TOWNSHIP OF HAMPTON

STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF SANITARY SEWER LINES AND APPURTENANCES

DECEMBER 2005

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TOWNSHIP OF HAMPTON
Standard 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 **Township'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 **Township**, or constructed by a land developer who in turn employs (a) construction **Contractor(s).**

B. These specifications are to be used in conjunction with the companion document Rules and Regulations for Sanitary Sewers.

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 **Township** 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(s).** The **Township** reserves the right to request, at its discretion, additional data, tests, drawings, details, or other such information as it deems necessary to judge the adequacy or acceptability of any sanitary sewer extension.

D. This document covers the construction work.

E. Where the term "**Township**" is used herein, it shall mean Hampton Township, its employees, management, or Board, as is appropriate for each occurrence of use of the term. When necessary or appropriate the **Township** may call upon its engineering and/or legal consultants for advice and direction.

F. Those costs payable by the **Contractor**/Developer shall be in accordance with the latest version of Schedules A and B Permit fees, Bonding, Inspection, Etc. as furnished by the **Township.**

2. Methods of Construction and Compliance

A. Prior to initiating construction, the **Contractor** shall comply with all the requirements of the Township governing sewage management.

B. All sanitary sewer extensions shall be consistent with the Official Sewage Facilities Plan (Act 537 Plan) for the **Township** where the extension is constructed.

C. All sanitary sewer and appurtenances shall comply with the requirements of, and shall be approved by (if necessary), the Pennsylvania Department of Environmental Protection (DEP), the Allegheny County Health Department, Allegheny Conservation District (ACCD) and **all** other required agencies.

D. The **Contractor** shall comply with the Commonwealth of Pennsylvania Department of Labor and Industry Regulations for Excavations and Constructions. The **Contractor** should file the required notification with the Bureau of Inspection, Department of Labor and Industry prior to starting work on this project.

A pre-construction conference shall also be held with all utilities, **Engineers** and the on site Inspector as designated by Township, State, or the **Township Engineer**.

E. Trench excavation shall be in strict conformance with OSHA Regulations regarding the selection of 1) sloping and benching systems, and or 2) support, shield or other systems. A registered professional engineer's certification and design calculations will be required for protective systems where trench depth is greater than 20 feet, in accordance with paragraphs 1926.652 (b) and (c) of the OSHA Regulations. In addition, a Professional Engineer's certification and usage specification for trench shoring or shielding systems or sloping of trenches will be required where the trench depth is 20 feet or less in accordance with Subpart P of the OSHA Regulations. The Professional Engineer must be registered in the Commonwealth of Pennsylvania where the work is performed. **The Contractor is required to have an OSHA competent person on site during all trench excavations.**

F. In keeping with the "Project Environment" that the Commonwealth of Pennsylvania has undertaken, that with the year 1970, the Department of Environmental Protection (DEP) and the Allegheny County Health Department require confirmation with practices which will alleviate pollution of the atmosphere, the ground, and all waters.

The **Contractor's** attention is also directed to the following:

1. Air Pollution Control Act, of January 8, 1960, P.L. 2119 as amended.

2. Clean Streams Law, the Act of June 22, 1947, P.L. 1987, as amended.

3. Solid Waste Management Act, Act No. 241 of July 31, 1968, as amended.

4. Hampton Township Noise Ordinance 298.

The **Contractor** is advised that he or she shall acquaint himself or herself with and shall abide by all provisions of the aforementioned Acts, as well as any other Federal, State and local legislation which applies to the **Contractor's** specific project.

3. Inspection 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 to all **Township** rules and regulations and shall be inspected during construction by an authorized representative of the **Township**.

B. All completed work shall be required to meet the approval of the **Township** and shall be changed, modified, replaced, removed or otherwise corrected by the **Contractor** to such extent as directed by the **Township**.

C. The work will be periodically or continuously inspected during its progress and when completed, shall be inspected jointly, by the **Township** and the **Contractor** and a punch list of uncompleted or corrected work will be developed. After all punch list items are completed, the work will be declared substantially complete. When the work is declared to be substantially complete and is accepted by the **Township**, 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 **Township** 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 **Township**, 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 300' surveyors tape for the purpose of spot checking distances and for the purpose of the **Contractor** providing off-set measurements as the work progresses.

4. 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 pipeline 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 **Township**.

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 20 feet; 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 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 five (5) feet. All construction activities shall be confined within the 40 feet wide construction right-of-way.

C. The **Contractor** shall, however, 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 **Township** 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. 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 One Call 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 Standard Drawing SD-004 and 005.

G. Where the **Contractor** must construct sewers underneath transportation utility installations, such as main highways and other similar locations where the **Townships** having jurisdiction over the work will not permit open cutting for the installation of the sewer, or where full traffic is required to be maintained, the **Contractor** shall make the installation by method generally outlined under the section entitled "Jacking and Boring" or other means of construction agreed upon the **Township** and **Engineer**.

H. Where the **Contractor** lays service sewers across, along or through rights of way, roadways, alleys, etc., belonging to the State, County or Township, the stipulation and regulations set up and required by those **OWNERS** shall be observed, and all work shall be in conformance with the requirements set forth by those **OWNERS**. Any permits required for opening roadways or streets, shall be obtained from the **Township** or regulatory agency at the **Contractor's** expense unless an individual obtains the rights-of-way for the specific purpose of installing his or her service sewer through private property. In the event, that an **individual** desires the right-of-way, they must negotiate for and on his behalf and pay all expenses attached thereto. The cost of all inspection(s) required by those said **OWNERS** shall be borne by the **Contractor** or individual, as delineated above.

5. Control of Pipe Line Elevations and Alignments

A. The elevations of all **Township** facilities shown on record drawings, plans and profiles of proposed work, are found 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 the Township grants prior approval.

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 **Township** by obtaining information during construction progress, and for purposes of preparing as-built record drawings.

6. 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 203A of the Pennsylvania Department of Transportation, the title of which is "Short Term Work Zone Traffic Control Guide".

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 Publication 203A. The **Contractor** shall submit a traffic control plan and procedure (conforming to the above referenced Publication 203A) to the **Township** for approval, prior to commencing with field construction.

C. All necessary barricades, flashing lights, flagmen, night warning signs and flares and other items of traffic control and safety shall be provided and maintained in working order by the **Contractor**.

7. Exploratory Excavations

A. Some of the proposed pipelines 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 **Township** 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 the Township shall approve any realignment of pipelines.

8. Maintenance of Existing Facilities

A. The **Contractor's** attention is directed to the fact that any and all existing facilities must be maintained in continuous operation throughout the course of the work. To that end, he or she shall schedule his or her work as to avoid interruptions in the operation of the present facilities.

B. Should it prove impossible to avoid an interruption of the present facilities, the **Contractor** shall notify the **Township** of the intended start and duration of the interruption at least seven (7) working days in advance, and shall receive written approval from the **Township** for the interruption before causing any of the existing facilities to be taken out of operation. The **Contractor** must have all materials, equipment, tools, plans, etc. to complete the work at hand. The **Township or**

designated Engineers shall make the final decision with regard to whether the equipment, tools, plans, etc. are adequate to complete the work. If so directed by the **Township**, the **Contractor** shall work around the clock to complete that portion of the work, which necessitated the interruption.

C. If it is determined by the **Township** that the facility cannot be interrupted or that the proposed interruption is longer than the system can tolerate, the **Contractor** shall develop an alternate plan that includes pumping or alternative sewers.

9. Existing Utility Lines - Location, Protection and Hazards

A. The plans show 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 is attributable to his or her 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 **Township** so that the **Township** may notify its customers.

E. The **Contractor** shall be responsible for all damage to utilities, private properties and structures, power lines, gas, oil and water lines, sewers, fences, landscape plantings, etc. that may result from his operation, and shall restore such obstructions to their original condition as soon as possible and prior to completion of his or her work.

F. In some cases, it may be found that existing pipelines 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.

G. 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 that will assure protection of all construction personnel and other personnel against said hazards. The **Contractor** assumes all responsibility and liability for all property damage and bodily injury that may result from his or her subcontractor's personnel contacting directly or indirectly with underground high voltage electric lines.

H. 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.

I. 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 and infiltrating into the public sewer system within the area served which may contain and/or generate toxic, noxious, oxygen depleting or other liquid or gaseous substances harmful to human beings.

J. 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.

10. Flood Conditions

A. It shall be the **Contractor's** responsibility to take whatever measures he or she deems necessary to protect the facilities from damage due to flood waters during the construction stage and until such time as the **Township** formally accepts them.

11. Shop Drawings and Materials Submittals

A. All materials proposed to be utilized for construction of any **Township** 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 that have not received the prior approval of the **Township**.

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 **Township** 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 twenty-one (21) 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.

12. As Built Drawings

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 or she 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 **Township** providing a daily construction progress record and identify all noted changes to the project, prior to **Township** acceptance of the facilities.

C. One (1) set of reproducible mylar and a disk containing record drawings of as-built conditions in a software format approved by the **Township** shall be provided to the **Township** 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.

13. Independent Commercial Testing Laboratory Services

A. The **Township** reserves the right to request that the **Contractor** furnish, during pipe delivery and construction, reports of an independent commercial testing laboratory for any project involving the installation of sewer pipe.

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.

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 pipelines. No trees shall be cut, however, without the specific approval and prior designation for cutting, by the **Township**. It is the intent of these specifications to minimize the removal of trees and, therefore, only those that 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 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. **Contractor** shall remove all salvageable surface items in the area to be excavated. **Contractor** shall properly separate, classify, store, protect, and preserve such materials and items for use in backfilling, resurfacing, replanting, restoring, or otherwise replacing the area of construction to its original conditions prior to construction, except as may hereinafter be noted.

D. All fencing, mailboxes, drainage pipes, doghouses, clothes posts, steps, moveable storage sheds, ornamental lawn fixtures etc., shall be carefully removed, and placed temporarily in a place convenient to the property owner until construction is completed, and protected against damage or theft. Upon completion of construction, the improvements shall be replaced or reinstalled in their original position and condition.

E. In cultivated or landscaped areas, all shrubbery, hedges, and small trees in the area of construction shall be carefully removed, stored, and preserved for reuse upon completion of construction, unless authorized otherwise by **Engineer**. Large trees that cannot be safely transplanted or reasonably replaced shall be left standing unless permission is specifically granted by the **Engineer** to remove the tree.

F. Ordinance 10.140 prohibits the placement of structures, planting of trees and shrubs on any **Township** utility easement.

2. Existing Sanitary Sewers

A. Existing sanitary sewers in close proximity to the Contractor's construction activities shall not be used as a drain for surface or ground water runoff during construction.

3. Maintenance of Access

A. Those trenches which are located along or across existing improved surfaces (i.e. State and local roads, berms, driveways, parking areas, etc.) which must be made safe for vehicular traffic as soon as possible, shall be immediately backfilled to full depth of trench above the pipe zone with 2-B modified lime stone, as approved by the **Township's** specification. **Any Slag material is prohibited.** The materials shall be properly tamped with mechanical or vibratory equipment for compaction as outlined below. Compaction shall be done in order that no settlement will take place in the trench areas.

B. In areas where trenches are located along or across paved areas, and where the trenching disturbs the existing paved surface, the **Contractor** will be required to complete temporary restoration of said disturbed surface prior to the cessation of his or her construction activities for that day, in the following prescribed manner:

The **Contractor** shall place graded granular material as prescribed in *Section 5, Paragraph O* to a point six (6) inches below the base of the existing improved surface. **Slag material is prohibited.** The **Contractor** shall neatly saw cut the edges of the pavement disturbed by the trench in accordance with SD-009. The **Contractor** shall place bituminous base course (weather permitting) or bituminous cold patch from the top of the graded granular material to the top of the existing paved surface.

C. The **Contractor** shall be responsible for maintaining all crossings of improved surface areas until such time that permanent restoration can take place. The above shall include placement of additional graded granular material, bituminous base course (or cold patch) as required, or as directed by the **Township's** specification.

Any excavation within three (3) feet of any roadway edge, or curbing must be backfilled with 100% solid stone in accordance with Section 5, Paragraph O and SD-009.

D. All trenches regardless of location must be properly tamped with mechanical or vibratory equipment for compaction. Compaction immediately over pipe may be (1) foot over crown of pipe. All other compaction is to be performed in six (6) inch or two (2) foot lifts depending on compaction method used as directed by the on site inspector.

E. Vibratory tamping equipment shall consist of two (2) rollers of sheep's foot type design. Tamping must be completed in one (1) foot intervals. Tamping equipment attached to excavators shall be completed in two (2) foot intervals or as specified by the inspector.

F. During roadway crossing, steel plates may be used for traffic control during working hours. **All trenches must be completely backfilled and ends of the pipe securely capped at the end of the day.**

4. Steep Slopes

A. Sewers constructed on slopes twenty (20%) percent or greater shall be of ductile iron (Class 52) or PVC SDR-21 construction and shall be securely anchored with concrete anchors in accordance with standard drawing SD-007.

5. 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. 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.

C. Limit daily trench excavation to a length of pipe placement and backfilling that can be completed the same day.

D. The width of all trenches shall not exceed the maximum of four (4) feet, or the outside diameter of the pipe, plus two (2) feet, from the bottom of the respective pipe trench to a horizontal plane located one (1) 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 accordance with Standard Drawings SD -001 and 002. The pipe shall be located within the center of the trench, and the sidewalls of the trench shall be vertical and parallel with each other. In the event that the **Contractor's** construction methods/activities result in a trench wider than four (4) feet or the pipe diameter plus two (2) feet within that pipe zone, he or she shall install concrete bedding or encasement or make such other provisions as may be directed by the **Township** to protect and assure the structural integrity of the pipe.

E. Excavations for manholes or similar structures may be performed on vertical banks except in paved areas and traveled ways, or where such excavation may undermine adjacent facilities or structures, or where such excavation will violate private property outside the right-of-way established for this work. In paved areas and traveled ways, the Contractor shall limit the area of his or her excavation so that the length and width of maximum of four (4) feet greater than the greatest length and width of structure involved.

F. 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, in accordance with Standard Detail SD-001.

G. Where the exposed trench bottom consists of rock or other unyielding material the trench shall be overcut a minimum of four (4) inches and the ductile iron or reinforced concrete pipe shall be installed on bedding material that is specified later within this manual.

H. When soft and/or unstable trench bottoms are exposed, they shall also be overcut and stabilized to the satisfaction of the **Township** with the same bedding material 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 **Township,** concrete caissons shall be installed as required at no expense to the **Township**.

I. All polyvinyl chloride pipe (PVC) shall, regardless of the character of the exposed trench bottom, be installed on bedding material at least six (6) inches in thickness, except where concrete cradle and/or encasement is required.

J. 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.

K. 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.

L. 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 one (1) foot 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 that have a maximum dimension exceeding two (2) 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.

M. 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 the Standard Drawing Detail SD-002-A .

N. Excavated material from the trench used as backfill material placed in trenches above the pipe zone, where such trenches are located within **Township** Street or State Highway rights of way outside of the pavement shall be consistent (for the entire trench width and depth) of material conforming to the requirements specified for bedding. The **Township's** representative shall determine whether materials are unsuitable and upon notice from the **Township's** representative all unsuitable material shall be disposed of and suitable material shall be brought in from an outside source. **(FULL STONE BACKFILL IS REQUIRED IN ALL ROADWAYS, ALLEYS AND DRIVEWAYS.)**

O. 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 crushed stone select backfill material placed in lifts not exceeding six (6) inches in thickness and shall be thoroughly and mechanically compacted by the use of vibratory or reciprocating tamping equipment - for the full depth of the trench.

P. At other locations along the alignment of the pipes where trench settlement is not of concern and, where designated by the **Township** 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 **Township**, 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.

Q. 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.

R. 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.

S. No material shall be used for backfill at any location that, in the opinion of the **Township**, is too wet, frozen, mucky, or contains debris, tree stumps or an excessive amount of rocks.

T. All excess excavated material resulting from the construction of the pipelines and appurtenances shall be disposed at a location and in a manner that shall be the **Contractors's** responsibility to determine.

U. 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.

V. The **Contractor** will be permitted to open no more than 100 linear feet of ditch excavation at any one time. **Engineer** may require that the trench be fully backfilled at the close of each workday, with no additional compensation to **Contractor.**

6. 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.

7. Bedding and Specially Graded Backfill Material

A. All pipe line bedding material, all material placed within the pipe zone of trenches in which PVC pipe is constructed and, all material placed above the trench bottom and below the concrete trench slab (where trenches cross or are located within **Township** Streets or State Roads) shall be either pea gravel, 2B limestone or 2B gravel, complying with the gradation and classification of the Pennsylvania Department of Transportation. The Township's representative must approve material that is not specified as pea gravel, 2B limestone or 2B gravel. Refer to Standard Drawing Detail 002-A for minimum requirements.

8. Compaction Testing

A. The **Contractor** is informed that in those areas where the excavated material is utilized as backfill where shown on the construction drawings that the compacted backfill achieve a density of ninety-five percent (95%) as determined by the Standard Method A, Proctor Test.

B. Tests will be performed to assure that such compacted densities prevail, at the discretion and expense of the **Township**. Generally, tests shall be performed as deemed necessary by the **Township** on the trench so backfilled and compacted by the **Contractor**. In the event that the placed backfill does not comply with the ninety-five (95%) percent 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.

9. 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 shall be done without first notifying the **Township, Township's Engineer** and appropriate Federal, State, and local government agencies. The **Township** reserves the rights to prohibit blasting where, in its opinion, it is not warranted or the risks are to high

C. 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 Hampton**.

D. Where blasting is permitted, all blasts shall be covered with heavy timbers, chained together, or with suitable mats. The amount of explosives used shall be such that nearby properties and facilities are not damaged and persons in the vicinity of the blast are not endangered.

E. The **Contractor** shall take out and maintain, during the period of the blasting operations, special liability and property damage insurance to cover blasting operations and shall notify all governmental agencies as required by law. No explosives shall be delivered to the site until proof of such insurance coverage is delivered to the **Township**. If Federal, State or local government agencies covering the blasting operations require a special bond, its cost shall be paid by the **Contractor.**

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. The **Contractor** shall be fully responsible and liable for all personal and property damage incurred as a result of his or her use of explosive and blasting operations regardless of whether or not he or she has complied with such Federal, State, and or local laws and regulations.

The **Contractor** shall keep a blasting record and a copy of this record shall be supplied to the **Township** and its engineer at the end of each working day.

I. **The TOWNSHIP must be notified in writing seven (7) days prior to any blasting, and the CONTRACTOR must provide a contact person, with a phone or pager number.**

J. A visual record, videotape or hard copy (pictures) of the blasting area and surrounding dwellings prior to blasting must be provided to the **Township.**

K. A total visual record of all dwellings showing the interior and exterior must be obtained prior to any blasting. A copy of this record shall be supplied to the **Township**.

10. 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 that 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 that 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.

11. 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 **Township** 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.

E. The **Township** assumes no responsibility in assuring that the **Contractor** adheres to the approved Soil Erosion and Sedimentation Control Plan, and as such, any fines or violations shall be the responsibility of the **Contractor**. The developer shall obtain the county soil erosion control permit.

The CONTRACTOR/Developer shall bear all fees and costs incurred by the TOWNSHIP.

F. 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 (DEP). Prior to commencing with the work, the **Contractor** shall, schedule a meeting with Allegheny County Conservation District for the review and approval of the final Erosion and Sedimentation Control Plan.

1. Immediately downstream of stream or creek crossings and where directed by **Township**, 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.

G. 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.

H. 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.

12. 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 **Township** 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 **Township**.

13. 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 six (6) inches of concrete all around the pipe, and fittings conforming to the requirements of the appertaining sections of these specifications. Refer to Standard Drawing SD-003 for typical stream crossings and concrete encasement.

B. The pipe shall be tied to eight (8) inch 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 three (3) feet. Where rock is encountered within the trench bottom, bedding material (as also specified herein) shall be utilized and a minimum of (1) foot cover will be required. At the discretion of the **Township's** representative, additional cover may be required for crossings of major streams.

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 five (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 **Township** at the time of excavation.

E. Disturbed bank areas shall be stabilized immediately upon completion of the crossing.

F. A permit from the PADEP for work in the stream, will be required and must be on hand for inspection should the need arise. <u>All requirements for erosion and sedimentation pollution control must be adhered to. A letter from the Allegheny County Conservation District approving the project may also be required.</u>

14. 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 in accordance with. 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 **Township** for approval of 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 that 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, protection of existing or proposed structures, pipe lines, facilities, pedestrian or vehicular traffic, etc. shall be furnished, designed, and installed by the **Contractor** and shall be adequate to withstand the loads to be imposed and superimposed. Materials and design for the sheeting, shoring, bracing and or lining shall be in conformance with the regulations prescribed by any Federal, State or local agency having jurisdiction over the work. The **Contractor** shall be fully responsible for the adequacy of the systems to withstand all loads thereon and shall hold harmless the **Township** and **Engineer** from any and all personal and property damages resulting from his failure to properly provide and maintain sufficient sheeting, shoring, and or bracing. 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 **Township** 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 **Township**, 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 augering the entire hole and then pushing the pipe through will not be permitted. The pipe shall conform to the paragraph under the heading of 'Steel Casing Pipe' of these specifications and in accordance with Standard Drawing SD-006.

K. The ends of the casing pipe shall be sealed using neoprene boot seals with stainless steel clamps.

L. It is the intent of these specifications to permit the **Contractor** to select any of the three above-mentioned methods of installing pipelines 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 pipelines true to line and grade and shall be held fully responsible for protection against surface subsidence, damages or disturbances to the satisfaction of the **Township**.

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 for in the bid prices.

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 **Township**.

P. Where the boring or jacking method of construction is used, it shall be mandatory to conduct said operation well in advance of any pipe installation. At least one (1) manhole run above or below the boring location shall be required in order that the grade of the boring after installation can be met by adjusting either grade above or below the boring and shall maintain the proposed pipe grades.

Q. Pipe cradles or equivalent supports as authorized by the **Engineer** shall be used as pipe supports inside the carrier pipe and in accordance with Standard Drawing SD-008 and 029. Both ends of the casing pipe shall be sealed with non-shrink type concrete.

15. 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 **Township** with 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. Reinforcing steel shall conform to the requirements of ASTM A-615, Grade 60; mesh reinforcement shall conform to ASTM A-185 requirements.

E. Concrete cradle and or encasements are required to be furnished and installed at all locations where the required eighteen (18) inches vertical clearance cannot be maintained, and under all sewer pipes within the excavated areas around manholes and other structures wherein the specified trench widths are exceeded. Said cradle and encasement material shall consist of concrete as described in the Cast in Place Concrete Part II Section 16 of these specifications. All cradles and encasements shall

be in accordance with Standard Drawing SD-008. Care shall be exercised in placing encasement or cradle to provide adequate anchorage for the sewer pipes in order to prevent flotation and or displacement of the pipe.

F. The **Contractor** shall provide and install all reinforcing steel that may be required to assure adequate strength for structures.

G. Concrete cradle and encasement shall be in accordance with the Standard Drawing SD-008 and Detail SD-002-B and 002-C.

H. All sanitary sewers located within areas of storm water retention ponds shall be concrete encased ductile iron pipe.

16. Cast In-Place Concrete

A. Materials: The component materials of the concrete shall meet the following requirements:

1. Portland Cement shall conform to the Standard Specifications for Portland Cement of the American Society for Testing Materials, Serial Designation C-150, Type I or Type III.

2. An air-entraining admixture shall be used. The use of all other admixtures shall require prior approval of the **Township's** representative.

3. Water used in mixing and curing concrete shall be fresh, clean, and free from injurious amounts of sewage, oil, acid, alkali, organic matter, or other deleterious substances. Water shall be approved for human consumption.

4. Concrete aggregate shall conform to the "Specifications for Concrete Aggregate," ASTM Designation C-33.

B. All concrete shall be ready mix and shall conform to the requirements of ASTM C-94. The concrete shall have a minimum allowable compressive strength on samples taken form the transportation unit at the point of discharge of 3750 psi in 28 days, and the maximum allow able slump as delivered to the site shall be four (4) inches. The concrete shall have an air content of five (5%) percent ± one (1 %) percent.

C. All concrete shall be place in accordance with applicable sections of:

ACI Standard 614 : "Recommended Practice for Measuring, Mixing, and Placing"

ACI Standard 306R : "Recommended Practice for Cold Weather Concreting"

ACI Standard 305R : "Recommended Practice for Hot Weather Concreting"

D. Concrete shall not be placed on frozen, loose, or otherwise unstable ground, or when debris, oil, or water is present. All concrete shall be thoroughly vibrated into place. All concrete surfaces shall be finished by experienced finishers to a smooth finish as soon as the concrete has been placed being conditions permit. No cement, plaster, or cement brush coast will be acceptable.

E. Concrete shall be protected from freezing or loss of moisture. Protection against loss of moisture from the surface of the concrete shall be accomplished by keeping the surface continuously wet. One of the following methods shall be used:

1. Surface remaining in contact with the form.

2. Covering with burlap or cotton mats kept continuously wet and covered with polyethylene plastic.

3. Continuous sprinkling of the exposed surface.

F. If after stripping of forms, any concrete is found to be not formed as shown on the drawings, or is out of alignment or level, or shows a defective surface, it shall be considered as not conforming with the intent of these specifications and shall be removed and replaced by the **Contractor** at his or her expense unless the **Township** grants permission to patch the defective area.

17. Underground Detectable Marking Tape

A. Four (4) inch wide 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 in aluminum foil or other similar materials.

18. Pavement Removal and Restoration

A. 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.

B. 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 4" thick BCBC. The binder course of ID-2 shall be 2" inch compacted depth followed by a 1-1/2" compacted ID-2 wearing course. Construction shall be in accordance with the details in Standard Drawing SD-009.

C. The pavement replacement shall conform to the existing type and depth of road binder and wearing courses. An additional (1) 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 Standard Drawing SD-009 at a depth of 3- 1/2" prior to placement of ID-2 surface.

D. Prior to the placing of any new bituminous material, all exposed vertical joints must be cleaned and primed with AC-20 Asphalt Cement or with Emulsions E1, E6, or E8.

E. When all paving and compaction is completed all joints shall be sealed using AC -20 Asphalt Cement or with Emulsions E1, E6, or E8. This application shall be a minimum of six (6) inches in width.

F. All bituminous material shall be installed and compacted by methods and with equipment approved by the Pennsylvania Department of Transportation.

G. 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**.

H. 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.

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

J. Should settlements of one (1) or more inches below the street grade occur within a period of eighteen months, the **Contractor** shall furnish and install additional material to maintain the surface at the streets grade. Where the **Contractor's** operations destroy permanent type road surfaces, they shall restore the road surface in accordance with the requirements set forth by governing body **(Township, County, State, etc.)**

19. Top Soil in Cultivated Areas

A. Where excavation is made through cultivated lawns or similar areas, the topsoil shall be removed and separately stored on the owner's property. 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. The topsoil salvaged from the excavation (or brought in from an outside source) shall then be placed to approximately 1" above the adjacent grade, rolled with a light roller, and seeded or planted to a condition equivalent to that existing before the commencement of construction.

B. Commercial topsoil shall be placed and lightly rolled in the top six (6) inches 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.

20. Restoration of Lawns and Other Improved or Cultivated Areas

A. The **Contractor** shall be responsible for all damages to private properties, structures, fences, lawns, landscape paintings, sidewalks, etc., that may result from his or her operations and shall restore all damages to their original condition as soon as possible and prior to completion of their work. The **Contractor** shall take an adequate number of pictures and videotapes prior to beginning work to document preconstruction conditions.

B. Copies of pictures and videotapes are to be supplied to the **Township**. Pictures are to be bound and numbered in a binder.

C. 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. 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.

D. Grass seed shall match that planted or shall be of same type that already exists. The **Township** shall retain the right to select the seed. Seeding and mulching of disturbed areas shall be accomplished by the end of each week.

E. 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 **Township**.

F. All shrubbery that is removed temporarily to accommodate construction of pipelines 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. Shrubbery 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.

G. 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 a 3-inch bituminous binder course, after compaction. The surface course shall be ID-2 installed in one wearing course totaling one (1) inch after compaction. Seal edges with hot bituminous liquid.

H. Where the proposed sewer crosses existing concrete driveways all concrete paving shall be restored by neatly and uniformly cutting the edges and placing a six (6)" thick reinforced concrete slab. The concrete shall be reinforced with 6x6x10 gauge wire mesh. If the proposed paving limit (trench width plus twelve (12) inches each side) is within three (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.

I. Where the proposed sewer crosses existing stone, slag, or gravel driveways the driveway shall be restored by placing a four (4) inch thick lift of crushed limestone for the full width of the disturbed area. The limestone shall consist of hard, though, 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.

J. 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 it with the **Township**. 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. Building sewers shall be installed as indicated on the applicable Standard Drawing SD-023, 024 and 027 and shall be a minimum of six (6) inches in diameter for commercial properties and four (4) inches in diameter for residences. All building 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, Standard dimensional ratio of 35 (SDR 35) for four (4) inch through fifteen (15) inch 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. The PVC plastic used in the pipe and fittings shall have a cell classification of 12454-B, 12454-C, 13364-B, with a minimum tensile modulus of 500,000 psi, as defined in ASTM D 1784.

C. Rubber gaskets shall comply in all respects with the physical requirements of ASTM F-477, D-1869, C-361, or C-443.

D. Pipe installation shall comply with Unibell Specifications UNI-B-5-78 and these specs.

E. All gravity sewer pipes 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 to 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.

F. Where building sewers are to be connected to an existing original sewer, they shall consist of a wye and repair sleeve conforming to these specifications.

G. Where determined by the **Township** 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 that 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 **Township** so directs, and 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 (¾) 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 (¼) of the pipe joint.

4. Manholes

A. Manholes constructed on **Township** 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 Standard Drawing SD-015,016, and 017. Bases shall be "extended bottom" unless the **Township** specifically approves the use of "mono-bottom" manhole base sections. **Precast Inverts in Precast Base Sections are not permitted**. All manhole inverts shall be field formed.

B. Manhole barrel sections shall be sealed with bitumastic materials placed in the field, as manufactured by Concrete Sealants, Inc. Two rings of said material shall be installed - one on the inside of the joint in the groove and the other on the outside of the tongue. The exterior of the manholes shall be sealed with an asphaltic compound such as a foundation sealer or other material suitable for this application per the requirements of the PADEP.

C. Manholes furnished with prefabricated base sections shall be installed on six (6) inch 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. Refer to Standard Drawing Detail SD-016-B.

D. Manholes where the largest connecting sewer is eighteen (18) inches in diameter or less shall have four (4) feet in diameter barrel section; where any connecting sewer exceeds eighteen (18) inches in diameter, manhole barrel sections shall be five (5) feet in diameter.

E. All manholes shall be provided with steps located twelve (12) inches on center, which shall conform, in general, to the configuration shown in Standard Drawing SD- 021; the steps shall be ASTM A 615, Grade 60 deformed steel encapsulated with injection molded Copolymer Polypropylene.

F. Frames and covers conforming to Standard Drawing SD-019 and 020 shall be fabricated of ASTM A48 cast iron and shall be free of bubbles and other sand or air imperfections. Contact surfaces shall be machined, and hatches and covers shall be inscribed with "HAMPTON SANITARY" as placed on noted on the Standard Drawings. Frames and covers shall be coated with a corrosion resistant bitumastic material, where directed by the **Township**, that will be subject to the approval of the **Township**. Four three-fourths (¾) inch in diameter stainless steel anchor bolts shall be provided for each frame. The final setting of manhole castings shall be such that they conform to the existing or proposed ground slopes and shall be set to exclude surface water.

Frames and covers fabricated of ductile iron material are subject to the approval of the **Township.**

G. Grade adjustments shall be accomplished with maximum one-foot high precast concrete rings and/or cast iron paving rings as shown in Standard Drawing Detail SD-016A. Pre-cast concrete grade rings shall be used between the top of manhole section and the manhole frame to meet existing grades up to twelve (12) inches where required, brick may be used for final grade alignment only, castings must be anchored to manhole sections.

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 six (6) inches higher than the springline or to the top of the inlet pipe, whichever is higher. In no case shall the smallest angle measured between the influent invert to effluent invert be less than 90°.

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 that accommodate smooth gravity flows must be provided. **NO OFFSET INVERTS ARE PERMITTED. All inverts must rise to three-fourths (¾) inch pipes, then slope up three (3) inches to manhole walls.**

L. All prefabricated manhole bases/barrels shall, where pipes connect, be furnished with resilient and/or flexible connectors to accommodate the respective pipe diameters.

M. All manholes shall also be furnished with manhole inserts or inflow protectors that shall be fabricated to fit the specified frames and covers. All manholes located in Road Paving and/or Road Berms shall have stainless steel Inflow Protectors. Inflow Protectors at all other manholes shall be Polypropylene Plastic Inflow Protectores. Stainless Steel Inflow Protectors shall be fabricated to fit the specified frames and covers, and shall have two stainless steel handles and be provided with a gas relief valve. They shall be Southwestern Packing and Seals (800-843-4950) Model BST27 304 Stainless Steel Rain Stopper or an approved equivalent. Polypropylene Plastic Manhole inserts shall be 28-1/2" in diameter with a minimum lip size of one (1) inch. The inserts shall not be more than six (6) inches deep, and shall be fabricated of a material that will not corrode or otherwise be adversely affected by the sewerage atmosphere and, shall be provided with a gas relief valve. 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. Machine cored entry holes and a flexible watertight gasket connection shall make connections to existing pre-cast manholes. Contact surfaces of frames and covers shall be machined so that covers rest securely in the frames. All additional manhole entries shall be above the crown of the existing pipe.

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 **Contractor** or public agency adjusting topographic grades, whether through road paving or site development, shall provide two (2) weeks notice to the **Township** to allow for manhole grades to be adjusted. All costs to adjust manhole grades will be charged to the **Contractor** or public agency.

R. Where manholes are installed in paved streets, alleys, roads, berms, parking areas, driveways or other improved surface areas, the entire excavated area around the manhole shall be backfilled with angular graded material 2A limestone approved by the **Township's** representative. **Slag material is prohibited.** The angular graded material shall be installed completely around the manhole from its base to the bottom of the improved surface area. Prior to installing the sub base, stone and all lose material in the excavated area below the manhole shall be thoroughly removed. The angular graded material shall continue out of the manhole-excavated area through and around the inlet and outlet pipe trench area so that its surface forms an approximate 45° angle with the top of the manhole. See Standard Drawing SD-017.

S. Where manholes are installed in unimproved areas, the entire excavated area around the manhole shall be backfilled with stone or angular graded material from the base to a point twelve (12) inches above the top of the highest pipe entering the manhole.

T. Manholes shall be installed at all changes in grade, size, or alignment and at distances no greater than 400 feet unless authorized by the **Township**. Manholes shall be located such that there are no service connections directed to manholes unless authorized and approved by the **Township**.

U. Manholes subject to flooding shall be set at an elevation approximately 18" above finished grade and protected with watertight covers. Two (2) rings of one (1) inch diameter flexible butyl rubber joint sealant approved by the **Township** shall be used between the manhole frame and the top pre-cast concrete wall section of the manhole (or grade ring).

V. Manholes up to twenty (20) feet deep shall have an internal diameter of four (4) feet. Manholes greater than twenty (20) feet deep shall have an internal diameter of five (5) feet. Manholes greater than twenty-five (25) feet deep shall be equipped with fabricated aluminum gratings every eight (8) vertical feet in accordance with Standard Drawing SD-015.

W. The pre-cast concrete base slab and base riser section shall be poured monolithically with the riser section having a minimum height of four (4) feet above the top of the base slab. The base slab shall extend a minimum of six (6) inches beyond the outside diameter of the pre-cast base riser section in accordance with the Standard Drawing SD-016.

X. New manhole connections shall be through approved flexible watertight sleeves pressed or poured into the manhole base at a minimum of four (4) inches above the manhole floor. A minimum of six (6) inches of concrete shall be required between the top of the manhole base section and the crown of the pipe entering or exiting the manhole in accordance with SD-016.

Y. The **Contractor** shall not order manholes from the manufactures, until complete field layout of the proposed pipeline is established with proper horizontal and vertical alignments of the proposed manholes.

Note: Only approved manhole manufacturers are permitted to deliver pre-cast manholes and sections to Hampton Township.

Z. All pre-cast concrete manholes shall have an air-entraining admixture added to the concrete to produce five (5%) percent ± one (1%) percent air content. Pre-cast manhole bottoms and barrel sections that show excessive honeycombing are subject to rejection at the discretion of the **Township** representative.

AA. Manhole invert channels shall be formed with cast in place concrete, steel troweled, such that there is minimum flow turbulence. A minimum of two (2) inches of fall shall be provided within the manhole between the influent and effluent sleeves. A uniform grade shall be maintained through the manhole when installing the concrete invert. The formed channel shall conform to three fourths (¾) the sectional area of the pipe. Wherever sewers enter manholes such that the invert of the sewer is less than 2'-0" above the manhole bottom, a channeled concrete fillet shall be constructed to prevent the flow from splashing into the manhole and shall be in accordance with Standard Drawing SD-017.

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 Standard Drawing SD-012. 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 fifteen (15) inches in diameter.

B. The type of drop connection used shall be as shown on the construction drawings. Inside drop connections shall require the use of a manhole five (5) feet in diameter. The drop pipe shall be secured with stainless steel straps.

C. Drop type manholes shall be outside drop type, in accordance with Standard Drawing SD-012 and 017, and shall be provided for all locations where the incoming sewer is 2'-0" or more above the manhole invert.

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. Force mains shall be designed for a minimum velocity of 2 fps at average design flow, containing a Hazen-Williams "c" factor (roughness) of 100. PVC Pipe shall have a minimum standard dimension ratio of twenty-one (SDR-21).

B. All PVC pipe suitable for use as pressure conduit shall be standard laying lengths 20 feet (plus or minus 1") for all sizes. Where PVC pressure pipe is used all ductile iron fitting shall be supported on a concrete cradle. 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 pipefittings 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 **Township**, all Force Mains shall be installed at a minimum depth of 4 to 4.5 feet cover over the top of the pipe.

F. Where determined by the **Township** that a hazard would be created, pipe shall not be removed from shipping pallets until ready for installation.

G. Automatic combination air/vacuum relief valves shall be installed in access manholes and shall be provided at high spots. Refer to Standard Detail drawing SD-031.

H. Force main clean-outs shall be provided at all low spots or at a maximum horizontal spacing of 500 feet. Refer to Standard Detail drawing SD-032.

I. 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 Standard Drawing SD-028.

7. Connections to Slip Lined Pipe

A. Connections of service sewers to slip lined pipe shall be made by removing a portion of the existing sewer around each service connection location to expose the liner pipe and provide sufficient working space for making the new service connection. Service laterals shall be connected to the liner pipe by using a heat fused polyethylene saddle, compatible to the resins in the liner. If extreme conditions prevent heat fusion of this saddle, it may be secured to the liner with stainless steel bands with a neoprene gasket between the liner and the saddle. The entire service connection shall be encased with a twelve-inch (12") cover (all around) of cement-stabilized sand.

8. Ductile Iron Pipe and Fittings

A. Ductile iron pipe shall be designed in accordance with ANSI Standard A-21.50 and manufactured in accordance with ANSI Standard A-21.51. Fittings shall conform to ANSI Standard A-21.10. Buried pipe shall be push-on or mechanical joint conforming to ANSI Standard A21-11. Exposed pipe shall be flanged joints conforming to ANSI Standard A-21.15.

B. Pipe shall be double cement lined bituminous-coated Class 52. Fittings shall be 250-psi pressure classification minimum.

C. For pressure pipe installations (force mains), Ductile joint deflection shall not exceed the values present in the most recent edition of the "HANDBOOK –DUCTILE IRON PIPE-CAST IRON PIPE," Section 3, Tables 5 and 6.

D. All pipes shall be factory hydrostatically tested to 500 psi.

E. Gaskets shall conform to ANSI Standard A-21.11

9. 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 pipelines 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.

10. PVC Pressure Pipe

A. PVC pressure pipe shall be designed, manufactured, and tested in accordance with ASTM D-2241, and have a minimum standard dimension ratio of 21 (SDR-21) for both barrel and bell dimensions. The pipe shall be pressure rated at 200-psi minimum.

B. Each pipe shall bear the National Sanitation Foundation Steel of approval and comply with the requirements for Type 1, Grade J (PVC 1120) of ASTM D1874.

C. The joints shall be the push on type with a rubber O-Ring gasket conforming to ASTM D-1 869. Joint deflection shall not exceed manufacturer recommendations or 5 degrees whichever is less.

D. The pipe shall be designed for an average trench depth of five (5) feet and installed with a minimum of four (4) feet of cover above the crown of the pipe.

E. Detectable Mylar tape shall be installed over all pipes at a depth of no more than 1 foot above the pipe. The tape shall be tested to insure continuity prior to acceptance of the **Township's** representative. The tape shall be 3" wide, Mylar encased, in aluminum foil-safety color as approved by the **Township**, with custom words

"CAUTION – SANITARY SEWER/ FORCE MAIN BURIED BELOW" clearly visible. In addition, #10 coded locating wire shall run in conjunction with the tape and positioned along the full length of the force main (pipe) with a monitoring point every 1,000 feet. The wire shall be tested to insure continuity prior to acceptance of the **Township's** representative. Both transmitter and receiver units compatible with the detection tape and wire shall be furnished by the **Contractor** for the testing of this tape and wire.

11. 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.

12. Thrust Restraints

A. Concrete blocks shall be cast in place in accordance with the configurations shown in Standard Detail drawing SD - 030. 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 **Township** 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 Part III, 10.G above shall be used.

13. 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 Class 52 and be in compliance with ASTM Specification A-120.

B. 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.

C. Provide and install neoprene boot seals, with stainless steel attachment bands, as described previously in this Specification.

D. 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 the table below: All casing pipe shall be new.

Minimum Casing wall Thickness:

Nominal Diameter of Casing Pipe in Inches	Coated or Cathodically Protected	Uncoated and Unprotected
14 and Under	0.188"	0.251"
14 and 16	0.219"	0.282"
18	0.25"	0.313"
20	0.281"	0.344"
22	0.312"	0.375"
24	0.344"	0.407"
26	0.375"	0.438"
29 and 30	0.406"	0.46P"
32	0.438"	0.501"
36 and 43	0.469"	0.532"

14. Sewer Tapping

A. General: In cases where a lateral or wye exists in the main sewer line, the connection shall not be made unless witnessed by the **Township's** representative, at the time of the sewer connection. Where no tap exists, the **Contractor** shall install a new service tap according to **Township's specification and supervision.** INSERTA TEE connections shall be required.

B. Notice shall be given to the Township at least twenty-four (24) hours in advance of the intended tap and sewer connection.

15. Service Sewer Connection

A. No job is to be started unless a connection permit has been issued.

B. The bottom of all trenches shall be undercut a minimum of six (6) inches below the invert grade of the proposed pipe. The undercut area shall then be filled with #2B limestone or pea gravel conforming to the requirements for "Small" concrete aggregate. The cradle material shall be adequately and compactly tamped in place, taking care no to heave, misalign, crack or otherwise injure the pipe or joints.

C. Where muck, quicksand, soft clay, swampy or other material is encountered in the trench bottom, which in the opinion of the Township's representative is unsuitable for foundation subgrade or backfill, such material shall be removed by undercutting to a depth satisfactory to the Township's representative. The trench shall be backfilled to grade with acceptable material, placed in four (4) inch maximum lifts (compacted density).

D. Pipe shall be laid to grade, with a minimum fall of 0.125 inches per foot (for every 6" diameter pipe) and 0.25 inches per foot (for every 4" pipe). No acute turns of more than 45 degrees will be permitted. Bell holes shall be excavated at proper intervals so that the barrel of the pipe will rest for its entire length upon the foundation material, and that the weight of the overburden is on the barrel of the pipe and not on the hub.

E. No slip-seal pipe shall be permitted.

F. Should the **Contractor** excavate below the grade, or disturb the foundation materials, either by blasting or in the use of power shovels, or other heavy equipment moved about resulting in loose, shattered, disturbed or spongy areas, said over-breakage, disturbed or spongy areas shall be completely removed to solid ground by the **Contractor** and shall be refilled to sub-grade as directed by the **Township** representative.

G. No connections to roof drainage or footer drainage systems shall be permitted. No tees or wyes will be permitted except where specifically authorized.

H. Clean-outs shall be spaced in conformance with the Standard Drawing SD-010, 011 and 022.

I. All traps must be 4"x 4"x 4" or 6"x 6"x 4". If a 6"x 6"x 4" trap is used, and adapter must be installed from the four (4) inch house line to six (6) inch opening in the trap.

The trap must be filled with water before the job can be considered complete. A grease trap shall be installed where applicable in conformance to Standard Drawing SD-026. Sizing of the grease trap is subject to Allegheny County Health Department and **Township** approval.

J. The **Contractor** shall determine where his or her operations may interfere with existing underground utilities, to this end; the **Contractor** shall contact all of the various utilities in the area, as required under PA ACT NO. 172 of 1986 (which amends previous PA Act No. 287) (HB-2543), prior to starting work, and also during construction, in order to ascertain the exact locations of any structures, mains or services that they may have along the route of his or her work, so that he or she may better locate and protect them. The cost rectifying any damages caused to existing utilities, structures or facilities shall be borne by the **Contractor.**

K. No sanitary sewer is to be connected to the **Township** facilities until the project is 99% completed and tested.

16. Marking Sewer Services

A. All ends of service lines and service sewers, not permanently connected, shall be marked with minimum 2" x 2" lumber placed at the end and depth of said service and extending above the ground surface a minimum of 2 feet. Water service markers shall be painted blue – sewer service markers painted green.

17. Inspection Ports

A. Inspection ports shall be installed in all building and service sewers at the property line by a plumber or **Contractor** certified by the **Township** at the time when the dwelling is to be connected to the public sewer. The inspection port shall consist of a tee, a riser pipe with a minimum diameter of 6" and a tamper-resistant cap (male end). The riser pipe should extend three (3) inches above the surface of the ground in a vertical position as specified by the Allegheny County Construction Specs. Refer to Standard Drawing SD-022 and SD-025. Where inspection ports are installed on slopes that may compromise pipe stability, the tee and one foot of riser pipe shall be encased in concrete.

18. Grinder Pumps

A. Grinder pumps for individual sewer service to private properties shall be used only when gravity service is not available or is not a viable option. Acceptable grinder pumps are those installed in wet wells manufactured and supplied as a package with the grinder pump unit. Grinder pumps installed in septic tank systems will not be approved. Grinder pump units may be of a progressive cavity or centrifugal variety. The grinder pump manufacturer must provide evidence of successful operation of its

unit in at least five (5) other locations under similar conditions and is, ultimately, subject to approval by the **Township** as well as the Allegheny County Health Department Plumbing Division. The installation of the pump and its operation, maintenance, and power costs shall be the responsibility of the property owner.

B. Building sewer installations discharging from grinder pumps shall conform to the requirements of these specifications.

19. Fresh Air Vents

A. Fresh air must rise to a height of at least 3-½" above the ground level adjacent to the vent and be situated at least five (5) feet from the outermost building wall of the structure. Where a service sewer is located in a driveway, the vent must be place on either side of the driveway.

B. Placement of fresh air vents in relation to dwellings, specifically garage doors and driveway areas, is subjected to the following stipulations.

1. The fresh air vent may be placed in front of a pier in the middle of a two car garage, provided garage door exists (not one single door), and provided the driveway slopes away from the house to ensure that no water, rain water or debris can enter into the vent.

2. In the case of a one-car garage, or a two-car garage having only one door, the fresh air vent will not be permitted to be placed in any portion of the driveway area this trafficable by vehicle. The fresh air vent must be placed at a minimum distance of one (1) foot from the bottom edge of either side of the garage door, on a horizontal line, and in an area where water, rainwater and debris cannot enter the vent.

3. Fresh air vents must be encased in concrete where specified by field inspectors. If the lateral and vent are four (4) inches in diameter the encasement must extend six inches below the receiving lateral to which the fresh air vent is attached. If a larger pipe is used, the concrete must extend to a point two (2) inches below the receiving lateral to which the fresh air vent is attached. The base of the concrete encasement must be placed on virgin soil, or soil that has been compacted to the satisfaction of the **Township's** representative. The vertical sides of the concrete encasement must be at least four (4) inches thick as measured from the outside diameter of the fresh air vent to the outside edge of the encasement. The concrete column in which the fresh air vent is encased must have square dimensions in plan and profile view of at least one (1) foot, and be extended approximately three (3) inches above the finished grade. If the fresh air vent is larger than four (4) inches in diameter or square section, the concrete encasement of cement must be

increased proportionately in order to have sufficient thickness to prevent destruction by fracturing or other related damages to the concrete. Refer to Standard Drawing SD-022 and 026.

4. Placement of curbing, channels or gutters which channel the flow of surface water towards the fresh air vent where it may enter the sewer pipe through orifices purposely drilled or placed in the vertical air vent pipe is prohibited. Implementation of any means or method by which storm water, rainwater, or the like can gain entrance into the fresh air vent under any circumstances is prohibited.

20. On Lot Septic System Conversions

A. Connections to the public system shall be made between the house and the septic tank as close to the house as possible. In order to avoid difficulty in securing proper fall, the **Contractor** shall be expected to open a ditch on the house side of the septic tank, exposing the house drain and make an opening at the lateral.

B. The **Township** shall be notified when all pipes are installed, including the trap, and prior to any backfilling, so that the entire installation may be inspected. **If backfill is placed prior to inspection, it will be necessary for the CONTRACTOR to re-open all areas that have been backfilled.**

Notification must be made at least twenty-four (24) hours in advance of the desired inspection date.

C. All downspouts and drains, including area drains, must be dye tested prior to connection of sanitary service to the **Township** sewer system. In addition, the inside of the dwelling or structure must be inspected for ground water infiltration, and any sump, or pumps installed must be tested to insure that only domestic waste is conveyed to the **Township** sewer system. All interior fixtures shall be tested to confirm connection to the service sewer.

D. When an "on lot" sewage facility is to be abandoned, it shall be the responsibility of the property owner to properly abandon such sewage facility. This section shall not apply to systems converted to equalization and retention facilities. Proper abandonment shall include:

1. Removal or disposal of all liquids, sludges, and solids from all tanks and distribution boxes.

2. Removal of filling of all tanks and distribution boxes with inert material.

3. Such other conditions as may be required by the **Township**.

21. Demolition of Abandoned Service Sewers

A. The customer desiring termination of sanitary sewer service shall submit a written request for the termination of service to the **Township.** The customers shall give the date and time when the capping of the tap will be made and available for inspection by Township personnel prior to backfilling. No application shall be submitted more than fourteen (14) days prior to the scheduled capping of the sewage line.

B. The work in general consists of:

1. The location and excavation of the four (4) inch or six (6) inch sewer lateral connections within three (3) to five (5) feet of the existing eight (8) inch or larger sanitary sewer main.

2. Permanently plugging or capping of each location with a suitable and compatible material with the type of pipe existing to prevent inflow or infiltration into the sanitary sewer system.

3. The excavation materials must be removed from the site and the trench must be backfilled with AASHTO 2-A limestone and compacted as it is installed to prevent future settlement.

   i. All locations in roadways and berms are to be backfilled to grade level.

   ii. Areas located out of the roadway and road edge area are to be at least ½ of the depth filled with 2-A limestone to prevent settlement, and then backfilled with topsoil and reseeded to prevent erosion.

4. A customer who has capped or plugged a sewer lateral connection after application and in accordance with these Rules and Regulations may reapply for sanitary sewer service for the same premises.

22. Pumping Stations

A. Pumping station construction and specifications are under the jurisdiction of the **Township** Wastewater Personnel, and the **Township** Consulting **Engineers.**

The **contractor** is advised to contact both entities for construction design and specification design.

END OF PART III

PART IV - TESTING AND ACCEPTANCE

1. General

A. All Sanitary sewers, manholes and force mains shall be acceptance tested, as hereinafter specified in the presence of the **Township's** representative. Acceptance testing shall be performed after backfilling is completed. The **Contractor** shall supply all required testing equipment and personnel to operate said equipment. The **Contractor** shall make any and all necessary repairs required to pass the acceptance test, at no additional cost to the **Township**. Each section of sewer between manholes shall be cleaned, tested and inspected. All repairs shown to be necessary by the tests are to be made promptly. Broken or cracked pipe shall be replaced and all deposits removed, the sewer pipe set into position true to the line and grade and entirely cleaned out.

2. Testing of Gravity Sewers

A. All gravity sewer pipes shall be inspected manhole-to-manhole and 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. The air test shall be conducted by the **Contractor** under the supervision of the **Township's** representative and shall be performed with equipment manufactured specifically for air testing of pipe.

C. The **Contractor** may desire to perform an air test for his or her own purposes prior to backfilling; however, the "acceptance air test" shall be performed after backfilling has been completed.

D. Each section of the sewer being tested shall be temporarily sealed-off by means of suitable plugs. In addition, all wyes, tees, or ends of lateral stubs shall be sealed with suitable removable caps securely fastened to withstand internal test pressure.

E. 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.

F. 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.

G. The pressurizing equipment shall have a safety gauge, which shall limit the loading on the sewer line to ten (10) psi. In addition, the calibrations on all pressure gauges shall be no greater than 0.10 psi.

H. 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 60 days. The maximum acceptable deflection shall be five (5%) percent of the vertical internal diameter as defined in ASTM Specification D-3034. 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 receives the prior approval of the **Township**.

The Contractor is permitted to attach a mandrel to the camera, for a camera so equipped, to perform the television inspection and mandrel test simultaneously.

I. The **Township** 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 **Township**.

J. If the pipe installation fails to meet these requirements, the **Contractor** shall determine at his own expense the source or sources of leakage, and he shall repair or replace all defective materials and workmanship.

3. 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 **Township 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 within the past three months.

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 including temporary removal of air relief valves for testing purposes.

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.

4. 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-tested for water tightness. Connecting pipes shall be securely plugged and an approved vacuum-testing device shall be placed and sealed within the manhole frame/cover section.

B. A vacuum of ten (10) inches of mercury (Hg) shall be drawn after which the vacuum pump shall be shut off. If the indicated vacuum pressure drops to nine (9) inches in less than three (3) 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 three (3) minutes 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.

5. Television and Inspection

A. After cleaning, and at the direction of the **Township**, and prior to acceptance of the sewers by the **Township**, sewer sections shall be visually inspected by the **Contractor, Engineer and Township** by means of closed-circuit television for final inspection. The inspection shall be done one manhole-to-manhole section of pipe at a time.

B. The **Contractor** is permitted to attach a mandrel to the camera, for a camera so equipped, to perform the television inspection and mandrel test simultaneously.

C. 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 **Township**; and if unsatisfactory, equipment shall be removed and no payment will be made for an unsatisfactory inspection.

D. The camera shall be utilized to record the condition of all manhole interior conditions.

E. 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.

F. 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.

G. Any section of gravity sewer that is found by internal TV inspection to be defective; to contain silt and/or debris; or to be otherwise unacceptable to the **Township**, shall be corrected and re-televised at the expense of the **Contractor**.

H. 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.

I. 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 **Township**.

J. 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 **Township**.

b. Videotape Recordings: Videotapes shall be color VHS format. The purpose of tape recording shall be to supply a visual and audio record of condition of the lines. Videotape recording shall be played back at the same speed that it was recorded at. Slow motion or stop-motion playback features may be supplied at the option of the **Contractor**. All original videotapes shall become the property of the **Township**.

c. Digital Video Recordings: Digital video recording shall be provided at the discretion of the Township in lieu of videotape recordings and shall be either color DVD or mpeg compatible.

K. Prior to the end of the eighteen (18) month warranty/maintenance period, and subsequent release of the 15% financial security, the **Township** may require that the **Contractor** retelevise selected "segments of interest."

END OF PART IV