ANTRIM TOWNSHIP MUNICIPAL AUTHORITY

Water Construction Specifications

Antrim Township Municipal Building
10655 Antrim Church Road
Greencastle, Pennsylvania 17225

JANUARY 2003

STANDARD REGULATIONS

WATER SYSTEM CONSTRUCTION

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Table of Contents

Introduction 5

CHAPTER 1

GENERAL CONDITIONS

1-1 Definitions 7
1-2 Intent of Specifications 8
1-3 Scope of Work 9
1-4 Permits, Licenses, and Certificates 9
1-5 Arranging Work 10
1-6 Conducting the Work 10
1-7 Observance of Laws 10
1-8 Safety Regulations 10
1-9 Protection and Safeguards 11
1-10 Public Safety 12
1-11 Inspection 12
1-12 Township Inspection Fees 12
1-13 Pennsylvania Department of Highways Specifications 12
1-14 Other Fees 12
1-15 As-Built Drawings 13
1-16 Complaints and Deficiencies 13
1-17 Special Construction 13
1-18 Plans and Specifications 13
1-19 Act 287 14
1-20 Property Corners 14
1-21 Guarantee 14

CHAPTER 2

GERERAL REQUIREMENTS

2-1 General 15
2-2 Products 15
2-3 Transport and Handling 16
2-4 Storage and Protection 16
2-5 Product Options 17
2-6 Substitutions 17

CHAPTER 3

EXCAVATION AND BACKFILL

3-1 General 19
3-2 Excavation 20
3-2.1 Preparation 20
3-2.2 Execution 20
3-2.3 Field Quality Control 21
3-2.4 Rock Excavation 22
3-2.5 Blasting 22
3-2.6 Condition of Excavation 23
3-3 Backfilling 23
3-3.1 Extent of Backfill 23
3-3.2 Backfill Material 24
3-3.3 Preparation 25
3-3.4 Execution 25
3-3.5 Tolerances 27
3.3-6 Field Quality Control 27
3-4 Dewatering 28
3-5 Sheeting, Shoring and Bracing 28
3-6 Protection of Finished Work 28
3-7 Protection of Property 28
3-8 Obstructions 29

CHAPTER 4

TRENCHES

4-1 Width and Depth of Trenches 31
4-2 Field Measurements 32
4-3 Coordination 32
4-4 Workman Qualifications 32
4-5 Fees 32
4-6 Fill Materials 32
4-7 Preparation 33
4-8 Excavation 34
4-9 Compaction and Backfilling 35
4-10 Tolerances 37

4-11 Field Quality Control 37
4-12 Protection of Finished Work 37
4-13 Backfilling 38

CHAPTER 5

MATERIALS

5-1 Ductile Iron Pipe 39
5-2 Fittings 39
5-3 Cement-Mortar Lining 40
5-4 Mechanical Joint Retainer Glands 40
5-5 Valves 41
5-6 Valve Boxes 42
5-7 Extension Stems 42
5-8 Small Valves 43
5-9 Water Service Lines 43
5-10 Tubing 43
5-11 Fittings for Copper and Tubing 44
5-12 Corporation Stops 44
5-13 Curb Stops and Boxes 44
5-14 Clamping Devices 44
5-15 Fire Hydrants 45
5-16 Steel Encasement Pipe 45
5-17 Cast Couplings 46
5-18 Flanged Coupling Adapters 46
5-19 Pressure Regulating Valves 46
5-20 Air Release Valves 46
5-21 Precast Reinforced Concrete Manholes 47
5-22 Concrete 47
5-23 Manhole Frames and Covers 47
5-24 Manhole Steps 48
5-25 Meters 49
5-26 Plastic Pit Setters 49
5-27 Backflow Prevention Devices 49

CHAPTER 6

INSTALLATION

6-1 General 51
6-2 Lowering Water Main into Trench 51
6-3 Cleaning Pipe and Fittings 51
6-4 Laying Pipe 52
6-5 Setting Valves and Valve Boxes 52
6-6 Setting of Hydrants 53
6-7 Anchorage 53
6-8 Connection to Existing System and Interruptions of Service 53
6-9 Taps onto the Line 54
6-10 Service Lines 54
6-11 Railroad and Creek Crossings 55
6-12 State Highway and Street Crossings 55
6-13 Corrosion Control 55

CHAPTER 7

TESTING AND DISINFECTION

7-1 General 56
7-2 Hydrostatic and Leakage Test 56
7-3 Disinfection 57

CHAPTER 8

CONNECTIONS

8-1 House Service Connections 60
8-2 Concrete Encasement 61
8-3 Duplex Connections 61
8-4 Bedding 61
8-5 Backfill 61
8-6 Location 62
8-7 Non-Residential Connections 62

ATTACHMENTS

Attachment “A” 63
Attachment “B” 64

STANDARD DETAILS

House Service Connections 67
Backfill 68
INDEX 69

INTRODUCTION

Antrim Township is a Municipal Government located in Franklin County, South-Central Pennsylvania with its southern border being a part of the Mason-Dixon line. The 69.5 square mile area has a population of approximately 12,500 citizens. There are 104 miles of Township roads and 77 miles of State highways.

Farming is the main business of the area and in Pennsylvania. Industry includes Grove Worldwide Hydraulic Crane Manufacturing, Corning Glass, Jerr-Dan Roll-Back Truck Manufacturing, Food Lion Distribution Center, Strait Manufacturing, L & S Stone, Fresh Express, Beck Manufacturing and dozens of smaller industries.

Township Government's original responsibility included construction and maintenance of rural roads and small bridges. Today, five elected Board of Supervisors and appointed staff oversee not only transportation, but public sewer, public water, zoning, planning, the Antrim Township Community Park, Enoch Brown Park, and Martin's Mill Bridge Park and special projects concerning the health, safety and welfare of the citizens of Antrim Township.

The location of Antrim Township with its close proximity to Interstate 70 and Interstate 81 running down the middle of the Township has produced tremendous growth in the Township. With the growth trends over the years the Township Supervisors got a vision to build a "Connector Road" connecting exit 3 and exit 5 of interstate 81. This road is the extension of Grindstone Hill Road and has various zoning districts throughout such as Light Industrial, Professional, Highway Commercial II and Community Commercial II. With the construction of the first phase of the "Connector Road" being completed the Supervisors then decided they wanted to look for other sources of water instead of relying solely on the Greencastle Area Franklin County Water Authority.

Lincoln Investments was a group of residents that were developing an area just east of Interstate 81 and on the north side of Hykes Road, which is now known as Sherwood Manor. 1988 this corporation was drilling a well for water for their development when they hit a water supply that could serve 800,000 gallons of water per day. This then created Lincoln Utilities a private water supplier. Since 1988, Lincoln Utilities not only serves all of Sherwood Manor, but also Cedarbrook Estates, The PA Dept. of Transportation Welcome Center, Jerr Dan Corporation, and Nottingham Meadows. In the year 2001, Lincoln Utilities Inc. pumped 14 million gallons, which equates to 38,356 gallon per day.

In 2002, Antrim Township Supervisors approached Lincoln Utilities about purchasing the water company. After a short couple of months Antrim Township and Lincoln Utilities came to an agreement for a sale. On January 20, 2003, Antrim Township Municipal Authority bought Lincoln Utilities, a Water System consisting of a treatment plant and 2 miles of water lines. Antrim Township Municipal Authority owns in addition, a Sewage Collection System

consisting of 77 miles of sewer lines, a wastewater treatment plant, and 23 pumping stations. The water company is solely owned and operated by the Antrim Township Municipal Authority, which was originally created in the mid 1970's to operate the Sanitary Sewage Collection and Treatment System.

Chapter 1

GENERAL CONDITIONS

1 - 1 DEFINITIONS

Where in these Regulations the following words and expressions occur, they shall have the meanings herein given:

Agreement -- The written agreement between Owner and Developer covering the work to be performed.

Approval -- The legal letter of approval issued by the Antrim Township Board of Supervisors and Antrim Township Municipal Authority passed by motion at a legally scheduled meeting of each of the above municipal entities and further witnessed by the Solicitor(s) for same. Said letter of approval shall be addressed to the OWNER and shall be endorsed and ATTESTED to by the OWNER in a manner specified by law.

Contractor -- Person, Firm, Partnership, or Corporation who, with approval of the Owner, intends to build, construct, and install a water system project in the Township.

Detail Drawings -- The detailed construction drawings provided by the Developer, and approved by the ATMA for Water Line Construction.

Developer -- The person, firm, or corporation ultimately responsible for construction of the water line with whom the Owner has entered into an agreement, as well as agents acting on behalf of the Developer, including the Developer's Contractor.

Developer's Contractor -- Person, Firm, Partnership, or Corporation constructing the water line on behalf of the Developer.

Engineer -- The Independent Engineer retained by the Owner.

Owner -- Titleholder of Subdivision Parcel, or their authorized representative.

Project -- Work to be performed under approval granted by the Township.

Sub-Contractor -- A person, firm, corporation, or partnership under contract to the Contractor.

Township -- The Antrim Township Board of Supervisors (ATBOS) or Municipal Authority (ATMA).

Township Engineer -- The Antrim Township Board of Supervisors (ATBOS) or Antrim Township Municipal Authority's (ATMA) Engineers.

Water Inspector -- Representative of the Antrim Township Municipal Authority.

A.A.S.H.T.O. -- American Association of State Highway and Transportation Officials.

A.N.S.I. -- American National Standards Institute.

A.S.C.E. -- American Society of Civil Engineers.

A.S.T.M. -- American Society of Testing Materials.

A.T.M.A. -- Antrim Township Municipal Authority.

A.W.W.A. -- American Water Works Association.

O.S.H.A. -- Occupational Safety and Health Administration.

Penn DOT -- Pennsylvania Department of Transportation.

1 - 2 INTENT OF SPECIFICATIONS

These specifications are for the purpose of illustrating the general character and extent of the work and are subject to such modifications as may be found necessary or advisable either before or during the prosecution of the work, and the Owner shall conform to and abide by whatever supplementary drawings and explanations may be required by the Township for the purpose of illustrating the work.

Should any incidental work or materials be necessary for the proper carrying out of the intent of the specifications, either directly or indirectly, the Owner agrees to perform all such work and furnish and install all such materials as if the same were fully specified.

All work within public right-of-ways, easements and/or private property shall be in accordance with these specifications. All permanent easements or right-of-ways shall be a minimum of 20 feet in width.

1 - 3 SCOPE OF WORK

The following specifications are for installation of water mains, water service lines and related appurtenances. These are presented as minimum specifications and may be changed only by the Antrim Township Municipal Authority as conditions warrant or when changes are in the best interest of Antrim Township Municipal Authority.

All plans for new water main installation or extension to the existing water mains must be submitted to and approved by The Antrim Township Municipal Authority prior to the start of construction. Profile of street(s) showing location of water mains and other utilities shall be included with the plans. Plans and profiles shall also include all existing or proposed utilities such as sanitary sewer, storm sewers, gas, electric, cable, and telephone lines.

No changes or substitutions shall be made to these specifications without approval by the Antrim Township Municipal Authority.

Antrim Township is served by three different water authorities. Specifications and regulations of each individual authority prevail to each authority's operating area.

These specifications shall apply to all water main installations even though installation may not be in a public right-of-way, and shall also apply to those connecting to the existing water mains.

1 - 4 PERMITS, LICENSES, AND CERTIFICATES

The Owner shall procure all permits, licenses, and certificates, pay all taxes, charges and fees, and give all notices necessary and incidental to the proper and lawful prosecution of the work.

1 - 5 ARRANGING WORK

Owner shall arrange his work to the satisfaction of the Township so as not to interfere with the normal operation of the Community.

1 - 6 CONDUCTING THE WORK

The work shall be conducted so as not to interfere with the work of others, nor to obstruct any thoroughfare or access to property, nor to impede highway traffic, except as may be authorized by duly constituted authority. Fire hydrants adjacent to the project shall be kept accessible at all times and no materials or obstructions shall be placed within twenty feet (20') of any such hydrants. Footways and storm sewer inlets shall not be obstructed.

1 - 7 OBSERVANCE OF LAWS

The Owner at all times shall observe and comply with all Federal, State, County, and Local Laws, by-laws, ordinances, codes and regulations, in any manner affecting the conduct of the work or applying to any employees on the project, as well as all orders or decrees which have been promulgated or enacted, or which may be promulgated or enacted during the progress of the work, by any legal bodies or tribunals having authority or jurisdiction over the work, materials, employees, or the project. The Owner shall indemnify and save harmless the Township and all its officers, employees, and agents, from all suits, actions, or claims of any character or description brought forth, made an account of, or arising from the violations of any such law, by-law, ordinance, regulation, order or decree.

1 - 8 SAFETY REGULATIONS

The Owner shall comply with all current safety regulations of the Department of Labor and Industry, Department of Environmental Protection, and any other Departments of the Commonwealth, as well as any Local or Federal Government having jurisdiction over the same. The Contractor shall solely be in charge of safety and shall save the Township or its representatives harmless from any safety related litigation.

1 - 9 PROTECTION AND SAFEGUARDS

The Owner shall erect and maintain proper protection for all equipment and all parts of the work during all stages of construction, alteration or repair, and shall correct at his own expense any damage to the satisfaction of the Township.

The Owner shall protect all trees, shrubs, lawns, and landscape work from damage and shall provide such guards and covering as is necessary. Owner shall use proper and necessary precautions to protect all public and private streets, roads and walks, in and near the area of the Project. All damaged items shall be repaired or replaced at the Owner's expense. The Owner shall follow completely the provisions of approved Sedimentation and Erosion Control Plan regulations.

Regardless of the type of project, it will be the responsibility of the Owner, at all times, to protect all excavations, trenches, installations, structures, and all work performed from water damage of every kind, including damage by rainwater, groundwater, or surface water, and the backing up of drains, rain conductors or sewers, and to repair any such damage immediately at his own expense.

Owner shall remove all snow and ice and at all times provide for dust control as may be required for the proper protection and prosecution of the work under this project.

Owner shall furnish, erect, and maintain such barricades, railings, enclosures, guard lights, danger signals, and warnings, and take such precautions in the area of the work, as are necessary to insure the safety of the public and to avoid damage or injury to all persons and property.

Contractor shall maintain and enforce regulations covering all fire hazards, including smoking, and shall provide suitable fire extinguishers and/or other protective measures.

All underground utilities, service lines, and other facilities uncovered or exposed by the operations under this Contract shall be protected by the Owner.

The owner/contractor shall carefully preserve bench marks, reference points, stakes and property pins and in the case of willful or careless destruction, he will be charged with any resulting expenses and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance. Prior to the final acceptance of the work by the Antrim Township Municipal Authority, the contractor shall re-establish and replace any disturbed property monuments within the work area at no cost to the property owners or easement holder of the Township.

No grounding of any utilities allowed on the water service connection line or within ten feet (10') of the water service line, this includes all interior and exterior water service lines.

1 - 10 PUBLIC SAFETY

During the progress of the work, the Owner and/or Contractor shall provide lights, fences, barriers, danger signals, warning and detour signs, and take such other precautions as may be necessary to protect life and property. The Owner shall be solely in charge of safety precautions and will save the Township or its representatives harmless of all safety litigation.

1 – 11 INSPECTION

All work and material shall be, at all reasonable times, subject to inspection by the Township. The Owner shall provide reasonable and necessary facilities for such inspection.

1 - 12 TOWNSHIP INSPECTION FEES

The Owner shall pay a fee to the Township for inspection of construction under this project. The fee shall be the current Township charge, as shown on Attachment "A" for water mains proposed to be installed under this Project. Payment shall be made in advance of start of construction in a form and manner acceptable to the Township.

Any failed inspection shall require a separate fee to be paid to the Township prior to subsequent inspections.[1]

1 – 13 PENNSYLVANIA DEPARTMENT OF HIGHWAYS SPECIFICATIONS

Work shall be performed in accordance with Specifications of the Commonwealth of Pennsylvania, Department of Transportation.

1 - 14 OTHER FEES

All fees arising from the review and/or construction of the Project shall be paid for by the Owner at no cost to the Township.

[1] Added January 19, 2004

1 - 15 AS-BUILT DRAWINGS

The Owner shall supply to the Antrim Township Municipal Authority, three (3) legible reproducible drawings of the approved water facilities for the use of the Authority's Engineer.[2] The Owner/Contractor shall keep as-built drawings on a print during construction. This print will be given to the Authority's Engineer after construction is complete. The Authority's Engineer will draft up the as-built water facilities on the reproducible drawing and deliver the drawings to the Authority. The Owner shall pay a fee to the Township for the development of the as-built drawings. The fee shall be the current Township charge as shown on Attachment "A".

The fee shall be placed in an escrow account and drawn on as costs are incurred. All remaining amounts, if any, will be returned to the Owner. See Attachment "B" for minimum standards for As-Built Drawings.

1 - 16 COMPLAINTS AND DEFICIENCIES

The Owner shall satisfy all complaints and deficiencies with respect to the project and the Township will not release the Owner's bonds until said complaints and deficiencies are resolved.

1 - 17 SPECIAL CONSTRUCTION

Complete details of all special construction items such as, but not limited to, borings, railroad crossings, stream crossings, etc., must be shown on the plans.

1 – 18 PLANS AND SPECIFICATIONS

Plan and profile of the proposed water line shall appear on the same sheet with the profile of the water line located directly under the plan view. All plans and specification submitted for review and approval must be in the form of Verticle=5' and Horizontal=50'

[2] Revised January 19, 2004

1 – 19 ACT 287

The Owner/contractor shall comply with Act 287, commonly referenced to as the PA One Call, Call before You Dig Act. Presently, the telephone number is 1-800-242-1776.

1 – 20 PROPERTY CORNERS

Prior to transferring easements, right-of-ways or deeded property over to the Antrim Township Municipal Authority, the Owner shall place permanent monuments at all corners and control points. These monuments shall be steel pins set in concrete appropriately marked and must be easily identified.

1 - 21 GUARANTEE

The Owner/Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefore, which shall appear within a period of one (1) year from the date of final acceptance of the work by the Township unless a longer period is specified. The Township will give notice of observed defects with reasonable promptness.

Chapter
2

GENERAL REQUIREMENTS

2 - 1 GENERAL

Unless otherwise specified, all materials used in the work shall conform to the requirements of the current specifications of the American Society for Testing Materials, and shall be tested in accordance with the current specifications or current methods of testing of the American Society for Testing Materials, where specifications and methods of testing have been adopted, revised, or proposed for such materials. It is understood and agreed that wherever the word "current" is used relative to the specifications, methods of testing are the Standard or Tentative Standards of that society bearing the latest date.

No material shall be used until it has been inspected and approved on the site of the work. When required by the Township, any or all materials entering into the construction of any work shall be tested by a reputable testing laboratory. Such inspection shall not relieve the Owner of any of his obligations in this respect, and any defective material or workmanship which may have been passed by the Township shall be at all times liable to rejection when discovered, until the final completion of the project and expiration of the year's maintenance bond.

Where a manufacturer's name is used in these Regulations it is used to designate a standard of quality. The use of said manufacturer's name does not eliminate other manufacturer's equipment and materials equally as good and efficient, and approved by the ATMA prior to use.

2 – 2 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and erection equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for reuse.

B. Provide interchangeable components of the same manufacturer for similar components.

2 – 3 TRANSPORT AND HANDLING

A. Transport and handle products in accordance with the manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

2 – 4 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when Site does not permit onsite storage and protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter. Cover all storage's to prevent loss of material and fugitive emissions.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of product to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

H. During loading, transporting, unloading, and storage on-site, exercise care to prevent damage to piping materials.

I. Mark each valve as to size, type, and installation location.

J. Seal valve ends to prevent entry of foreign matter into valve body.

K. Store materials and accessories in areas protected from weather, moisture and possible damage. Assure materials are left clean and dry.

L. Do not store materials directly on the ground.

M. Handle valves and accessories to prevent damage to interior and exterior surfaces.

N. Hydrants shall be drained and stored as to protect them from freezing and rusting.

O. Do not place materials on private property without written permission from the property owner.

P. Do not drop pipes or fittings.

Q. Avoid shock or damage at all times.

2 – 5 PRODUCT OPTIONS

A. Products specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products specified by naming one or more manufacturers: Products of manufacturers named and meeting specifications, no option or substitutes allowed.

C. Products specified by naming one or more manufacturers with a Provision for Substitution: Submit a request for substitution for any manufacturer not named.

2 – 6 SUBSTITUTIONS

A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

C. A request constitutes a representation that the Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same Warranty for the Substitution as for the specified product.
   3. Will coordinate installation and make changes to other work, which may be required for the work to be complete with no additional cost to the Owner.
   4. Waive claims for additional costs or time extension, which may subsequently become apparent.
   5. Will reimburse Owner for review or redesign services associated with reapproval by authorities.
   6. Demonstrates, thorough calculations or other acceptable means, that the proposed substitution will not increase the cost of operating or maintaining the equipment/system.
   7. Shows or demonstrates the cost savings which would be realized by the Owner.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:
   1. The procedures for submitting a request for a substitution or alternate shall comply with the requirements of the Antrim Township Municipal Authority.

Chapter
3

EXCAVATION AND BACKFILL

3 - 1 GENERAL

The Owner shall grub and clear the area and remove all surface materials, of whatever nature, over the line of the trench; and he shall properly separate and classify the materials removed, store, guard, and preserve such of said materials as may be required for use in backfilling, or for other purposes. All rock, earth, curbing, gutter, concrete, flagstone, and all sectional paving units which may be excavated, together with all materials taken from the trenches shall be removed from the street, roadway, right-of-way, or such area at the Owner's expense subject to the approval of the Township.

The Owner shall remove paving for such width only as is necessary for the excavation of the trench, and in case he removes the paving for a greater width than is deemed necessary, or in case he removes or disturbs any paving on account of settlement, slides, or cave-ins or in making excavation outside the lines of the work, the Owner shall permanently replace same at his expense to satisfaction of the Township.

In business districts or in streets that are main thoroughfares, or in narrow streets, the material excavated from the first one hundred feet (100') of any opening, or from such additional length as may be required shall be removed from the area at the Owner's cost and expense. The material subsequently excavated and found satisfactory may be used to refill the trench with approval from the Township.

In case more material is excavated from any trench than can be backfilled over the completed water or can be stored on the street or within the limits of the right-of-way, leaving space for the traffic and drainage as herein provided, the excess material shall be removed to some convenient place, provided by the Owner. The Owner shall at his own cost and expense, bring back as much of the material so removed, as may be required to properly backfill the trench.

When it is necessary to haul soft or wet material over the streets, the Owner shall provide suitable tight vehicles, of a pattern approved by the Township.

3 - 2 EXCAVATION

3-2.1 Preparation

A. Identify required lines, levels, contours, and datum.

B. Notify all utility companies that serve the area of the impending excavation in accordance with the Pennsylvania Act 287 requirements.

C. Locate, Identify, and protect utilities that remain from damage.

D. Notify utility company to remove or relocate utilities.

E. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

F. Protect bench marks, existing structures, fences, sidewalks, paving, curbs, and any other features or structures not designated for removal from excavation equipment and vehicular traffic.

3-2.2 Execution

A. Underpin adjacent structures, which may be damaged by excavation work.

B. Excavate subsoil required to accommodate equipment support pads.

C. Excavate to working elevation(s).

D. Do not interfere with forty-five (45) degree bearing splay of foundation.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Hand trim excavation where applicable. Remove loose matter.

G. Remove lumped subsoil, boulders, and rocks.

H. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

I. Correct unauthorized excavation in accordance with section on Backfilling.

J. Stockpile excavated material in area designated on site if directed by the Engineer. Remove excess material not being reused from site.

K. Direct surface water from excavations and stockpile site so as to prevent erosion or deterioration of area in accordance with Sedimentation and Erosion Control.

3-2.3 Field Quality Control

A. Field observation will be performed under provisions of Section on Quality Control.

B. Provide for visual inspection of bearing surfaces.

C. Dimensions
   1. Excavate to elevations and dimensions indicated on the Drawings or as specified for structural fill areas; allow additional space as required for construction operations and inspection of foundations.
   2. Make excavations large enough for working space, forms, damp-proofing, waterproofing, and inspection.
   3. Notify Engineer as soon as excavation(s) are completed in order that subgrade may be observed. Engineer will observe and accept subgrade under compacted fill material, under foundations, under floor slabs on grade and under equipment support pads, and under retaining wall footings as being free of undesirable material, being of compaction density required by this Specification, and being capable of supporting superimposed foundation, fill, and building loads to be placed thereon. Observations will be made before fill is placed, concrete poured, framework is erected, or reinforcing is placed. Engineer will be given the opportunity to observe subgrade below fill material both before and after subgrade compaction. Therefore, fill material, foundations, retaining wall footings, floor slabs on grade, and equipment support pads shall not be placed until subgrade directly below has been observed and accepted by the Engineer.
   4. Place fill material and equipment support pads as soon as weather conditions permit after excavation is completed, observed, and accepted and forms and reinforcing are observed and accepted. Before concrete or fill material is placed, protect accepted subgrade from becoming loose, wet, frozen, or soft because of weather, construction operations, or other reasons.

D. Subgrade Stabilization
   1. If subgrade under equipment support base becomes frozen, loose, wet, or soft, remove and replace with acceptable compacted materials. Compact replacement material as stated in this Specification. Loose, wet, or soft materials, when accepted by the Engineer, may also be stabilized by a compacted working mat of well-graded crushed stone. Remove frozen materials and replace with acceptable material. Method

of stabilization will be accepted by Engineer and repaired subgrades will also be accepted by the Engineer before construction can be placed thereon.

2. Do not place equipment support pads until subgrade below has been accepted, embedded piping has been tested and accepted, reinforcement placement has been approved, and Contractor is permitted to commence slab construction. Do not place slabs on grade when temperature of air surrounding the slab is or is expected to be below 40˚F degrees before structure is completed.

E. Protection of Structures

1. Prevent new and existing structures from becoming damaged because of construction operations or other reasons. Prevent subgrade under new and existing foundations from becoming wet or undermined during construction.

3–2.4 Rock Excavation

All rock shall be fully taken out at least twenty-five feet (25') in advance of pipe laying, to a point at least six inches (6") below the outer bottom of the pipe, and to a width not to exceed the width of the trench, shown on Standard Details. Rock appearing in miscellaneous excavations or where future pipes are to connect with those laid under this project, shall be excavated in accordance with the directions of, and to the lines prescribed by the Township.

If rock below the specified grade is shattered due to excessive drilling or blasting, and, if in the opinion of the Township, it is unfit for foundations, such shattered rock shall be removed and the area backfilled to the proper grade with material acceptable to the Township at the expense of the Owner.

Where manholes are excavated in rock they shall be excavated twelve inches (12") outside the exterior lines of the manhole base and to a depth sufficient to include the stone bedding under the manholes.

All excavated material which is unfit for refilling shall be immediately removed from the site of the work.

3-2.5 Blasting

The Owner shall regulate the character and strength of explosives used, and the manner of their use and storage. Only small amounts of explosives should be kept at any place and they shall be kept under lock, the key to be only in the hands of a trustworthy person. Great care shall be taken in handling dynamite and similar explosives. Caps and exploders shall not be kept in the same place as explosives. Blasts shall be properly matted and securely covered. The ATMA shall be notified 24

hours in advance of any blasting that is to take place within fifty (50') feet of the water line or ATMA Sanitary Sewer line.

Blasting for excavation may be restricted by the Township who shall reserve the right to fix the time during which blasting may be performed. The Owner shall be responsible for any damage resulting from blasting. The Owner's method of procedure relative to blasting shall conform to State, Federal, and to the local Municipal Ordinances.

The Owner shall be solely responsible for injury to persons or property that may result from his use of explosives, and the exercise of, or failure to exercise, control on the part of the Township shall in no way relieve the Owner of his responsibility for injury or damage resulting from the use of explosives.

All blasting shall be performed under the supervision of a competent blasting expert, and subject to all Federal, State, County, and Local regulations for blasting. Whenever any pipe main or conduit is encountered in the trench area, the right is reserved to direct that all rock within eight feet (8') of the same shall be removed by methods other than blasting.

3-2.6 Condition of Excavation

The Owner shall be responsible for the condition of all excavations made by him. All slides and cave-ins shall be removed at whatever time and under whatever circumstances that may occur.

Any delay on the part of the Owner, or by any act of the Township, resulting in the keeping of an excavation open longer than would otherwise have been necessary shall not relieve the Owner from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from any of his obligation relating to injury of persons or property.

3 - 3 BACKFILLING

When backfilling, Contractor must follow the requirements pertaining to the amount of backfill needed in the area of the work. The backfilling requirements under Penn DOT roads shall follow Penn Dot standards, and under Township roads shall follow Township standards. Amount of backfill needed will be different depending on the surface material where the water pipe is being laid. Refer to the Drawings in the "Standard Drawings" chapter in this book.

3–3.1 Extent of Backfill

Backfilling water trenches shall include all material, compaction, tamping, or rolling, as required, the regrading of adjacent disturbed areas, the replacing of drains and other

surface and subsurface structures, the placing and maintaining of temporary sidewalks and driveways, furnishing of suitable backfill material if necessary, reseeding lawns and replacing trees and shrubbery damaged by the Owner and all appurtenant work incidental thereto. **No trench shall be backfilled until the water pipe has been installed to proper line and grade, with all joints correctly formed, and the pipe has been inspected by Antrim Township Authority**. Any section of pipe backfilled prior to the Authority's inspection and approval shall be considered faulty, and such backfill shall be removed for proper inspection of the pipe.

3–3.2 Backfill Material

Only 1B Stone shall be used for backfilling under and along the sides of the water pipe and to a height of two feet (2') over the top of the water pipe. The backfilling material shall be brought up evenly on both sides of the water pipe and thoroughly compacted by mechanical tamping. No backfilling shall be made when the material already in the trench is frozen, nor shall frozen material be used in backfilling.

After the water pipe and its appurtenance have been built and the trench refilled to a height of two feet (2') above the top of the water pipe, the remainder of the trench shall be backfilled by one of the following methods:

A. When the water is located within the State Highway right-of-way, backfill shall be in accordance with the requirements of Pennsylvania Department of Transportation.

B. When the water is located within the municipal roadway, parking lot, shoulder, or other roadway ROW, the trench shall be backfilled completely with 2RC aggregate stone above the 1B cover. (See Standard Detail). (This shall include all areas that are proposed to become municipal roadways, etc.)

C. When the water is located beneath an unpaved area, or area not subject to vehicular traffic, the backfilling may be accompanied by filling to the ground surface in one operation and compacting by trench roller or special heavy-duty tamping machine. Should these areas settle, the Owner will refill, regrade, and reseed such areas to original grade.

If, in the opinion of the Township, the material used for refilling is of such character that satisfactory results cannot be obtained, the Owner shall refill the trenches with suitable material in such a manner and at such times as the Township may direct.

As soon as the trench is refilled, the surface of the trench shall be regraded and in paved areas, the trench shall be temporarily repaved and all surplus earth shall be removed from the site.

Should there be a deficiency of proper material for refilling, the Owner shall furnish the same at his own expense.

No house ashes, putrescible refuse, rocks in excess of eight inches (8”), or other material of an unsatisfactory character shall be used in backfilling and the Owner shall not permit the trench to be used as a dumping ground for refuse.

Wye branches, house connections, or other points designated by the Township shall not be covered over or filled around until the same have been located and measured by the Antrim Township Municipal Authority, and permission given by him to refill the trenches at such points.

3-3.3 Preparation

A. Compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of adequate compaction. Backfill with Type 2RC fill and compact to density equal to or greater than requirements for subsequent fill material.

C. Scarify and proof roll subgrade surface to a depth of 12 inches to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3-3.4 Execution

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Granular Fill Type 2RC: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

D. Employ a placement method that does not disturb or damage other work.

E. Contractor shall maintain moisture content at plus or minus two percent of the optimum moisture content of the backfill materials to attain the required compaction density.

F. Make grade changes gradual. Blend slope into level areas.

G. Remove surplus backfill materials from site.

H. Leave fill material stockpile areas completely free of excess waste materials.

I. Do not use in backfilling work putrescible refuse and such other materials considered unsatisfactory by the Engineer. Do not permit excavations to be used as dumping areas for refuse.

J. Do not use frozen backfill materials or place backfill materials on frozen subgrade or trench surfaces.

K. Stockpile backfill material in area designated on site and acceptable to the Engineer. Height of stockpile is not to exceed eight (8) feet.

L. Fill Under Grass Areas:
1. Fill Type 2RC to 12 inches below finish grade, compacted to eighty (85%) percent of maximum dry density.
2. Fill material shall be placed in lifts not to exceed 12” uncompacted depth. Each lift shall be compacted prior to placing next lift. Engineer/Owner may consider alternate methods of compaction upon submission of means and methods and demonstration by the contractor.
3. Final 6” shall be topsoil type S3 or S4.

M. Fill Under Landscaped Areas:
1. Fill type 2RC, to 12 inches below finish grade, compacted to eighty-five (85%) percent of maximum dry density.
2. Fill material shall be placed in lifts not to exceed 12” uncompacted depth. Each lift shall be compacted prior to placing the next lift. Engineer/Owner may consider alternate methods of compaction upon submission of means and methods and demonstration by the Contractor.
3. Final 6” shall be topsoil.

N. Fill Under Asphalt or Concrete Paving to be Restored (State Roads and Shoulders)
1. Compact subsoil to ninety-five (95%) percent of its maximum dry density.
2. Fill Type 2RC, to a sufficient depth below finish paving elevation to facilitate reconstruction, compacted to ninety-five (95%) percent of maximum dry density as indicated on drawings.
3. Fill material shall be placed in lifts not to exceed 6” uncompacted depth. Each lift shall be compacted prior to placing the next lift. Engineer/Owner may consider alternate methods of compaction upon submission of means and methods and demonstration by the Contractor.

O. Fill Under Asphalt or Concrete not Requiring Restoration:

1. Backfill with Type 2RC aggregate compacted to ninety-five (95%) percent of maximum dry density.
2. Fill material shall be placed in lifts not to exceed 6" uncompacted depth. Each lift shall be compacted prior to placing the next lift. Engineer/Owner may consider alternate methods of compaction upon submission of means and methods and demonstration by the Contractor.

P. Fill to Correct Over-excavation
1. Fill Type 2RC, flush to required elevation, compacted to ninety (90%) percent of maximum dry density.
2. Fill material shall be placed in lifts not to exceed 6" uncompacted depth. Each lift shall be compacted prior to placing the next lift. Engineer/Owner may consider alternate methods of compaction upon submission of means and methods and demonstration by the Contractor.

Q. Gravel Roads or Driveways
1. Compact subsoil to ninety-five (95%) percent of its maximum dry density.
2. Fill Type 2RC, to a sufficient depth below finish paving elevation to facilitate reconstruction, compacted to ninety-five (95%) percent of maximum dry density as indicated on drawings.
3. Fill material shall be placed in lifts not to exceed 6" uncompacted depth. Each lift shall be compacted prior to placing the next lift. Engineer/Owner may consider alternate methods of compaction upon submission of means and methods and demonstration by the Contractor.

3-3.5 Tolerances

A. Top Surface of Backfilling under Paved Areas: Plus or minus one inch from the required elevations.

B. Top Surface of General Backfilling: Plus or minus one inch from the required elevations.

3-3.6 Field Quality Control

A. Field testing will be performed under provisions of Section on Quality Control.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1556, ANSI/ASTM D1557, ASTM D2922 and ASTM D3017.

C. If tests indicate Work does not meet specified requirements, remove, replace and retest the work.

D. Proof roll compacted fill surfaces under paving.

3 – 4 DEWATERING

The Contractor shall keep all excavations free from water while the pipe is being laid and while any class construction is in progress at the Contractors expense. Adequate pumps shall be provided and maintained if necessary to prevent the accumulation of water in trenches until the backfill is placed to a depth of twenty-four (24) inches above the pipe. The Contractor shall not open more trench in advance of pipe laying than available pumping facilities are able to keep dewatered to the satisfaction of the Antrim Township Municipal Authority Representative. At no time shall ground water be allowed to enter the water main. If ground water is allowed to contaminate the line, adequate flushing and disinfectant procedures may be required to insure the cleansing of the line.

3 – 5 SHEETING, SHORING AND BRACING

Provide material for, and install, all sheeting, shoring and bracing according to Federal, State, and local laws, rules, regulations, requirements, precautions, orders and decrees. Sheeting, sheet piling, bracing and shoring shall be withdrawn and removed as the trenches are being backfilled, except where the Engineer shall require that the above be left in place or where the Authority Engineer permits the Contractor to leave sheeting, sheet piling, bracing and shoring in place at the Contractor's own request and cost. Voids or holes left by the sheeting or sheet piling shall be filled with compacted approved material.

3 - 6 PROTECTION OF FINISHED WORK

Reshape and recompact fills subjected to vehicular traffic.

3 - 7 PROTECTION OF PROPERTY

The Owner shall, at his own expense, protect from injury, all pipes, tracks, walls, buildings, and other structures or property in the vicinity of his work, whether above or below the ground. He shall at all times have a sufficient quantity of protective materials on the site and shall use them as necessary for sheeting his excavation and for protecting or supporting any structures that are uncovered, undetermined, or otherwise weakened.

The Owner shall be aware of all risks involved due to the proximity of pipes, poles, overhead wires, tracks, walls, buildings, and other structures and property, of every kind and description, in or over his trenches, whether above or below the surface of the ground; and he shall be responsible for all damages and assume all expenses for direct or indirect injury, caused by his work, to any of them, whether such structures are or are not shown on the drawings.

Where necessary, in order to keep one side of the street or roadway free from obstructions or to keep the material piles alongside of the trench from falling on private property outside the right-of-way, a safe and suitable fence shall be placed alongside the trench.

In the event of encountering quicksand, subsurface streams, excessive groundwater, or similar contingencies, or where passing buildings or any structures which by their construction or position might bring a great pressure upon the trenches, the right is reserved for the Township to direct that such buildings or structures, shall be under-pinned, or supported and protected, or that special sheeting shall be driven in such a manner and to such depth, as may be directed, or that only a short length of trench shall be opened at one time; and furthermore, if necessary, that the trench shall be surely sheeted and braced on all sides, after the manner of a shaft, and that the permanent work shall be constructed in the same and the shaft backfilled before another opening is made. Any work performed as above directed shall be at the cost and expense of the Owner.

The Township reserves the right under such conditions to require the Contractor to complete the water line and the back-filling up to such a point as the Township may direct before proceeding further with the excavation; and the Owner shall not thereby become entitled to demand or to receive any allowance or compensation.

3 - 8 OBSTRUCTIONS

Certain information regarding the presence, size, character, and location of existing underground structures may have been shown on the Project Drawings.

The location of underground structures shown may be inaccurate and other obstructions than those shown may be encountered. The Owner hereby distinctly agrees that the Township is not responsible for correctness or sufficiency of the information given, or on account of the insufficiency or absence of information regarding obstruction either revealed or not revealed by the Project Drawings; and that he shall have no claim for relief from any obligation or responsibility, in case the location, size or character of any pipe or other underground structure is not as indicated on the Project drawings, or in case any pipe or other underground structure is encountered that is not shown on the Project Drawings.

Should the position of any pipe, conduit, pole or other structures, above or below the ground be such as to require its removal, realignment, or change, the Owner shall realign, uncover, and/or sustain the structures, at his own expense. The Owner shall not be entitled to any claim for damage on account of any delay in the removal or rearrangement of the same.

The Owner shall, without compensation, break through and reconstruct, if necessary, the invert or arch of any water culvert, or conduit that may be encountered, if the said structure is in such a position that in the judgment of the Township, as not to require its removal, realignment, or complete reconstruction.

The Owner shall not interfere with any persons, firms, or corporations or with the Township in protecting, removing, changing, or replacing their pipes, conduits, poles, or other structures; but he shall acquiesce in said persons, firms, or corporations, or the Township to taking all such measures as they may deem necessary or advisable for the purpose aforesaid, and the Owner shall thereby be in no way relieved of any of his responsibilities. At railroad track crossing, any expense in shoring up tracks, or maintenance traffic shall be borne by the Owner, whether same is billed directly to him, or the Township. Should any such bill be unpaid by the Owner, the Township shall be empowered to pay said bill and charge the amount thereof, to the Owner.

Chapter 4

TRENCHES

4 - 1 WIDTH AND DEPTH OF TRENCHES

Walls of trenches shall be kept as nearly vertical as possible, and the trenches shall be twelve inches (12") wider on each side than the outside diameter, at the barrel, of the pipe to be laid therein. The trenches shall be excavated true to line so that there is a clear space of twelve inches (12") on each side of the barrel of the pipe and to a height of not less than the top of the pipe. If sheeting is required at the level of the pipe, the dimensions in the foregoing sentence shall be applicable to the inside faces of the sheeting.

The depth of the excavation for the water or other structure herein specified shall be such that they can be built to proper grade, due allowance being made for standard crushed stone bedding, complete stone backfill, and concrete encasement.

Except at locations where excavation of unsuitable material is required, excavation shall be to a depth of six inch (6") below the bottom of the pipe. A six inch (6") standard stone bedding type 57 shall be provided under the water pipe and to a height of twenty-four inches (24") over all water pipe installed under this project (see Standard Detail).[2]

When the material encountered at sub-grade is unstable, it shall be removed from the trench. The excavation below sub-grade of such unsuitable material shall be backfilled with a 3 A Ballast. In rock excavation, if trenches are shattered by blasting below or beyond the lines of excavation specified herein, the trench shall be refilled and compacted as specified. If earth trenches are excavated beyond the specified depths, they shall be backfilled to the proper grade with 3 A Ballast at the expense of the Owner.

Wherever necessary to meet safety requirements, prevent cave-ins, and for excavation in sand, sandy soil, or other unstable material, the trench shall be adequately sheeted and braced. Where sheeting and bracing is used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, backfilled,

[2] Revised January 19, 2004

and compacted to a depth of two feet (2') over the top of the pipe. The Owner shall be solely responsible for the adequacy of all sheeting and bracing.
All trenches must comply with OSHA requirements.

4 - 2 FIELD MEASUREMENTS

A. Verify that survey bench marks and intended elevations for the Work are as shown on Drawings.

B. Excavate all test pits shown on the drawings and any others deemed necessary by the Contractor prior to layout of work and ordering of materials.

4 – 3 COORDINATION

A. Verify works associated with lower elevation utilities are complete before placing higher elevation utilities.

4 – 4 WORKMAN QUALIFICATIONS

A. Provide at least one person thoroughly trained and experienced in the skills required who readily understands the design and is completely familiar with the construction technique.

4 – 5 FEES

A. Inspection costs to Penn DOT having jurisdiction for all crossing and/or longitudinal occupancies shall be paid by the Developer

4 – 6 FILL MATERIALS

A. Refer to Backfill in Chapter 3.

4 – 7 PREPARATION

A. Identify required lines, levels, contours, and datum. Use Engineer's computed depths of cut as guides for excavation, allowing for excavation to accommodate the first class bedding, and for concrete cradles or concrete encasements where indicated or required by the Engineer. Mark station and depth of cut on stakes or paint on paved surface.

B. Inform all utility companies of the intention to excavate the site at least seventy-two (72) hours prior to start of construction and in accordance with Pennsylvania Act 287.

C. Protect plant life, lawns, landscaping, and other features remaining as a portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

E. Locate, maintain and protect all existing above grade and subgrade utilities which are to remain.

F. Furnish and erect substantial barricades at crossings of trenches or along trenches to protect the traveling public.

G. Remove, realign or change the direction of the above or below grade utilities or their supports as directed by the utility owner and/or the Engineer. The Contractor shall not be entitled to claims for damage or extra compensation due to the presence of such obstruction or delay in the removal or rearrangement of same. Additional precaution concerning obstruction as follows:

1. Do not interfere with persons, firms, corporations or utilities employing protective measures, removing or replacing their property or structures, but allow said persons, firms, corporations or utilities to take such measures as they may consider necessary or advisable under the circumstances; which shall not relieve the responsibilities of the Contractor.

H. Provide effective dust control by sprinkling water, spraying calcium chloride or through the use of any other method reviewed and accepted by the Engineer.

I. Do not obstruct streets, roads, and highways except in locations where so authorized by the municipality or agency having jurisdiction. If the control agency authorizes closing of a street, obtain written notification for said closing and employ such measures at no expense to the Owner.

J. Maintain a straight and continuous passageway on sidewalks and over crosswalks at least three (3) feet wide and free from obstructions.

4 – 8 EXCAVATION

Refer to Chapter 3 of this book for complete details.

A. Remove all materials of every description existing in the spaces to be excavated with the exemption of the utilities, pipelines, and structures that are designed to remain.

B. Dig trenches to a uniform width required to properly install each pipe or utility. Trench widths are to be a minimum of outer pipe diameter plus 12 inches on each side of the pipe unless indicated otherwise on drawings.

C. Excavate trenches to the depths indicated and required. Carry the depth of trenches for piping to establish indicated flow lines, invert elevations and depth of cover.

D. Excavate subbase to depth indicated for pipes to minimum 6 inches below the bottom of the work to be supported.

E. Excavate trench so that the minimum depth of cover over the water pipe is 4 feet unless otherwise specifically indicated on the drawings.

F. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Maintain sides and slopes of excavations in a stabilized condition until completion of backfilling.

G. Utilize a trench box or install shoring and bracing if required by code or ordinance or if needed to stabilize the excavation. Contractor is responsible for the design of any shoring and bracing used on the site.

H. Prevent surface water and subsurface or groundwater from entering excavations or flooding project site by enacting the measures outlined in Section on Sedimentation and Erosion Control.

I. Remove any accumulation of water within excavations to prevent softening of trench bottom, undercutting structures and destabilizing subgrade and foundations. Provide and maintain pump, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from the excavations. Pumped water is to be conveyed and discharged where accepted by the Engineer and/or by PADEP.

J. Do not store any material within any street pavement or other right-of-way.

K. Adequately support any underground pipes or conduits exposed as a result of the excavation. Install such supports in such a manner that backfilling may be performed without dislodging the pipe or conduits. This support shall be provided at the Contractor's expense.

L. Do not interfere with the forty-five (45) degree bearing splay of any structural foundations unless directed by the Engineer.

M. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove all loose matter.

N. Correct areas over excavated. If excavations are carried below indicated or specified subgrade without written permission, refill to proper subgrade with thoroughly compacted backfill material at no expense to the Owner.

O. Stockpile excavated material in area designated on site. Height of the stockpile is not to exceed eight (8) feet. Remove excess material from site.

P. Protect stockpile in accordance with Section on Sedimentation and Erosion Control.

Q. When it is necessary to haul soft or wet soil material over roadways, use suitable watertight containers to prevent spillage. Clear away spillage of materials on roadways caused by hauling.

R. Where passing buildings or any structure which by their construction or position might bring a great pressure upon trenches, the right is reserved by the Engineer to require that such buildings or structures be underpinned or supported and protected or special sheeting be driven or that short lengths of trench be opened at one time.

S. The Contractor shall maintain all existing underground utilities in service during the construction period. If existing utility piping or other services are damaged during construction, it shall be repaired promptly at the Contractor's expense in a manner consistent with local utility policy and acceptable to the Engineer. Under no circumstances shall a customer service be interrupted for a period longer than eight (8) hours.

4 – 9 COMPACTION AND BACKFILLING

Refer to Chapter 3 of this book for complete details.

A. Do not commence with backfilling of any part of the excavation until such part has been observed by the ATMA.

B. Pipe bedding and pipe embedment are to be installed to the depths indicated in the appropriate specification section for that pipe and as indicated on the drawings.

C. Backfill each material at optimum moisture content and compact to a dry density of not less than ninety-five (95) percent maximum dry density for structural backfill and backfill under pavement, and not less than eighty-five (85) percent maximum dry density for open, unpaved areas as determined by the testing procedures specified.

D. Compaction to be performed using vibrating compaction equipment or mechanical tampers. Hand tamp around pipe bells, manholes and utilities, if necessary. Compaction by jetting or puddling or the use of Hydra-Hammer is not permitted.

E. Backfill trenches to contours and elevations with unfrozen materials.

F. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

G. Employ a placement method that does not disturb or damage pipe in trench.

H. Remove surplus backfill materials from site and dispose of in a lawful manner.

I. Leave fill material stockpile areas completely free of excess waste materials.

J. Backfill trenches with concrete where excavations pass within 18 inches of column or wall footings or other concrete structures and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing.

K. Encase pipe or conduit which passes within 18 inches in a horizontal or vertical plane of another pipe or conduit containing potable water in 6 inch thick concrete as indicated on the drawings for a minimum horizontal distance of five (5) feet to either side of the crossing.

L. Encase sewer pipes which travel within a horizontal distance of less than ten (10) feet from a water main or submain in 6 inch thick concrete along the entire section within that ten (10) foot distance as shown on the drawings

M. Displacement of the pipeline and settlement of backfill shall be considered evidence of improper workmanship or inclusion of unsuitable backfill materials, or both, and will require regarding and realigning the pipeline and removing and recompacting settled materials at no expense to the Owner.

N. Do not use in backfilling work putrescible refuse and such other materials considered unsatisfactory by the Engineer. Do not permit excavations to be used as dumping areas for refuse.

O. Do not use frozen backfill materials or place backfill materials on frozen subgrade or trench surfaces.

4 – 10 TOLERANCES

A. Top Surface of Backfilling: Under paved areas and parking areas: plus or minus one half (1/2") inch from the required elevations.

B. Top Surface of General Backfilling: Plus or minus one half (1/2") inch from the required elevations.

4 – 11 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Quality Control.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1556, ANSI/ASTM D1557, ASTM D 2922, and ASTM D 3017.

C. If tests indicate work does not meet specified requirements, remove, replace and retest the work.

D. Frequency of Tests:
   1. Trench Backfill
      - 1 test per lift per 500 LF, or fraction thereof, of trench in open areas
      - 1 test per 100 LF, or fraction thereof, of trench in roadway or adjacent to structures.

4 - 12 PROTECTION OF FINISHED WORK

A. Protect finished work as required.

B. Reshape and recompact fill subject to vehicular traffic during construction.

4 - 13 BACKFILLING

A. Refer to Chapter 3 for backfilling requirements.

Chapter 5

MATERIALS

5 - 1 DUCTILE IRON PIPE

All ductile iron pipe shall conform to ANSI A21.51 (AWWA C151) and shall be cement-mortar lined, double thickness, and asphaltic seal coated in accordance with American Water Works Association (AWWA) C104. Provide NSF 61 approved seal coatings. All water mains, 4-inch diameter and larger, shall be ductile iron pipe, except that pipe in cathodic protection areas may be PVC conforming to AWWA C900.

Joints shall be push on type, conforming to ANSI A21.11 (AWWA C111), except that all pipe installed at railroad, highway and stream crossings shall have mechanical joint ends, conforming to ANSI A21.11.

The Contractor shall submit to the Authority, in triplicate, a certificate from the manufacturer that the pipe furnished complies with all applicable requirements of ANSI A21.51 (AWWA C151).

Minimum wall thickness of ductile iron pipe shall be determined in accordance with ANSI A21.50 (AWWA C150), American National Standard for the Thickness Design of Ductile Iron Pipe, and ANSI A21.51 (AWWA C151). The design internal pressure in combination with earth and live loads shall be specified in this Spec. book. The design for trench loading shall be based on Laying Condition Type 2, as defined in ANSI A21.51 (AWWA C151). The pipe furnished shall be Class 52, unless otherwise specified by the Authority.

Tar coat exterior of ductile iron pipe and fittings.

5 – 2 FITTINGS

Ductile iron fittings will be accepted for all ductile iron pipes. Ductile iron fittings shall have a minimum pressure rating of 250 psi, and shall conform to ANSI A21.10 (AWWA C110).

Fittings used with ductile iron pipe shall be furnished with mechanical joint ends conforming to ANSI A12.11 (AWWA C110). Mechanical joint fittings shall be furnished complete with either gray iron or ductile iron glands, bolts and nuts, and plain rubber gaskets.

Flanged fittings, for exposed piping or when specified on the Drawings, shall conform to ANSI A21.10 (AWWA C110) or ANSI B16.1. All flanges shall be faced and drilled in accordance with ANSI B16.1. Machine bolts and nuts for flanged fittings shall be steel, conforming to ASTM Designation A307, Grade B. Dimensions of bolts and nuts shall conform to ANSI B18.2. Threads of bolts and nuts shall conform to ANSI B1.1, Coarse-Thread Series, Class 2A fit on bolts, and Class 2B fit on nuts. Gaskets for flanged connections shall be synthetic rubber and the flat ring type. Dimensions of gaskets shall conform to ANSI B16.21.

All fittings shall be cement-mortar lined, paint seal coated inside, and bituminous coated outside. The Contractor shall submit to the Authority, in triplicate, a certification from the manufacturer that all fittings comply with the ANSI Standards noted above.

Furnish gaskets in accordance with ANSIA21.4.

5 – 3 CEMENT-MORTAR LINING

Cement-mortar lining shall conform to ANSI A21.4. Paint seal coat in accordance with ANSI A21.11.

5 – 4 MECHANICAL JOINT RETAINER GLANDS

Provide retainer glands for use on mechanical joints on fittings and valves 24 inches or less. Use fully restrained type joints on fittings and valves greater than 24 inches. Retainer glands on fittings and valves greater than 24 inches are not acceptable. Retainer glands are not acceptable in lieu of restrained joints.

Mechanical joint retainer glands shall be cast from ductile iron. Wedging mechanism shall be manufactured of ductile iron, heat treated to a hardness of 370BHN minimum. Provide retainer glands with dimensions that can be used with standardized mechanical joint bell and tee head bolts conforming to requirements of AWWA C111 and AWWA C153. Wedge action screws incorporate twist off nuts in design to ensure proper torque. Provide mechanical joint restraining device for water working pressure rating of 250 psi minimum with a safety factor of at least 2:1.

Install and apply torque according to manufacturer's recommendations. Tighten torque limiting twist off nuts in alternate manner and clockwise direction. Apply joint deflection before T-bolts are torqued. Where retainer glands are used, limit joint deflection to 2 ½ degrees maximum. Glands are to be EBAA Iron, Inc, Series 1100 (Megalug); Ford Meter Box Co., Inc. Series 1400 (Uni-Flange) or approved equal.

5 – 5 VALVES

A. General: Valves 14-inches and larger shall be butterfly valves as long as valve design pressures are not exceeded. Valves 3 to 12 inches shall be gate valves.

B. Butterfly Valves: Butterfly valves shall conform to AWWA C504, except where otherwise specified herein. Butterfly valves shall be the tight-closing, rubber-seated type. Valves shall be bubble tight at design pressure, and shall be satisfactory for valve operation after long inactive periods.

Valves shall be the short body type with mechanical-joint ends, constructed of Bronze conforming to AWWA Standards. All valve bodies shall have two hubs for shaft bearing housings, cast integrally with the body. Body shell thickness shall conform to AWWA Standards.

Valve shafts shall be one-piece or two piece units securely attached to the valve disc. Valve shafts shall have a minimum diameter as specified in Table 3 of AWWA C504, and shall be 18-8 stainless steel, Type 304. Shafts seals shall conform to AWWA C504, section 3.7. Valve bearings shall be nylon, reinforced Teflon, or graphite bronze.

Valve seats shall provide leak-proof shutoff with design pressure on one side and zero pressure on the other side. Valve seats shall be the 90-degree type, and shall be bonded and/or mechanically secured to the valve body or disc. Valve discs shall be alloy cast iron conforming to ASTM A436, Type 1 or 2, or ASTM A439, Type D2, with a maximum lead content of .003 percent.

Valve operators shall be the worm gear or traveling nut type, fully enclosed, and fitted with a standard 2-inch square operating nut. Operators shall produce the required output torque with a maximum input torque of 150 foot-pounds on the operating nuts. All valves shall open to the left.

The Contractor shall furnish manufacturer's certified shop drawings, in triplicate, to the Authority. Valves shall be American Flow Control or approved equal.

C. Gate Valves: All gate valves 4-12 inch shall be resilient seated meeting or exceeding AWWA C509. Gate valves shall have mechanical joint ends and be equipped with a 2-inch operating nut and be suitable for buried applications. Valve working pressure shall conform to AWWA C500 Section 2.

Valves shall be vertical, inside screw, non-rising stem valves with 2-inch square operating nuts. Valves shall open to the left, shall be fitting with O-ring seals, and shall have mechanical joint ends and conform to AWWA C111. Valves shall be American Darling, Clow, or approved equal.

The Contractor shall furnish manufacturer's certified shop drawings, in triplicate, to the Authority for approval. The manufacturer shall also certify that the valves comply with AWWA C500.

D. Tapping Sleeves and Valves: Before installing a tapping sleeve, the Contractor shall verify the type and diameter of the existing pipe. Tapping sleeves shall have mechanical joint type ends and shall have two halves for bolting around the main. Gaskets shall extend the entire sleeve length and shall provide a water tight joint.

Tapping valves shall comply with the gate valve specification presented herein. Valves shall be American Darling, Mueller Company or approved equal.

5 – 6 VALVE BOXES

Provide Tyler utilities cast iron valve boxes of two pieces for valves up to 12 inches. Valve box design of adjustable two section, screw type, telescoping column, inside diameter of 5 ¼ inches, and furnished with a cover marked WATER. Hot coat inside and out with tar or asphalt compound. Valves boxes shall be Bingham and Taylor, Bibby-Ste-Croix Foundries, Tyler or approved equal.

5 – 7 EXTENSION STEMS

Each underground valve whose operating nut is deeper than 4 feet shall be equipped with an extension stem that is 1-inch square solid steel and fitted over the valve operating nut. The stem shall have 2-inch square top operating nut and a spacer or spider. Each extension stem top shall be set in the range from 3 feet to 6 inches below ground surface and shall not interfere with the valve box cover.

5 – 8 SMALL VALVES

General: Small valves are defined as 2 ½ inch or smaller valves and shall be one of the following types, unless specified otherwise.

A. Gate Valves: Gate valves shall be the 150 pound split wedge disc, parallel seat, rising stem type and be handwheel operated. Valve bodies shall be bronze and have threaded ends. Valve shall be Crane Company, Catalog No. 440, or approved equal.

B. Globe Valves: Composition Disc Globe Valves: Composition disc 150-pound bronze globe valve with threaded ends, bronze body conforming to ASTM B62, brass or bronze bonnet and bronze stem. Valves to be Crane No. 7TF as manufactured by Crane Company.

C. Ball Valves: Bronze body with bronze trim and TFE seats and seals. Valves to be Crane Company, Nibco T-560 or approved equal.

5 – 9 WATER SERVICE LINES

A. Copper Water Service Lines: tubing shall be Type K, 200 psi, copper tube size (WST). Service lines must be one continuous run of pipe from curb stop to the house, no couplings are permitted.[2]

B. Plastic Water Service Lines: tubing shall be polyethylene, defined as PE 3408, SDR 9, NSF approved, 200 psi, copper tube size (WST).[1]

5 – 10 TUBING

A. Copper tube shall conform to the requirements of ASTM B-88, with Type K underground and Type L in exposed locations. Type K shall also be used in hook-ups to air-release valves.

B. Plastic tube shall conform to requirements of ASTM D2737 with stainless steel inserts at all connection points.

[1] Added January 19, 2004
[2] Revised January, 19, 2004

5 – 11 FITTINGS FOR COPPER AND PLASTIC TUBING

All new service laterals shall be one continuous run of plastic or copper with no underground splicing connections. Couplings for pipe and tubing of existing laterals shall be Mueller Company "Insta-Tite" coupling or the Ford Meter Box Company, Inc. "Gap Joint" coupling, or approved equal needed to connect to the existing service material.[2]

5 – 12 CORPORATION STOPS

For copper tubing, corporation stops shall be Mueller H-15000, Ford Meter Box Company, Inc. F-1000, or approved equal. Designed to conform to AWWA C800

For plastic tubing, corporation stops shall be Mueller H-15006 (with "Insta-Tite" Connection), Ford Meter Box Company, Inc. F-1000, or approved equal.[1]

5 – 13 CURB STOPS AND BOXES

Curb stops shall be Mueller Company H-15200, Ford Meter Company, Inc., ¾ inch, Z44-333-G or larger as appropriate, or approved equal. Designed to AWWA C800.

Curb boxes shall be manufactured of cast iron. Cast iron curb boxes shall be Buffalo type as manufactured by the Grinnell Company, Inc. or approved equal. All thread tie rods shall be coated with bitumastic paint and wrapped in polyethylene. The Contractor shall submit a sketch for Authority approval for installations using clamping devices. Curb Boxes are to be placed outside the right-of-way and installed by the Developer.

5 – 14 CLAMPING DEVICES

Socket clamps, anchor straps and tie rods used to anchor pipe fittings, shall be as manufactured by the Grinnell Company, Inc. or approved equal. All thread tie rods shall be coated with bitumastic paint and wrapped in polyethylene. The Contractor shall submit a sketch for Authority approval for installations using clamping devices.

[1] Added January 19, 2004
[2] Revised January, 19, 2004

5 – 15 FIRE HYDRANTS

Fire hydrants are to be compression type with a 5-inch main valve, 5 ¼ inch seat opening and a 6-inch mechanical joint inlet. The hydrants shall have two 2 ½ inch hose nozzles, and one 4 ½ inch pumper nozzle, complete with nozzle cap chains. Hydrants shall be traffic type with breakable safety flange and stem coupling and shall open left. The hydrant shall have a pentagon operating nut and be provided with National Standard threads on the hose and steamer nozzles. Exposed portion of the hydrant is to be painted according to the Authority. Hydrants must conform to AWWA C502 and be leak proof at the design pressure. Use American Darling, Model B-62-B or approved equal. The Developer shall install "Out of Service" rings on the fire hydrants until they are in working condition.

5 – 16 STEEL ENCASEMENT PIPE

Steel encasement pipe shall be the size and wall thickness specified in Part 5 of the American Railway Engineering Specifications for pipelines and have a minimum tensile strength of 60,000 psi and a minimum yield point of 35,000 psi. Do not consider the coating when finding the strength of the pipe. Pipe shall conform to ASTM Designation A139, Grade B: or A53. Use pipe with flame or machine cut plain ends, which shall be beveled for field welding and circumferential joints, and have a protective coating of Standard Mill Primer prior to shipment.

Support water mains inside steel casing pipe by use of casing spacers to prevent direct contact between water main and steel casing. Casing spacers also facilitate installation of pipe within casing, and limits movement of pipe within casing, both vertically and horizontally. Provide casing spacers of one of the following design types:

A. Bolt on style, fusion PVC coated steel band (14 gauges) with (10 gauge) steel risers, PVC inner liner, and glass reinforced polyester insulation runners.

B. Bolt on style, T-304 stainless steel (14 gauge) shell and risers, lined with ribbed PVC extrusion, and ultra high molecular weight polymer insulating runners.

Casing spacers shall be PSI (Pipeline Seal and Insulator, Inc.), Cascade Waterworks Mfg. Co., APS (Advance Products and Systems, Inc.) or approved equal.

5 – 17 CAST COUPLINGS

Cast couplings shall be casketed, sleeve type with diameter to properly fit specified pipe. Couplings consist of one steel middle ring; two steel malleable iron or ductile iron followers; two specifically compounded rubber gaskets; and high strength low alloy steel bolting system suitable for coupling steel or ductile iron pipe. Use Dresser Manufacturing Division, Style 38 and 138, transition Style 162; Smith Blair Product No. 411, transition product No. 413 or approved equal.

5 – 18 FLANGED COUPLING ADAPTERS

Gasketed, sleeve type with diameter to properly fit specified pipe. Couplings consist of one steel middle ring; two steel, malleable iron or ductile iron followers; two specially compounded rubber gaskets; and high strength low alloy steel bolting system suitable for coupling steel or ductile iron pipe. Flanged coupling adapters shall be Dresser Manufacturing Division Style 38 and 138, transition Style 162; Smith Blair Product No. 411, transition product No. 413 or approved equal.

5 – 19 PRESSURE REGULATING VALVES

The installation of pressure regulating valves may be required by the Authority to prevent excessive pressures at customer services or other locations.

Pressure regulating valves 2 ½ inches and larger shall be globe pattern, cast iron ASTM A126 with Class 125 flanges conforming to ANSI B16.1 standards. Interior trim will be bronze ASTM B62. Provide easily renewable valve seals and visual valve position indicator. Also, provide a pressure sending line (including copper tubing, union and gate valve) from the inlet side of the valve to the sensing port of the control pilots.

Factory assemble and mount on the valve the hydraulic piping, shut-off valves, needle valves, control pilots and unions. Valves shall be GA Industries, Inc., Ross Valve Manufacturing Company, Inc. or approved equal.

5 – 20 AIR RELEASE VALVES

Air release valves shall be combination air release valves to vent air accumulating at high points in water main. Air/vacuum valve portion exhausts larger quantizes of air present in

system during filling of water main and allows air to re-enter main during draining of pipe. Provide air release valves with cast-iron body and cover, stainless steel lever mechanism and stainless steel trim with Buna-N-Seat. Use a maximum working pressure of 100 psi and inlet size of 1 inch. Valve shall be Val-Matic, Model 38, APCO, G.A. Industries or approved equal.

5 – 21 PRECAST REINFORCED CONCRETE MANHOLES

Manhole walls shall be constructed of precast concrete riser sections set on a cast-in-place concrete footing. The riser sections shall be manufactured in compliance with the requirements of ASTM Specifications Designation C478 for Precast Reinforced Concrete Manhole Sections and shall have a minimum inside diameter of 4 feet. The manhole shall be provided with a flat slab top. The flat slab top shall have a minimum thickness of 8 inches and shall be reinforced with steel in accordance with the design requirements specified in ASTM Designation C478. The bottom riser section shall be provided with doghouse holes designed to accommodate the water main pipe passing through the manhole. See detail.

5 – 22 CONCRETE

Concrete shall conform to the applicable requirements of Section 704, Cement Concrete and Ready-Mixed Concrete, of Commonwealth of Pennsylvania, Department of Transportation Specifications Publication 408 with the latest supplements. High Early Strength cement concrete conforming to the requirements set forth in the current issue of the Supplement to Publication 408, shall be used for reaction backings and pavement replacement.

5 – 23 MANHOLE FRAMES AND COVERS

Castings for Standard and watertight manhole frames and covers shall conform in design to the Standard Detail Drawings and shall meet the requirements of ASTM Designation A48, Class 30B loadings. All castings shall support A.A.S.H.T.O. “HS-20” loading and shall weigh minimum of 350 pounds.

Castings shall be true to pattern in form and thickness, free from cracks, gas holes, flaws, excessive shrinkage, sound, cleaned by means of sand blast and neatly finished. Runners, fins, risers, and other cast-on pieces shall be removed. All parts of castings shall be thoroughly coated at the factory with one (1) coat of black asphaltum paint.

Castings shall be commercially machinable with the metal bearing areas machine ground, finished to insure satisfactory seating so that it will not rock after the cover has been set in the proper position in the frame

Frame and Cover: ASTM, Class 30B. Cast iron construction, machined flat bearing surface, removable self-sealing cover, closed lid design; lid molded with the words "WATER" in 2 inch (2") raised letters. The name of the manufacturer shall also appear on the cover in letter no larger than 1 inch (1"). Watertight lid shall have gasket and cover hold down bolts, and must be A48 class 30B. All lids which "rock" and do not lie solid after construction is finished will be condemned and must be replaced by perfect lids. All "cross-country" lids shall be bolted down with Anchor Bolts. The Anchor Bolts are to be ¾ inch (3/4") diameter by 6 inch (6") long galvanized to ASTM A123, for embedment in the manhole top and a minimum 2 inch (2") projection through the bars of the frame.

A. Two (2) bolt slots or inserts shall be cast into the manhole top, positioned at 180 degrees at the time of manufacture.

B. Sealing Compound: Two (2) rings of ½ inch diameter flexible butyl rubber joint sealant set between bottom of frame and top of concrete section or grade rings; also set between concrete manhole sections.

C. Precast Grade Rings: Concrete masonry units of 2 inches, 3 inches, or 4 inches thick conforming to C 478; hold down bolts matching the manhole frame; designed to provide for full bearing of manhole frame; Split Rings not permitted. No more than two (2) rings total, and no more than twelve inches (12") allowed.

5 – 24 MANHOLE STEPS

Manhole steps shall be 3/8 inch (3/8") diameter round steel encapsulated with copolymer polypropylene plastic, capable of withstanding design loading requirements of ASTM C478 at a temperature of 0 degrees F with no structural failure. Manhole steps shall be cast into the walls of base, risers and conical top sections, and shall be aligned vertically and spaced so as to be on equal centers in the assembled manhole at a maximum distance apart of 12 inches. Steps shall be located a minimum of 6 inches (6") from those ends of base, riser, and top sections. Manhole step dimensions shall meet the requirements of OSHA Standard 1910.27 for fixed ladders.

5 – 25 METERS

The meter manufacturer or vendor shall certify that the meters comply with the AWWA Standard for the particular meter being furnished and that each meter complies with accuracy and capacity requirements of the AWWA Standard for Testing Cold-Water Meters, C705. The meter shall be an Invensys SRII unit as manufactured by Invensys Metering Systems. The model number for a ¾" house service line is SRII Meter with a remote TouchRead System and appurtenances shall be purchased and installed by the Contractor/Developer, and then owned by the Municipal Authority after it is approved for service. The meter shall be equipment with a "remote" head mounted in the curb box for quick access by the utility meter reader.

5 – 26 PLASTIC PIT SETTERS

Plastic Pit Setter shall be used outside homes over 75 feet from the water main and outside homes which do not have sufficient basements as determined by the Authority. Plastic Pit Setters shall be Ford Meter Box Company, with cast-iron top and frost-proof lid.

5 – 27 BACKFLOW PREVENTION DEVICES

A. General: A backflow prevention device shall be installed at each customer service where the Authority determines that a potential cross-connection may exist. The number, size, location and type of backflow preventor shall be approved by the Authority.

B. Reduce Pressure Backflow Preventors: This device shall be used at connections where toxic chemicals, sewage, or other substances determined by the Authority to be hazardous, might enter the distribution system. It shall conform to AWWA C511, shall be minimum 150 psi design pressure, and shall be equipped with suitable test cocks. The device consists of an automatic pressure differential relief valve located in the zone between two or more independently acting check valves, which in turn are located between two tightly-closing shutoff valves. All reduced pressure backflow preventors for fire service connections shall be BEECO or approved equal. All other reduced pressure backflow preventors shall be Hersey-Sparling Meter Company, BEECO Model 6CM; Watts Regulator Company Services 990 or approved equal.

C. Double Check Valve Assemblies: This device shall be used at connections where nuisance materials, such as foods and beverages, or other materials that do not constitute a health hazard, might enter the disturbance system. It shall conform to

AWWA C510, shall withstand a 150 psi design pressure. The device consists of a mechanical, independently operating hydraulically dependant relief valve located between two independently operating, internally loaded check valves that are located between two tightly closing resilient-seated shutoff valves with four properly placed resilient-seated test cocks. All double check valve assemblies shall be Hersey-Sparling Meter Company No. 2 or approved equal.

Chapter 6

INSTALLATION

6 - 1 GENERAL

Size of Pipe	Deflection Angle	Maximum Deflection	
		18 ft. Length	20 ft. Length
Thru 12"	2 1/2˚	9 1/2"	10 1/2"
14" - 24"	2 1/2˚	9 1/2"	10 1/2"

Where underground conditions require a change of alignment or grade, such change shall only be made with the written consent of the Authority. When a change in grade is indicated, the class of pipe installed at the location shall withstand the new loadings.

Except at predesignated point, no high point shall be established where air can accumulate. If field conditions necessitate a change in the pipe profile and, in the opinion of the ATMA, the change requires the installation of an air release valve and manhole, the Contractor shall install the same at his expense.

6 - 2 LOWERING WATER MAIN MATERIAL INTO TRENCH

The Contractor shall conform to AWWA Specification C600, Section 3.3.

6 - 3 CLEANING PIPE AND FITTINGS

All lumps, blisters and excess coating shall be removed from the end of each piece of pipe and fittings. The outside of the spigot, the inside of the bell and gasket shall be thoroughly wiped cleaned and dried before the pipe is installed. Remove pipe and fittings if the interior has been contaminated with oil, gasoline, kerosene or other material damaging to bituminous seal coat or cement mortar lining and replace.

6 - 4 LAYING PIPE

No pipe shall be laid when, in the opinion of the ATMA, trench or weather conditions are unsuitable. When pipe laying is not in progress, the open ends of installed pipe shall be closed by approved means to prevent entrance of trench water and foreign material into the line. Enough backfill shall be placed in the center sections of the pipe to prevent floating. Any pipe that has floated shall be removed from the trench and re-laid.
All joints shall be made in accordance with the pipe supplier's specifications and in accordance with the following instructions.

A. Push-on Type Joints: Cleaning and assembly of push-on joints shall conform to AWWA C600, Section 3.4.1.

B. Mechanical Joints: The cleaning, assembly and bolting of the mechanical joint shall conform to AWWA C600, Section 3.4.2.

C. Bell-and-Spigot Joints: Bell-and-spigot joints shall conform to AWWA Specification C603, Section 3.4.4.4.

D. Flanged Joints:
   1. Flanged joints shall not be used for buried service.
   2. Flanges shall be wiped clean with a solvent-soaked rag prior to installation. The gasket shall also be wiped clean.
   3. The pipe, fittings and valves shall be properly supported during installation.
   4. All flanges shall be properly aligned and checked with a spirit level, both horizontally along the pipe and vertically across the flange faces.
   5. With flanges secured in position, half the bolts shall be inserted at the bottom of the flange, the gasket inserted between the flanges and the remaining bolts inserted.
   6. The threads of the bolts shall be given a light coating of thread lubricant and the nuts shall be installed on the bolts and turned up by hand. The nuts shall be tightened with a wrench by the crossover method to load the bolts evenly until the joints are tight.

6 - 5 SETTING VALVES AND VALVE BOXES

All valves shall be set vertical and shall be provided with a valve box. If the valve is furnished with a bypass, a valve box shall also be furnished for the bypass valve. The tops of boxes shall be set to finished grade, unless directed otherwise by the ATMA.

6 - 6 SETTING OF HYDRANTS

Fire hydrants shall be installed as specified in AWWA C600, Section 3.7. Where there is no sidewalk or curb the hydrant shall not be less than 6 feet from the edge of the paved road surface. In no case will hydrants be located closer than 25 feet to a building except where building walls are blank firewalls. Hydrants shall not be located closer than 3 feet to any obstruction, or in front of any entrance ways. All hydrants shall stand plumb, with the pumper nozzle facing the curb, and the hose nozzles parallel to the curb. The lowest nozzle shall be at least 18 inches above finished grade. Connecting hydrant lateral main shall be 6 inches or larger and controlled by an independent gate valve. The gate valve shall be placed a minimum of 2 feet from the hydrant, unless directed otherwise by the ATMA.

6 - 7 ANCHORAGE

All plugs, caps, tees and bends (both horizontal and vertical) shall be provided with concrete reaction backings, or shall otherwise be anchored as authorized by the Authority. Sizes of required concrete reaction backings are shown on the attached standard detail section. Where the water mains must be tested before connections to existing mains can be installed, temporary reaction backings or restrained type plugs shall be installed. Concrete for reaction backings shall be High Early Strength cement concrete as specified.

The Contractor shall submit a sketch and obtain the ATMA's approval for the anchorage of the pipe and fittings at each connection, or at any other locations designated by the ATMA. The ATMA reserves the right to require mechanical joint retainer glands in addition to concrete reaction backings.

Hydrant bases shall be braced against undisturbed earth with reaction backings and shall be restrained with tie rods, clamps or retainer glands, in a manner approved by the ATMA. The approved hydrant installation is shown on the attached standard detail section.

6 - 8 CONNECTION TO EXISTING SYSTEM AND INTERRUPTIONS OF SERVICE

The Contractor shall notify the ATMA at least 7 working days before installing connections to the existing water system or shutting off a portion of the system. All valves shall be operated by a representative of the ATMA. Under no circumstances shall the Contractor operate valves on the existing system.

The ATMA reserves the right to designate the day and time when water mains may be shut off and may be required that this work be done at night or on a weekend. In addition, the

ATMA reserves the right to require that, where service to customers is interrupted, work is carried out continuously and expeditiously until water service is restored. The Contractor shall give adequate and timely notice to the ATMA's customers in advance of construction requiring service interruption. The installation schedule and procedure shall be approved by the ATMA before the work is started, and all the necessary material, tools and equipment shall be on hand before work is started. Where required, the new water mains shall be tested, sterilized and flushed prior to the installation of the connections. For jobs such as installation of connections, cutting and capping of existing water mains or passing of existing fittings, the Authority has the right to require that work be continuous, without interruption and that this work be at night or on a Sunday.

The Contractor shall dig test pits prior to making any connection to existing water mains in order to determine the exact location, elevation, diameter and type of the existing pipe. Test pits shall be excavated under the supervision of the ATMA and shall be protected and backfilled by the Contractor.

6 - 9 TAPS ONTO THE LINE

Developer/Contractor shall dig the area of the water main for where the tap onto the line will be located. The ATMA will perform the tap and will require seven (7) days notice prior to the tap. All fees incurred to the ATMA shall be reimbursed by the Contractor/Developer to the ATMA.

6 – 10 SERVICE LINES

A. General: The sizing of customer service lines shall be subject to ATMA approval and shall be based on the length of the line and the water demand. Residential service lines shall normally be ¾ inch in size. The service line shall normally consist of a plastic pit setter as described.

B. Materials:
   1. Corporation Stops: See Section 5-13
   2. Water Service Tubing: See Section 5-9
   3. Copper or Plastic Tube: See Section 5-10[2]
   4. Fittings for Copper or Plastic Tubing: See Section 5-11[2]
   5. Curb Stops and Boxes: See Section 5-13
   6. Meter Pits and Plastic Pit Setters: See Section 5-25 & 5-26

[2] Revised January 19, 2004

C. Construction Methods: When installing corporation stops, the main shall be tapped at a 22 ½ degree angle above the horizontal. Service tubing shall be installed as a continuous length of pipe and shall have a minimum cover of 4 feet. Curb stops shall be vertical, with the top of the curb box at a finished grade. Where grading may still be in progress, the curb box shall be marked by a high stake. Curb boxes shall be located behind curbs and outside driveways.

6 - 11 RAILROAD AND CREEK CROSSINGS

Pipeline crossings under railroads and creeks shall be installed in accordance with the railroad specifications and the agencies in control of streams and creeks.

6 – 12 STATE HIGHWAY AND STREET CROSSINGS

The general requirements for work in Penn DOT right-of-ways must follow all requirements as set forth in the PennDOT Highway Occupancy Permit (HOP) and its written specifications.

6 - 13 CORROSION CONTROL

Water mains that cross pipelines which are now, or may be in the future, cathodically protected, shall be constructed using PVC pipe as specified herein. The PVC pipe shall extend a minimum distance of 20 feet from the crossing pipe on each side. The PVC pipe shall be suitable for direct connections to cast iron or ductile iron piping, and shall conform to AWWA C900.

Chapter
7

TESTING AND DISINFECTION

7 - 1 GENERAL

This section covers the testing and disinfection of the water mains. The Contractor shall prepare a schedule and procedure for the testing and disinfection of the different parts of the work, and shall submit the same to the Authority for approval two weeks before beginning the testing and disinfection. The Contractor shall perform the testing and disinfection promptly and efficiently without interference to the system operation. The Contractor shall give the Authority 48 hours notice before testing any main.

The Contractor shall begin testing and disinfection of the various sections of water mains promptly upon the completion of a section of the work unless the ATMA approves otherwise. The Authority reserves the right to limit the amount of water main to be tested by valves or temporary plugs. The Contractor shall install temporary reaction backings where required. Do not test or disinfect water mains if the air temperature is expected to fall below 35 degrees F.

7 - 2 HYDROSTATIC AND LEAKAGE TEST

Hydrostatic pressure tests shall not be made until at least 5 days after the High Early Strength cement concrete reaction backings are installed. Conduct hydrostatic and leakage tests in the presence and to the satisfaction of the Authority.

The Contractor shall completely backfill the trench, or may partially backfill the trench with written approval of the ATMA, prior to carrying out the pressure test.

The section of water main being tested shall be filled with water a minimum of 24 hours before the main is tested. The Contractor shall insure that the air is expelled from the pipeline. Any taps necessary to release air or water from the main during testing shall be made at the Contractor’s expense.

After the pipeline has been filled with water for 24 hours, the Contractor shall conduct a hydrostatic or pressure test. The duration of the pressure test shall be at least 2 hours. Each section of water main shall be tested under the design pressure specified in the design, measured at the low point of the section of main being tested. The test pressure shall be 150 psi or 1-½ times the working line pressure, which ever is greater, unless otherwise specified by the Authority. The Contractor shall not employ a test pressure which exceeds the allowable pressure of any installed pipe, valve or appurtenance. The section of pipeline shall be tested and examined in accordance with AWWA C600, section 4.1. After completion of the test, the Contractor will flush the system. Sixteen hours after replenishing the system, the Contractor will be responsible for obtaining samples for testing.

The leakage test shall be in accordance with AWWA C600, section 4.1, except that the Contractor shall provide an approved means for measuring the leakage. The leakage test may be conducted at the same time as the pressure test, provided leakage is suitably measured during the pressure tests and a 2-hour record is kept of water added to the pipeline.

7 - 3 DISINFECTION

A. General: Before being placed in service, all pipe installed under this Contract shall be disinfected by chlorination in accordance with AWWA C651, except where specified otherwise in this section.

B. Preliminary Flushing: Prior to disinfection, the section of pipeline being disinfected shall be flushed thoroughly. If necessary, the line shall be opened up to flush, as in a case where no hydrants are available. The ATMA shall operate all existing flushing valves.

C. Form of Chlorine for Disinfection: The Contractor shall use either liquid chlorine or calcium hypochlorite solution for disinfection in accordance with AWWA C651, section 2.

D. Application of Chlorine: The following table gives the amount of calcium hypochlorite and the quantity of 1 percent hypochlorite solution required to produce a 25 mg/l chlorine concentration in 100 feet of pipe.

Calcium Hypochlorite and Chlorine Solution Required to Produce 25mg/l Concentration in 100 Feet of Pipe

Pipe Size	Contents in a 100 - Foot Section			Amount of Calcium Hypochlorite		1% Chlorine
(inches)	Cubic Feet	Pounds	Gallons	Ounces	Pounds	Solution (Gallons)
3	4.9	306	37	1/5	0.012	0.09
4	8.73	545	66	1/3	0.021	0.16
6	19.60	1,225	147	1 1/2	0.091	0.73
8	34.9	2,180	261	2 1/2	0.159	1.30
10	54.55	3,405	408	4	0.252	2.06
12	78.55	4,905	588	5 5/8	0.350	2.88
16	139.60	8,725	1044	10	0.621	2.88

E. Point of Application: The chlorine solution shall be applied at the high end of the pipeline section through a corporation stop inserted in the top of the new pipe. If the water for the chlorine solution is supplied from the existing pipeline, there shall be a physical break between the injector supply and the injector or pump.

F. Rate of Application: The chlorine solution shall be pumped slowly into the new pipeline until the entire main is filled with the chlorine solution. If required by the ATMA, the chlorine residual shall be measured at several points along the main.

G. Point of Discharge: The Contractor shall discharge the sterilizing solution through available outlets, or through taps in the main. The chlorine-bearing water is extremely toxic, and the Contractor shall protect property and fish life from damage due to the discharge of chlorine solution. If special precautions are required to prevent damage to aquatic life, the Contractor shall neutralize the chlorine solution by applying sodium thiosulfate, in the ratio of two parts thiosulfate to one part chlorine, at the point of discharge.

H. Flushing Water: The Authority will provide flushing water. Existing water system valves shall be operated by the Authority.

I. Water for Testing: The Authority will furnish water for one hydrostatic test and disinfection procedure per line installed. If pipelines must be retested and disinfected, the cost for additional water will be at the Contractors expense.

J. Tablet Method of Disinfection: The Authority, at its option, may allow the tablet method of disinfection to be used for short extensions (up to 2,000 feet) and smaller diameter mains (up to 12 inches). The tablet method shall be in accordance with AWWA C651, section 5.1.

K. Disinfection of Water Main Connections: If it is not possible to disinfect the pipe, valves and fittings in the manner specified above, the Contractor shall, with the Authority's approval, use the following procedure:

The Contractor shall prevent foreign material and trench water from entering the pipe, fittings and valves during their installation. The interior of all pipe, fittings and valves shall be swabbed with a 5 percent hypochlorite solution which can be obtained by mixing 3 pounds of granulated calcium hypochlorite with 5 gallons of water. After the pipe, fittings and valves have been swabbed, they shall be thoroughly flushed with water.

Service connections shall be part of the testing and disinfection program. The Contractor shall drain the chlorine from the service connections. If necessary, the Contractor shall request service customers to run spigots in the dwelling to remove chlorine from the lines. The Contractor shall be responsible for any damage to customer service lines.

Chapter
8

CONNECTIONS

8 - 1 HOUSE SERVICE CONNECTIONS

The Owner/Developer shall construct all service connections to extend behind the property line or outside the water/road right-of-way with a curb box. These connections should be built with a quality pipe required by these specifications. The ends of all service connections shall be laid and joined in every respect in the manner called for in these Regulations for water pipe installation. All lateral service lines constructed by open cut shall be a minimum of three fourths inches (3/4") in diameter. All house service laterals must be shown on the plans.

Whenever a stone or concrete sidewalk or curb exists, witness signs cut into the curb or sidewalk and painted shall indicate service connections.

When rock is encountered at the end of a Service line, the rock must be removed for a distance of five feet (5') beyond the end of the service line.

If rock is encountered in a service connection excavation within ten feet (10') of any building, drilling and wedging or methods other than blasting must remove it.

When required, on account of the depth of the water pipe, branches shall be built up on an angle upwards no greater than forty-five (45) degrees from horizontal.

Detectable locator tape for non-metallic piping: Polyethylene plastic tape, acid and alkali resistant, with a minimum thickness of .005 inch with no less than 50 gauge (.0005) solid aluminum foil core six inches (6") wide. The foil shall be visible from both sides and the adhesives that bond the protective plastic jacket to both sides of the foil must be applied directly to the film and foil layers with no inks or printing extending to the edges of the tape. APWA color-coded and imprinted with the standard legend for water lines. All printing shall be encased to avoid ink rub-off. Tape shall have a minimum strength of 5480 psi. lengthwise and 3090 psi. crosswise.

8 – 2 CONCRETE ENCASEMENT

Where required or directed by the Township, pipes shall be encased in concrete. Concrete encasement shall compose of Class B Concrete. All encasement shall conform to the dimensions shown on the Standard Details.

8 – 3 DUPLEX CONNECTIONS

All duplexes must have a separate service line to the main line, and conform to the House Service Connection Regulations of this chapter. Connecting the duplex to the main line any other way must be approved by the ATMA

8 – 4 BEDDING

All house service lines must be placed on six inches (6") of stone bedding. Only Type #57 stone shall be used for bedding.[2]

8 – 5 BACKFILL

There must be a minimum of two feet (2') of Type 57 stone backfill covering the entire pipe.[2]

Areas that will have vehicular traffic (i.e. paved, stoned etc.) there must be an additional two feet (2') of 2RC stone placed over the initial two feet (2') of backfill for a total of four feet (4') of stone cover. Please refer to the backfill detail.[1]

There must be a total cover of at least four feet (4') over the entire pipe. No backfill may be placed over the pipe until it has been inspected by a representative of ATMA.

Any backfilling done within PA Dot's right-of-way must follow PA DOT's specifications along with ATMA's specifications.

[1] Added January 19, 2004
[2] Revised January 19, 2004

8 – 6 LOCATION

A water service line must remain on the property on which it serves.

If this cannot be achieved the property owner shall request a waiver from this requirement by the ATMA. If approved for this waiver the property owner shall present to the ATMA the proposed easement necessary for this line to cross an adjoining property. Upon approval by the ATMA the easement shall be executed by the interested parties. The original easement documents shall be forwarded to the ATMA for recording at the Franklin County Courthouse. All costs of same shall be paid by the property owner requesting the waiver.[2]

Service lines may not be placed under any foundation of any structure, and must be relocated if a structure is to be erected where the service line is currently located.

Any service line that will have to cross a railroad must follow the railroads guidelines for crossings. Any service line that will have to cross a state road must follow Penn Dot standards for crossings. Any service line that will cross a Township road will follow the Township standards for crossings, and will be determined by the Township whether it will be an open cut or a bore.

8 – 7 NON-RESIDENTIAL CONNECTION

These standards may differ for non-residential connections, based on the type of business. It will be the discretion of the ATMA and their Engineer to determine the standards for the connection of the non-residential business

If a business changes its operation at any time then the ATMA may require the business to increase the size of the service line.

[2] Revised January 19, 2004

ATTACHMENT "A"

A – 1 INSPECTION FEES

The Municipal Authority cost per lineal foot of water line tested will be set by a resolution of the Antrim Township Municipal Authority, and may be reviewed from time to time.

A – 2 As-Built Drawings

The Municipal Authority cost per lineal foot of water line tested will be set by a resolution of the Antrim Township Municipal Authority, and may be reviewed from time to time.

Any construction such as Pumping Stations, Treatment Plants, Metering Chambers, etc. the cost of inspection and the cost of as-built drawings will be estimated prior to approval and the estimated amount will be duly approved.

ATTACHMENT "B"

A. Three (3) Drawings are to be submitted on twenty four inch by thirty-six inch (24" x 36") reproducible Mylar. It shall be labeled as to contract number and sheet number to correspond with existing Municipal Authority drawings. The drawing shall show direction of north and shall be scaled at one inch equals fifty feet horizontal (1"=50'), and one inch equals five feet vertical (1"=5'). A reduced 11" x 17" copy of the "As-builts" shall be provided to enable the A.T.M.A. to have with them in the field.[2]

B. Drawing is to show plan and profile (on the same sheet) of water line run, including all valves and House Service connections, with the length of the run shown as measured.

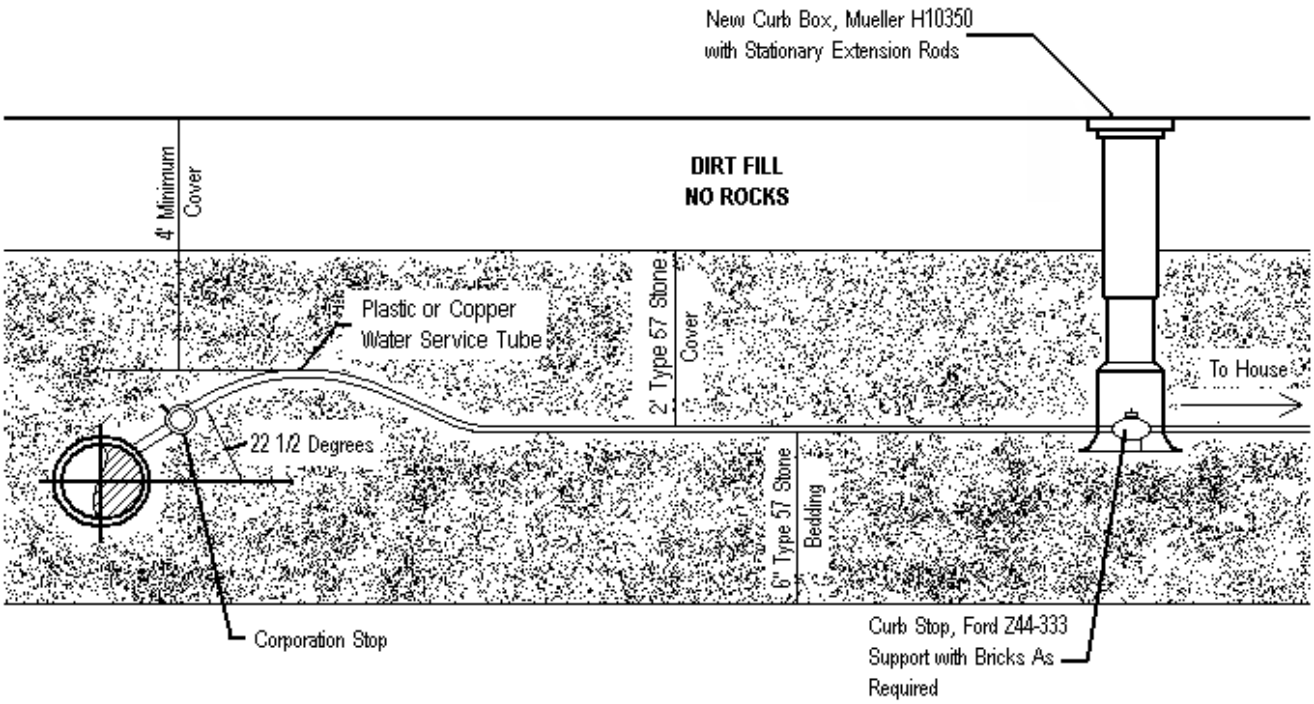
C. The water line plan shall show the following:
   1. Air-Release manhole numbers
   2. Lateral wye stations and depths (in block)
   3. Lateral end shall be located with its station along the main water line and the distance to the end measured perpendicular to the main water line. The depth of the lateral end from existing ground surface shall be noted
   4. Existence of all culvert pipes, gas lines, sewer lines, manholes and their numbers, electric, etc. as it relates to crossing water installation.
   5. Road profile and existing homes shall be included for proper field determination
   6. Matchline to existing drawings

As-Built drawings shall be reviewed by the Antrim Township Municipal Authority or its representatives for proper compliance with inspectors notes.

[2] Revised January 19, 2004

STANDARD DETAILS

WATER SYSTEM



NO GROUNDING OF ANY UTILITY TO THE WATER SERVICE LINE ON THE INTERIOR OR THE EXTERIOR OF THE BUILDING OR THE PLACEMENT OF ANY GROUND RODS WITHIN 10' OF ANY WATER SERVICE LINE.

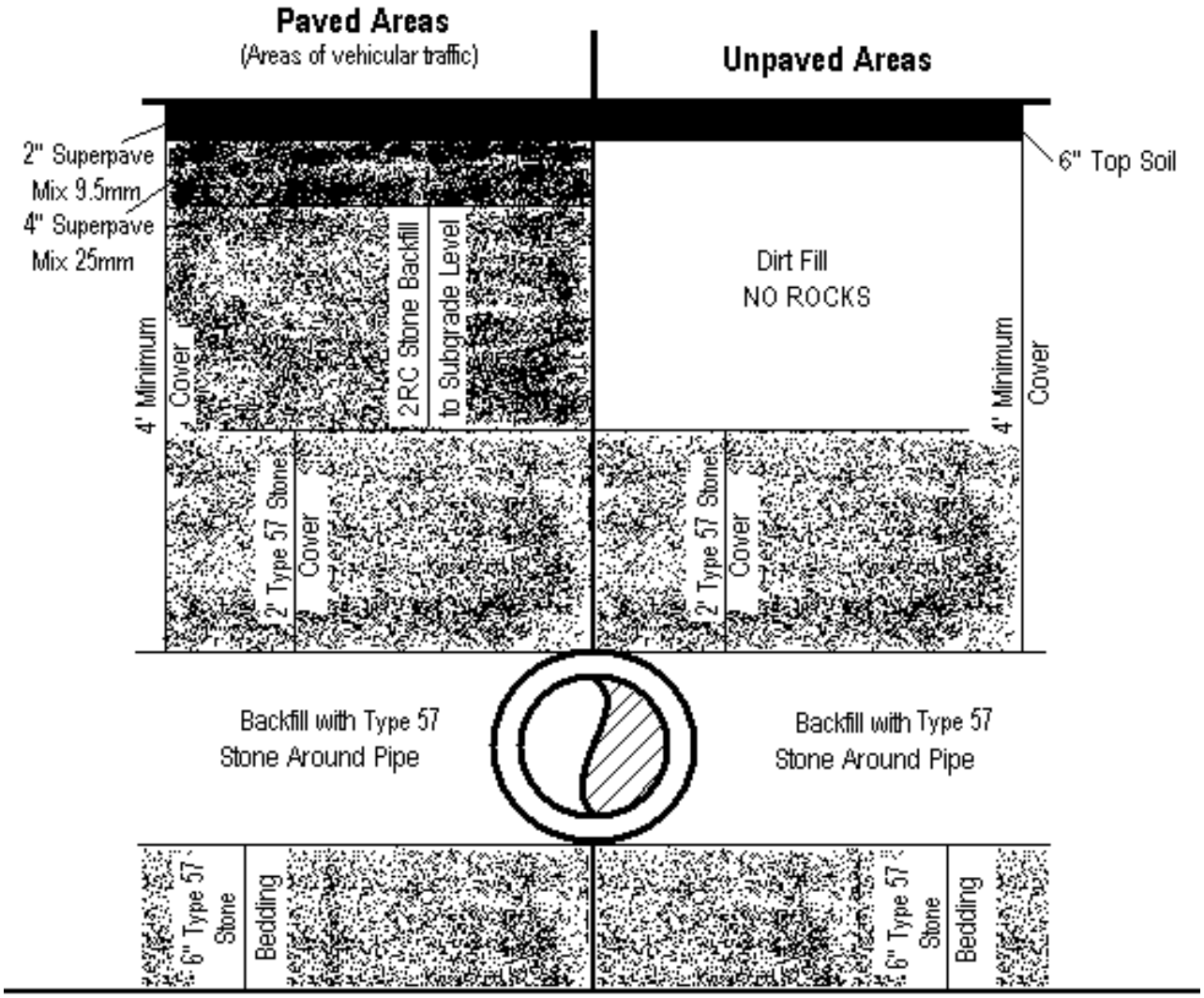
Revised January 19, 2004

House Service Connection must be made in accordance with Chapter 8.

All Service lines placed in an area of vehicular traffic shall follow the correct backfilling procedures shown on the backfill detail and described in Chapter 8 section 5.

HOUSE SERVICE CONNECTION

(Not to Scale)



Antrim Township Road Construction Specifications shall be followed when constructing a road overtop of any sewerline.

Revised January 19, 2004

BACKFILL

(Not to Scale)

Index

A

Act 287, 13
Air Release Valves, 46
Anchorage, 53
Arranging Work, 10
As-Built Drawings, 12

B

Backfill
  Service Connections, 61
  Detail, 68
Backfilling, 23
  Backfill Material, 24
  Execution, 25
  Extent of Backfill, 23
  Field Quality Control, 27
  Preparation, 25
  Tolerances, 27
Backflow Prevention Devices, 49
Bedding
  Service Connections, 61
Blasting, 22

C

Cast Couplings, 46
Cement-Mortar Lining, 40
Clamping Devices, 44
Cleaning Pipe & Fittings, 51
Compaction and Backfilling, 35
Complaints and Deficiencies, 13
Concrete, 47
Concrete Encasement, 61
Condition of Excavation, 23
Conducting the Work, 10
Connection to Existing System & Interruptions of Service, 53
Connections, 60
  House Service, 60
  Duplex, 60
  Non-Residential, 61
Coordination, 32
Copper Tube, 43
Corporation Stops, 44
Corrosion Control, 55
Curb Stops and Boxes, 44

D

Definitions, 7
Dewatering, 28
Disinfection, 57
Ductile Iron Pipe, 39
Duplex Connections, 61

E

Excavation, 20
  Blasting, 22
  Condition of Excavation, 23
  Execution, 20
  Field Quality Control, 21
  Preparation, 20
  Rock Excavation, 22
Extension Stems, 42

F

Field Quality Control, 37
Field Measurements, 32
Fees, 32
Fill Materials, 32
Fitting for Copper Tubing, 44
Fitting for Plastic Tubing, 44
Fittings, 39
Fire Hydrants, 45
Flanged Coupling Adapters, 46

G

General Requirements, 15
  General Requirements, 15
  Excavation & Backfill, 19
  Installation, 50
  Testing & Disinfection, 55
  Trenching, 31
General Conditions, 7
Guarantee, 14

H

House Service
  Connection, 59
  Detail, 67
Hydrostatic and Leakage Test, 56

I

Inspection, 12
Installation, 51
Intent of Specifications, 8
Introduction, 5

L

Laying Pipe, 52
Location, Service, 62
Lowering Water Main into Trench, 51

M

Manhole Frames and Covers, 47
Manhole Steps, 48
Materials, 39
Mechanical Joint Retainer Glands, 40
Meters, 49

N

Non-Residential Connections, 62

O

Observance of Laws, 10
Obstructions, 29
Other Fees, 12

P

Penn Dot Specifications, 12
Permits, Licenses and Certificates, 9
Plans & Specifications, 13
Plastic Tube, 43
Plastic Pit Setters, 49
Precast Reinforced Concrete Manholes, 47
Preparation
  Excavation, 20
  Backfilling, 25
  Trenching, 33
Pressure Regulating Valves, 46
Products, 15
Product Options, 17
Property Corners, 14
Protection of Finished Work, 28; 37
Protection of Property, 28
Protection & Safeguards, 11
Public Safety, 12

R

Railroad & Creek Crossings, 55
Rock Excavation, 22

S

Safety Regulations, 10
Scope of Work, 9
Service Lines, 54
Setting of Hydrants, 53
Setting of Valves & Valve Boxes, 52
Sheeting, Shoring & Bracing, 28
Small Valves, 43
Special Construction, 13
State Highway and Street Crossings, 55
Steel Encasement Pipe, 45
Storage and Protection, 16
Substitutions, 17

T

Taps onto the Line, 54
Testing, 56
  Disinfection, 56
  Hydrostatic & Leak, 55
Tolerances, 27; 37
Township Inspection Fees, 12
Transport & Handling, 16
Trenching, 31

V

Valves, 41
Valve Boxes, 42

W

Water Service Line, 43
Width and Depth of Trenches, 31
Workman Qualifications, 32