

# IMPROVEMENTS SPECIFICATIONS MANUAL

BOROUGH OF MECHANICSBURG  
36 WEST ALLEN STREET  
MECHANICSBURG, PA 17055  
(717) 691-3310



Prepared by: Pennoni Associates  
431 Railroad Avenue  
Camp Hill, PA 17011

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# BOROUGH OF MECHANICSBURG CONSTRUCTION STANDARDS

## FORWARD

This manual of minimum design standards is prepared as a guide to design engineers, architects, contractors, developers and staff. Its intent is to point out some of the many details expected in site development and to convey to the developer the desire for quality in constructed projects in the Borough. It supplements the current subdivision and land development regulations and must be used in conjunction with such regulations and ordinances in order to adequately design and construct public improvements in Borough of Mechanicsburg.

Scaled dimensions shall not be used in any case. If discrepancies exist on any of the data contained in this Manual, a clarification of the intent of the discrepancy must be obtained from the Borough Engineer.

The application of these standards must be coordinated with the Borough Engineer during the preliminary plan stage. Usage is to be based on engineering judgment substantiated by calculations. The design and construction standards represent minimum requirements and the designer is cautioned that each site has conditions unique unto itself and in some cases minimum standards may not be sufficient. Appropriate design procedures must be applied in each case to ensure proper design.

## ACKNOWLEDGEMENTS

1. Pennoni Associates Inc. – Standard Details
2. “Improvements Specification Manual” – Newberry Township
3. “Site Design and Construction Standards” – Lower Merion Borough

# IMPROVEMENTS SPECIFICATIONS MANUAL

## PROCEDURES, MATERIALS AND SPECIFICATIONS

THE FOLLOWING SPECIFICATIONS SHALL SUPPLEMENT THE BOROUGH OF MECHANICSBURG SUBDIVISION AND LAND DEVELOPMENT ORDINANCE, AND ALL OTHER REGULATIONS OF BOROUGH OF MECHANICSBURG WHICH PERTAIN TO THE CONSTRUCTION OF THE TYPES OF IMPROVEMENTS REGULATED BY THESE SPECIFICATIONS.

ALL SANITARY SEWERAGE SYSTEM CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY OF THE BOROUGH OF MECHANICSBURG. IF CONFLICTS BETWEEN THESE SPECIFICATIONS AND THE AUTHORITY REQUIREMENTS ARISE, THE MORE STRINGENT STANDARDS SHALL APPLY.

### A. NOTIFICATIONS

The Borough of Mechanicsburg shall be notified at least two (2) working days prior to the start of any public improvement construction including, but not limited to, excavation, installation of pipe, curb, road structure or removal of anything in an existing street, existing right-of-way, existing utility easement, existing storm drainage easement, and waterways in Borough of Mechanicsburg.

Proof of all required permits, certifications and all other approvals must be available for review prior to the start of construction.

### B. PERMITS AND CERTIFICATES

<u>Permits</u>	<u>Agency</u>
Water Quality.....	Department of Environmental Protection (D.E.P.)
Stream Encroachment.....	D.E.P. and Corps of Engineers (C.O.E.)
Flood Plain Encroachment.....	C.O.E.
State Highway Occupancy.....	Pennsylvania Department of Transportation (PENNDOT)
Borough Street Opening Permit with Insurance Certificate.....	Borough of Mechanicsburg (MECH)
Sediment & Erosion Control.....	Cumberland County Conservation District (CCCD)
Building Permit.....	MECH

**C. LOCATION OF UTILITIES**

Provide proof of compliance with the Utility Notification Requirements of Pennsylvania Act No. 38 of 1991 which amends Act No. 287 of 1974.

**D. OPERATIONAL SAFETY**

Work being performed on any and all existing public highways, streets, rights-of-way and easements, shall require Street Occupancy Permit from the proper authority. All work shall be performed using all required safety protection, including flag persons, signing, barricades, flashing warning devices and other required devices, conforming with PENNDOT Publication 203, *Work Zone Traffic Control*. All labor and materials shall be furnished and maintained solely by the applicant. Borough of Mechanicsburg shall reserve the right to issue a stop work order for any project if the appropriate work zone traffic control safety devices are not in place in accordance with PENNDOT Publication 203.

All work performed shall be in compliance with Federal, State, and local safety regulations and shall provide for public safety and the safety of all personnel involved directly or indirectly in the construction of all improvements, including, but not limited to, trench shoring, protective clothing, safety shields, switches on power equipment, and equipment and vehicle alarms.

**E. CONSTRUCTION OBSERVATION**

Construction Observation shall be performed by the Borough to ensure the use of proper materials and procedures and methods of installation of all improvements required to be installed.

Observations shall be required prior to starting construction, during the prosecution of work, and upon the completion of all improvements. All improvements shall be installed in accordance with all required approved regulations and specifications.

Any and all unsatisfactory work, and defective materials that have been installed, shall be rejected and noted for the record on the Daily Field Report prepared by the Borough's designated representative, and shall be corrected by the applicant/developer before final acceptance.

The placement of all required improvements shall be in accordance with the controls set by a surveyor registered by the Commonwealth of Pennsylvania, to ensure installation of improvements to proper location, elevation, alignment and profile.

The Contractor shall notify the Authority Engineer for construction observation of sewerage system installation.

The following is intended to describe the format of inspections and notification procedures. Scheduling of required inspections shall be the responsibility of the owner.

1. Storm Drainage System

Shall require visual inspection, section by section, upon completion of that section, prior to backfilling any section including pipes, inlets, manholes, endwalls, detention and retention basins, culverts and bridges, and all items being installed as part of the storm drainage system. Concrete culvert and bridge structures may require material samples, in compliance with ASTM C39 standards. Samples must be taken in the presence of the inspector.

2. Subgrade Structure

Observation and testing of subgrade for stability and acquired density and visual inspection of under drain pipe installation including all connections to the storm drainage system as required by the Borough Engineer. Nuclear density testing by a third party inspection agency may be required.

3. Subsoil System

Observation to determine subsoil structure compaction to required density, and inspection of subsoil elevation to insure grade and profile conformance with selected street construction requirements. Nuclear density testing by a third party inspection agency may be required.

4. Concrete Curb Structure

Observation prior to installation to verify type of curb, vertical, slant, and/or a combination of either. String line shall be set prior to any concrete pour to show line and grade, profile and alignment. Material inspection, including the submittal of all certified material delivery slips.

5. Subbase Course

Observation of materials placed as subbase prior to installation of base course, for type, thickness and density/stability prior to installation of base course, including the submittal of all certified material delivery slips. Nuclear density testing by a third party inspection agency may be required.

6. Base Course

Observation of materials placed as base for type, thickness and density/stability prior to installation of wearing course, including the submittal of all certified material weight slips.

7. Wearing Course Structure

Observation of materials placed as wearing surface for type, thickness and density/stability prior to accepting of streets, including the submittal of all certified material weight slips.

8. Sidewalk Structures

Observation of subbase grade, form grade and alignment prior to any pour.

9. Right-of-Way Profile

Observation of required finish grade elevations to limits of street right-of-way.

10. Drainage Easement Piping and Structures

Observation of required finish grade elevations, alignments and profiles to limits of easement.

11. Site Stabilization

Observation of permanent site stabilization measures including seeding and protective linings within the limits of the right-of-way.

12. Final Inspection

All public improvements shall be inspected for conformance with approved plans.

The intent of the construction observation specifications and procedures is to ensure the proper placement and workmanship of constructed improvements in accordance with the approved design.

**F. STREET SPECIFICATIONS**

1. All material depths as listed shall mean material depths compacted in place to the density required for each type of material. Placement of materials shall be by using methods conforming to PENNDOT Specifications, Publication 408, as amended, unless specified otherwise herein.

2. Street subsoil shall be excavated, compacted and profiled to a point one foot (1') beyond back of concrete curb structure. Subsoil shall have slope of 2% from centerline of street to point one foot (1') beyond back of curb.
3. Paving rings for the purpose of bringing manhole covers and valve boxes to finished grade are prohibited. Manhole covers and valve boxes shall not be placed within curb structures or sidewalks.
  - a. All underground utility structures (valve boxes, manholes, etc.) shall be raised to grade prior to any final paving operations.
4. Concrete curb types and dimensions of placement:
  - a. Standard straight curb shall be constructed as shown in Section L. ½" expansion joints shall be every 100 feet, at structures, and at the end of each day's work. Contraction joints shall be saw cut every 20 feet a minimum of 2 inches in depth and sealed with an elastomeric sealant by Sika Flex or approved equivalent. Concrete shall be minimum 4,000 psi compressive strength and installed in accordance with PENNDOT Publication 408, as amended.
  - b. All curb terminus' shall have end treatment in accordance with PENNDOT RC standards.
5. Sidewalk shall be constructed of 4,000 psi concrete, 4 foot wide, 4-inch thick placed on a minimum 4-inch layer of No. 57 stone bedding. One half inch (½") expansion joints shall be every 20 feet with contraction joints cut every 4 feet a minimum of 1-inch in depth. Additional expansion materials shall be placed between any curb and driveway aprons and in the sidewalk and apron. A "tooled edge" shall be provided on all edges including expansion joints.

In the case where sidewalks are proposed directly against curb, expansion material shall be installed continuously along the common edge.

Handicapped ramps shall comply with Americans with Disability Act and shall be constructed at all street intersections. No drop off will be acceptable between ramp and pavement.

Access drives shall be brought to grade of walk and depressed curb to be carried across all drives to 1- 1½" above gutter grade. (See curb cut detail in Section L).

10-gauge 6" x 6" WWF shall be installed in all driveway apron/sidewalk areas.

6. All interface areas adjacent to curbs, "Existing Paving", inlets, utility covers, and trench repair areas shall be sealed with AC-20.

7. The coarse aggregate used in bituminous wearing course shall meet the minimum skid resistance level (SRL) letter designation as determined by the designer based upon guidelines from PENNDOT's Design Manuals and approved by the Borough.
8. Restoration of trench openings in all streets:
  - a. Full depth stone backfill (2A) shall be used, compacted in lifts of maximum 8 inches to 95% of modified proctor.
  - b. Nuclear density testing shall be performed on all backfill by a certified third party inspection agency at the sole expense of the applicant/developer. Tests shall be performed at a rate of one per 25 linear feet of longitudinal trench for each 2 foot depth of backfill material, with a minimum of one test required and one test per 10 linear feet of transverse trench for each 2 foot depth of backfill material, with a minimum of one test required.
  - c. Initial surface restoration shall be made with the installation of 2 inches of temporary paving, maintained until the final restoration is completed. Final surface restoration shall be made between 60 and 180 days after the street is opened as soon as weather conditions permit.
  - d. Prior to making final restoration, one foot from each edge of the trench shall be saw cut, in a neat straight line, to the bottom elevation of the existing base course, and the detached material shall be removed. The pavement depths shall be a minimum of 4 inches of Superpave HMA base course HMA, and 1½ inches of Superpave HMA wearing course. Additional Superpave base course shall be used to match the total existing pavement thickness if the total thickness exceeds 6". (See Section L for typical trench and roadway restoration detail.) All subgrade material shall be stable and thoroughly compacted prior to placement of Superpave base course.
  - e. All "saw cut" and vertical edges shall be sealed with AC-20.
9. All public streets shall be constructed of a flexible type pavement section unless the construction of a rigid type pavement section has been authorized by the Borough Council.
10. All materials and construction methods employed in the construction of public streets shall be in accordance with the latest edition of PENNDOT's Specifications (Publication 408).
11. For minor streets, the minimum pavement section shall consist of a 1½" Superpave HMA wearing course, PG 64-22, < 0.3 million ESALS, 9.5 MM mix

on a 4" Superpave HMA base course, PG 64-22, < 0.3 million ESALS, 25 MM mix on subbase (2A) 6" depth laid on a prepared subgrade.

12. The minimum pavement section shall be constructed unless:
  - a. The minimum pavement section is increased at the professional discretion of the Borough Engineer if there is evidence of: inadequate soil subgrade bearing capacity or the possibility of excess equivalent eighteen thousand pound single-axle load applications during the 20-year design life of the pavement.
  - b. The developer submits to the Borough a pavement design analysis in accordance with the procedure specified in the latest edition of PENNDOT's Design Manual, Part II entitled "Highway Design" (Publication 13), demonstrating that a lesser pavement section may be used.
13. For major streets including collector streets and arterial streets, industrial and commercial developments, a pavement design analysis in accordance with the procedure specified in the latest edition of PENNDOT's Design Manual, Part II "Highway Design" (Publication 13) shall be submitted to the Borough for approval.
14. Pavement base drains shall be installed beneath public streets at locations where the Borough Engineer deems necessary to properly drain subbase.

The Borough Engineer shall base this determination on: soil survey reports published by the USDA – Soil Conservation Service, on-site inspection and investigation of the natural subgrade soil and subsurface drainage conditions, soil tests and additional means in accordance with adopted engineering practice. Necessary soil tests shall be performed as directed by the Borough Engineer at the sole expense of the developer.

Where pavement base drains are required, they shall be installed in accordance with PENNDOT Specifications, Publication 408. The pavement base drain shall consist of a four (4) inch diameter perforated pipe in an aggregate filled trench extending twelve (12) inches below the bottom of the base course as per PENNDOT's Standards for Roadway Construction (Publication 72). In general, the pavement base drains shall be located on each side of the cartway. The location and type of all subsurface drain outlets shall be subject to the approval of the Borough Engineer.

15. Applicant shall be responsible for providing temporary paving around all utility structures immediately after binder course placement. Provide temporary diversion swales as required to provide positive drainage to all inlets.

16. Shoulders, where required, shall be four (4) feet in width from the edge of the pavement. Shoulders shall be a minimum of PENNDOT's Type 3 and shall consist of a full depth aggregate course equal to flexible pavement thickness, or better of, No. 2A stone with a bituminous surface treatment. In lieu of bituminous surface treatment the bituminous wearing surface may be extended the width of shoulder over aggregate base course equal to depth of pavement binder, and lane lines provided.
17. Each new street being constructed shall be inspected at the completion of each stage of construction; subgrade, base course, subbase, and wearing course. It shall be the responsibility of the contractor to notify the Engineer a minimum of 48 hours prior to when inspection is desired.
18. Subgrade shall be compacted to 95% of modified proctor, and all unstable material shall be replaced.
19. Nuclear density tests shall be provided by certified personnel to verify in place densities. Compaction tests shall be provided for all trenches in accordance with Section 4.8.b. of this manual and for all new public road construction within the Borough. Tests shall be required for the compaction of subsoil and subgrade in both cut and fill areas, storm sewer and structure backfill, and subbase course. Provide testing at intervals of one test for every 150 square yards for each 2 foot depth of fill material placed. One test per 300 square yards of subgrade preparation in cut sections and subbase placement shall be required. Density tests shall be provided at drainage structures in a minimum of four areas or more as directed by the Borough Engineer based on field conditions. A minimum of one test shall be required for quantities less than those listed above. All tests shall be performed in accordance with AASHTO specification T-191 or T-310.
20. A test for materials thickness shall be provided at the request of the Borough Engineer, to verify compliance with these standards.
21. Compaction of subbase stone shall be accomplished with roller capable of achieving densities required by PENNDOT Specifications, Publication 408, latest edition.
22. Deadline for wearing course placement is October 31 of each calendar year, in accordance with PENNDOT standards. Exceptions can only be approved by the Borough Council.
23. "Tack" coat may be required at the Borough Engineer's discretion before application of wearing course to any surface. Base course pavement shall be swept clean prior to wearing course placement.
24. All materials, types of equipment, and construction procedures shall be in accordance with PENNDOT Specifications, Publication 408, latest edition.

## **G. STORM DRAINAGE**

### **1. PIPE**

An enclosed water carrying structure of one or more barrels having a total flow equivalent to 48-inch diameter or less.

Material Alternates:

- Reinforced concrete, tongue and groove, shall conform to AASHTO M170 and M207.
- Corrugated polyethylene (PE) smooth interior only, shall conform to ASTM D1248 and D2412. Stone backfill shall be placed to one (1) foot above the crown of the pipe, or as required by manufacturer's specifications.
- Corrugated polyethylene (PE) perforated underdrain shall conform to AASHTO M252.

All installations shall be in accordance with manufacturer's recommendations.

### **2. CULVERT**

An enclosed water carrying structure of one or more barrels having a combined span less than 8 feet and having a total flow area greater than 48-inch diameter.

Material Alternates:

- Reinforced cement concrete cast in place, mix design strength 4,000 psi.
- Pre-cast reinforced concrete box sections in accordance with AASHTO M259.
- Reinforced concrete piping, rubber gasketed, shall conform to AASHTO M170, M198, and M207.

All culverts shall have reinforced concrete pre-cast or cast in place full flow inverts to limits of required endwall sections, with invert base end cut-off walls extending three feet (3') below channel flow line, or to rock whichever occurs first.

All culverts with continuous or intermittent water flow other than rainfall events shall have type "DW" headwalls/endwalls installed. All others shall have suitable end treatments to accommodate site conditions.

Installations having a maximum five feet (5') vertical rise from flow channel invert to crown of street, with the required maximum 3 to 1 embankment slope from limit of right-of-way to elevation of low channel invert, shall not require protective parapets. All other installations shall require protective concrete parapets and approach guide rail in accordance with PENNDOT Specifications, Publication 408.

All culvert structures shall require a submission of complete design drawings and shop drawings, for review by Borough, to assure compliance to PHL-93 loading, flow design capacity and calculated life cycle of proposed structures.

Minimum one foot (1') cover over top of culvert to subgrade shall be required.

### 3. BRIDGE

An enclosed water carrying structure of one or more barrels having a combined span of 8 feet or greater.

All bridge designs shall be in accordance with PENNDOT Design Manual, Part IV (Latest Revisions) and shall be submitted to Borough for approval of materials, structural design, compliance to PHL-93 loading, flow design capacity and calculated life cycle of proposed structures. All bridges shall have concrete parapets and approach guide rail in accordance with PENNDOT Specifications, Publication 408.

### 4. DETENTION/RETENTION BASINS

Primary Outlet Structures:

Materials:

- Pipe – Reinforced concrete, rubber gasketed, shall conform to AASHTO M170, M198 and M207.
- Poured-in-Place Outlet Structure – Reinforced concrete, minimum 4,000 psi compressive strength in accordance with PENNDOT Publication 408, Latest Edition.
- Pre-cast Outlet Structure – Reinforced concrete, minimum 4,000 psi compressive strength in accordance with PENNDOT Publication 408, Latest Edition. Submit design and shop drawings for Borough review and approval.
- Pre-cast Reinforced Concrete Box Sections in accordance with AASHTO M259. Submit design and shop drawings for Borough review and approval.

- Orifice Plates – Stainless steel, type 304, with stainless steel mounting hardware. Use ¼ inch thick up to 24-inch span and 3/8 inch thick over 24-inch spans.
- Headwalls/Endwalls – Reinforced concrete, minimum 3,750 psi. Compressive strength in accordance with PENNDOT Publication 408, Latest Edition.
- Cutoff Collars – Reinforced concrete, minimum 3,750 psi compressive strength.
- Concrete Pipe End Sections – Reinforced concrete in accordance with PENNDOT Publication 408.
- Steel Grates – In accordance with PENNDOT Publication 408, Latest Edition.
- Outlet structures, headwalls, and endwalls shall be designed to prevent unauthorized or accidental access to drainage structure.

Embankment:

Embankment Structure – Materials suitable, to limit the seepage through the embankment so that no internal erosion takes place. The embankment structure shall include an impervious core and cutoff trench, if required, compacted to a minimum density of 95% of modified proctor.

Maximum 3:1 slopes shall be maintained on limited access facilities interior slopes and 4:1 on exterior slopes.

Underground Detention:

Structure – Materials as approved under pipes. Submit design and shop drawings for Borough review and approval.

5. STORM DRAINAGE APPURTENANCES

- a. Headwalls, endwalls, inlets, manholes and energy dissipators shall be furnished and installed in accordance with PENNDOT Publication 408, Latest Edition.
- b. All drainage manhole covers shall have the words “Storm” cast in them.
- c. All inlets shall have bicycle safety grates. Channels shall be poured in inlets and manholes using 3,300 psi compressive strength concrete.

1. All sectional pre-cast units shall be set in mastic at the perimeter of all joints prior to final placement. The use of non-shrink cement grout as a bonding agent will not be permitted.
2. Pre-cast “riser” units shall be required in place of brick and grout construction for inlets requiring final adjustment to grade.
3. Weepholes shall be placed in all pre-cast units. Provide geotextile fabric on exterior face of weephole openings.

## **H. BUILDING SEWER AND SANITARY LATERAL INSTALLATIONS**

### **1. DEFINITIONS**

Unless clearly stated otherwise, the meanings of terms used in this Ordinance shall be the same as those used in the Sewers and Sewage Disposal Ordinance of the Borough of Mechanicsburg.

### **2. PERMITS**

No connection shall be made nor construction or modification of a Building Sewer or Lateral unless and until the owner of the property in which the work is to be done, or the contractor who is to do the work as the owner's representative, shall have applied for and obtained the necessary permits from the Borough as required in the Sewers and Sewage Disposal Ordinance of the Borough of Mechanicsburg.

### **3. INSPECTION AND TESTING**

Sanitary Sewage will be admitted to the Sewer System only after satisfactory inspection of the Building Sewer and Lateral by the Borough. The property owner or Contractor shall give the Borough a minimum of 24 hours notice of the date when work is scheduled to begin and a minimum of two hours advanced notice for an inspection. Inspections and tests shall only be performed during regular Borough business hours. The discharge of roof, storm, surface, or building foundation water or drainage into a Building Sewer or Lateral is prohibited.

- A. Testing Equipment: The Contractor will be responsible for providing all test equipment. Control valve and test gauge apparatus shall be located above grade during testing to allow for observation by the Borough. Testing apparatus must be equipped with necessary piping, control valves and gauges to control pressure within piping test section and to monitor pressure throughout the test.
- B. Testing apparatus shall have an approved pressure relief device set at 10 psi to prevent accidental overloading. The test gauge shall be recently calibrated and read in one-half pound increments.

- C. Before tests are conducted, clean the pipe line until free of dirt, silt, and construction debris. Provide a means to collect the debris during the cleaning of the pipeline.
- D. After the pipeline is cleaned and partially backfilled to the extent required to hold the pipe in place, but with the top of the pipe still visible, perform a low pressure air line acceptance test in accordance with the following:
  - (1). Seal the pipeline at the connection to the main sewer or lateral end test tee, and at the property owner's structure, using pneumatic type plugs. Test the seal plugs first on a short length of pipe outside the trench before performing the actual in-trench testing.
  - (2). Introduce low-pressure air slowly into the sealed pipe until internal air pressure reads 5 psi. Introduce air until the pressure is stabilized after which the test period should begin. A successful test is performed when no drop in air pressure is observed for a minimum of 180 seconds. The Contractor may be required to hold the pipeline under test air pressure while performing the remainder of the backfilling. This requirement is at the discretion of the Borough to ensure that no leakage is produced during backfilling.
  - (3). If the installation does not pass the Borough's test, the contractor must identify the source of the leakage and make necessary repairs. After repairs are completed, the pipeline must be retested at the Contractor's expense and repairs made to any defects found.
- F. The Borough will make a final inspection of the installed pipeline upon completion of surface restoration.
- G. Before the connection of any pre-existing Building Sewer or Lateral to the Sewer System, the Building Sewer or Lateral must pass all required test to the satisfaction of the Borough.

#### 4. PROTECTION

The Contractor shall make every effort to protect the public during installation of the building sewer or lateral.

- A. Total obstruction of streets, roads, or highways is not allowed. Do not partially obstruct streets, roads, and highways unless the Borough or Governing Agency authorizes obstruction in writing. Employ all necessary measures to keep street, roads or highways open and safe for traffic. All work performed within State Highways must meet the requirements of the

latest edition of the Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Department of Transportation, Chapter 459, Occupancy of Highway by Utilities. The regulations are made part of these Specifications by reference. Materials and safety devices provided for the purpose of protecting the work and the safety of the public, and for maintaining and protecting traffic, shall conform to the requirements specified in Section 901 of the current edition of the Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408, as supplemented. Safety devices shall also conform to the requirements specified in the current edition of PA Code Title 67, Transportation, Chapter 203 - Work Zone Traffic Control which complements Section 901.

- B. The Contractor shall pay the costs of inspection by personnel of the Commonwealth of Pennsylvania. When working within the Borough streets, the Contractor is required to obtain a Street Cut Permit from the Borough prior to the start of construction. Maintain a straight and continuous walkway on sidewalks and crosswalks, at least three feet wide and free of obstruction. **DO NOT OBSTRUCT FIRE HYDRANTS.** At the shutdown of work at the end of the day, streets shall remain open and safely passable for both public and emergency access. Notify the Borough police of ANY road closure whether it is daytime or nighttime.
- C. The Contractor shall assume all risks pertaining to the presence of overhead or underground public utility and private lines, pipes, conduits and support work for the same, existing structures and property of whatever nature. Damages and expenses for direct or indirect injury to such structures or to any person or property by reason of them or by reason of injury to them by his/her work rests solely with the Contractor. Contractor must comply with the provisions of the Underground Utility Line Protection Law, as amended. The PA One Call System telephone number is 1-800-242-1776.
- D. The Provisions of the Occupational Safety and Health Act of 1970 of the U.S. Department of Labor shall be complied with in the performance of the work of these Specifications. Observance of and compliance with the Act is the sole responsibility of the Contractor, without responsibility whatsoever on the part of the Borough. The duty of enforcement of this Act lies with the U.S. Department of Labor only.

## 5. EXCAVATION AND BACKFILLING.

The property owner and Contractor are solely responsible for the conditions of excavation. The Borough assumes no legal or financial responsibility for excavating caving or slipping, or damages to persons or property resulting from excavation and backfill activities.

- A. Temporary fences surrounding excavation shall be erected to prevent unauthorized persons entering the excavation area. Substantial barricades shall be furnished and erected by the Contractor at crossings of the trench or along the trenches to prevent public access.
- B. Cover open excavation when work therein is suspended or left unattended, such as at the end of a workday. For such covers, use materials of sufficient strength and weight to prevent their removal by unauthorized persons.
- C. Blasting is not allowed in performance of excavating work. Remove rock by such mechanical means and methods as developed specifically for rock removal without blasting. Additionally, perform rock removal in accordance with the requirements of state and local laws, rules, and regulations, and utility owner requirements.
- D. Excavate trench banks to vertical lines and not less than the outside pipe diameter plus 12-inches from sub grade elevation to an elevation at least 12-inches above the top of the outside barrel of the pipe. Where shoring is required, the dimensions apply to the inside face of shoring. From a point 12-inches above the top of the outside barrel of the pipe, keep trench banks as nearly vertical as possible for trenches made in roadways. In no case shall the trench width exceed the outside pipe diameter plus 40-inches. Where pipelines are constructed in other than streets or roadways, the maximum trench width is at the discretion of the property owner, only if construction is kept entirely on the limits of the property line without damaging adjacent properties.
- E. On site excavated soil or soil-rock mixed material free of topsoil, vegetation, lumber, metal, refuse, and rocks or hard objects larger than 6-inches in any dimension may be used for backfilling within the right-of-way or on private property. Rock to soil ratio shall not exceed one part rock to three parts soil. Excavated materials that meet the requirements for backfilling should be separated and properly stored until backfilling begins. All other material should be disposed of properly in accordance with all applicable rules and regulation. Do not use materials such as house ash, putrescible refuse and other such materials considered unsatisfactory by the Borough for backfilling. Do not permit excavation to be used as dumping areas for refuse.
- F. Do not use frozen backfilling materials or place backfilling on frozen sub grade of trench surfaces. Should there be a deficiency of on site backfilling material, provide acceptable borrow material. Where the backfill is placed in other than street, place the backfill in six-inch compacted layers over the initial backfill in a manner that does not disturb the pipe. Replace topsoil to the approximate depth of existing topsoil.

- G. Where backfill is within the right-of-way of existing State Highway, the work is subject to inspection by representatives of the Commonwealth of Pennsylvania Department of Transportation (PDT) and must conform to all their requirements. General requirements include:
- (1). Paved Areas: Over Initial Backfill, place an Aggregate Backfill, Select Granular Material (PDT2RC), which meets the requirements of the PDT, to the bottom of the temporary or permanent paving.
  - (2). Unpaved Shoulders: Over initial backfill place the aggregate backfill to existing grade.
  - (3). Unpaved Areas: Over Initial Backfill, place Aggregate Backfill to the bottom of the topsoil. Replace topsoil to the approximate depth of existing topsoil and crown to such height as required by the PDT Inspector.
- H. Where backfill is within existing and proposed Borough streets perform Backfill operations in accordance with the following:
- (1). Over Initial Backfill, place an Aggregate Backfill, Select Granular Material (PDT2RC), which meets the requirements of the PDT, to the bottom of the temporary or permanent paving.
  - (2). Unpaved Shoulders: Over initial backfill place the aggregate backfill to existing grade.
- I. All shoring materials and installations shall conform to Federal (OSHA), State and local laws, rules, regulations, requirements, precautions, orders, and decrees. The responsibility for inspection and determination of compliance and enforcement lie with said agency and department and not with the Borough. Underground pipes or conduits exposed as a result of excavation shall be adequately supported for the entire length of their exposure. Supports shall be installed in a manner that exposed pipes and conduit not become dislodged or break during backfilling. Trenches should be kept free from water until pipe joints have made and inspections and tests have been performed. Under no circumstances should pipe be laid in water or on bedding containing frost.
- J. Aggregate Bedding: Use Select Granular Material (2RC) conforming to the requirements of the Commonwealth of Pennsylvania Department of Transportation (PDT) Publication 408, Section 703.3. Slag aggregates are not allowed.
- K. Pipe Zone Bedding and Initial Backfill: Use Coarse Aggregate conforming to PDT Section 703.2 (AASHTO No.8). Place bedding and initial backfill in 4-

inch layer in such a method not to damage or disturb the pipe. The minimum height of the Initial Backfill shall be 12-inches above the pipe.

- L. Compacting: All backfill material must be properly compacted according to regulations of the appropriate Authority. Such Authority should approve mechanical compactors and tampers.
- M. Streets, sidewalks, curbs, and all other public property disturbed during construction shall be restored to as new condition.
- N. Warning Tape: Continuous warning tape shall be provided in all trenches for purposes of identification and early warning during future trenching or other excavations. The underground warning tape shall be a magnetic polyethylene tape, a minimum of 3-inches in width, with a minimum lettering of 1-inch. Tapes shall be buried at a depth of 6-inches below finished grade. In pavement, tapes shall be buried 6 inches below the bottom of the road subbase.

## 6. PIPING

Install piping in accordance with the Detailed Drawings attached hereto and made part of these specifications. Provide a minimum depth of four feet of cover over pipelines for frost protection.

- A. Elastomeric materials used in pipelines shall be suitable for continuous contact with domestic sewage.
- B. Polyvinyl Chloride (PVC) Pipe: Schedule 40 PVC Pipe with a minimum diameter of 4 or 6-inches that is properly marked should be used for gravity installations. The pipe should have a hydrostatic design stress of 2,000 psi and designated PVC 1120.
- C. Ductile Iron Pipe (DIP): DIP shall be class 50 with push-on or mechanical style rubber-gasket joints. All fittings shall be gray iron or ductile iron. Pipes and fitting should all be properly lined and coated. DIP should only be used when approved by the Borough in writing.
- D. Where new Laterals are to be provided, the Contractor shall only use materials approved by the Borough. Use fitting types as appropriate to the main sewer being connected to, unless otherwise instructed by the Borough.
- E. PVC Saddles: PVC Saddle should be correctly contoured for outside diameter of pipe and incorporating ring gasket bell outlet for SDR-35 PVC pipe or schedule 40 PVC adapter or solvent weld outlet for PVC adapter (or solvent weld outlet for Schedule 40 PVC Lateral pipe).

- F. Cast Iron Saddles (for Connection to Other Than Plastic Sewer Mains): use saddle correctly contoured for outside diameter of the pipe and incorporating a gasket and band assembly.
- (1). Saddle body shall be Class 35 Cast Iron and coated heavily inside and out with a heavy coat of black asphaltum type paint.
  - (2). Gasket shall be a rubber compound (neoprene) tubular O-ring design.
  - (3). The band shall be made of type C -304 stainless steel band assembled with two 3/8-inch Type B304 stainless steel T-bolts, washers and hex nuts.
  - (4). Provide bell inlet saddle suitable for solvent weld connection of Schedule 40 PVC.
- G. Make connections to main sewer incorporating a saddle connection. Core bore a hole in the sewer of proper size using a machine specifically designed for the purpose; no other means of making the hole is permitted. Notify the Borough of sewer main tap after hole is cut for inspection.
- H. Pipe Installation: Pipe shall be laid at a minimum grade of 1 percent with the best possible alignment. Pipe shall have maximum cover possible to protect the pipe from frost damage. All PVC solvent welds should be properly primed. All joints should be absolutely watertight. No transition from one pipe material to another is permitted without special manufactured adaptors designed specifically for that purpose. Pipeline bends shall not greater than 45 degrees except with authorization from the Borough.
- I. Traps: A trap and air intake pipe must be provided for each Building Sewer, as shown on the attached drawings, unless all plumbing fixtures within the structure to be served are properly trapped and vented. The top of the air intake pipe shall extend a minimum of 6-inches above the ground surface to prevent surface water from entering and shall be provided with a cap sufficient to prevent the entrance of precipitation.
- J. Building Sewers shall not exceed 50 feet without having a clean-out installed. Clean out shall include a riser of the same material and size of building sewer and lateral. Caps can either be of cast brass or PVC inverted lug design.
- (1). If in a location of traffic a Cap Protection Casting shall be installed to protect the riser and cap from damage.
  - (2). Clean-out riser at connections to laterals and just outside the building wall shall be at grade but must remain visible.
  - (3). Clean-out risers located in all other areas, except at test tees at the street and building, shall either be capped with a watertight cap approximately two inches below grade or at grade. Install a short, 6-inch long, piece of 10-inch steel well casing surrounding the clean-out cap to promote future detection of cap location.

- (4). As an alternative to item 3 above, an inverted lug cap at grade maybe used.

## 7. GRINDER PUMPS

Structures that cannot be served by gravity building sewers meeting the requirements specified in Section 4 shall be provided with a complete grinder pump system to transport sewage to the Sanitary Sewer. The grinder pump system shall include a building sewer from the structure to the grinder pump basin, the grinder pump, motor, basin, control panel, and pressure lateral between the basin and point of connection to the lateral. (Refer to Detail Drawing). The property owner shall maintain ownership of the grinder pump system and shall be fully responsible for its operation, maintenance, and repair.

- A. For new grinder pump systems not provided by the Borough, submit for approval completely dimensioned shop drawings and submit catalog cuts or other data as required to show evidence of Underwriters' Laboratories (UL) Listings and Approvals on the electric control panel and grinder pump. Also submit details of the Anti-Flotation Anchor indicating the size and weight required.
- B. Provide completely watertight basin, of 100 gallon capacity minimum, and designed to withstand the minimum depth of bury earth load at the proposed tank location. Grinder units shall be a minimum of 2 horsepower, Cast Iron, Class 30 Motor, with hardened 440C stainless steel cutter and shredding ring, 416 stainless steel shaft, 12-vane vortex cast iron impeller. The submersible grinder pump shall be designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry.

Acceptable manufactures to include:

1. Barnes Model Number SGV-2022L
  2. Or equal, as approved by the Borough.
- C. Grinder pump units shall comply with the applicable requirements of the Pennsylvania Department of Environmental Protection and the National Sanitation Foundation. Unit must be set on sub grade deemed acceptable by the Borough. In no instance shall units be set on sub grade containing frost.
  - D. Use Discharge piping of 1, 3-inch diameter on the Simplex Unit and 1, 2-inch diameter on the Duplex Unit. Discharge pipe may be SDR 21 PVC (Pressure Class 200 psi.) conforming to ASTM D 2241; or Schedule 80 PVC manufactured from class 12454-B Rigid PVC Compounds with a hydrostatic design stress of 13.8 MPa (2000 psi designated as PVC 1120) and conforming to ASTM D 1785. Use push-on or compression type joint with a

performance conforming to ASTM D 3139 and with rubber gasket suitable for domestic sewage service and conforming to ASTM F 477.

- E. Include a check valve, true union ball valve, and hydraulically sealed discharge flange in pump discharge piping. Provide valves of the same type by the same manufacturer; suitable for intended service. Markings factory cast on the bonnet or body of each valve shall indicate manufacturer's name or mark, year of valve casting, size valve, directional flow arrow and designation of working water pressure. Valve pressure-temperature rating of not less than the design criteria applicable to system components. Valves shall open to the left (counterclockwise). Provide extension stems with bronze bushed stem guides where required. Provide a top support and one intermediate support unless the unsupported stem length exceeds four feet, in which case provide an additional support every two feet of valve stem length. Valve ends shall be threaded in accordance with ANSI B2.1.
- F. Use ball check valve designed for minimum water working pressure of 150 psi and factory tested to double that pressure before shipment. Check valve bodies to provide excess area through the valves to assure full delivery of line capacity. Include with each Unit one separate 1 3/4-inch check valve for installation in the discharge line between the Grinder Pump and the sewer main. Double union type manufactured from PVC 12454-B conforming to ASTM D 1784 with Vitron O ring seals.
- G. Provide the pump discharge with a factory installed true union, manually operated shut-off ball valve. Ball valves shall be full ported, constructed of stainless steel, cast iron, or PVC, with rated pressure of 150 psi.
- H. Install units and associated piping and valving in strict accordance with manufacturer's instruction and installation manual, and in locations and in accordance with Detailed Drawings. Install units on a six-inch deep compacted layer of aggregate meeting all requirements. Install pipe zone bedding material as backfill up to highest pipe connection. Form and pour anti-flotation concrete anchors in accordance with all requirements. Use Class B (3,000 psi) concrete.
- I. Provide two-foot minimum cover over underground electrical cables unless otherwise indicated on the Drawings. Make electrical cable penetrations through the tank absolutely watertight. Perform grounding of electrical system and metal enclosures in accordance with Article 250 of the NEC. In addition use approved grounding connectors only. Clean the surfaces involved in the made-grounds before connecting and finish the installation with touch-up painting or other protective coating to prevent corrosion.
- J. Appropriately fasten control panel and cable to exterior of the building or post (for post mounted) using screw type corrosion resistant fasteners correct for

the particular material. Install control panel such that from the bottom of the panel to the existing grade measures four-feet. If post mounts installation, provide post of sufficient length to permit three feet of embedment in ground and the four feet of clearance required. Control panels may also be installed within the interior of the building.

- K. Perform both exfiltration and infiltration tank watertight tests. Fill the installed units with clear water to highest tank wall. Allow one-hour for stabilization before commencing a three consecutive day test. Measure and record the water level at the end and beginning of the test in the presence of the Engineer. For a successful test, the water level must not go up or down in the three days
  
- L. Determine a mutually acceptable time for inspections and tests with the unit manufacturer. Conduct the performance test prior to the property owner's electrical wiring and plumbing connections to the grinder pump. Tests shall be conducted as specified herein. Demonstrate to the satisfaction of the Borough the mechanical performance of each unit when operated in accordance design intent and specifications. Upon satisfactory completion of test in the presence of the Borough and manufacturer, provide written documentation of test results to the Borough. Provide all necessary materials needed for tests.
  
- M. Electrical systems tests must be completed in the presence of the Borough. Electrical work must be inspected by authorized inspection agency for compliance with the NEC. The entire installation must be rendered free from short circuit and improper grounds. In no case shall the insulation resistance be less than one hundred thousand ohms. Perform initial electrical system tests using meggers, ammeters, voltmeters, insulation resistance testers, and high-pot testers prior to placing electrical systems into complete operation. Use meggers with an adjustable 2.5/5.0 KV range which will permit reading of 0.05 to 100,000 Megohms. The minimum testing voltage obtained by adding 1000 V to twice the rated voltage of the cable, device, apparatus or equipment in no case should the resistance be less than one Megohm. However, the recommended insulation resistance measurement of each test shall conform to the IEEE and ANSI Standards.
  - (1). Connect 120V temporary power source to the alarm circuit at the control panel and fill the tank with sufficient water to test the high level audible and visual alarms
  
  - (2). Connect 24V temporary power source to the power circuit at the control panel and run the unit through a minimum of three operation cycles to check pump operation and shut-off.
  
  - (3). Installer shall repair all deficiencies

## **I. SPECIFICATIONS FOR GEOTEXTILES**

### **1. Geotextile Type 1 – Street Applications**

Shall be installed on compacted subgrade to front of concrete curb structure. Install in compliance with manufacturer's recommendations. All edges of fabric shall be overlapped a minimum of two feet (2'). Fabric shall be installed from edge line of street to centerline of street. Geotextile Type 1 shall be equal to Phillips Fibers Corporation Supac Non-Woven Geotextile 5NP.

### **2. Geotextile Type 2**

Install as part of wearing surface structure. Material shall be machine placed. Apply AC-20 at a rate of 0.25 gallons per square yard or E-3 or E-8 at a rate of 0.35 gallons per square yard. Geotextile Type 2 shall be equal to Phillips Fibers Corporation Petromat 4½ oz. per square yard.

### **3. Geotextile Type 3 – Storm Drainage Applications**

Storm Drainage Applications installed in conjunction with rip rap and gabion mattresses on compacted subgrade. All edges of fabric shall be key way channel set and fabric overlapped in key cut and backfilled to flow line with rip rap or gabion mattresses. Geotextile Type 3 shall be equal to Phillips Fibers Corporation Supac Non-Woven Geotextile 4NP.

### **4. Geotextile Type 4**

Shall be installed as required for sediment control and construction site stormwater drainage control. The fabric shall be installed as to create a fence. The bottom of the fabric shall be adequately buried in a trench cut into the ground so as to prevent sediment from escaping under the fence. Geotextile Type 4 shall be equal to manufacturer Phillips Fibers Corporation 3WS-UV.

### **5. Geotextile Type 5**

Erosion control and re-vegetation mat for use in storm drainage easements, embankments (excluding emergency spillways) and flow channels. Geotextile shall be a flexible mat of vinyl monofilaments bonded together into a three-dimensional web. The mat shall have an optimum balance of web density, porosity,

flexibility and weight. Placement, site preparation, mat anchor trenches, seeding, mat placement, ground fastening, in ditches/channels, shall be in accordance with manufacturer's guidelines. Geotextile Type 5 shall be equal to Mirafi Inc., Miramet 3M.

**J. STREET IDENTIFICATION SIGNS AND MARKINGS**

1. Street sign posts: hot dipped galvanized steel tubing, twelve feet (12'), one piece section, 2-3/8" O.D., minimum 2 lbs. per foot.
2. All fittings shall be aluminum and/or stainless steel.
3. Signs shall be aluminum minimum .080 gauge thickness.
4. Sign facing shall be 3M Engineer Grade, color green.
5. Letters shall be 3M Series 605-B, H.A., color white, 8" height.
6. All signs shall meet PENNDOT Specifications, Publication 408 for materials.
7. All signs shall be constructed with break-away mountings in accordance with "Traffic Control Signing Standards," PENNDOT Publication 111, TC 7700 Series as last amended.

**K. TRAFFIC CONTROL DEVICES**

All traffic control devices shall meet the standards of the U.S. Department of Transportation Manual of Uniform Traffic Control Devices, as amended. All materials and construction procedures shall be in accordance with PENNDOT Specifications, Publication 408 as amended.

**L. TABLE OF ABBREVIATIONS**

DEP	Pennsylvania Department of Environmental Resources
COE	Corps of Engineers
PENNDOT	Pennsylvania Department of Transportation
MECH	Borough of Mechanicsburg
CC	Cumberland County
CCCD	Cumberland County Conservation District
ASTM	American Society for Testing Materials
AASHTO	American Association of State Highway and Transportation Officials
AWWA	American Water Works Association
ANSI	American National Standards Institute
WWF	Welded Wire Fabric

*Section M - Details*

BOROUGH OF MECHANICSBURG

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Resolution No. 2006-XX

**AFFIRMING AND ENACTING THE ESTABLISHMENT OF THE IMPROVEMENT SPECIFICATIONS MANUAL AS OFFICIAL POLICY FOR THE PREPARATION, CONSTRUCTION AND INSTALLATION OF ALL PUBLIC IMPROVEMENTS.**

**WHEREAS,** The Borough of Mechanicsburg Borough Council did cause to have developed an Improvement Specifications Manual setting forth, clarifying and compiling minimum standards for the preparation, construction and installation of public improvements within the Borough of Mechanicsburg; and

**WHEREAS,** The Borough of Mechanicsburg Borough Council did act on \_\_\_\_\_ to adopt the Improvement Specifications Manual for public improvements as a policy for the Borough; and

**WHEREAS,** The Borough of Mechanicsburg Borough Council desires that this action taken \_ be formalized, affirmed and enacted.

**NOW, THEREFORE, BE IT ENACTED AND RESOLVED BY THE BOROUGH COUNCIL OF BOROUGH OF MECHANICSBURG AS FOLLOWS:**

The document entitled "Improvement Specifications Manual" drafted and presented by the firm of Pennoni Associates Inc., adopted by the Borough of Mechanicsburg Borough Council as a policy for the Borough on \_\_\_\_\_ is hereby affirmed, adopted and enacted as the Official Policy of the Borough of Mechanicsburg setting forth minimum standards for the preparation, construction and installation of all public improvements within the Borough.

The Manual shall be made available to the public, at a cost set by the Borough Council, at the Municipal Building.

**ENACTED AND RESOLVED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_**

**BOROUGH OF MECHANICSBURG BOROUGH COUNCIL**

BY: \_\_\_\_\_  
Chairman

ATTEST: \_\_\_\_\_  
\_\_\_\_\_  
Vice Chairman

\_\_\_\_\_  
Council Member