

**Municipal Authority of the  
Township of South Fayette  
Specifications for Construction of  
Sanitary Sewer Lines and Appurtenances**

**PART I - GENERAL REQUIREMENTS**

**1. Introduction**

- A. These specifications cover the requirements for construction of all of the Authority's sewer line facilities. These specifications are intended for and apply to all such projects whether directly constructed by (a) Contractor(s) under contract to the Authority, or constructed by a land developer who in turn employs (a) construction Contractor(s).
- B. These specifications are to be used in conjunction with a companion document - the current Rules and Regulations of the Municipal Authority of the Township of South Fayette.
- C. The Rules and Regulations Manual describes and identifies procedural requirements, relative to engineering work, payment of fees, certain facility design criteria and parameters, private sewer service facility requirements, time restraints, certain terms which will be incorporated in an agreement with the Authority before the commencement of construction and other factors relating to the sewage system facilities desired to be constructed in connection with the development of the Township.
- D. This document covers the construction work.
- E. Where the term "Authority" is used herein, it shall mean the Municipal Authority of the Township of South Fayette, its employees, management, or Board, as is appropriate for each occurrence of use of the term. When necessary or appropriate the Authority may call upon its engineering and/or legal consultants for advice and direction.

**2. Resident Observation of Construction Work**

- A. All work performed in connection with the extension, modification or improvement of public wastewater facilities within the Township shall be required to conform with all Authority rules and regulations and shall be observed during construction by an authorized representative of the Authority.

- B. All completed work shall be required to meet the approval of the Authority and shall be changed, modified, replaced, removed or otherwise corrected by the Contractor to such extent as directed by the Authority.
- C. The work will be periodically or continuously observed during its progress and when completed, shall be inspected jointly, by the Authority and the Contractor. If the work is declared to be substantially complete and is accepted by the Authority, the eighteen month maintenance bond period shall commence. During the term of the maintenance bond the Contractor shall return when and as required to reconcile any problems resulting from construction, such as leakage, mechanical malfunctions, trench settlement, pavement failure, surface restorations, drainage, etc. In addition, a maintenance bond inspection shall be made by the Authority at a date between twelve (12) and eighteen (18) months following the date of declaration of completion of construction. The Contractor will be notified in advance of that inspection date and shall participate therein.
- D. The Contractor shall keep on site, and make available upon request by the Authority, a surveyor's rod and level for the purpose of spot checking elevations as the work progresses.
- E. The Contractor shall also keep and make available a 200' surveyors tape for the purpose of spot checking distances and for the purpose of the Contractor providing off-set measurements as the work progresses.

### **3. Rights-of-Way**

- A. The alignments and locations of the proposed pipelines and appurtenances are shown on the plans on which street, highway and/or other acquired rights-of-way limits have also been superimposed. No pipe line shall be relocated outside of the street or other right-of-way within which it is shown without obtaining the formal written approval for such change from the Authority.
- B. Where a special pipe line right-of-way is obtained through private property, the minimum permanent width for operation and maintenance purposes shall be 15 feet minimum; the width of the temporary right-of-way obtained through such private properties for initial pipe line installation and construction purposes shall be 40 feet, 10 feet minimum of which shall be located adjacent to and on the outside of both limits of the permanent right-of-way. The minimum distance between the center of any longitudinal pipe line and the right-of-way limit line shall be 5 feet. All construction activities shall be confined within the construction right-of-way as much as possible.

- C. The Contractor shall make his own arrangements for office space, materials storage yards, change trailers, sanitary facilities, utility services, debris disposal sites, and; for ingress and egress to any location along the pipe line project for which the Contractor desires or requires use and, for which the Authority has been granted no such right-of-way.
- D. Proposed pipe lines and appurtenances may also encroach upon right-of-way occupied by pipelines or other facilities owned, operated and/or maintained by other utility companies including Bell Telephone Company, National Transit Company, Equitable Gas Company, Columbia Gas of PA Inc., Peoples Natural Gas Company, Pennsylvania American Water Company, Columbia Gas Transmission Corp., South Fayette Township School District, Duquesne Light Company, Municipal Authority of the Township of South Fayette, AT & T, Pennsylvania Department of Transportation, Comcast, Verizon Wireless, Township of South Fayette and/or other utility and governmental entities. It shall be the responsibility of the Contractor to notify the appropriate representatives of those agencies in advance of performing any work therein and, to conduct all construction activities in accordance with the respective regulations appertaining thereto. The Contractor shall utilize the PA OneCall System as required by law. The PA One Call telephone number is 1-800-242-1776.
- E. The position of sewer lines proposed to be constructed in connection with land development projects shall be such that, regardless of the sequencing of various utility line construction (gas, power, telephone, water, storm sewer, sanitary sewers, etc.) no pipe line shall be aligned longitudinally, along the sanitary sewer lines, any closer than three (3) feet. It is imperative that such minimum distance be maintained along all sanitary sewer and water lines to provide space required for future maintenance and/or repairs.
- F. In accordance with the regulations of the Pennsylvania Department of Environmental Protection, the separation between water and sewer pipe shall be as is shown in Appendix IV.

#### **4. Control of Pipe Line Elevations and Alignments**

- A. The elevations of all Authority facilities shown on record drawings and on plans and profiles of proposed work, are on the Datum of the United States Geological Survey. The Contractor shall confirm the elevation of all existing facilities to which proposed facilities will connect, as well as the profile of the existing and/or finished (in the case of land development projects) ground lines, prior to commencement of construction, to confirm compatibility.

- B. All sewer lines shall be required to be constructed and the elevations and alignment shall be controlled by the use of laser equipment. Sewer line construction shall begin at the manhole with the lowest invert elevation unless prior approval is granted by the Authority.
- C. The Contractor shall employ competent field survey personnel as may be required to control grades and/or alignment of proposed facilities and to assist the Authority by obtaining information during construction progress, and for purposes of preparing as-built record drawings.

**5. Traffic Warning Signs, Barricades, Lights and Control**

- A. Where pipe lines and/or other facilities are constructed along State Highways and/or Township Streets, and where construction activities may otherwise impede normal vehicular traffic patterns on said highways or streets, the control of traffic shall be accomplished in accordance with the details set forth in Publication 213 of the Pennsylvania Department of Transportation, the title of which is "Traffic Control Guidelines".
- B. The position of work zone signs, erection of signs, sizes of signs, details and configuration of signs, traffic channelizing, tapered lengths/spacing, cones, drums, vertical panels, lighting devices, arrow boards and all flagging conduct and activities shall conform to the details described therein. The location and configuration of traffic control methods shall conform to those graphically illustrated on the appertaining Table 5 and Figures 5 through 23 shown in the publication. The Contractor shall submit a traffic control plan and procedure (conforming to the above referenced Publication 213) to the Authority for approval, prior to commencing with field construction.

**6. Exploratory Excavations**

- A. Some of the proposed pipe lines and appurtenant structures are somewhat flexible with respect to alignment. Therefore, in those existing streets, roadways, berms or other areas expected to have a number of underground utility lines, where there are large trees which may be saved by realignment, and where the Authority so directs, the contractor shall make appropriate exploratory excavations for the purpose of locating said lines.
- B. In all instances, the costs associated with exploratory excavations shall be the responsibility of the Contractor, and any realignment of pipelines shall be approved by the Authority.

- C. For Private Development, design changes for alignment or grade must be approved by the developer's design engineer & MATSF.

**7. Existing Utility Lines - Location, Protection and Hazards**

- A. The plans show those underground water lines, gas lines, electric lines, cable TV lines, telephone lines, sanitary sewers, storm drains, conduits and other similar utility lines and appurtenances for which said location information was either made available to the designer, or was observed in the field. Neither the number of such underground facilities nor their respective types, sizes and/or locations can be assured or guaranteed and it is, therefore, the responsibility of the Contractor to obtain such additional information as is required to properly complete the work in compliance with the specifications, and; to contact the owners of the various utilities in the area prior to starting and during performance of the work in accordance with PA Act No. 287 of 1972 and As Amended by PA Act 187 of 1996 known as the Underground Utility Line Protection Act.
- B. The approximate location of any power and telephone poles and guy poles along the route of the work is shown on the drawings and the overhead lines supported by all such poles shall be observed and located by the Contractor prior to commencement of the work.
- C. The Contractor shall be completely and solely responsible for any and all property damages, bodily injuries, financial losses and interruption of service that results from or are attributable to his construction activities and, which affect water lines, gas lines, electric lines, telephone lines, drain lines, sanitary and storm sewer lines and all appurtenances and service facilities connected thereto. Restoration of all such disturbed facilities shall be accomplished immediately after incurrence thereto.
- D. Water, sewer, gas, power and telephone service to dwellings or places of business shall be maintained with a minimum of interruption throughout the construction of the contract work. No such service shall be intentionally interrupted without the approval of the respective utility company concerned, and without first giving due warning to the occupants of said dwelling or business establishment. At least three (3) days notice of an interruption in service shall be given to the Authority so that the Authority may notify its customers.
- E. In some cases, it may be found that existing pipe lines are in a location where construction of the proposed work cannot reasonably proceed until the utility has been relocated. The Contractor shall make all necessary sub-surface investigations and shall locate such utility mains far enough in advance of the trenching work so that work progress is not unnecessarily interrupted.

- F. Attention is directed to the fact that the proposed work could be in close proximity to overhead power lines which transmit electric current at high voltages and which, if disturbed or contacted during construction, would be hazardous to construction personnel and/or other persons. The Contractor shall, therefore, properly protect such wires, pole supports or other power line appurtenances to avoid disturbance to those facilities, and shall operate all machinery and conduct all other construction activities in a manner which will assure protection of all construction personnel and other persons against said hazards.
- G. Work in the vicinity of the existing underground gas lines and appurtenances is also hazardous because, under certain conditions, such materials are flammable and/or explosive and, the Contractor shall avoid all temporary and permanent supports and other required protection to prevent exposure of the same to construction personnel and/or other persons. Where such lines are exposed during construction and leakage is detected, construction work in those areas shall be immediately suspended, the owner of the pipe line shall be immediately advised of the condition and the construction work shall not resume until all repairs have been properly completed.
- H. The construction activities required to be performed in the conduct of the work may necessitate the inter-connection, interception, surveying, inspection, removal, replacement and repair of certain existing manholes, sewer pipes and appurtenances. Said items are conveying all wastes and runoff discharged to and infiltrating into the public sewer system within the area served, which wastes may contain and/or generate toxic, noxious, oxygen depleting or other liquid or gaseous substances harmful to human beings.
- I. The Contractor shall also provide all personnel with all tools, clothing and other devices necessary for such safe practice, including appropriate waterproof clothing, respirators, protective glasses, mechanical air blowing equipment to pre-ventilate manholes and other chambers, explosive atmosphere detectors, ladders, safety harnesses, etc. No work shall be performed under any unsafe conditions and if same is detected at any time, the Contractor shall, therefore, thoroughly instruct all personnel involved in such work so that appropriate and complete safety practices are observed at all times.

## **8. Shop Drawings and Materials Submittals**

- A. All materials proposed to be utilized for construction of any Authority facilities are required to be approved for use, in advance of shipment to the job site. No materials shall be incorporated in any sewer lines or appurtenances which have not received the prior approval of the Authority.

- B. Such approvals shall be obtained by submitting five copies of shop drawings, catalog cuts, materials specifications, bills of materials and/or such other printed information which clearly illustrates the details of all pipe, joints, pipe line structures and appurtenances, supports, mechanical details, specific installation requirements, etc.
- C. The Authority will review, make corrections on, reject and/or approve said submitted shop drawings and materials information and will return one copy to the developer/contractor within fourteen calendar days; resubmittal shall be made by the Contractor as required to obtain approvals - prior to installation of the material in the construction work.
- D. The review and approval of any separate submittal item shall not eliminate alter or otherwise affect the responsibility of the Contractor to coordinate all of such submittals with the performance and progress of the work to assure completion of the intended project.

**9. Independent Commercial Testing Laboratory Services**

- A. When a proposed project or series of projects involves installation of more than a total of 3000 lineal feet of polyvinyl chloride sewer pipe or reinforced concrete sewer pipe (regardless that different diameter pipe may aggregate that amount) the Contractor shall furnish, during pipe delivery and construction, reports of an independent commercial testing laboratory.
- B. Said reports shall set forth critical pipe characteristics such as materials tests; hydrostatic tests (infiltration); pipe dimensions; gasket testing; deflection (PVC); absorption (RC) and such other test results which will confirm conformance with these and the referenced ASTM, AWWA and other standards contained herein. One pipe section of every 200 sections manufactured and delivered, regardless of length of each pipe, shall be selected at random by the testing laboratory representative and transported to the commercial lab for such purposes.

**10. Record Drawings of As Built Conditions**

- A. The Contractor shall retain one (1) reasonably clean set of drawings of the proposed improvements at the job site, on which he shall note changes in pipe line alignments and elevations and, any other changes from the pre-construction approved plans. He shall also reference the locations of the ends of sewer service laterals so that the same may be uncovered and connected at future times.

- B. The set of prints on which such field information is recorded shall be turned over to the Authority providing a daily construction progress record and identify all noted changes to the project, prior to Authority acceptance of the facilities.
- C. One (1) set of blue prints and a disk containing record drawings of as-built conditions, in a digital form satisfactory to MATSF that can be easily integrated into the Authority's Geographical Information System (GIS), shall be provided to the Authority by the Contractor having the following information described. The As-Built information shall include, but not be limited to, manhole inverts, line lengths, slopes, wye locations, offset dimensions, and detailed information on all other aspects of the construction of the facilities.

**END OF PART I**

## **PART II - SITE WORK AND PREPARATION**

### **1. Clearing and Grubbing**

- A. Certain work to be performed will require clearing. The Contractor shall cut, clear and remove all brush, sapling, scrub and other wild growth along the route of the pipe lines. No trees shall be cut, however, without the specific approval and prior designation for cutting, by the Authority. It is the intent of these specifications to minimize the removal of trees and, therefore, only those which will positively prevent the application of reasonable construction methods and procedures will be permitted to be removed.
- B. Brush, scrub growth, stumps, saplings and tree limbs and trunks so directed to be cut and removed, shall be placed into piles and/or completely removed from the site of the work. No such debris shall be included in any backfill and as part of the clean-up work shall be required to be removed and transported away from the site to the contractors dump site.
- C. For Private Development, the owner and development engineer shall determine the degree of clearing, which shall reflect the submitted plans.
- D. No burning is permitted in Allegheny County without the proper permitting.

### **2. Open Excavation and Backfill**

- A. CONTRACTOR is directed to the provisions of the Underground Utility Line Protection Law Act 287 (1974), as amended by Act 187 of 1996, and full compliance therewith is required of the CONTRACTOR.
- B. The CONTRACTOR shall be governed by the conditions, restrictions and regulations made by OSHA, the Commonwealth of Pennsylvania Department of Labor and Industry, the state highway department, the county commissioners, Authority officials and township supervisors during open trenching, excavation and backfilling in or along state borough, county and/or township highways. All such conditions, restrictions and regulations shall be in addition to the requirements of these Specifications.
- C. Except where jacking, boring or tunneling is indicated on the plans and/or profiles, pipelines and appurtenances may be constructed by the open trench excavation method. All excavation shall be unclassified and no extra payment shall be made for hand excavation or for the removal of any rock, boulders, stumps, tree roots, shale, muck, masonry, curbing, paving or other natural or man-made materials.

- D. Excavation shall be true to the lines and grades shown on the Drawings except as authorized by the Authority. The grade shown on the Drawings is the invert of sewers to which the Work must conform. Work not conforming to the grade or line shall be corrected by the Contractor as his expense in a manner acceptable to the Engineer.
- E. Limit daily trench excavation to a length of pipe placement and backfilling that can be completed the same day.
- F. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depths shown on the Drawings, as specified herein or as otherwise directed. Side walls of trenches shall be kept as nearly vertical as possible. Trenches shall be excavated true to line and as narrow in width as practicable.
- G. In any excavation where the depth of a trench with vertical sides is 5 feet or greater, the Contractor shall provide adequate and suitable means of shoring, sheeting and/or bracing to prevent the trench walls from collapsing and to protect his personnel working in the trench. The system of shoring shall be as required under Paragraph 3C of this Section.
- H. The width of all trenches shall not exceed the outside diameter of the pipe, plus two feet, from the bottom of the respective pipe trench to a horizontal plane located one foot above the top of the pipe. That section of the trench is identified as the pipe zone and its configuration is graphically illustrated in Appendix II. In the event that the Contractor's construction methods/activities result in a trench wider than four feet or the pipe diameter plus two feet within that pipe zone, he shall install concrete bedding or encasement or shall make such other provisions as may be directed by the Authority to protect and assure the structural integrity of the pipe.
- I. Where the bottom of the trench shall, by the mistake of the Contractor, have been excavated to a greater depth than called for, it shall be refilled to the proper grade using granular bedding, mechanically compacted. This bedding shall be furnished and placed by the Contractor, who shall receive no additional compensation therefore. Refilling with earth to bring the bottom of the trench to the proper grade shall not be permitted.
- J. All ductile iron pipe and reinforced concrete pipe may be installed directly on exposed trench bottoms, where no rock or other unyielding material or where no soft unstable conditions exist. Ductile iron pipe will be required in all cases where the slope of the sewer between manholes exceeds 30%.

- K. Where the exposed trench bottom consists of rock or other unyielding material the trench shall be overcut a minimum of 4" and the ductile iron or reinforced concrete pipe shall be installed on bedding material which is specified later within this manual.
- L. When soft and/or unstable trench bottoms are exposed, they shall also be overcut and stabilized to the satisfaction of the Authority with a mud mat of R4 Rip-Rap choked with AASHTO #57 stone before the pipe is installed. Trench bottoms shall be overcut at joints where pipe bells will occur to assure that all pipe barrels are continuously supported for the entire barrel lengths. If this method does not provide adequate pipe support, as determined by the Authority, concrete caissons shall be installed as required at no expense to the Authority.
- M. All polyvinyl chloride pipe shall, regardless of the character of the exposed trench bottom, be installed on bedding material at least 6" in thickness, except where concrete cradle and/or encasement is required.
- N. The excavation material from the trench may be stored along its alignment on rights-of-way obtained for construction purposes. It may not, however, prohibit traffic flows along the streets and roadways, access to private properties, or access to existing utility lines by the respective utility companies.
- O. The temporary storage of excavated material shall not obstruct or alter the flow of surface water runoff to the detriment of the operation of existing surface water drainage facilities and ditches and, shall be placed at a location which will not superimpose excessive loading on the trench walls and/or the sheeting, shoring or bracing installed within the trenches.
- P. At all locations along ductile iron or reinforced concrete pipelines, the backfill material placed in the pipe zone (that is, that material located above the top of the trench bottom or bedding material to an elevation located two (2) feet above the top of the pipe), shall be selected excavated material which shall be thoroughly compacted and placed in such a manner to avoid disturbance or displacement of the pipe and other appurtenances. The pipe zone material shall contain no rocks or hard shale which have a maximum dimension exceeding two inches. Pipe barrels shall be continuously supported on trench bottoms for their entire length and no rocks, bricks, on edges or other point supports will be permitted. Bedding material shall be used, where necessary, to compensate for irregular trench bottoms and provide such continuous support.

- Q. At all locations along polyvinyl chloride pipelines the backfill material placed within the pipe zone to an elevation of twelve (12) inches above the top of the pipe shall be the same as that material specified hereinafter for the bedding of the pipe as depicted in Appendix II.
- R. Backfill material placed in trenches above the pipe zone, where such trenches are located within Township Streets or State Highways shall consist (for the entire trench width and depth) of material conforming to the requirements specified for bedding.
- S. Backfill material in trenches above the pipe zone in traveled ways, road shoulders or berms and at all other locations where trench settlement must be avoided, shall be excavated material placed in lifts not exceeding eight inches in thickness and shall be thoroughly and mechanically compacted by the use of vibratory or reciprocating tamping equipment - for the full depth of trench.
- T. At other locations along the alignment of the pipes where trench settlement is not of concern and, where designated by the Authority during construction progress, backfill above the pipe zone may be loosely placed by machine mounded over the trench. After settlement has satisfactorily occurred, and subject to a time approved by the Authority, the excess material shall be leveled and blended with the slope of adjacent ground surfaces in a manner which does not adversely impede the flow of surface water or otherwise have a deleterious affect on the finished landscape.
- U. When the trench excavation is being backfilled, the disturbed area shall be graded to final contours and appropriate temporary erosion and sediment pollution control measures/facilities shall be installed. Seeding and mulching of all disturbed areas shall be done at the end of each week.
- V. If daily backfilling is delayed, the disturbed area shall be graded to final contours, appropriate temporary erosion and sediment control measures/facilities shall be installed, and the areas seeded and mulched within the next two calendar days.
- W. No material shall be used for backfill at any location which, in the opinion of the Authority, is too wet, frozen, mucky or contains debris, tree stumps or an excessive amount of rocks.
- X. All excess excavated material resulting from the construction of the pipelines and appurtenances shall be disposed at a location and in a manner which shall be the Contractors's responsibility to determine.

- Y. The Contractor shall schedule construction activities and provide all required equipment and personnel such that the backfilling of trenches located along or crossing streets, street berms, roadways, driveways and other traveled ways, results in resumption of normal traffic patterns immediately after pipe construction has been completed for the day.

### **3. Construction Site Safety**

- A. Safety on the construction site shall be the absolute responsibility of the Contractor.
- B. Where necessary to maintain the required trench configuration in the pipe zone, in confined areas where trench walls above the pipe zone cannot be sloped, or for the protection and safety of construction personnel, sheeting, shoring and/or bracing shall be installed in accordance with the requirements of the appertaining regulatory agencies.
- C. Said sheeting, shoring and/or bracing shall be designed by the Contractor and shall be adequate to withstand the loads to be imposed during the construction operations. Its placement and removal shall be carefully performed to avoid displacement or disturbance of the entrenched pipe. All trench supports shall also be required to provide complete safety to construction personnel working within. Trench boxes may be utilized however their design, fabrication, structural adequacy, handling, placement and removal shall be the responsibility of the Contractor.
- D. Trenches at any and all locations where pedestrian or vehicular traffic hazards would result, shall not be left open during non-construction hours, unless they are suitably covered with a steel plate which is adequately anchored and reinforced to sustain pedestrian and/or vehicular traffic loads which may be imposed. All excavations within road rights-of-way shall be closed over night and over weekends and marked with a flashing traffic marker to warn motorists and pedestrians.
- E. All structure excavations and open trenches shall be constructed in accordance with the regulations set forth under subpart P, "Excavation, Trenching and Shoring" published as a part of the Safety and Health Regulations for construction by the U.S. Department of Labor, as amended, as the same pertains to the shape of trenches, trench side-wall supports, the construction methods employed, the general protection requirements, the general excavation requirements, and the minimum requirements for the respective contractor for the conditions encountered. Methods of installation shall be compatible with assuring the protection against disturbance of adjacent facilities and/or grounds and, the safety of construction and other personnel.

#### **4. Bedding and Specially Graded Backfill Material**

- A. All pipe line bedding material shall be 2B limestone or gravel, pea gravel, or Engineer approved slag. All material placed above the pipe zone and below the concrete trench slab (where trenches cross or are located within Township Streets or State Roads) shall be pea gravel, 2B limestone or 2RC, 2A modified or 2B gravel, complying with the gradation and classification of the Pennsylvania Department of Transportation. See SD-001 & SD-002.

#### **5. Compaction Testing**

- A. The Contractor is informed that in all fill areas must be compacted to achieve a density of 95% as determined by the Standard Method A, Proctor Test. Test results from an independent testing lab must be provided.
- B. Tests will be performed to assure that such compacted densities prevail, at the discretion and expense of the Authority. Generally, tests shall be performed as deemed necessary by the Authority on the trench so backfilled and compacted by the Contractor. In the event that the placed backfill does not comply with the 95% density requirement, the work shall be re-excavated and re-compacted and the costs of the subsequent re-testing after replacement shall be the Contractors responsibility.

#### **6. Blasting**

- A. When rock, hard shales or other unyielding material is encountered in the trenches and/or structural excavation operations and cannot reasonably be moved by the machines on the job, it may be fractured by pre-drilling and blasting, in a manner which will enable the Contractor to remove the material and complete the excavation in accordance with the specified trench widths and/or shapes, and in a manner that will produce the least practicable disturbance or displacement whatsoever to existing aboveground or underground structures and pipe lines.
- B. No blasting is to be performed without written request and approval of the Authority and the Township of South Fayette, the Engineers or any other regulating agency. The Owner reserves the right to prohibit blasting in those areas where adjacent utilities, structures, or other conditions exist which may be endangered as a result of the operation.

- C. Where blasting is permitted, the Contractor shall be fully liable for any damage or injury to persons or property that may result from use of explosives. The blasting shall be performed by a licensed blaster in accordance with all federal, state, and local laws and regulations governing transportation, storage, handling and otherwise use of explosives. Special blasting insurance shall be provided with a limit of at least \$1,000,000 per occurrence. The coverage shall be in addition to liability coverage called out under General Conditions.
- D. All blasting shall be done by licensed blasters and shall be performed in accordance with all applicable Federal, State and local laws, rules and regulations regarding registration, transportation, storage, handling and otherwise using explosives. Blasting permits are required to be obtained in advance from the Township of South Fayette.
- E. At the beginning of the blasting operation in any particular area, a short test line of holes shall be used for the purpose of determining optimum spacing, sizing and loading of the holes and in order to ascertain best practicable and safe procedures.
- F. The Contractor shall have a plan of his proposed blasting procedures prior to commencing with same, and shall continually adjust his operations when materials of varying and/or different characteristics are encountered in order to obtain specified and desired trench or other structural excavation shapes. Hole spacing, size and loading; offset benching; ignition sequencing; type of equipment utilized, and all other procedures and operations shall be especially adapted at each location in order to produce relatively smooth, unshattered and completely safe back slopes and/or trench walls, and, in order to assure protection of all personnel employed in connection with the work and other persons.
- G. At the beginning of the blasting operations in any particular area, a short test line of holes shall be used for the purpose of determining optimum spacing, sizing and loading of the holes in order to ascertain best practicable and safe procedures.
- H. During the blasting operation, the Contractor shall maintain a blasting log indicating the number and depth of holes, distances between holes, size of the charge in each hole, type of detonator used and such other items as required to provide a complete record of the operation. A recording seismograph shall be utilized to monitor the effects of the blasting operations. All costs pertaining to blasting operations will be the responsibility of the Contractor.

## **7. Dewatering**

- A. All excavation shall be dewatered thoroughly in advance of the installation of any of the construction work; no facilities shall be constructed in any excavation where water flows or is pooled, or where groundwater infiltration or surface water inflow is not immediately removed.
- B. Water which accumulates in the open trench shall be completely removed by pumping before pipe placement and/or backfilling begins.
- C. Where dewatering does occur, the Contractor shall conduct those operations in a manner which complies with regulations on the subject of Soil Erosion and Sediment Pollution Control as promulgated by The Pennsylvania Department of Environmental Protection. No such discharges shall be permitted to erode or otherwise adversely effect any public or private property and all such discharges shall be trapped, settled, rough-filtered, retained and/or checked (depending upon the clarity, turbidity, and concentration of suspended solids within such discharges) in accordance with detailed requirements of Pennsylvania Department of Environmental Protection, Office of Resources Management, Bureau of Soil and Water Conservation, Division of Soil Resources and Erosion Control.

## **8. Minimizing Water Pollution from Soil Erosion**

- A. All Contractors shall conduct their activities and shall program trenching and restoration operations in such a manner as to minimize pollution of the ditches, streams and creeks and their tributaries from erosion of the freshly excavated and/or backfilled material during periods of excavation and surface water runoff.
- B. The Contractor shall reduce the area and duration of exposure of all erodible soils by the greatest extent practicable and to that end, hydro-mulching, reseeding and other surface restoration shall be required to closely follow backfilling operations. Where the Authority so directs in the field, sediment traps, hay bales, and/or other means to retard runoff rates shall be installed; similar holding basins or other sediment trap arrangements shall also be required to be installed at the discharge of dewatering pumps.
- C. Temporary erosion control measures shall be established prior to or concurrent with clearing and grubbing.

- D. Discretion shall be exercised in selecting the number and location for encroachments during construction both in and along the creeks such that a minimum of stream disturbance and erosion pollution results. As previously referenced, the appended Supplemental Detail drawings illustrate the temporary facilities which will be required to be installed.
- E. Prior to earthmoving activities the Contractor shall install the necessary erosion protection devices required as outlined below, and as detailed in the latest edition of the Erosion and Sediment Pollution Control Program Manual, as published in the Bureau of Soil and Water Conservation of the Pennsylvania Department of Environmental Protection.
1. Immediately downstream of stream or creek crossings and where directed by Authority, the Contractor shall install a temporary short term stream disturbance sedimentation check.
  2. For equipment stream crossings, the Contractor shall use the same criteria as established for channel disturbance.
  3. Where the pipeline is located in wooded or planted areas the downstream side of the area to be excavated will be protected by installation of fabric fence or straw bales.
  4. Where the pipeline is located in traveled roadways or road berms, drainage facilities and ditches immediately downstream of the construction area to be protected by constructing a straw bale debris filter in the existing drainage ditch. After construction, the ditch is to be removed of straw bales and all silt and debris and returned to its original condition.
- F. During construction, there shall be no discharge of petroleum products from construction equipment into ditches, streams, creeks, storm sewers or on ground surfaces and, water removed during the trench dewatering operation shall be free of suspended material and/or mud, or shall be pumped to sediment trap before conveyance to the stream.
- G. All excavation and grading shall be accomplished in a manner that complies with all requirements and standards set forth in the Erosion and Sediment Pollution Control Manual published by the Pennsylvania Department of Environmental Protection, unless more stringent requirements are indicated herein or by a specific permit as issued by PaDEP and/or Allegheny County Conservation District.

**9. Dust and Mud Control on Streets and Other Traveled Ways**

- A. Dust control palliatives shall be utilized where and when necessary and as directed by the Authority to satisfactorily maintain roads, streets, berms and other traveled ways for vehicular traffic. In addition, the accumulation of mud and/or dirt from the excavation, backfill and trenching operations shall be cleaned off the surfaces to properly maintain the roadway in a condition satisfactory to the Authority and South Fayette Township.

**10. Stream Crossing**

- A. Where sanitary sewer lines cross creeks or streams, such crossing shall be accomplished by using ductile iron pipe or PVC pipe encased in a minimum of 6" of concrete all around the pipe, and fittings conforming to the requirements of the appertaining sections of these specifications. In all cases involving stream crossings or encroachment, appropriate permits must first be obtained through PaDEP.
- B. The pipe shall be tied to 8" concrete blocks laid on the trench bottom and shall be encased in concrete all around the pipe. The concrete encasement shall be at least six (6) inches thick. The minimum depths of pipe; that is, the vertical distance between the lowest elevation of the stream along the pipe alignment and the top of the pipe, shall be one (1) foot in rock, and three (3) feet including concrete encasement in other material. Where rock is encountered within the trench bottom, bedding material (as also specified herein) shall be utilized.
- C. The concrete encasement of the pipe shall extend between the tops of the stream on creek banks, or where such banks are not evident, a minimum distance of 5 feet each side beyond the normal stream channel.
- D. Backfill around the stream crossing shall consist of the excavated material unless the same is deemed unsuitable by the Authority at the time of excavation.
- E. Disturbed bank areas shall be stabilized immediately upon completion of the crossing.
- F. As shown on the construction drawings, rip-rap shall be installed to prevent erosion of the slopes, stone shall be minimum weight of 155 lbs per cubic foot durable rock, as computed by multiplying the specific gravity (bulk saturated, surface dry basis, ASSHTO Test T 85) times 62.3 pounds per cubic foot. The rip-rap shall meet NSA requirements and shall be placed on a filter blanket meeting the requirements of the Department of Environmental Protection. Installation of rip-rap shall be per Pennsylvania Department of Environmental Protection requirements and regulations.

## **11. Tunneling, Jacking or Boring**

- A. At those locations indicated on the plans and/or profiles open cut excavation will not be permitted and, therefore, the Contractor shall tunnel, jack or bore the casing pipes and/or sewers, or force mains.
- B. After installation of casing pipes or tunnel liners, the carrier pipe shall be threaded within. The method of placement shall be determined by the Contractor, however, care shall be exercised to not displace or disturb the interior pipe. The Contractor shall submit to the Authority for approval his method of placement.
- C. Where tunneling is employed, the tunnel liner plate shall be designed by the Contractor for the particular diameter or shape which he elects to use. The plate shall be designed and assembled in accordance with the manufacturer's published recommendations for the material encountered in the tunnel excavation.
- D. Tunnels shall be carefully excavated by experienced tunnel workers and shall be trimmed to such a size and shape as to allow the proper placing of the sanitary sewers and force main to the lines and grades shown on the plans after the liner is in place. Care shall be exercised in excavating tunnels so that voids outside the casing and disturbance of the surrounding material are kept to a minimum. Large voids are to be filled immediately with grout. The space between the tunnel bore and the casing shall be completely filled with an approved sand-cement mortar.
- E. All sheeting, shoring, bracing, lining, etc., required for the construction of tunnels, shafts, portals, etc. shall be furnished and installed by the Contractor. All work relative to the installation of liners and carrier pipes by means of jacking, boring, or tunneling shall be performed in accordance with regulations set forth under Subpart S, "Tunnels and Shafts, Caissons, Cofferdams and Compressed Air" published as a part of the Safety and Health Regulations for Construction by the U. S. Department of Labor.
- F. The Contractor shall make all arrangements necessary for the location, construction and operation of any intermediate shafts and/or drifts he may require.
- G. The Contractor shall excavate the tunnel and support the surrounding earth so that no movement of the earth over or adjacent to the work shall occur at any time. In case, due to unforeseen conditions or otherwise, any such movement does occur, the Authority may order the Contractor to stop any and all work except that which assists in making the tunnel secure and in preventing further movement of the ground over or adjacent to the work.

- H. The Contractor shall resume tunneling at the place at which such movement occurred only when, in the opinion of the Authority, he has taken all necessary precautions to prevent movement.
- I. Where boring and jacking is employed, a minimum 1/2" thick steel shield at least 24" long shall be required to extend beyond the forward end of the casing pipe, liner or plate, or conduit being jacked. The outside radius of the shield shall not exceed the outside diameter of the pipe by more than 1". Excavation ahead of the casing, liner plate, or conduit shall not progress beyond the end of the shield being used.
- J. The casing pipe shall at all times follow immediately behind the boring auger at a distance no greater than 2 feet. The method of auguring the entire hole and then pushing the pipe through will not be permitted.
- K. The ends of the casing pipe shall be sealed using either neoprene boot seals with stainless steel clamps, concrete or pipe grout.
- L. It is the intent of these specifications to permit the Contractor to select either of the three above-mentioned methods of installing pipe lines where open cut is not permitted, provided construction details and methods employed comply with the requirements of the authorities having jurisdiction, in addition to the requirements of these specifications.
- M. Regardless of whether tunneling, jacking or boring is employed, the Contractor shall be responsible for construction of the various pipe lines true to line and grade and shall be held fully responsible for protection against surface subsidence, damages or disturbances to the satisfaction of the Authority.
- N. The Contractor shall be responsible for reimbursing all agencies owning property where boring, jacking or tunneling is required for any inspection and/or flagmen costs incurred and deemed necessary by those agencies at any and all locations where work under this contract is performed, to ensure safe traffic conditions and safe conduct of the work. Submission of the previously described details, subsequent approvals and responsibility for inspection costs for either parallel or longitudinal occupancies shall be required and shall also be provided.
- O. Failure to comply with any of the foregoing, as well as all damages to facilities and highway traffic interference or impedance, shall be the responsibility of this Contractor and he shall be required to rectify all such conditions to the satisfaction of the Authority.

**12. Cast-in-Place Concrete for Structures, Bedding, Paving, Thrust Restraints, Trench Caps in Roadways, Encasements, Underpinning, Etc.**

- A. Construction of all concrete work shall be in accordance with the applicable portions of "Specifications for Structural Concrete for Buildings" ACI 301 of the latest revision, except as modified hereinafter. Concrete shall be ready-mixed and shall be batched, mixed and transported with sufficient facilities to deliver the concrete at the rate required and in accordance with the standards set forth in ASTM Specification C-94.
- B. Mixing and flushing water in transmit mixtures shall be equipped with a calibrated glass gage. The ready-mix concrete supplier shall furnish the Authority a certified statement that the concrete furnished to the job conforms to the provisions of these specifications.
- C. All concrete shall be dense and workable and shall be placed utilizing pneumatic vibrators.
- D. Concrete shall be required to develop a comprehensive strength of 3500 psi in 28 days.
- E. Reinforcing steel shall conform to the requirements of ASTM A-615, Grade 60; mesh reinforcement shall conform to ASTM A-185 requirements.

**13. Underground Detectable Marking Tape**

- A. Standard marking tape shall be installed at a depth of two (2) feet above the pipe along the alignment of all sewer lines, including sewer services. It shall be vividly colored and marked "Gravity Sewer Line" at Gravity Sewers or marked "Intermittent Pressure Sewer" at Force Main Sewers. The marking tape for sewer lines shall be green with a foil back.
- B. The tape shall be magnetically detectable with conventional location equipment and therefore shall be encased aluminum foil or other similar materials.

**14. Pavement Removal and Restoration**

- A. The Contractor shall at all times exercise care not to excavate beyond the temporary construction lines shown on the Drawings and/or as specified herein, unless otherwise authorized by the Engineer.

- B. When it is necessary when trenching for pipe laying to cut and remove paving, the removal shall be done by or under the direction of the Contractor responsible for replacing the paving.
- C. The pavement to be removed shall be saw cut through the wearing and base course if bituminous, and through the concrete course if concrete. The removal of pavement and disposal of spoil shall be accomplished before and not coincidentally with the excavation work.
- D. All roads, driveways, streets, traveled ways, berms, sidewalks, etc. disturbed during construction shall be reconstructed by the Contractor to their original condition, unless noted otherwise.
- E. At all locations where trenching, excavation, and/or other construction activities destroy or damage pavement surfaces of Township roads and streets, the base course replacement shall be 6 inch thick 25 MM Superpave. The wearing course shall be 1-1/2 inch compacted depth 9.5 MM Superpave. Construction shall be in accordance with the details in Appendix II.
- F. The pavement replacement shall conform to the existing type and depth of road binder and wearing courses. An additional one foot on each side of the trench must be cut prior to placing the bituminous base course as specified above in order to provide bearing support for the bituminous concrete. The wearing surface shall be saw cut on an angle as shown in Appendix II at a depth of 1- 1/2" prior to placement of the 9.5 MM Superpave surface.
- G. Prior to the placing of any new bituminous material, all exposed vertical joints must be cleaned and primed with J1 or BM-1 material and sand.
- H. When all paving and compaction is completed all joints shall be sealed using J1 or BM-1 material and sand. This application shall be a minimum of six inches in width.
- I. All bituminous material shall be installed and compacted by methods and with equipment approved by the Pennsylvania Department of Transportation.
- J. The CONTRACTOR shall protect newly paved areas keeping traffic off of the area until adequate curing and stability is attained and as directed by the ENGINEER.
- K. All painted traffic lines and markings destroyed during the construction of the project shall be replaced. All painted traffic lines and markings shall be installed according to the Commonwealth of Pennsylvania Department of Transportation Specifications, Section 962, and all other applicable sections.

- L. All roads under the jurisdiction of the Commonwealth of Pennsylvania shall be restored in accordance with the requirements of the Pennsylvania Department of Transportation.

**15. Top Soil in Cultivated Areas**

- A. In lawns and gardens, and in other improved areas (except for streets, roadways, and traveled ways), the top of the backfill material shall be placed to an elevation approximately 6" below the finished ground surface.
- B. Commercial topsoil shall be placed and lightly rolled in the top 6" of all excavated areas and other places where construction equipment and activities impose damage to ground surfaces.
- C. Commercial topsoil shall be obtained by the CONTRACTOR from a local garden supplier or nurseryman for areas where topsoil is not of adequate quantity.

**16. Restoration of Lawns and Other Improved or Cultivated Areas**

- A. After the topsoil has been spread, all lawns shall be restored by properly rolling, tilling and hand raking the area disturbed during construction and an application of an approved fertilizer at a rate of 50 lbs. per 1,000 square feet shall be made. Said area then shall be completed with peat moss, mushroom manure, or other approved mulch material after which an approved grass seed shall be sown in accordance with Appendix IV. The Contractor shall be responsible for restoration of all settlements and for properly preparing the topsoil, applying fertilizer and mulch and planting the seed, but will not be required to water those restored areas.
- B. Grass seed shall match that planted or shall be of same type that already exists. The Authority shall retain the right to select the seed. Seeding and mulching of disturbed areas shall be accomplished by the end of each week.
- C. Where the pipeline is located within road rights-of-way, or where indicated on the Construction Drawings, the Contractor shall place jute mats for erosion control where directed by the Authority.
- D. All shrubbery which is removed temporarily to accommodate construction of pipe lines shall be promptly replaced after backfilling is completed and shall be fertilized and otherwise treated to insure restoration to a condition existing prior to the installation of the sewer. Shrubby which is not successfully removed and replaced, and hence, does not survive, shall be subsequently replaced or otherwise made good by the Contractor for the period of the 18 month Maintenance Bond.

- E. Where the proposed sewer crosses existing asphalt driveways, all bituminous paving shall be restored by neatly and uniformly cutting the edges and placing a binder course and surface course over the trench fill in accordance with requirements contained herein. The binder course shall be 19 MM Superpave placed at a depth of 3-inches compaction. The surface course shall be 9.5 MM Superpave installed in one wearing course totaling one inch after compaction. Seal edges with hot bituminous liquid.
- F. Where the proposed sewer crosses existing concrete driveways all concrete paving shall be restored by neatly and uniformly cutting the edges and placing a 6" thick reinforced concrete slab. The concrete shall be reinforced with 6x6x10 gauge wire mesh. If the proposed paving limit (trench width plus 12 inches each side) is within 3 feet of an existing joint in the concrete driveway the existing pavement shall be saw cut at the joint and replaced to the existing joint. If the proposed paving limit is not within 3 feet of an existing joint in the concrete driveway the CONTRACTOR shall saw cut to the width as described herein and replace the concrete as described above placing a new joint on one side of the new concrete paving where it matches the existing concrete.
- G. Where the proposed sewer crosses existing stone, slag, or gravel driveways the driveway shall be restored by placing a 4" thick lift of crushed limestone for the full width of the disturbed area. The limestone shall consist of hard, tough, durable stone free from slaty texture or cleavage planes. The limestone shall be secured from a Pennsylvania Department of Transportation approved supplier. Sandstone, shale, slag, etc., will not be an acceptable substitute.
- H. All properties damaged due to construction operations and restored in accordance with the foregoing, shall be inspected by the Contractor and the respective property owner, and when determined satisfactory by that Owner, the Contractor shall obtain a signed release by such Owner and file copy of same with the Authority. Contracts will not be considered final until all such releases have been obtained.

## END OF PART II

## **PART III - MATERIALS AND INSTALLATION**

### **1. Gravity Sewer Pipe**

- A. Service sewers shall be installed as indicated on the applicable supplemental detail drawings and shall be a minimum of 6" in diameter for commercial properties and a minimum 4" in diameter for residences. All service sewer pipe and fittings and all collector or interceptor sewer pipe fittings 27" diameter and smaller, unless otherwise indicated on the plans and profiles shall be extruded polyvinyl chloride conforming to ASTM D3034, SDR-35 for 4" through 15" pipe sizes, and ASTM F679 for 18" through 27" pipe sizes. Flexible elastomeric seals shall be provided conforming to ASTM D3212 and ASTM F477.
- B. All gravity sewer pipe larger than 27" in diameter shall be large diameter polyvinyl chloride (PVC) sewer pipe or shall be reinforced concrete pipe (RCP) provided with steel end ring joints and o-ring gaskets. The PVC pipe shall conform to ASTM F 794. The RC pipe shall conform with the structural strength requirements set forth in the ASTM C76 specifications - Class III -unless otherwise stipulated on the plans and profiles. The jointing arrangements shall include steel end rings welded to the pipe wall reinforcement and o-ring gaskets, both of which shall conform to the appertaining provision of the AWWA C302 standards. The outside annular ring of the joint shall be completed, after installation of the pipe, by filling with a mortar mix specified hereinafter.
- C. Where service laterals are to be connected to an existing sewer, they shall consist of a wye and repair sleeve conforming to these specifications.
- D. Where determined by the Authority that a hazard would be created, sewer pipe shall not be removed from shipping pallets until ready for installation.

### **2. Assembly of PVC Sewer Pipe**

- A. Pipe joints shall be carefully lowered into the excavated trenches to avoid damage to the pipe barrel and the bell and spigot pipe ends. All rubber gaskets shall be examined to assure there is no apparent damage during handling and shipment.
- B. Both the bell and spigot ends shall be wiped clean with a reasonably dry cloth. The spigot end of the pipe shall then be lubricated by application of a suitable grease-like product which will not adversely affect either the gasket or pipe wall. The entire circumference of the spigot shall be coated and the lubricated spigot shall be inserted into the bell.

- C. The pipe shall be shoved home by hand or by use of a bar and block. A representative of the pipe manufacturer shall, when the Authority so directs, spend a reasonable amount of time on the job site (at the beginning of the work) demonstrating pipe laying techniques and instructing the Contractor's personnel on proper construction methods.

### **3. Assembly of Reinforced Concrete Pipe Joints**

- A. Pipe joints shall be carefully lowered into the excavated trenches to avoid damage to the pipe barrel and the tongue and groove end. The steel end rings shall be wiped clean and the gaskets shall be lubricated as recommended by the pipe manufacturer, after which the pipe shall be shoved home.
- B. The joint shall then be completed by the use of a cloth diaper which shall be securely wound around the outside lower three-fourths of the joint, which shall be poured full of a thin mortar mix consisting of one part cement to two parts sand in water. A stiffer mortar mix shall be traveled over the upper one-fourth of the pipe joint.

### **4. Manholes**

- A. Manholes constructed on Authority pipelines shall be fabricated of precast concrete in accordance with the requirements of ASTM C478. The manhole structures may be furnished with prefabricated base sections or, the bases may be cast-in-place of reinforced concrete as shown on the appertaining Supplemental Detail drawings in Appendix II. Bases shall be "extended bottom" unless the Authority specifically approves the use of "mono-bottom" manhole base sections. All manhole slab tops, lids, and castings shall meet or exceed AASHTO H20 standard specification for unintended vehicular traffic, unless otherwise approved.
- B. Manhole barrel sections shall be sealed with bitumastic materials placed in the field, as manufactured by Concrete Sealants, Inc. Said material shall be installed at all manhole joints and at the manhole frame and cover. The exterior of the manholes shall be sealed with a bitumastic compound such as a foundation sealer or other material suitable for this application per the requirements of the PA DEP. All manhole joints, including frame and cover, shall be wrapped with WrapidSeal encapsulation system, or approved equal.

- C. Manholes furnished with prefabricated base sections shall be installed on 6" minimum thickness crushed stone or washed gravel conforming to the requirements of "Bedding and Specially Graded Backfill Material" as specified elsewhere herein. Said material shall also be placed in the bottom of the manhole excavation - between the limits of the influent and effluent pipe trenches - to an elevation one foot above the top of the connecting pipes. In other words, all sewer pipe connections to manholes shall be completely supported (to the bottom of the excavation) on bedding and, shall be enveloped in the same material to an elevation located one foot above the top of the pipe.
- D. Manholes where the largest connecting sewer is 18" diameter or less shall have a 4 feet diameter barrel section; where any connecting sewer exceeds 18" diameter, manhole barrel sections shall be 5 feet diameter.
- E. All manholes shall be provided with steps located 12" on center, which shall conform, in general, to the configuration shown in Appendix II; the steps shall be ASTM A 615, Grade 60 deformed steel encapsulated with injection molded Copolymer Polypropylene.
- F. Frames and covers conforming to Appendix II shall be fabricated of ASTM A48 cast iron, shall be free of bubbles and other sand or air imperfections, and shall meet AASHTO H20 standard specifications for unintended vehicular traffic, unless otherwise approved. Contact surfaces shall be machined, and hatches and covers shall be inscribed with "SFA". Frames and covers will be subject to the approval of the Authority.
- G. Grade adjustments shall be accomplished with maximum one foot high precast concrete rings as shown in Appendix II. When approved by the Authority, PennDOT approved plastic grade rings may be used.
- H. Invert channels shall be smooth and accurately shaped to a semi-circular bottom conforming to the inside of the adjacent sewer section. Inverts may be formed directly in the concrete of the structure base, or where reinforced concrete culvert pipe is used, may be built up of mortar or may be constructed by laying full section of sewer pipe straight through the structure and breaking out the top half after the base is constructed. Where necessary, invert channels in manhole bottoms shall be shaped and smoothed with Parson's Parsonpoxy or approved equivalent.
- I. The size and depth of the inverts will vary to suit the size of the pipe used and shall have a height of at least 6 inches higher than the springline or to the top of the inlet pipe, whichever is higher.

- J. 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. Changes in the pipe size 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.
- K. Elevations shown on the plans indicate invert elevations of the center of manhole unless indicated otherwise. No manhole bottoms which result in collection of solids or in pooling of wastewater will be accepted. Gradients in manholes which accommodate smooth gravity flows must be provided.
- L. All prefabricated manhole bases/barrels shall, where pipes connect, be furnished with resilient and/or flexible connectors to accommodate the respective pipe diameters per Appendix II.
- M. All manholes located in impervious areas such as, Road Paving and/or Road Berms shall have Polypropylene Plastic Inflow Protectors or an approved equivalent. Polypropylene Plastic Manhole inserts shall be 28-1/2" in diameter with a minimum lip size of 1". The inserts shall not be more than 6" deep, and shall be fabricated of a material which will not corrode or otherwise be adversely affected by the sewerage atmosphere. They shall be similar to the sewer guard model manufactured by Parsons Environmental Products Co., or approved equivalent, all inserts shall be installed per the manufacturer's recommendation.
- N. The exterior surfaces of all precast concrete manhole barrel sections shall be waterproofed. Waterproof coating shall be two coats bitomastic material or Coal Tar Solution. Each shall have a minimum dry film thickness of eight mils.
- O. Connection of new sewers to existing or new manholes where a cast in place boot has not been provided, shall be core drilled. The opening shall be provided with a rubber water stop and shall be sealed with concrete on both the inside and the outside of the manhole.
- P. At locations where new manholes are constructed over existing clay pipe sewers, the clay pipe shall be removed for one equivalent length of PVC Pipe (thirteen feet). The new manhole shall be set with one full length of PVC Pipe placed through the manhole pipe openings. Pipe connections shall be made utilizing dresser couplings. The manhole invert shall be formed around the PVC pipe and upon satisfactory vacuum testing of the manhole the crown of the PVC pipe shall be cut and removed.

- Q. Any developer, public agency, or individual adjusting topographic grades, whether through road paving or site development, shall provide two (2) weeks notice to the Authority to allow for manhole grades to be adjusted. All costs to adjust manhole grades will be charged to the developer or public agency.

## **5. Sewer Drop Connections**

- A. Where drop connections are indicated on the plans and profiles they shall be installed in accordance with the details shown in Appendix II. In general, drop connections should be avoided except for extreme changes in elevations and in any event, will not be permitted for application on sewer pipes greater than 15" diameter.
- B. Typically only one (1) interior drop connection per manhole shall be permitted. If more than one (1) interior drop is proposed a 60" diameter shall be used.
- C. The type of drop connection used shall be as shown on the construction drawings. The drop pipe shall be secured with stainless steel straps. Typical drop connections shall be of the inside drop type. Any proposed outside drop connection must be specifically approved by the Authority Engineer.
- D. All inside drop connections must be equipped with a Reliner/Duran, Inc. drop bowl, or approved equal, installed per the manufacturer's specifications.

## **6. Force Main**

- A. All wastewater force mains shall be fabricated of ductile iron pipe conforming with the ANSI A21.50 and A21.51 specifications, Thickness Class 52, or Polyvinyl Chloride (PVC) Pressure Pipe meeting the requirements of AWWA C900. PVC Pipe shall be class 200 Pipe meeting the requirements of DR14.
- B. All PVC pipe suitable for use as pressure conduit shall be standard laying lengths 20 feet (plus or minus 1") for all sizes. At least 85% of the total footage of pipe of any class and size shall be furnished in standard lengths. The remaining 15% can be furnished in random lengths. Random lengths shall not be less than 10 feet long. Each standard and random length of pipe shall be tested to four times the class pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe. The bell shall consist of an integral wall section with a locked in solid cross section elastomeric ring which meets the requirement of ASTM F-477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C900.
- C. The ductile iron pipe shall be furnished with a double cement mortar lining coated per ANSI A21.4, and shall be coated with a standard bituminous coating.

- D. Fittings shall also be fabricated of ductile iron conforming to ANSI A21.10 or A21.53 (short body) (gray iron fittings are not acceptable). All pipe fittings shall be furnished with a double cement mortar lining per ANSI A21.4. Fittings shall be rated for at least 350 pounds per square inch (psi) service.
- E. Unless otherwise approved by the Authority, all Force Mains shall be installed at a depth of 4 to 4.5 feet cover over the top of the pipe.
- F. Where determined by the Authority that a hazard would be created, pipe shall not be removed from shipping pallets until ready for installation.

## **7. Assembly of Ductile Iron Pipe**

- A. Pipe joints shall be carefully lowered into the excavated trenches to avoid damage to the pipe barrel and the bell and spigot ends.
- B. After the bell hole has been prepared and the joint is ready for assembly and where push-together joints are specified, the bell and spigot shall be wiped clean and a non-toxic lubricant shall be applied.
- C. The pipe may be shoved home by use of a bar and block or some other suitable tools.
- D. Gaskets shall be furnished and handled as recommended by the pipe manufacturer.
- E. When mechanical joints are specified, thorough cleaning of the surface to be mated shall be done after which the gland and the gasket shall be slipped over the plain end. The gasket shall then be inserted into the socket and the gasket shall be evenly seated. The gland shall then be inserted and the bolts and nuts drawn finger-tight. The joint shall then be completed by uniformly tightening the bolts in such a manner that the distance between the gland and the face of the flange is maintained approximately uniform.
- F. In general, ductile iron pipe lines shall be installed in conformance with the standards set forth in AWWA C600.
- G. In areas where the pipes are installed in fill, or in tight locations where the installation of thrust blocking will not be practical, pipes will be secured with the use of Field-Loc Gaskets or EBAA Iron Mega-Lug Restraint Fittings at the discretion of the Authority.

## **8. Assembly of PVC Pressure Pipe**

- A. Pipe is to be inspected for defects and cleanliness. All foreign matter and dirt is to be removed from the Pipe interior.
- B. Pipe section shall be carefully lowered into the prepared trench bed in such a manner as to prevent damage to the pipe. Pipe should never be dropped into the trench.
- C. Inspect bell end and wipe clean and insert rubber ring gasket.
- D. Clean pipe spigot end and lubricate as recommended by the manufacturer.
- E. Pipe may be shoved home by the use of a bar and block or other suitable tools.
- F. When connecting PVC pipe to ductile iron fittings use mechanical joint rubber ring with M.J. fittings. Do not use PVC rubber ring in a cast iron bell or fitting.

## **9. Thrust Restraints**

- A. Concrete blocks shall be cast in place in accordance with the configurations shown in Appendix IV. Such blocks shall be required to be poured, after installation of the adjacent piping at all fittings installed along the pipeline.
- B. The concrete shall be placed such that it is supported against undisturbed earth along the excavated trench wall and the trench bottom and shall be thoroughly worked and vibrated to insure complete contact with the walls of the fittings being restrained.
- C. No trench backfill shall be placed at the locations of the thrust blocks until twenty four hours after placement, and/or until the Authority has inspected the installation. Refer to cast-in-place concrete specification for minimum strength of concrete.
- D. Where existing conditions and/or available space do not permit the installation of concrete thrust blocks, restraining fittings as described in III.7.G above shall be used.

## **10. Steel Casing Pipe**

- A. All steel casing pipe furnished where boring and jacking is required or, where otherwise required, shall conform to the ASTM A53 specifications and shall have a minimum yield strength of 35,000 psi.
- B. Joints shall be full-circumference welded and the pipe shall be the diameter indicated on the plans and/or profiles. Wall thicknesses and minimum diameters shall conform to those listed in Appendix II. All casing pipe shall be new.

- C. Casing Spacers located within the casing pipe and supporting the carrier pipe shall be properly sized to accommodate the two pipes. Casing spacers shall be as manufactured by Advance Products & Systems, Inc., Power Lone Star, Inc., or approved equivalent. The use of timber skids and stainless steel bands is not acceptable.
- D. Provide and install concrete, grout, or neoprene boot seals, with stainless steel attachment bands, as described previously in this Specification.

## **11. Raw Sewage Pumping Facilities**

- A. All raw sewage pumping stations proposed to be constructed by a developer within the Municipal Authority of the Township of South Fayette service area must be designed and constructed to standards acceptable to the Authority and their technical advisors. Further, PaDEP must review any proposed design and issue a Part II construction permit. Due to the unique conditions encountered at each raw sewage pumping station site it is mandatory that the developer proposing to utilize a pump station and hand over the facility to the Authority for perpetual operation and maintenance meet with the Authority prior to commencing detailed design of said facilities. This pre-design meeting will benefit both parties as the Authority will be informed of the proposed development/pumping station and the developer will be furnished with technical information regarding acceptable equipment/facilities for the proposed raw sewage pumping conditions.
- B. All raw sewage pumping stations shall be furnished with a minimum of two solids handling pumping units each capable of pumping the expected peak day flow. Each station must also be furnished with a comminutor device and bypass trash screen and meet all PA Department of Environmental Protection regulations. Under certain circumstances, grinder type pumps may be used, eliminating the need for the comminutor.
- C. All pumping facilities must include an automated emergency power supply capable of operating the entire facility at under peak design conditions.
- D. All pump stations must include an enclosed structure housing key electrical components, telephone components, along with an approved alarm system with dial-out capabilities.
- E. All pumping facilities utilizing 3 Phase/480 Volt motors must be designed without the use of single phase to 3 phase inverters. Any design concept utilizing single phase motors must be specifically approved by the Authority.

- F. Any proposed pump station sited shall be completely enclosed with chain link fence with appropriate gates and access for maintenance of the station. The gates shall be padlocked and master keyed as directed by the Authority. External site lighting must also be provided.
  
- G. All pipe within the pump station and valve pit shall be flanged ductile iron pipe meeting the specifications of ANSI/AWWA C100. All ferrous metal within the pump station, except for the ductile iron pipe, pumping units and communitor, shall be stainless steel.

**END OF PART III**

## **PART IV - TESTING AND ACCEPTANCE**

### **1. Testing of Gravity Sewers**

- A. All gravity sewer pipes shall be tested by inducing low pressure air into the pipe. The air shall be slowly introduced into the pipe and the pressures shall gradually be increased with the test section to 5.0 psi.
- B. All such pipe so tested shall be required to sustain the 5.0 psi test pressure without loss or drop in pressure for a time period of 5 minutes. In the event that the loss does occur, appropriate repairs or reconstruction shall be made and the test procedure shall be rerun until the test criteria (5.0 psi for 5 minutes) are successfully accomplished.
- C. In the event where ground water elevations prevail higher than the top of the sewer pipe being tested, 0.5 psi per foot of hydrostatic head above the top of the sewer pipe shall be added to the test pressure.
- D. All PVC pipes shall also be tested for pipe deflection. Said tests shall not be performed until the backfill has been in place for at least 30 days. The maximum acceptable deflection shall be 5% of the vertical internal diameter. Said testing shall be performed with a mandrel similar or equal to that manufactured by Cherne Industries, Inc. Mandrels are to bear ASTM certification for the pipe size being tested. It is required that deflection testing equipment receive the prior approval of the Authority.
- E. The Authority will lamp each section of sewer pipe between manholes by placing a light at one end and observing the pipe at the other end. Sewers not constructed on uniform line and grade, and therefore not showing a full circle of light during lamping, will not be accepted by the Authority.

### **2. Hydrostatic Testing of Force Mains**

- A. All force mains shall be hydrostatically tested for leakage after installation is completed. Said testing shall be performed in accordance with the applicable sections of the AWWA C standards. Prior to performance of the testing work the CONTRACTOR shall submit to the ENGINEER the following:
  - 1. A testing schedule.
  - 2. A listing of equipment intended to be used, including general information on the pump, pressure gauge, pressure relief and water meter.
  - 3. Certification that the pressure gauge has been calibrated to 0.1 psi.

- B. The CONTRACTOR will provide the water required for testing purposes and shall provide all required temporary fittings to complete testing prior to connection to the existing force main.
- C. Each section of pipe to be tested shall be slowly filled with water during which time air shall be expelled from the pipeline through the air release valves (where high points in the line exist at which there are no air release valves, CONTRACTOR shall install corporation cocks for that purpose). After all air is expelled, the air release devices shall be closed and line pressures shall be raised to the test pressure directed by the ENGINEER. Test pressures shall be 1.5 times the expected working pressure predicated upon the elevation of the lowest point in the line, corrected to the elevation of the lowest point in the line, corrected to the evaluation of the test gauge. Any joint, cracked pipe or other appurtenances revealing leakage during the pressure test shall be corrected after which the pressure test shall be rerun. Pressure tests shall be conducted for a 30 minute time period.
- D. After performance of the successful pressure test, a leakage test shall be performed over a duration period of two hours at a pressure to be determined by the ENGINEER. Leakage is defined as the quantity of water supplied to the test section of pipe, which is required to maintain pressure within 5 psig of said test pressure during the entire testing period. Pipe construction so tested shall be deemed to have failed the leakage test if the leakage resulting is greater than 10 gallons per inch diameter per mile of pipe per day.

### **3. Vacuum Testing of Manholes**

- A. After erection of the manholes, connection of the sewers, and placement of the backfill to approximately the finished ground elevation, each manhole shall be vacuum-testing for water tightness. Connecting pipes shall be securely plugged and a vacuum testing device similar to that manufactured by Cherne Industries, or equal, shall be placed and sealed within the manhole frame/cover section.
- B. A vacuum of 10" of mercury (Hg) shall be drawn after which the vacuum pump shall be shut off. If the indicated vacuum pressure drops to 9" in less than one minutes, the test apparatus shall be removed and appropriate repairs/plugging shall be performed. The test shall be repeated, as necessary, until a time period of a minimum of one minute occurs before the vacuum pressure drops one inch (1") and/or there is no visual indication of water leakage.
- C. Appropriate repairs/plugging is defined as sealing the grade rings and inside joints with Parsons Epoxy Compound, Parsonpoxy FG, or approved equivalent.

#### **4. Television and Inspection**

- A. Prior to acceptance of the sewers by the Authority, sewer sections shall be visually inspected by the Contractor by means of closed-circuit television. The inspection shall be done one manhole to manhole section of pipe at a time. Projects may not be phased to evade television inspection project length requirements.
- B. The television camera used for the inspection shall be one specifically designed and constructed for such inspection and shall be capable of pan and tilt direction movement to view lateral connections and defects. Lighting for the camera shall be suitable to allow a clear color picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor and other components of the video system shall be capable of producing a color picture quality to the satisfaction of the Authority; and if unsatisfactory, equipment shall be removed and no payment will be made for an unsatisfactory inspection.
- C. The camera shall be utilized to record the condition of all manhole interior conditions.
- D. The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary and at lateral connections and shall tilt and pan each lateral connection to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute.
- E. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole.
- F. Any section of gravity sewer which is found by internal TV inspection to be defective; to contain silt and/or debris; or to be otherwise unacceptable to the Authority, shall be corrected and re-televised at the expense of the Contractor.
- G. When manually operated winches are used to pull the television camera through the line, telephones or other suitable means of communication shall be set up between the two manholes of the section being inspected to ensure good communications between members of the crew.

- H. The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Authority.
  
- I. Documentation of the television results shall be as follows:
  - a. Television Inspection Logs: Printed location records shall be kept by the Contractor and will clearly show the location in relation to an adjacent manhole of each infiltration point observed during inspection. In addition, other points of significance such as locations of building sewers, unusual conditions, broken pipe, and other discernible features will be recorded and a copy of such records will be supplied to the Authority.
  
  - b. Closed Circuit Televising (CCTV) Recordings: Video inspections shall be provided in an MPEG or other similar digital format. The purpose of digital recording shall be to supply a visual and audio record of condition of the lines. Recording playback shall be at the same speed that it was recorded. Supplemental digital photos depicting specific pipe defects should clearly define the location of the defect. All original digital video files shall become the property of the Authority.
  
  - c. Contractor shall use NASSCP PACP WinCan Software for all internal CCTV inspection.