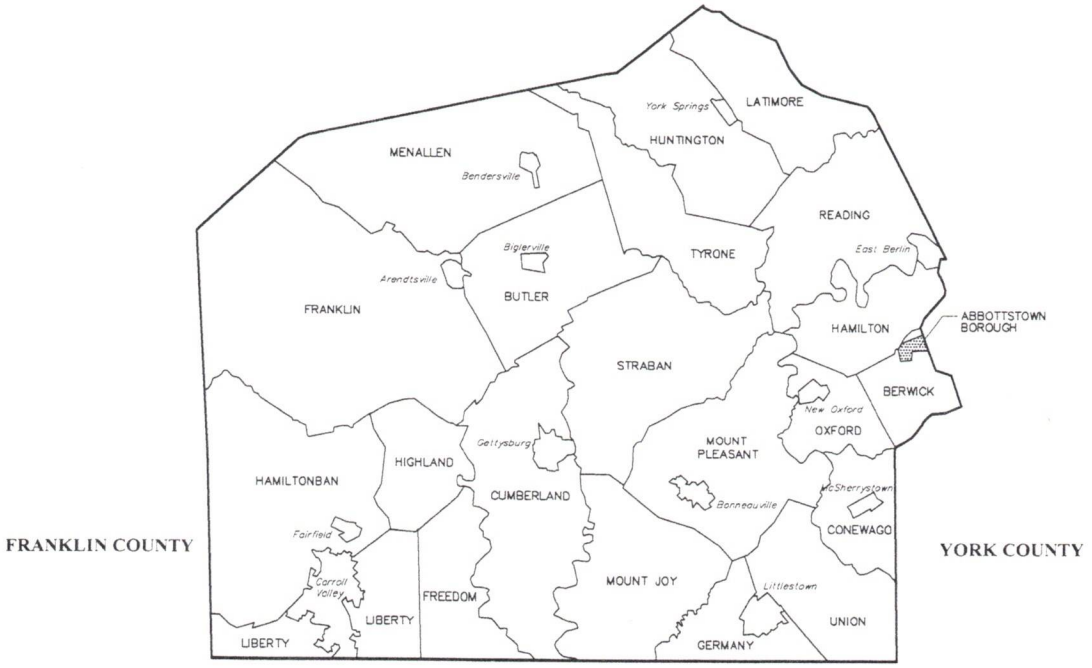
EXHIBIT A

CONSTRUCTION AND MATERIAL SPECIFICATIONS



Abbottstown Borough

ADAMS COUNTY, PENNSYLVANIA

February 2014

C.S.Davidson, Inc.

Excellence in Civil Engineering

38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

ABBREVIATED TABLE OF CONTENTS

SECTION 00100

TERMS AND ABBREVIATIONS

I. TERMS

Unless indicated otherwise, the meaning of terms used in these specifications shall be as follows:

Contract is defined as the agreement between a developer and contractor or Municipality and contractor performing the site improvements.

Contractor is defined as company performing the construction of site improvements.

Developer is defined as subdivider or potential buyer, property owner, equitable owner who has executed an agreement with contractor performing site improvements.

Drawings/Approved Drawings are defined as those land development and subdivision plans or construction documents approved by the Borough. Drawings shall meet the requirements of the Plan Standards contained within the Subdivision and Land Development Ordinance.

Engineer is defined as the Borough's appointed engineering firm.

Municipality is defined as Abbottstown Borough and its full time employees, elected officials and appointed representative(s).

Borough is defined as Abbottstown Borough and its full time employees, elected officials and appointed representative(s).

II. ABBREVIATIONS

The following abbreviations are used in the text of these specifications:

AASHTO	American Association of State Highway Transportation Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
BCBC	Bituminous Concrete Base Course
DI	Ductile Iron
FS	Federal Specifications
HES	High Early Strength
HDPE	High Density Polyethylene
IEEE	Institute of Electrical & Electronics Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
MH	Manhole
MUTCD	Manual of Uniform Traffic Control Devices
NEC	National Electric Code
NECS	National Electric Safety Code
NEMA	National Electrical Manufacturers Association

NFPA	National Fire Protection Association
OSHA	Occupational Safety & Health Administration
PA DEP	Pennsylvania Department of Environmental Protection
PennDOT	Pennsylvania Department of Transportation
Psi	Pounds per square inch
PSIG	Pounds per square inch gauge
PTM	Pennsylvania Test Method
PVC	Polyvinyl Chloride
SDR	Standard Dimension Ratio
SESC	Soil Erosion and Sedimentation Control
SESPC	Soil Erosion and Sediment Pollution Control
UHMW	Ultra High Molecular Weight
UL	Underwriter's Laboratories, Inc.
WWF	Welded Wire Fabric

END OF SECTION

SECTION 00160

UTILITY CONFLICT STATEMENT

PART 1 GENERAL

1.01 DISCREPANCIES

A. Any discrepancies between the requirements of these specifications and the requirements of any other authorized agency, such as public utilities must be resolved prior to commencement of construction activities in order to avoid delays.

1.02 REQUIREMENTS

A. It is the responsibility of the Contractor to comply with the requirements of the PA One Call System, as required by PA Act 38 (1991), prior to commencement of construction activities in order to avoid delays.

B. The Contractor will insure that all work is within the requirements of the Pennsylvania Underground Utility Protection Law.

END OF SECTION

SECTION 01010

GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 WORK CONDITIONS

A. Construct the work in stages to provide for public convenience.

1. Do not close off public use of facilities until completion of one stage of construction will provide alternative usage.

B. Conduct construction operations to ensure the least inconvenience to the general public.

C. Take measure to control traffic when working on or near public roads and streets.

1. Employ traffic control measures in accordance with the MUTCD and Pennsylvania Department of Transportation Publication No. 213, "Temporary Traffic Control Guidelines", or latest revision.

D. Restore existing paving outside the limits of the work that is damaged by the Developer's operations, to its original condition at the expense of the Developer.

E. Continuously keep rights-of-way, storage areas, streets, roads, highways and adjacent properties free from accumulation of waste materials, excess excavation, rubbish and windblown debris resulting from construction operations.

F. Protection of Existing Utilities and Structures:

1. Take all precautions and utilize all facilities required to protect existing utilities and structures.

2. In compliance with Act 38 of General Assembly of Pennsylvania, advise each Utility Company at least 3 working days in advance of intent to excavate, do demolition work or use explosives and give the location of the job site. Request cooperative steps of the Utility Company and suggestions for procedures to avoid damage to its lines.

3. Advice each person, in physical control of powered equipment or explosives used in excavation or demolition work, of the type and location of utility lines at the job site, the Utility Company assistance to expect and procedures to follow to prevent damage.

4. Immediately report to the Utility Company, the Borough and the Engineer any break, leak or other damage to the lines or protective coatings made or discovered during the work and immediately alert the occupants of affected premises of any emergency created or discovered.

5. Allow free access of Utility Company personnel at all times for purposes of maintenance, repair and inspection.

6. Protect all storm sewer systems from the introduction of any mud, debris, polluted water or foreign material.

1.02 PENNDOT HIGHWAY OCCUPANCY PERMIT

A. The Developer's attention is directed to Chapter 459, Occupancy of Highways by Utilities under Title 67 Transportation of the Pennsylvania Code. The Developer will pay the cost of the highway occupancy permit and the costs of the permit inspection fees, if any. The Borough will be designated as the permittee. The Developer shall pay all costs in connection with the highway occupancy permit or permits, including but not limited to all costs for special insurance and bonds. The Developer/Contractor is responsible for scheduling final inspection and obtaining final PennDOT approval.

1.03 PERMITS

A. The Developer shall secure and pay the cost for the Department of Environmental Protection Water Quality Management Permit.

B. The Developer shall secure and pay for other permits required to comply with Federal, State, and local ordinances and regulations.

1.04 MUNICIPAL ROAD OCCUPANCY PERMIT

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work, within the right-of-way of an adopted Borough road.

1. Employ traffic control measures only after approval from the Borough.

2. Notify Adams County Emergency Services (911) at least 72 hours in advance of any operations requiring changes to existing traffic patterns.

1.05 SUBMITTALS AND CERTIFICATIONS

A. All materials and products requiring submission of manufacturer's information must be approved by the Engineer prior to purchasing and installing.

B. The Developer/Contractor shall provide any additional information required by the Engineer to assure compliance with these specifications.

C. Provide three (3) copies (plus the number of copies the Contractor wants returned) of all submittals and certificates to the Engineer.

PART 2 EXECUTION

2.01 PROCEDURE

A. Confer and verify with other Contractors as to locations and extent of their work, to the end that interferences and deletions between trades are prevented and embedded or required items are installed in conjunction with the work under this contract. Interconnections between work of other contracts shall be made by the Developer whose work is erected last unless otherwise specifically stated in the Contract Documents, required by the Engineer or necessitated by the nature or extent of the work.

2.02 DEVELOPER'S USE OF PREMISES

A. Confine construction equipment, the storage of materials and equipment, and operations of workmen to within the permanent and temporary rights-of-way.

B. Pipeline materials may be stored appropriately along the route of the Work provided such stored materials do not unduly restrict public use or infringe on private property that has not given written approval of use.

C. Assume full responsibility for materials stored on site.

D. Provide dumpsters for disposal of waste materials. Do not stock pile waste materials on site.

E. The Developer/Contractor shall provide self-contained toilet units at the site.

F. Field offices or structures in or along the right-of-way of the Borough shall be maintained in good order and repair.

2.03 UTILITY MARKING TAPE

A. Tape shall consist of minimum 5-mil (0.005") overall thickness, with no less than a 35 gauge (0.00035") solid aluminum foil core a minimum of 2" width. The foil must be visible from BOTH sides. The layers shall be laminated together with the extrusion lamination process, not adhesives. Further, there shall be NO inks or printing extending to the edges of the tape. The adhesive will NOT contain any dilutants, pigments or contaminants and is specially formulated to resist degradation by all known alkalis, acids, chemical reagents and solvents normally encountered in the soil. All printing shall be encased to avoid ink rub-off.

B. Test Data:

Property	Method	Value
Thickness	ASTM D2103	5.0 mils
Tensile strength	ASTM D882	25 lbs./inch (5500 psi)
Elongation	ASTM D 882-88	<50% at break
Printability	ASTM D2578	>50% dynes/cm^2
Flexibility	ASTM D 671-81	Pliable hand
Inks	Mfg. Specs .	Heat set Myles
Message repeat	Mfg. Specs.	Every 20"
Foils	Mfg. Specs.	Dead soft/annealed
Top Layer	Mfg. Specs	Virgin PET
Bottom Layer	Mfg. Specs	Virgin LDPE

Adhesives	Mfg. Specs.	>30%, solid 1.5#/R
Bond strength	Boiling H^2O @ 100°C	5 hours w/o peel
Colors	APWA code	See below

C. Color Code shall be as follows:

1. Safety Red: Electric power, distribution and transmission and municipal electric systems.

2. High Visibility Safety Yellow: Gas and oil distribution and transmission, dangerous materials, product and stem.

3. Safety Alert Orange: Telephone and telegraph systems, police and fire communications, and cable television.

4. Safety Precaution Blue: Water systems and slurry pipelines.

5. Safety Green: Sanitary and storm sewer systems.

6. Safety Brown: Force mains, reclaimed water lines and effluent reuse lines.

7. Alert Purple: Reclaimed non-potable water lines.

2.04 SOIL EROSION AND SEDIMENTATION CONTROL PLAN

A. The Developer/Contractor is required to provide soil erosion and sedimentation control measures as indicated in the Soil Erosion and Sedimentation Control Plan which will be completed as necessitated by the nature or extent of the work. An approved copy of the Soil Erosion and Sedimentation Control Plan, as approved by the Adams County Conservation District, shall be submitted to the Borough.

2.05 FIELD OBSERVATION

A. Field observation shall be at the discretion of the Borough. The Borough's Inspector shall have the authority to halt construction if, in his opinion, construction is not being done according to specifications and/or construction drawings. Any construction not being performed in accordance with the Borough Specifications shall be reported to the Borough and Engineer for direction. Periodic field visits will occur on all construction activities, unless special circumstances warrant additional time. The Developer/Contractor is responsible for payment of Engineer's inspection and administrative fees to the Borough.

2.06 PRECONSTRUCTION MEETING

A. Before starting the work, a conference will be held at the Borough office to review the project and to establish a working understanding between the parties as to the Project. Present at the conference will be the Developer or his representative, the Borough Engineer, the Borough's Inspector, the Contractor and the Superintendent. At the preconstruction meeting, the Developer or Contractor shall supply a schedule for construction activities and a list of materials/products to be used on the Project. The list should identify manufacturers, model numbers and sufficient data to assure compliance with

these Specifications. The Developer or Contractor shall supply a list of personnel with contact information that the Borough may use in the event of an emergency.

2.07 RECORD DRAWINGS

A. The Contractor is required to keep an up-to-date set of Record Drawings (As-Constructed Drawings) for the project. Up-to-date is defined as containing modifications for work performed within the past 30 days.

B. The Contractor shall identify the location of all newly installed, existing to remain, and piping to be abandoned pipe and conduit as it is installed or uncovered during the construction period.

C. No trenching for pipe or conduit shall be backfilled until the piping has been located and recorded by the Contractor.

D. The CONTRACTOR shall verify As-Constructed elevations of sanitary sewer and storm sewer inverts and road profiles.

E. At the end of the project, the Contractor's record drawings shall be turned over to the Engineer in AutoCAD format or as indicated in the Subdivision and Land Development Ordinance, or directed by the Engineer.

F. The Engineer will review the Contractor's record drawings. If the record drawings do not meet the requirements stated above, final adoption of the improvements will not be approved.

G. The Contractor shall provide detailed locations of all sanitary sewer locations, depth and length. The Contractor shall provide detailed lateral locations of all water service locations, including depth and length. Sewer laterals shall be located using manholes as a reference point and stationary from that point. Water service curb stops shall be located using distance from property lines.

2.08 FINAL ACCEPTANCE

A. There will be no final acceptance of sewer lines until all other utilities are installed and all testing is completed.

END OF SECTION

SECTION 02100

CLEARING AND GRUBBING

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Clearing
2. Grubbing
3. Stripping and stockpiling topsoil
4. Debris disposal

B. Related Work Specified Elsewhere:

1. Utility Conflict Statement:	Section 00160
2. Site excavation and placement of fill material:	Section 02210
3. Trenching, backfilling and compacting:	Section 02221
4. Roadway excavation, fill, and compaction:	Section 02230
5. Soil erosion and sedimentation control:	Section 02270
6. Finish grading, seeding, and sodding:	Section 02485

C. Definitions:

1. Clearing is defined as the removal of trees, brush, down timber, rotten wood, rubbish, any above original ground elevation not designated to be saved. Clearing also includes removal of fences, walls, guard posts, guide rail, signs, and other obstructions interfering with the proposed work.

2. Grubbing is defined as the removal from below the surface of the natural ground of stumps, roots and stubs, brush, organic materials and debris.

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE - Section Not Used

1.03 SUBMITTALS

A. Permits:

1. For off-site disposal, submit two copies of the agreement with each property owner releasing the Borough from responsibility in connection with the disposal of the debris, and permits or approvals from regulatory agencies.

1.04 JOB CONDITIONS

A. Construction Limits

1. The Contractor may clear all obstructions within the construction limits or permanent and construction rights-of-way except those specifically designated on the drawings or specifications to be saved or restored.

B. Control of Traffic

1. Employ traffic control measures only after requesting traffic alterations, in writing to the Borough.

2. The Contractor will employ traffic control measures in accordance with the MUTCD and with PennDOT Publication 213.

3. Notify Adams County Emergency Services (911) at least 72 hours in advance of any operations requiring changes to existing traffic patterns.

C. Coordination With Utilities

1. The Contractor shall insure all work complies with the requirements of the Pennsylvania Underground Utility Protection Law.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Fencing:

1. Undamaged picket snow fence, 4' high, formed of wooden slats, tightly woven with wire cable.

2. Soil-set fence posts, studded "T" type, 6' high.

3. Undamaged temporary construction fencing, 4' high, formed of plastic, orange colored.

B. Tree Wound Dressing:

1. Antiseptic and waterproof, asphalt base.

PART 3 EXECUTION

3.01 PREPARATION

A. Notify the Borough, the PA One Call System, and regulatory agencies at least 3 business days prior to beginning any clearing work.

B. Contractor's work should meet the requirements of the Soil Erosion and Sedimentation Control Plan for the site, as approved by the Adams County Conservation District.

C. Protect benchmarks, property corners, utilities, existing trees, shrubs and other landscape features designated for preservation with temporary fencing or barricades satisfactory to the Borough. No material shall be stored or construction operation carried on within 4-feet of any tree to be saved or within the tree protection fence.

D. When a private enclosure fence encroaches on the work area, notify the property owner at least 5 days in advance of the clearing/grubbing operations to permit the owner to remove it, construct a supplemental fence, or make such other arrangements as may be necessary for security purposes. Upon failure of the property owner to reasonably proceed with the work required to secure his property, carefully remove the fence, in whole or in part and neatly pile the materials onto the owner's property.

3.02 UTILITY RELOCATIONS

A. Inform all companies, individuals and others owning or controlling facilities or structures within the limits of the work which have to be relocated, adjusted or reconstructed in sufficient time for the utility to organize and perform such work in conjunction with or in advance of the Contractor's operations.

B. Comply with the requirements of Pennsylvania Underground Utility Protection Law.

3.03 CLEARING

A. Confine clearing to within the construction limits.

B. Clear in a manner that will avoid damage to property corners, trees, shrubs, structures, and other installations which are to be retained.

C. Comply with the requirements of Pennsylvania Underground Utility Protection Law.

D. Where stumps are not required to be grubbed, flush cut with ground elevation.

3.04 GRUBBING

A. Grub areas within the construction limits to remove roots and other objectionable material to a minimum depth of 24".

B. Remove all stumps within the cleared areas.

3.05 STRIPPING AND STOCKPILING TOPSOIL

A. Strip topsoil to whatever depth it may occur from areas to be excavated, filled, or graded and stockpile.

B. Topsoil shall not be used as backfill.

C. Topsoil should be protected through implementation of a Soil Erosion and Sedimentation Control Plan to prevent discharge to any storm sewer system.

3.06 DEBRIS DISPOSAL

A. Trees, logs, branches, brush, stumps, and other debris resulting from clearing and grubbing operations shall become the property of the Contractor and shall be legally disposed of.

B. Burning of any debris shall be done in accordance with all applicable ordinances of the Borough.

C. Discarded materials within the right-of-way limits necessary to perform the work shall be removed and properly disposed of at the Contractor's expense.

3.07 RESTORATION

A. Repair all injuries to bark, trunk, limbs, and roots or remaining plants by properly dressing, cutting, and painting, using approved arboricultural practices and materials.

B. Replace trees, shrubs and plants designated to be saved which are permanently injured or die as a result of construction operations with like species.

C. Remove protective fences, enclosures and guards upon the completion of the project.

D. Restore guard posts, guide rail, signs and other interferences to the condition equal to that existing before construction operations.

E. Fences, mail boxes, and signs within the line of work shall be carefully removed, stored, and upon completion of backfill, reset or replaced to their original condition and location, at the Contractor's expense.

END OF SECTION

SECTION 02150

BORING AND JACKING

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Approach trench excavation
2. Installation of casing pipe
3. Installation of carrier pipe

B. Related work specified elsewhere:

1. Utility Conflict Statement:	Section 00160
2. Trenching, backfilling and compacting:	Section 02221

C. Definitions: NONE

D. Applicable Standard Details:

AB 02150-1 Casing Installation

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Comply with applicable federal, state and local ordinances, codes, statutes, rules and regulations, and affected jurisdictional bodies.

2. Pennsylvania Department of Transportation Publication 408 Specifications.

3. American Railway Engineering Association, Manual for Railway Engineering.

B. CONTRACTOR Qualifications:

1. Construction operations shall be undertaken only by a Contractor well experienced with a minimum of five operations of similar magnitude and condition.

1.03 SUBMITTALS

A. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

B. Submit description of proposed construction methods, including methods to establish and maintain vertical and horizontal alignment.

C. Manufacturers' Literature

1. Submit manufacturers' catalog information for each type of pipe, fittings, couplings, adapters, gaskets, casing spacers, and assembly of joints for approval by the Borough. Include manufacturers' recommendations for deflection in pipe joints.

D. Certificates:

1. Submit certifications for each type of pipe, fittings, gaskets, lubricants or other joint materials from the manufacturers attesting that each of these meets or exceeds specifications requirements.

1.04 JOB CONDITIONS

A. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger the integrity of surface or subsurface structures or utilities, and landscape in the immediate or adjacent areas.

B. When boring or jacking under state highways and railroads, comply with applicable right-of-way occupancy permits, including requirements for maintenance and protection of traffic.

C. Control of Traffic:

1. Employ traffic control measures only after requesting traffic alterations, in writing to the Borough.

2. The Contractor will employ traffic control measures in accordance with the MUTCD and with PennDOT Publication 213.

3. Notify Adams County Emergency Services (911) at least 72 hours in advance of any operations requiring changes to existing traffic patterns.

D. If boring is obstructed, relocate or jack or tunnel crossing as approved by the Borough.

E. Coordination With Utilities:

1. The Contractor shall insure all work complies with the requirements of the Pennsylvania Underground Utility Protection Law.

PART 2 PRODUCTS

2.01 STEEL CASING PIPE

A. ASTM A53; 35,000 psi minimum yield strength, new materials only.

B. Full circumference welded joints.

C. Diameter and wall thickness as shown on the drawings.

2.02 CASING SPACERS

A. Timber Skids:

1. Pressure treated, cut to a cross-sectional size to allow placement of the carrier pipe in the casing and to support the barrel of the carrier pipe.

a. Provide with notches to accommodate fastening.

B. Bolt On:

1. Stainless steel shell with PVC liner, stainless steel hardware, and UHMW polymer runners. Centered Type. Cascade Waterworks Manufacturing Company, Yorkville, Illinois, or equal.

C. Non-Metallic:

1. HDPE with no metal bolts or attachments. Spacers shall strap onto carrier pipe and slide easily into casing but shall not move during installation.

2. Spacers shall provide constant projections around entire circumference of carrier pipe. Projections must have minimum height to pipe bells, similar to RACI type spacers as manufactured by RACI Spacers of North America, Vernon, British Columbia, or approved equal.

2.03 STEEL STRAPPING: ASTM A36

2.04 SAND (Fine aggregate)

A. Section 703.1, PennDOT Publication 408 Specifications. Type A.

2.05 GROUT

A. One part Portland cement (ASTM C150), and 6 parts mortar sand mixed with water to a consistency applicable for pressure grouting.

2.06 FLOWABLE FILL - Type D as specified in Section 02221, Table 1

2.07 BORED LATERAL PIPING

A. Gravity sewer pipe and fitting for 4" or 6" PVC bored laterals shall meet ASTM D3034, minimum SDR-21.

B. Solvent cemented joints shall meet ASTM D2855 specifications.

C. Solvent cement shall meet ASTM D2564 specifications.

D. Solid wall coupling shall be provided to make pipe transition from SDR-21 to SDR-35 or Schedule 40 piping.

E. All laterals shall be air tested with cleanouts in place.

PART 3 EXECUTION

3.01 APPROACH TRENCH

A. Excavate approach trench using methods as site conditions require.

B. Ensure pipe entrance face as near perpendicular to alignment as conditions permit.

C. Establish a vertical entrance face at least 1 foot above top of casing or tunnel lining.

D. Install adequate excavation supports as specified in Section 02221.

3.02 CASING PIPE INSTALLATION METHODS

A. Boring:

1. Install casing pipe with the determined vertical and horizontal alignment prior to installation of the carrier pipe.

2. Push the pipe into the ground with a boring auger rotating within the pipe to remove the spoil. Do not advance the cutting head ahead of the casing pipe except for that distance necessary to permit the cutting teeth to cut clearance for the pipe. The machine bore and cutting head arrangement shall be removable from within the pipe. Arrange the face of the cutting head to provide a barrier to the free flow of soft material.

3. Do not overcut excavation by more than 1" greater than the outside diameter of the casing pipe.

4. If voids should develop greater than the outside diameter of the pipe by approximately one inch, grout to fill voids.

B. Jacking:

1. Construct adequate thrust wall normal to the proposed line of thrust.

2. Impart thrust load to the pipe through a suitable thrust ring that is sufficiently rigid to ensure distribution of the thrust load on the pipe.

C. Drilling and Jacking:

1. Use an oil field type rock roller bit or plate bit made up of individual roller cutter units solidly welded to the pipe which is turned and pushed for its entire length by the drilling machine to give the bit the necessary cutting action.

2. Inject a high density slurry (oil field drilling mud) to the head as a cutter lubricant. Inject slurry at the rear of the cutter units to prevent jetting action ahead of the pipe.

D. Mining and Jacking:

1. Utilize manual hand mining excavation from within the casing pipe as it is advanced with jacks, allowing minimum ground standup time ahead of the casing pipe.

3.03 CARRIER PIPE INSTALLATION WITHIN CASING PIPE

A. All provisions regarding cleaning, inspection and handling specified under pipe material sections apply to this work.

B. Place the carrier as shown on Standard Detail AB 02150-1. Exercise care to prevent damage to pipe joints when carrier pipe is placed in casing.

C. Support pipeline within casing so that no external loads are transmitted to carrier pipe. Attach casing spacers to barrel of carrier pipe at 6' on centers, minimum 2 per pipe section.

D. Close ends of casing by sealing with brick masonry bulkheads, water-plug, or other approved hydraulic cement. The downstream bulkhead shall have a 2" diameter weephole (stainless steel).

E. Completely fill annular space between carrier pipe and casing pipe with limestone screenings or sand. If in a State Highway, fill annular space with flowable fill.

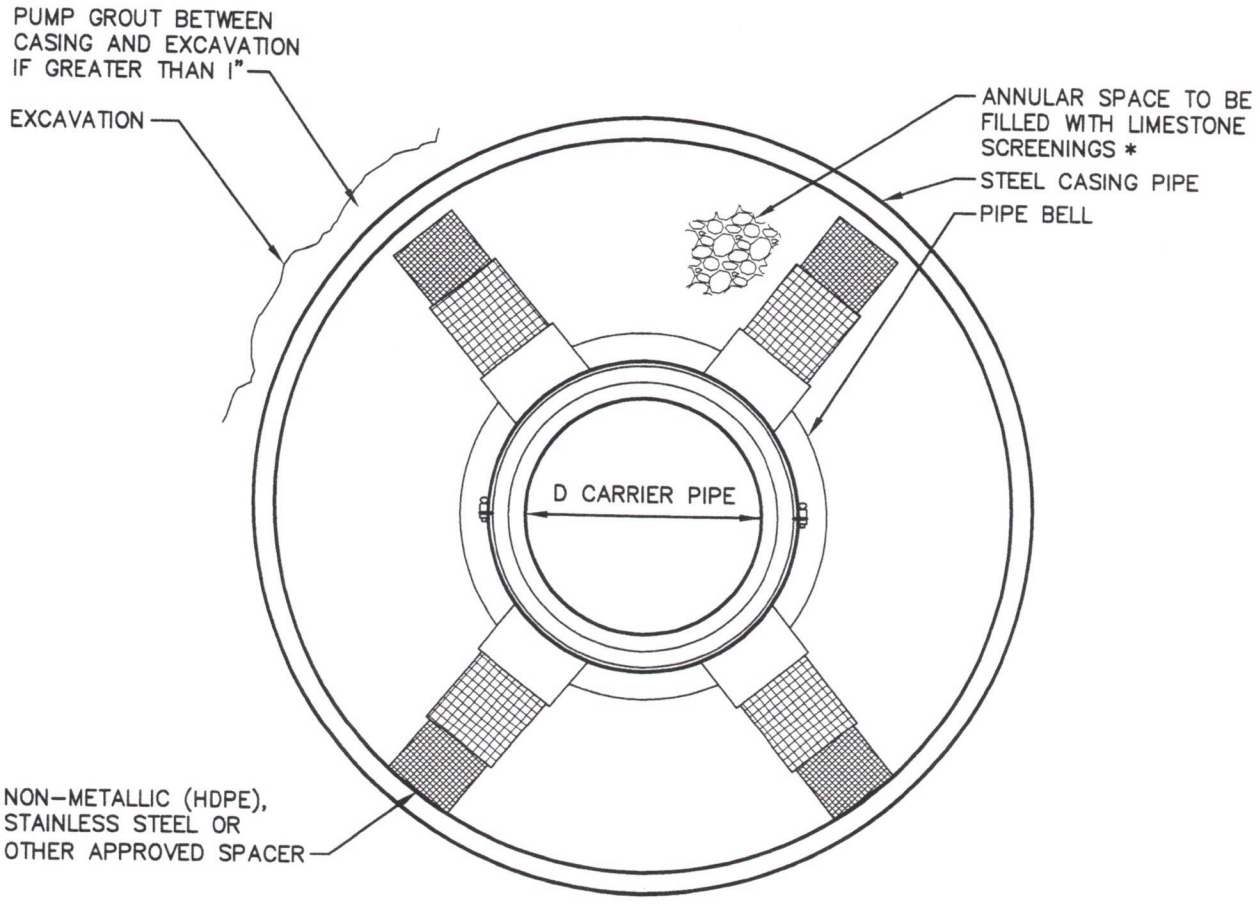
3.04 CARRIER PIPE INSTALLATION WITHOUT CASING PIPE

A. Bore the opening with a boring auger to the determined vertical and horizontal alignment.

B. Do not overcut boring excavation by more than 1" greater than the outside diameter of the lateral pipe.

C. Carefully guide the lateral pipe and joints through the opening, assembling joints prior to inserting into the boring.

END OF SECTION



NOTE:
DO NOT SUPPORT CARRIER PIPE ON BELLS

* IF IN STATE HIGHWAY RIGHT-OF-WAY, USE FLOWABLE FILL, TYPE D.

ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

CASING INSTALLATION

ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02150-1
FILE NO.	4904.1.00.01

SECTION 02210

SITE EXCAVATION AND PLACEMENT OF FILL MATERIAL

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Excavation
2. Blasting
3. Placement and compaction of fill material

B. Related work specified elsewhere:

1. Utility Conflict Statement:	Section 00160
2. Clearing and grubbing:	Section 02100
3. Trenching, backfilling and compacting:	Section 02221
4. Roadway excavation, fill and compaction:	Section 02230
5 Soil erosion and sedimentation control:	Section 02270
6. Finish grading, seeding, sodding:	Section 02485

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
Publication 19, Field Test Manual

- PTM No. 106 — Moisture-Density Relations of Soils (using 5.5 lb Rammer and 12 inch drop
- PTM No. 402 — Determine In-Place Density and Moisture Content of Construction Materials by Use of Nuclear Gauges

2. American Society for Testing and Materials (ASTM):

D698	Test Method of Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft.-lbf./ft^3)
D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lbf./ft^3)
D2922	Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

3. American Association of State Highway and Transportation Officials (AASHTO):

T89	Determining Liquid Limit of Soils
T90	Determining Plastic Limit and Plasticity Index of Soils

4. Pennsylvania Code

Title 67, Transportation, Chapter 459, Occupancy of Highway by Utilities

B. Testing Agency:

1. Compaction testing shall be performed by an approved Soils Testing Laboratory engaged and paid for by the Contractor and approved by the Borough.

C. Compaction Testing:

1. Determine compaction by the testing procedure contained in ASTM D698 or ASTM D1557 at the locations and frequencies specified by the Borough.

1.03 SUBMITTALS

A. Certificates:

1. Submit certified compaction testing results from the soils testing laboratory.

1.04 JOB CONDITIONS

A. Classification of Excavation:

1. All site excavation work includes excavation and removal of all soil, shale, rock, boulders, fill, and all other materials encountered of whatever nature.

B. Control of Traffic:

1. The Contractor shall employ traffic control measures in accordance with the MUTCD and with PennDOT Publication 213.

2. Notify Adams County Emergency Services (911) at least 72 hours in advance of any operations requiring changes to exiting traffic patterns.

C. Protection of Existing Utilities and Structures:

1. Take all precautions and utilize all facilities required to protect existing utilities and structures in compliance with Pennsylvania Act 187. Request cooperative steps of the Utility and suggestions for procedures to avoid damage to its lines.

2. Allow free access to Utility personnel at all times for purposes of maintenance, repair and inspection.

PART 2 PRODUCTS

2.01 ACCEPTABLE MATERIALS

For purposes of construction control, the following materials may be deemed acceptable for use in placement of fills:

A. Soil. Soil shall include all inorganic material having a maximum size that can be readily placed and compacted in loose 8 inch layers and of which more than 35 percent shall pass the No. 200 sieve. Soil shall have a minimum dry weight density of 98 pounds per cubic foot as determined in accordance with PTM No. 106, Method B and a maximum liquid limit of 65 as determined in accordance with AASHTO Designation T89. The plasticity index, as determined by AASHTO Designation T90 for soils having liquid limits of 41 to 65 inclusive, shall be not less than that determined by the formula: Plasticity Index = Liquid Limit - 30.

B. Granular Material. Granular material shall include all natural or synthetic mineral aggregates having a maximum size that can be readily placed and compacted in loose 8 inch layers and of which 35 percent or less shall pass the No. 200 sieve.

C. Shale. Shale shall include all rock-like materials formed by the natural consolidation of mud, clay, silt and fine sand and usually thinly laminated, comparatively soft and easily split, having a maximum size that can be readily placed and compacted in loose 8 inch layers.

D. Rock. Rock shall include all igneous, metamorphic and sedimentary rock having a maximum size that can be readily placed and compacted in loose 8 inch layers and which generally has sufficient fines to normally fill all the voids in each layer.

E. Random Materials. Random material shall include any combination of the above classifications and may include old concrete, brick, etc., from demolition; having a maximum size that can be readily placed and compacted in loose 8 inch layers, and which have been approved by the Borough.

F. Flowable Fill. See Section 02221.

PART 3 EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Coordinate the work to ensure the least inconvenience to traffic and maintain traffic on one or more unobstructed lanes unless closing of the roadway is authorized.

B. Maintain access to all streets and private drives and for emergency vehicles.

C. When streets must be closed, provide and maintain signs, flashing warning lights, barricades, markers, and other protective devices as required to conform to construction operations and to keep traffic flowing with minimum restrictions.

D. Comply with State and local codes, permits and regulations.

3.02 SALVAGE TOPSOIL

A. Within the areas indicated for grading, strip topsoil to the depth of suitable topsoil material and stockpile for subsequent top-soiling operations. See Section 02100.

3.03 PLACEMENT OF FILL MATERIAL

A. After removal of topsoil, areas to receive fill shall be thoroughly rolled, and any soft spots disclosed by rolling shall be excavated and the unsuitable material removed and disposed of in a waste area. The excavated area shall be filled with suitable fill material approved by the Borough and re-compacted. Suitable fill material shall be spread in layers of not more than 8 inches (loose) over the full area of the fill, and compacted to the required density by the use of compaction equipment. All fill material shall be compacted to not less than 95% of its maximum dry weight density at its optimum moisture content, plus or minus 2%, as determined by ASTM D698, under roadways, shoulders, driveways, curbs, sidewalks, and all parking areas and not less than 90% in yards and fields. When the material is too coarse to satisfactorily use these methods, compaction will be determined by the Borough based on non-movement of the material under the compaction equipment.

B. Fill material placed in areas inaccessible to the compaction equipment shall be placed in uniform loose layers not exceeding 4 inches in depth and compacted by means of approved mechanical tampers to the density requirements herein specified.

C. When a previously constructed fill requires additional material to bring it to required elevation, the top of the fill shall be thoroughly scarified before the required additional material is placed.

D. Material containing moisture in excess of that percentage which will ensure satisfactory compaction shall not be placed in the fill and fill material shall not be placed on material that has become unstable due to excessive moisture.

E. Frozen fill material shall not be placed in fills, and fill material shall not be placed on frozen material. If during construction the top of the fill freezes, all frozen material shall be removed before additional material is placed.

F. Wet or frozen materials which would be suitable when dried or when thawed and dried, may be wasted by the Contractor for his convenience only with the written permission of the Borough, and subject to replacement in equivalent volume, at the expense of the Contractor. However, in no case shall waste material be disposed of in the flood channel area of any stream. In all cases the filling must be in compliance with all Federal and State requirements.

G. Shale and random material containing an excessive quantity of large fragments shall be so placed that the coarser material is in areas where no building foundations or utility trenches are to be located. The large pieces shall then be broken down by the use of approved equipment until all voids are filled. Mixtures of shale and rock shall be placed in accordance with the requirements for placing shale.

H. Where fill is to be constructed on a slope, the slope shall be benched to the width and depth shown on the drawings or as approved by the Borough.

3.04 EXCAVATION

A. Perform excavation of borrow material in a manner satisfactory to the Borough. Strip borrow pits of brush, trees, roots, grass and other vegetation prior to removal of material for use in fill. During the excavation operation, grade the borrow area to ensure free drainage of water from the area. Place and maintain erosion control devices after completion of the excavation, grade the excavated area, including side slopes, to drain and present a uniformly trim appearance merging into the surrounding terrain. After borrow excavation operations are complete, re-grade area, if necessary, to prevent erosion.

3.05 BLASTING

A. No blasting is permitted without a State permit and advance notice to the Borough.

B. Blasting is the sole responsibility of the Contractor and no duty is assumed or to be exercised by the Borough relative thereto.

C. Blasting work shall be supervised by licensed and experienced personnel and performed in conformance with applicable Federal, State and local codes.

D. Provide Borough with a copy of the blasting permit and notify emergency services.

3.06 CONTROL OF EXCAVATED MATERIAL

A. Provide temporary barricades to prevent excavated material from encroaching on private property, walks, gutters, and storm drains.

B. Maintain accessibility to all fire hydrants, valve pit covers, valve boxes, curb boxes, fire and police call boxes, and other utility controls at all times. Keep gutters clear or provide other satisfactory facilities for street drainage. Do not obstruct natural water courses. Where necessary, provide temporary channels to allow the flow of water either along or across the site of the work.

C. All excavated material shall be controlled in accordance with the Soil Erosion & Sedimentation Control plan, as approved by the Adams County Conservation District and in accordance with section 02270, Soil Erosion and Sedimentation Control.

3.07 DEWATERING

A. Keep excavations dry and free of water. Dispose of precipitation and subsurface water clear of the work.

B. Intercept and divert surface drainage away from excavations. Design surface drainage systems; so that they do not cause erosion on or off the site, or cause unwanted flow of water.

C. Comply with Federal and State requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.

D. All work to be outlined in an erosion and sedimentation plan reviewed and approved by the Adams County Conservation District and in accordance with section 02270, Soil Erosion and Sedimentation Control.

3.08 TOPSOILING

A. Top-soiling shall be as specified in Section 02485.

3.09 DISPOSAL OF EXCAVATED MATERIAL

A. Excavated material remaining after completion of placement of fills shall remain the property of the Contractor, removed from the construction area, and properly disposed of.

3.10 FOREIGN BORROW MATERIAL

A. Foreign borrow consists of excavation, placement and compaction in fill areas of approved material obtained from sources outside the project limits.

B. The Contractor shall make his own arrangements for obtaining all foreign borrow material and pay all costs involved, including an approved erosion and sedimentation control plan for the borrow excavation site.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Cutting paved surfaces
2. Blasting
3. Trench excavation, backfill and compaction
4. Support of excavation
5. Pipe bedding requirements
6. Control of excavated material
7. Rough grading
8. Restoration of unpaved surfaces

B. Related work specified elsewhere:

1. Utility Conflict Statement	Section 00160
2. Clearing and grubbing:	Section 02100
3. Boring and jacking:	Section 02150
4. Soil erosion and sedimentation control:	Section 02270
5. Finish grading, seeding and sodding:	Section 02485
6. Trench paving & restoration:	Section 02575

C. Definitions: NONE

D. Applicable Standard Details:

AB 02221-1	Pipe Bedding Details
AB 02221-2	Flowable Backfill Detail
AB 02221-3	Clay Dike Detail
AB 02221-4	Utility Line Wetland Crossing (Flumed) Detail
AB 02221-5	Utility Line Stream Crossing (Flumed) Detail
AB 02221-6	Utility Line Stream Crossing (Bypass) Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revisions:

Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
Publication 72M, Standards for Roadway Construction
Publication 19, Field Test Manual

- PTM No. 106 – Moisture-Density Relations of Soils (using 5.5 lb. Rammer and 12 inch drop)

- PTM No. 402 – Determining-in-Place Density and Moisture Content of Construction Materials by Use of Nuclear Gauges

2. American Society for Testing and Materials (ASTM):

C33	Specifications for Concrete Aggregates
D698	Test Method of Laboratory Compaction Characteristics of Soil Using Standard Effort
D2922	Test for Density of Soil and Soil Aggregate in Place by Nuclear Methods

3. Pennsylvania Code Title 67, Transportation, Chapter 459 occupancy of highways by utilities.

B. Testing Agency:

1. Compaction testing shall be performed by an approved Soils Testing Laboratory engaged and paid for by the Contractor and approved by the Borough.

C. Inspections/Compaction Testing:

1. Inspection by Borough will, at a minimum, be made of bearing material, backfill material, and pipe installation.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification attesting that the composition analysis of pipe bedding, select material stone backfill materials and flowable fill meet specification requirements.

2. Submit certified compaction testing results from the soils testing laboratory, if required.

B. Compaction Equipment List:

1. Submit a list of all equipment to be utilized for compacting, including manufacturers' lift thickness limitations.

C. Permits:

1. Road Occupancy Permit.

2. PennDOT Highway Occupancy Permit.

1.04 JOB CONDITIONS

A. Classification of Excavation:

1. Excavation work includes excavation and removal of all soil, shale, rock, boulders, fill, and other materials encountered of whatever nature.

B. Compaction of Backfill:

1. The degree of compaction required at each location is indicated in the Backfill and Surface Restoration Requirements Table in Section 02575.

C. Control of Traffic:

1. The Contractor will employ traffic control measures in accordance with the MUTCD and with PennDOT Publication 213.

2. Notify Adams County Emergency Services (911) at least 72 hours in advance of any operations requiring changes to existing traffic patterns.

D. Protection of Existing Utilities and Structures:

1. Take all precautions and utilize all facilities required to protect existing utilities and structures. Comply with the requirements of the Pennsylvania Underground Utility Protection Law. Request cooperative steps of the Utility and suggestions for procedures to avoid damage to its lines.

2. Advise each person in physical control of powered equipment or explosives used in excavation or demolition work of the type and location of utility lines at the job site, the Utility assistance to expect, and procedures to follow to prevent damage.

3. Immediately report to the Utility and the Borough any break, leak or other damage to the lines or protective coatings made or discovered during the work and immediately alert the occupants of premises of any emergency created or discovered.

4. Allow free access to Utility personnel at all times for purposes of maintenance, repair and inspection.

E. Site Inspection:

1. Prior to entering upon any private property, the Contractor shall have arranged for and completed a site inspection of each property with Borough, at which time the Borough will advise the Contractor as to what area is available for work; as to the trees, planting, and improvements which may be removed or disturbed during the work; and as to any special conditions or requirements which shall govern the work on each property.

PART 2 PRODUCTS

2.01 PIPE BEDDING MATERIAL

A. Type III and Type IV Bedding Material:
1. AASHTO No. 8, Table C, Section 703.2, Publication 408. Do not use slag or cinders.

B. Type V Bedding:

1. AASHTO No. 8 coarse aggregate conforming to Section 703, Publication 408. Do not use slag or cinders.

2.02 BACKFILL MATERIAL

A. Select Material Backfill:

1. Crushed stone or gravel aggregate conforming to Select Granular Material (2RC), Section 703.3, Publication 408 Specifications. Do not use slag or cinders.

B. Flowable Backfill Material:

1. Material conforming to PennDOT special provisions S94 (S2060130), Type A or B as shown in Table 1.

2. Flowable backfill inside casing pipe shall be Type D.

C. Suitable Backfill Material (unpaved areas)

1. From top of pipe bedding material to 24" over top of pipe:

a. Material excavated from the trench if free of stones larger than 6" in size and free of wet, frozen or organic materials.

2. From 24" above pipe to subgrade elevation:

a. Material excavated from the trench if free of stones larger than 8" in size and free of wet, frozen, or organic materials.

D. Suitable Backfill Material (Streets, Driveways, and Shoulders)

1. From top of pipe bedding material to subgrade elevation:

a. Select material backfill

b. Flowable backfill material – where directed or approved.

Table 1 - Flowable Fill

Properties & Criteria	Type A	Type B	Type C	Type D
Mix Design (/cy)				
• Cement (lbs)*	100	50	150-200	300-700
• Fly Ash (lbs)*	2000	300	300	100-400
• Bottom Ash (lbs)* or Coarse Aggregate or Fine Aggregate	0	2600	2600	**
Flow Cone (seconds) ASTM C939	30-60	–	–	30-60****
Slump (inches) PTM No. 600	–	7-11	7-11	7-11****
Density (pcf) PTM No. 613	95-110***	120-135***	125 min. ***	30-70 or as specified ***

Properties & Criteria	Type A	Type B	Type C	Type D
Water Absorption of Aggregate, PTM No. 506	–	–	–	20 (max %)
Compressive Strength (psi) PTM No. 604				
• 3 days (minimum	25	25	300	40
• 28 days (range)	50-125	50-125	800 min.	90-400

* Quantities may be varied or alternate designs submitted to adapt mix to conform to density and strength requirements or to adapt to specific site conditions.

** Requires using a suitable lightweight aggregate or air entraining admixture. Provide a mix design that achieves the specified strength and density requirements.

*** Approximate Value. Use of air entraining agent may reduce these values.

**** As appropriate depending on whether light weight aggregate or air entraining admixture is used to obtain lightweight properties.

PART 3 EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Coordinate the work to ensure the least inconvenience to traffic and maintain traffic on one or more unobstructed lanes unless closing of the roadway is authorized.

B. Maintain access to all streets and private drives and for emergency vehicles.

C. When streets must be closed, provide and maintain signs, flashing warning lights, barricades, markers, and other protective devices as required to conform to construction operations and to keep traffic flowing with minimum restrictions.

D. Comply with State and local codes, permits and regulations.

3.02 CUTTING PAVED SURFACES PRIOR TO TRENCHING

A. Where installation of pipelines, miscellaneous structures, and appurtenances necessitate breaking a paved surface, make cuts in a neat uniform fashion forming straight lines parallel with the centerline of the trench. Cut offsets at right angles to the centerline of the trench.

B. Protect edges of cut pavement during excavation to prevent raveling or breaking; square edges prior to pavement replacement.

C. The requirement for neat line cuts, in other than state highways, may be waived if the final paving restoration indicates overlay beyond the trench width.

3.03 BLASTING

A. No blasting is permitted without a State permit, copy provided to Borough, and 72-hour advance notice to the Borough and any other emergency services.

B. Blasting is the sole responsibility of the Contractor and no duty is assumed or to be exercised by the Borough relative thereto.

C. Blasting work shall be supervised by licensed and experienced personnel and performed in conformance with applicable Federal, State and local codes.

3.04 TRENCH EXCAVATION

A. Depth of Excavation:

1. Gravity Pipelines:

a. Excavate mainline trenches to the required depth and grade for the invert of the pipe plus that excavation necessary for placement of pipe bedding material.

b. Excavation for laterals shall provide a straight uniform grade of 1/4" per foot from the main pipeline to the right-of-way line, plus that excavation necessary for placement of pipe bedding material.

2. Pressure Pipelines:

a. Excavate trenches to the minimum depth necessary to place required pipe bedding material and to provide a minimum of 42" from the top of the pipe to the finished ground elevation, except where specific depths are otherwise shown on the Drawings.

3. Where unsuitable bearing material is encountered in the trench bottom, continue excavation until the unsuitable material is removed, solid bearing is obtained or can be established, or concrete cradle can be placed. If no concrete cradle is to be installed, refill the trench to required pipeline grade with pipe bedding material.

4. Where the Contractor, by error or intent, excavates beyond the minimum required depth, backfill the trench to the required pipeline grade with pipe bedding material.

B. Width of Excavation:

1. Excavate trenches, including laterals, to a width necessary for placement and jointing of the pipe, and for placing and compacting pipe bedding and trench backfill around the pipe, but not less than 16" or more than 24" plus the pipe outside diameter from the bottom of the trench to a point 12" above the crown of the pipe.

2. Shape trench walls completely vertical from trench bottom to at least 2' above the top of the pipe. Trench walls from 2' above the top of the pipe to grade to be benched and sloped, or shaved, to comply with Federal and State laws and codes.

3. For pressure pipeline fittings, excavate trenches to a width that will permit placement of concrete thrust blocks. Provide earth surfaces for thrust blocks that are perpendicular to the direction of thrust and are free of loose or soft material.

3.05 SUPPORT OF EXCAVATION

A. Excavation support is the sole responsibility of the Contractor and no duty is assumed or to be exercised by the Borough relative thereto.

B. Support excavations with sheeting, shoring, and bracing or a "trench box" as required to comply with Federal and State laws and codes.

C. Install adequate excavation supports to prevent ground movement or settlement of adjacent structures, pipelines or utilities. Damage due to settlement because of failure to provide support or through negligence or fault of the Contractor in any other manner, shall be repaired at no expense to the Borough.

D. Withdraw sheeting, shoring, and bracing as backfilling proceeds unless otherwise approved by the Borough.

3.06 CONTROL OF EXCAVATED MATERIAL

A. Keep the ground surface on both sides of the excavation free of excavated material to comply with Federal and State laws and codes.

B. Provide temporary barricades to prevent excavated material from encroaching on private property, walks, gutters, and storm drains.

C. Maintain accessibility to all fire hydrants, valve pit covers, valve boxes, curb boxes, fire and police call boxes, and other utility controls at all times. Keep gutters clear or provide other satisfactory facilities for street drainage. Do not obstruct natural water courses. Where necessary, provide temporary channels to allow the flow of water either along or across the site of the work.

D. In areas where pipelines parallel or cross streams, ensure that no material slides, is washed, or is dumped into the stream course. Remove cofferdams immediately upon completion of pipeline construction.

E. Comply with the requirements of the Soil Erosion & Sedimentation Control plan, as approved by the Adams County Conservation District and as specified in Section 02270, Soil Erosion and Sedimentation Control.

3.07 DEWATERING

A. Keep excavations dry and free of water. Dispose of precipitation and subsurface water clear of the work. Comply with Section 02270, Soil Erosion and Sedimentation Control.

B. Maintain pipe trenches dry until pipe has been jointed, inspected, and backfilled, and concrete work has been completed. Prevent trench water from entering pipelines under construction.

C. Intercept and divert surface drainage away from excavations. Design surface drainage systems so that they do not cause erosion on or off the site, or cause unwanted flow of water.

D. Comply with Federal and State requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.

3.08 PIPE BEDDING REQUIREMENTS

A. Flowable Backfill Bedding:

1. Depth of pipe bedding aggregate and flowable fill as shown on Standard Detail AB 02221-2.

B. Type III Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail AB 02221-1.

2. Provide Type III bedding when installing reinforced concrete storm drain pipe.

C. Type IV Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail AB 02221-1.

2. Provide Type IV bedding when installing all other pipe larger than 2" diameter.

D. Type V Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail AB 02221-1.

2. Provide Type V bedding when installing piping 2" diameter and smaller.

E. Shape recesses for the joints or bell of the pipe by hand. Assure that the pipe is supported on the lower quadrant (under haunches) for the entire length of the barrel. Fill all voids below the pipe.

F. Pipe embankment material shall be placed, worked by hand or compacted until a minimum density of 90% in yards and 95% under roadways, shoulders, driveways and sidewalks is achieved (at optimum moisture content, ±2%, standard proctor).

3.09 PIPE LAYING

A. Provide required pipe bedding placed in accordance with the detail AB 02221-1 or AB 02221-2.

B. Lay pipe as specified in the appropriate Section of these Specifications for pipeline construction.

3.10 THRUST RESTRAINT

A. Provide pressure pipe with concrete thrust blocking (See Section 03050) or use restrained joint fittings at all bends, tees, valves, and changes in direction.

3.11 BACKFILLING TRENCHES

A. After pipe installation and inspection, backfill trenches to 12" above the crown of the pipe with specified backfill materials, as per pipe bedding detail (AB-02221-1), placed and carefully compact with approved compaction equipment in layers of suitable thickness to provide specified compaction. Backfill and compact the remainder of the trench with specified backfill material. Refer to Backfill and Surface Restoration Requirements Table in Section 02575 for trench backfill material and compaction requirements at each specific location.

B. Lift Thickness Limitations For Crushed Aggregate:

1. Submit a list of the compaction equipment to be utilized on the project, the recommendations of the equipment manufacturer as to the maximum lift thickness which can be placed, and the method of compaction to be used with this equipment to achieve the required compaction. In no case shall maximum lift thickness placed exceed the maximum limits specified by the manufacturer's recommendations. However, if the equipment manufacturer's lift thickness recommendation is followed and the specified compaction is not obtained, the Contractor shall, at his own expense, remove, replace, and retest as many times as is required to obtain the specified compaction.

2. Lift thickness limitations specified for state highways, shoulders, or embankments shall govern over the compaction equipment manufacturer's recommendations.

C. Jetting:

1. When approved by the Borough in writing, jetting methods may be used to consolidate backfill. Quality assurance methods to verify adequate compaction will be a condition of the approval by the Borough.

D. Uncompacted Backfill:

1. Where uncompacted backfill is indicated on the drawings, backfill the trench from one foot above the pipe to the top of the trench with material excavated from the trench, crowned over the trench to a sufficient height to allow for settlement to grade after consolidation, providing for surface water drainage.

E. Unsuitable Backfill Material:

1. Where the Borough deems backfill material to be unsuitable and rejects all or part thereof due to conditions prevailing at the time of construction, remove the unsuitable material and replace with select material backfill.

F. Compaction Testing:

1. Conduct compaction tests as directed by the Borough during backfilling operations.

2. Determine compaction in state highways and shoulders by the testing procedure contained in Pennsylvania Test Method, PTM 106, Method B or PTM 402.

3. Determine compaction in areas other than state highways and shoulders by the testing procedure contained in ASTM D698 or ASTM D2922.

3.12 DISPOSAL OF EXCAVATED MATERIAL

A. Excavated material remaining after completion of backfilling shall remain the property of the Contractor, removed from the construction area, and legally disposed of.

3.13 ROUGH GRADING

A. Rough subgrade areas disturbed by construction to a uniform finish. Form the bases for terraces, banks, and lawns.

B. Grade areas to be paved to depths required where placing subbase and paving materials.

C. Rough grade areas to be topsoiled and seeded to 4" below indicated finish contours.

3.14 RESTORATION OF UNPAVED SURFACES

A. Restore unpaved surfaces disturbed by construction to equal the surface condition prior to construction.

B. Restore grassed areas in accordance with Section 02485.

3.15 LIMITS OF WORK

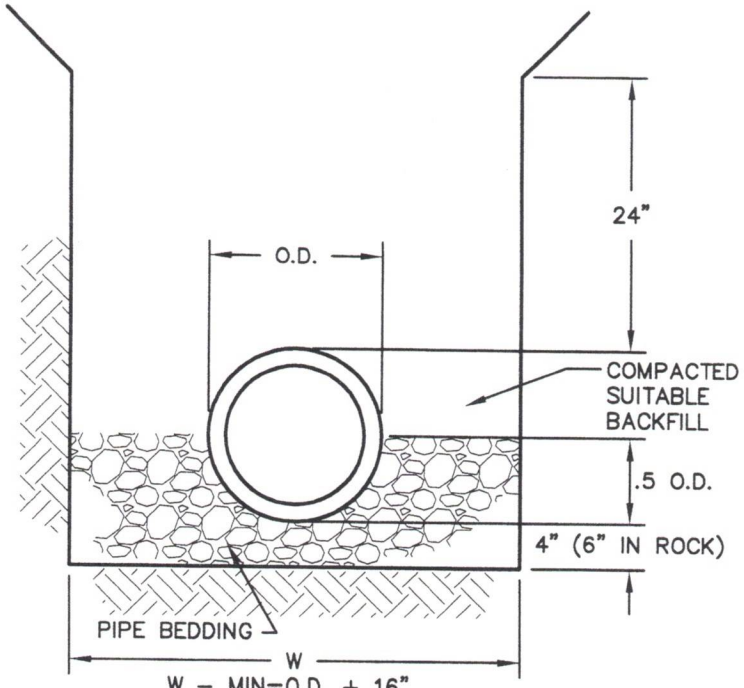
A. All disturbances shall be confined to Developer's property, street rights-of-way, permanent easements, and temporary construction easements shown on the Drawings.

B. The Contractor shall not permit trucks and equipment to enter private driveways.

C. All work shall be confined to the Borough or state highway rights-of-way and permanent rights-of-way or temporary construction rights-of-way shown on the Drawings.

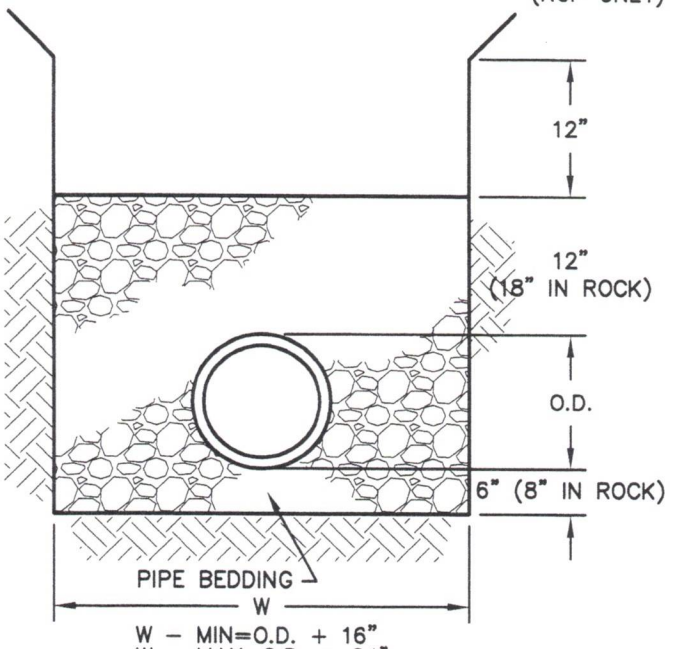
D. The Contractor shall not permit trucks and equipment to enter private property except where easements are provided or prior written permission from the owner has been obtained by the Contractor.

END OF SECTION



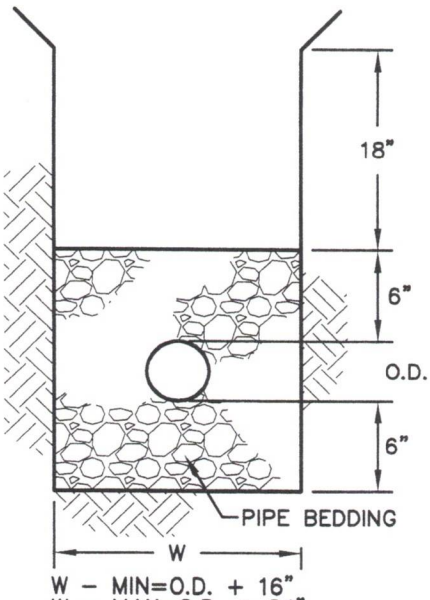
W – MIN=O.D. + 16"
W – MAX=O.D. + 24"

TYPE III
(RCP ONLY)



W – MIN=O.D. + 16"
W – MAX=O.D. + 24"

TYPE IV



W – MIN=O.D. + 16"
W – MAX=O.D. + 24"

TYPE V
(2" DIA. AND SMALLER)

NOTE: TYPE I AND II NOT PERMITTED.

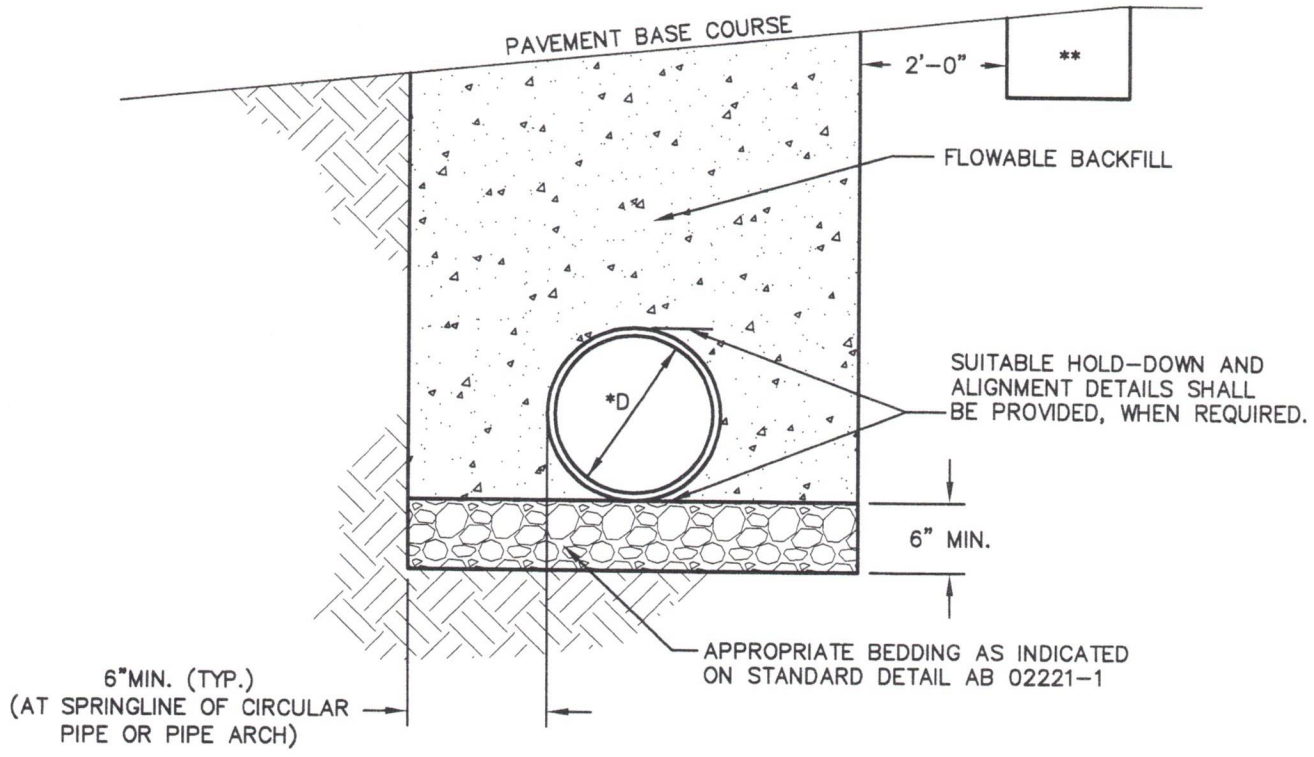
ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson.Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

PIPE BEDDING DETAILS

ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02221-1
FILE NO.	4904.1.00.01



*D = 3'-0" MAXIMUM DIAMETER OR RISE.

** IF DRAINAGE IS REQUIRED TO MAINTAIN POSITIVE FLOW OF WATER AWAY FROM THE TRENCH, IT MUST BE PROVIDED BY USE OF PROPERLY DESIGNED GRANULAR OR SYNTHETIC DRAINS.

NOTES:

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 601 AND 220.
2. FLOWABLE BACKFILL WILL ENVELOP THE LAST SECTION OF PIPE OR END SECTION. CONSTRUCT DIKE OF FLOWABLE BACKFILL MATERIAL AS SPECIFIED IN SPECIAL PROVISION OR PROVIDE FORMWORK TO CONTAIN FLOWABLE BACKFILL.

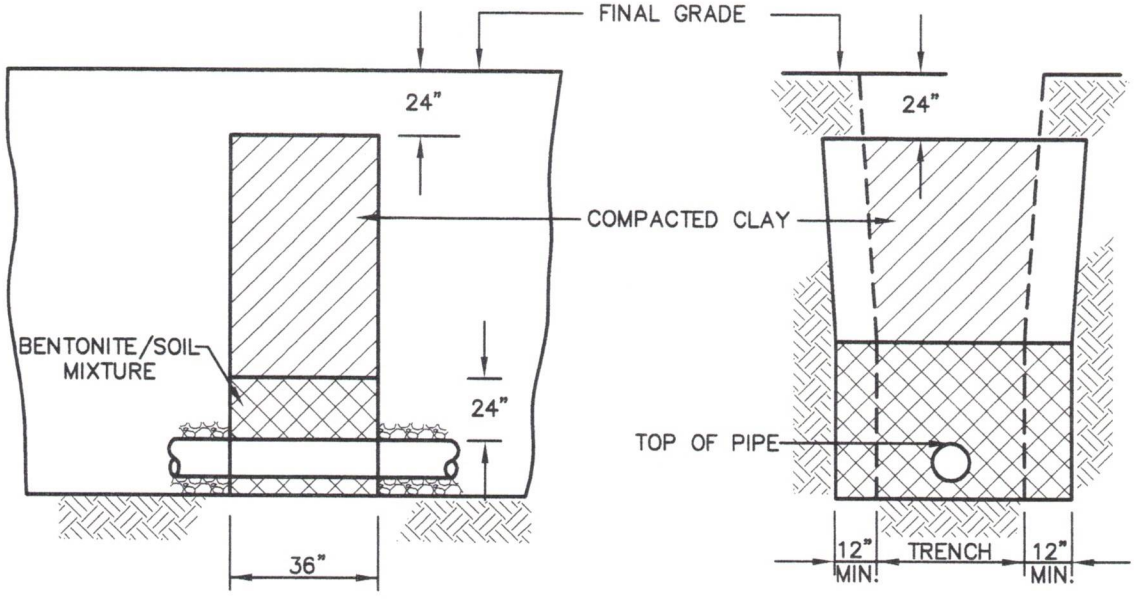
ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

FLOWABLE BACKFILL DETAIL

ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02221-2
FILE NO.	4904.1.00.01



NOTES:

1. COMPACTED CLAY DIKES SHALL EXTEND VERTICALLY FROM UNDISTURBED GROUND AT BOTTOM OF TRENCH TO WITHIN 24" OF FINAL GRADE, AND FROM UNDISTURBED GROUND ON TRENCH SIDES FOR WIDTH OF TRENCH AND 12" BEYOND EACH SIDE OF TRENCH.

2. CLAY BACKFILL TO A POINT 24" OVER THE PIPE SHALL CONSIST OF A BENTONITE/SOIL MIXTURE AT A 5:1 MIX.

3. REMAINING BACKFILL SHALL CONSIST OF CLAY CONTAINING NO MORE THAN 15% (BY VOLUME) STONE NOT LARGER THAN TWO (2") INCHES IN DIAMETER. CLAY SHALL BE PLACED IN SIX (6") INCH LIFTS AND COMPACTED BY MECHANICAL TAMPER TO NOT LESS THAN 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT.

ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

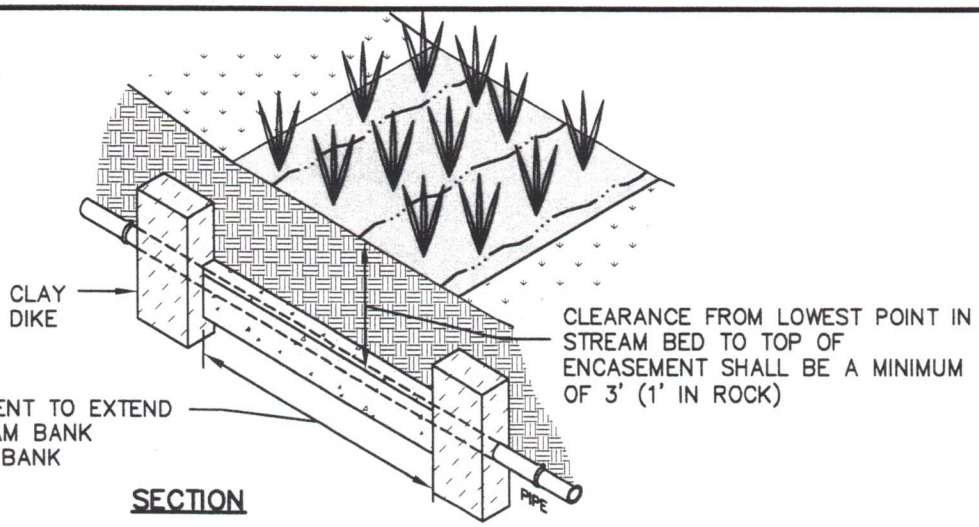
C.S.Davidson.Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

CLAY DIKE DETAIL

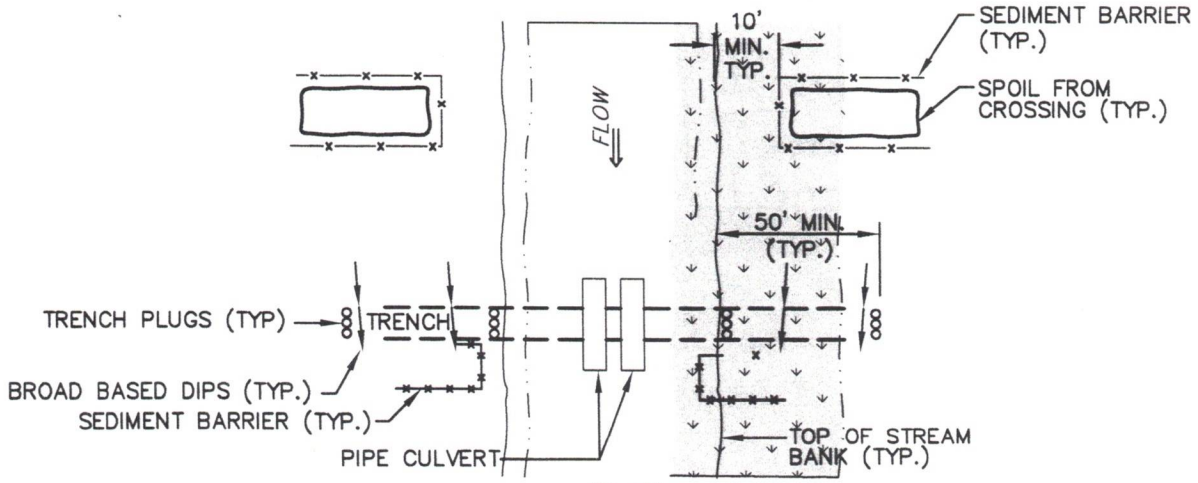
ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02221-3
FILE NO.	4904.1.00.01

Notes:
1. Concrete to be 3,000 psi.
2. Encasement to be used only where specified on drawings.
3. Pipe shall be ductile iron pipe.
4. Filter fabric to be placed under rip–rap and keyed into embankment.



SECTION



PLAN

NOTES:
1. All work within the wetland area must follow the requirements for all applicable permits obtained for the project. All work within the stream, including the trench backfilling, stabilization of the stream banks must be completed within 72 hours.
2. Install broad based dips at 50' from the top of bank and 10' from the top of bank.
3. Construct sediment barriers and direct runoff from the broad based dips into them.
4. Install temporary pipe culverts in the wetland. Size and number of culverts to be determined on site to adequately convey baseflow. (Mats, pads, or other similar devices shall be installed where crossing of wetland areas by construction equipment cannot be avoided.)
5. Install pipe with trench plugs.
6. Once entire pipe is installed between corresponding manholes install clay dikes and concrete encasement.
7. Remove trench plugs and backfill trench with native wetland material. Original grades through wetland must be restored. Any excess material must be removed from the wetland. Mounding of fill material to allow for settlement in the trench will be permitted in accordinance with best construction methods.
8. Remove temporary pipe.
9. Woodchips from clearing and grubbing of wetland area should be spread over all disturbed areas. Do not reseed the disturbed areas of the wetland.
10. Install sediment barrier at top of wetland banks. Grade out broad base dips and all disturbed areas in accordance with Seeding Restoration Table.
11. Provide pinning to anchor pipe.

ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

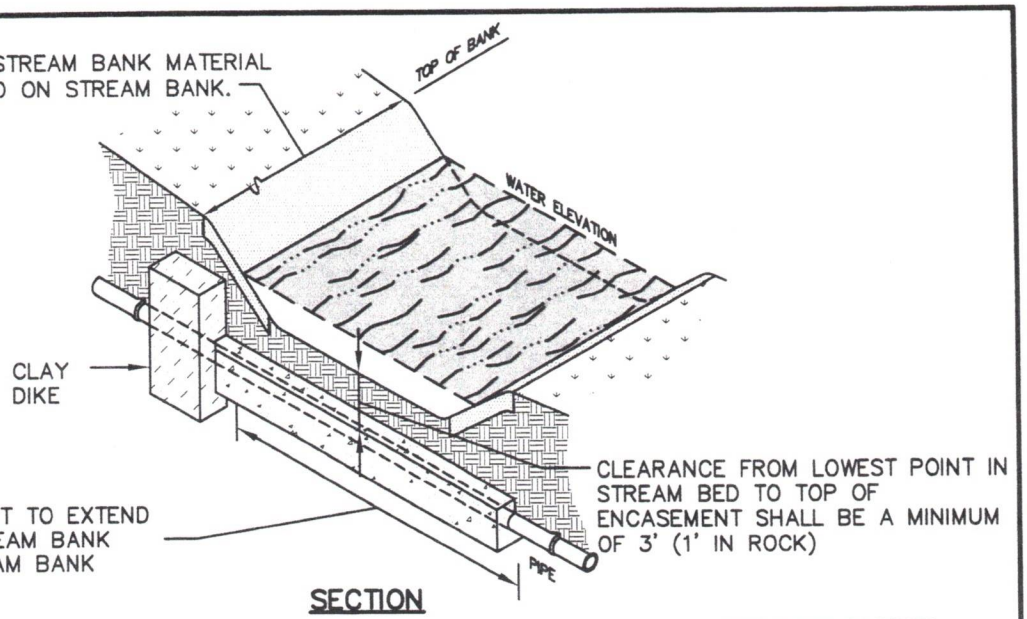
C.S.Davidson.Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

UTILITY LINE WETLAND CROSSING (FLUMED) DETAIL

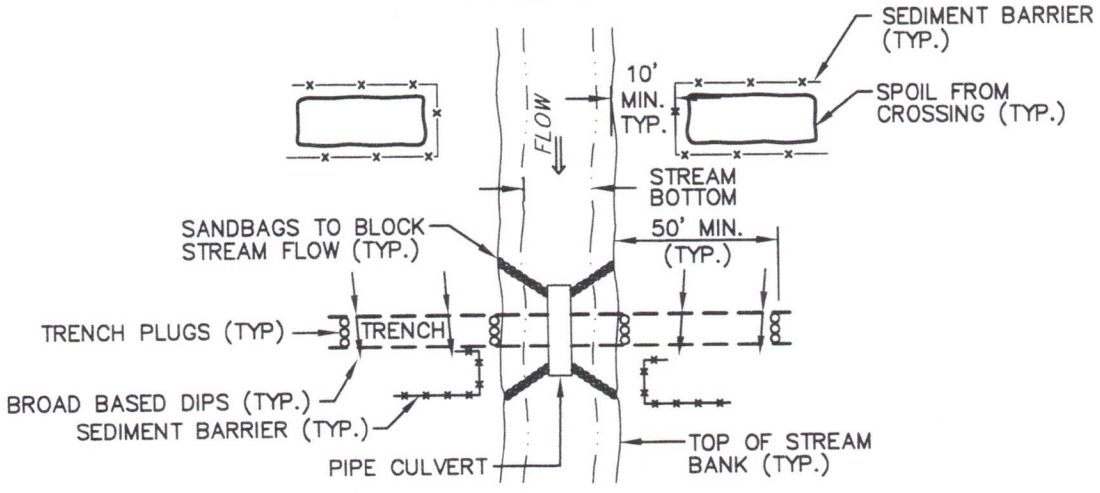
ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02221-4
FILE NO.	4904.1.00.01

Notes:
1. Concrete to be 3,000 psi.
2. Encasement to be used only where specified on drawings.
3. Pipe shall be ductile iron pipe.
4. Filter fabric to be placed under rip–rap and keyed into embankment.



SECTION



PLAN

NOTES:
1. All work within the stream area must follow the requirements for all applicable permits obtained for this project. All work within the stream, including the trench backfilling, stabilization of the stream banks must be completed within 72 hours.
2. Install broad based dips at 50' from the top of bank and 10' from the top of bank.
3. Construct sediment barriers and direct runoff from the broad based dips into them.
4. Install temporary pipe culvert in the stream. Size and number of culverts to be determined on site or adequately convey baseflow. Minimum culvert diameter to be 12".
5. Install pipe with trench plugs.
6. Once entire pipe is installed between corresponding manholes install clay dikes and concrete encasement.
7. Remove trench plugs and backfill trench. Place minimum 8" of natural stream bed material at existing grades.
8. Remove sandbags and temporary pipe.
9. Install sediment barrier at top of stream banks. Grade out broad base dips and all disturbed area in accordance with seeding restoration table.
10. Provide pinning to anchor pipe.

ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

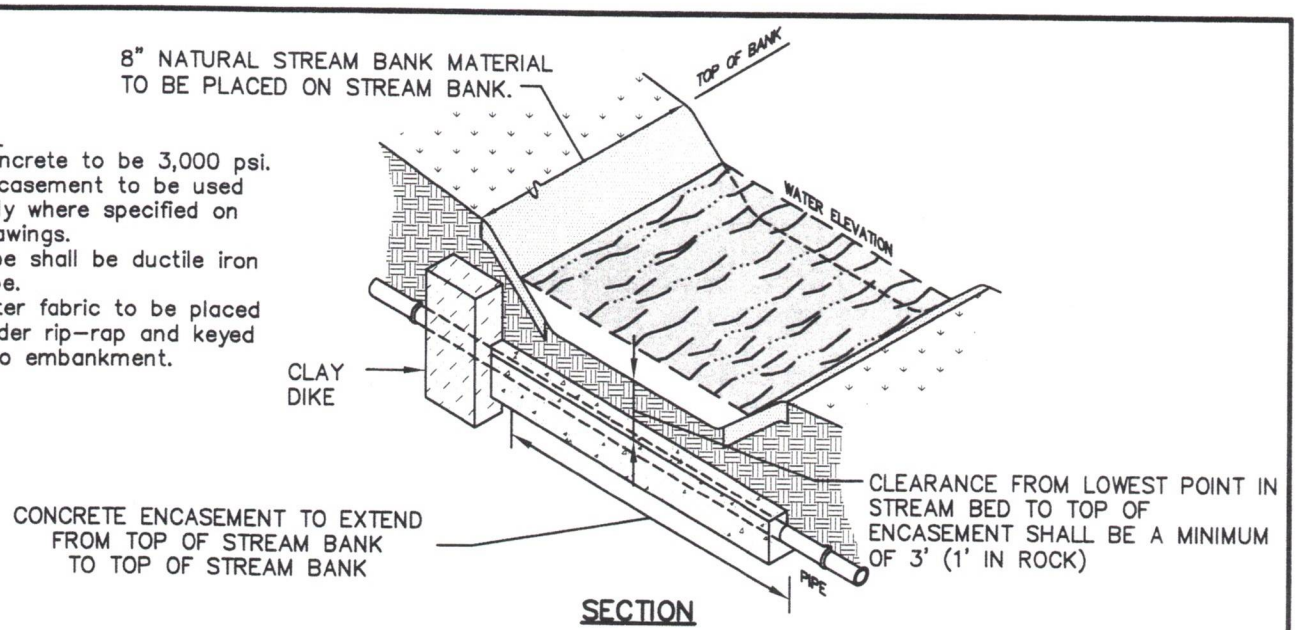
C.S.Davidson, Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

UTILITY LINE STREAM CROSSING (FLUMED) DETAIL

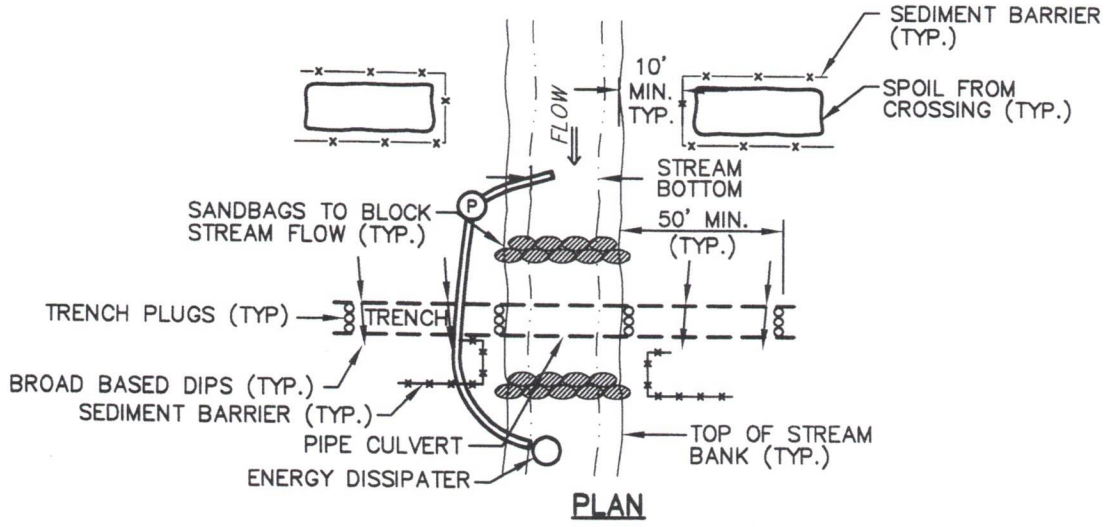
ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02221-5
FILE NO.	4904.1.00.01

Notes:
1. Concrete to be 3,000 psi.
2. Encasement to be used only where specified on drawings.
3. Pipe shall be ductile iron pipe.
4. Filter fabric to be placed under rip–rap and keyed into embankment.



SECTION



PLAN

NOTES:
1. All work within the stream area must follow the requirements for all applicable permits obtained for this project. All work within the stream, including the trench backfilling, stabilization of the stream banks must be completed within 72 hours.
2. Install broad based dips at 50' from the top of bank and 10' from the top of bank.
3. Construct sediment barriers and direct runoff from the broad based dips into them.
4. Install temporary pipe culvert in the stream. Size and number of culverts to be determined on site or adequately convey baseflow. Minimum culvert diameter to be 12".
5. Install pipe with trench plugs.
6. Once entire pipe is installed between corresponding manholes install clay dikes and concrete encasement.
7. Remove trench plugs and backfill trench. Place minimum 8" of natural stream bed material at existing grades.
8. Remove sandbags and temporary pipe.
9. Install sediment barrier at top of stream banks. Grade out broad base dips and all disturbed area in accordance with seeding restoration table.
10. Provide pinning to anchor pipe.

ABBOTTSTOWN BOROUGH CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson.Inc.
Excellence in Civil Engineering
38 N. DUKE STREET YORK, PA • PHONE (717) 846-4805 • FAX (717)846-5811
50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

UTILITY LINE STREAM CROSSING (BYPASS) DETAIL

ABBOTTSTOWN BOROUGH ADAMS COUNTY , PENNSYLVANIA

DRAWN BY	CJM
CHECKED BY	
SCALE	N.T.S.
DATE	10/24/2012
DWG. NO.	AB02221-6
FILE NO.	4904.1.00.01

SECTION 02230

ROADWAY EXCAVATION, FILL AND COMPACTION

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section includes but is not limited to:

1. Excavation
2. Compaction
3. Fill
4. Subgrade Preparation
5. Base Preparation

B. Related Work Specified Elsewhere:

1. Utility Conflict Statement:	Section 00160
2. Clearing and grubbing:	Section 02100
3. Site excavation and placement of fill material:	Section 02210
4. Soil erosion and sedimentation control:	Section 02270
5. Finish grading, seeding and sodding:	Section 02485
6. Bituminous paving and surfacing:	Section 02500

C. Definitions:

1. Roadway: Area under and within ten feet of the edge of paving.

2. Roadway Subgrade: The prepared earth surfaces on or over which additional roadway materials will be placed or work is to be performed.

D. Applicable Standard Details:

1. See Section 02500.

2. The "Backfill and Surface Restoration Requirements" Table in Section 02575 lists the specific paving requirements.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):

T99 Moisture-Density Relations of Soils, Using a 5.5-lb. Rammer and a 12-in. Drop.
T191 Standard Method of Test for Density of Soil In-Place by the Sand Cone Method.

2. American Society for Testing and Materials (ASTM):

D2167 Test Method for Density and Unit Weight of of Soil in Place by the Rubber-Ballon Method.

D2922 Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

3. Pennsylvania Department of Transportation Publication 408 Specifications - Section 703.2 Coarse Aggregate.

B. Inspections:

1. Inspection by the Borough will, at a minimum, be made of materials upon delivery to the job site; of the subgrade prior to placement of the base course; of the completed base course prior to placement of the binder surface; of the completed binder course prior to placement of the wearing course; and of the completed wearing course.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from aggregate suppliers attesting that materials conform to specifications herein. Certification shall be provided with each load of crushed aggregate delivered to the job site.

B. One copy of the approved Soil Erosion & Sedimentation Control plan, including approval letter.

1.04 JOB CONDITIONS

A. As specified in Section 02210.

B. Control of Traffic:

1. Reasonable access must be maintained for adjacent property owner's and commercial properties.

2. All excavations in access drive, driveways and State Highway right-of-way shall be backfilled or plated at the end of each work day.

PART 2 PRODUCTS

2.01 ACCEPTABLE MATERIALS

A. Roadway Fill Areas: As specified previously under Site Excavation and Placement of Fill Material, Section 02210.

B. Embankment Fill Areas: As specified previously under Site Excavation and Placement of Fill Material, Section 02210.

C. Excavated Areas: Suitability of material for subgrade purposes shall be determined by non-movement of the material under compaction equipment.

D. Coarse Aggregate: Hard, tough, durable, and uncoated inert particles reasonably free from clay, silt, vegetation other deleterious substances coarse aggregate shall be obtained from approved source.

2.02 GEOTEXTILES

A. For all areas of wet subgrade – Class 4 Type B as defined in PennDOT Publication 408, Specifications, Section 735, and as approved by the Borough.

B. For pavement base drains – Class 1 as defined by PennDOT Publication 408 Specifications, Section 735, and as approved by the Borough.

PART 3 EXECUTION

3.01 SUBGRADE

A. Perform soil erosion control work in accordance with requirements of approved Soil Erosion and Sedimentation Control Plan and Section 02270.

B. Roadway Excavation. Excavate or otherwise remove and satisfactorily dispose of materials located within the limits indicated on the drawings for roadways.

1. Excavate to roadway subgrade depths required, and cut drainage channels and waterways as detailed on the drawings. Proof roll subgrade to the satisfaction of the Borough.

2. Remove rock encountered in roadway excavation to a depth six inches below finished subgrade elevation.

3. Excavate unsuitable subgrade material. Refill such areas to required elevation with acceptable materials.

4. Place geotextile layer in wet areas prior to placing final base course.

C. Roadway Grading. Shape subgrade of roadways, intersections, approaches, entrances and adjoining pedestrian walkways to no more than 0.10 foot above or below the design elevations.

D. Roadway Fill. Construction requirements for roadway fill shall be as follows:

1. Form the roadway fill with acceptable materials.

2. Compact material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2% per ASTM D698 or D1557. Proof roll roadway fill to the satisfaction of the Borough.

E. Roadway Embankment. Construction requirements for roadway embankment shall be as follows:

1. Break up shale and other rock-like materials formed by natural consolidation of mud, clay, silt and fine sand into a maximum size that can be readily placed and compacted in loose eight inch layers.

2. Place rock to form the base of roadway embankments. Place in uniform loose layers not exceeding in depth the approximate average size of the larger rock, but not exceeding 8 inches deep.

3. Smooth and level each layer adding soil or granular material conforming to Section 02210, in sufficient quantity to supplement the smaller rock pieces, filling the voids and pockets.

4. Form the top 18 inches of roadway embankments with soil or granular material conforming to Section 02210.

5. Compact embankment material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2% per ASTM D698 or D1557. Proof roll embankments to the satisfaction of the Borough.

6. During foreign borrow excavation operations, keep the borrow area graded to ensure free water drainage. Following completion of work in the borrow area; grade the area to present a uniformly trim appearance merging into the surrounding terrain and to prevent erosion.

3.02 BASE COURSES

A. Subbase Course

1. Compact subgrade material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2% per ASTM D698 or D1557. Perform finish rolling on roadway subgrade just prior to installation of aggregate subbase or base course.

2. When indicated on the drawings or directed by the Borough, construct subbase in accordance with PennDOT Publication 408 Specifications, Section 350.

B. Crushed Aggregate Base Course (Type A)

1. On prepared subgrade (or subbase if required), spread AASHTO No. 10 (limestone screenings) to a depth of one inch and compact. Construct stone base of AASHTO No. 1 aggregate to an 8" compacted depth.

2. Compaction shall be achieved by means of approved static or vibratory equipment as specified in PennDOT Publication 408. If static roller is used, base course of more than 8 inches shall be constructed in two lifts. If approved vibratory roller is used, base course up to 10 inches in compacted thickness may be constructed in one course.

3. Spreading Coarse Material. The coarse material shall be spread uniformly on the initial layer of fine material by approved mechanical stone spreaders to the full width of the base unless otherwise specified for part-width construction. Spreaders shall be adjusted to spread the loose material to obtain a layer of the required depth after compaction. In areas inaccessible to spreading equipment, the material may be spread directly from trucks provided the distribution is equivalent to that achieved by the spreader. All segregated material shall be removed and replaced with well graded material. The coarse material shall not be spread for a distance of more than an average day's work ahead of choking and compacting.

4. Compacting Coarse Material. Immediately after surface corrections have been made to the spread coarse material, it shall be thoroughly compacted. The rolling shall begin at the sides and progress to the center, except on superelevated curves where the rolling shall begin on the low side and progress to the high side. The rolling shall be parallel with the centerline of the roadway, uniformly lapping each preceding track, covering the entire surface with the rear wheels ahead of the roller wheels. After each layer of material has been spread and compacted, it shall be checked with approved templates and straightedges, and all irregularities shall be satisfactorily corrected. Red flags shall be placed at the limits of satisfactorily compacted coarse material. The flags shall be moved ahead as additional material is compacted, and no filler shall be applied to the coarse material in advance of the flag-marked sections.

5. Application of Fine Material. After the coarse material has been set and keyed by compaction, dry limestone screenings (AASHTO No. 10.), in an amount equal to approximately 50% of that required to fill the voids in the coarse material, and shall be spread uniformly over the surface. The vibratory compaction equipment shall then be operated over the surface to cause the screenings to settle into the voids. The remaining screenings shall be spread and vibrated in one or more applications to satisfactorily fill the voids; however, the quantity of screenings used and the operation of filling shall not cause floatation of the coarse aggregate. Areas not completely filled, in the foregoing operations, shall be filled by manual methods and need not be further vibrated.

6. Compacting and Bonding. After completing the vibration of the fine material, the surface of single-layer construction, or the surface of each layer of multi-layer construction, shall be sprinkled with water and rolled. All excess screenings forming in piles or cakes upon the surface shall be loosened and scattered by sweeping, exercising care that the fine material is not removed below the top of the coarse aggregate. On the surface of single-layer construction or the top layer of multi-layer construction, the sprinkling and rolling shall be continued and additional screenings applied where necessary until all voids are filled and until a slight wave of grout forms in front of the roller wheels. Brooms attached to the roller, and hand brooms, shall be used to distribute the grout uniformly into the unfilled voids. After the wave of grout has been produced over the entire section of the base course, this portion shall be left to dry. The surface shall be sprinkled and re-rolled as required to bond it thoroughly and to secure a satisfactory surface. The quantity of screenings and water used shall be sufficient to produce a smooth, hard monolithic surface.

7. Maintenance and Traffic. The Contractor shall maintain the completed base course until the placement of the surface course. No traffic shall be allowed on the base course other than necessary local traffic and that developing from the operation of essential construction equipment. Any defects which may develop in the construction of the base course or any damage caused by the operation of local or job traffic is the responsibility of the Contractor and shall be immediately repaired or replaced at no expense to the Borough.

C. Crushed Aggregate Base Course (Type B)

1. On prepared subgrade (or subbase if required), construct stone base of PennDOT 2A coarse aggregate to the compacted depth specified in the "Backfill and Surface Restoration Requirement" Table in Section 02575. Material substitutions shall be approved by the Borough.

2. Compaction shall be achieved by means of approved static or vibratory equipment. If static roller is used, base course of more than 8 inches shall be constructed in two lifts. If approved vibratory roller is used, base course up to 10 inches compacted thickness may be constructed in one course.

3. Spreading Coarse Material. The aggregate material shall be spread uniformly by approved mechanical stone spreaders to the full width of the base unless otherwise specified for part-width construction. Spreaders shall be adjusted to spread the loose material to obtain a layer of the required depth after compaction. In areas inaccessible to spreading equipment, the material may be spread directly from trucks provided the distribution is equivalent to that achieved by the spreader. All segregated material shall be removed and replaced with well graded material. The aggregate material shall not be spread for a distance of more than an average day's work ahead of compacting.

4. Compacting Coarse Material. Immediately after surface corrections have been made to the spread material, it shall be compacted. The rolling shall begin at the sides and progress to the center, except on super elevated curves where the rolling shall begin on the low side and progress to the high side. The rolling shall be parallel with the centerline of the roadway, uniformly lapping each preceding track, covering the entire surface with the rear wheels and continuing until the material does not creep or wave ahead of the roller wheels. After each layer of material has been spread and compacted, it shall be checked with approved templates and straightedges, and all irregularities shall be satisfactorily corrected. Red flags shall be placed at the limits of satisfactorily compacted material. The flags shall be moved ahead as additional material is compacted.

5. Maintenance and Traffic. The Contractor shall maintain the completed base course until the placement of the surface course. No traffic shall be allowed on the base course other than necessary local traffic and that developing from the operation of essential construction equipment. Any defects which may develop in the construction of the base course or any damage caused by the operation of local or job traffic is the responsibility of the Contractor and shall be immediately repaired or replaced at no expense to the Borough.

D. Crushed Aggregate Shoulders

1. As specified in Section 02230, Article 3.02.C.

E. Pavement Base Drain – See Section 02618

3.03 FIELD QUALITY CONTROL

A. Surface Tolerance.

1. After the base course has been completed as specified, the surface smoothness shall be checked with approved templates, string lines, or straightedges.

a. Templates. The Contractor shall furnish and use approved templates of required length and cut to the required crown of the finished surface of the base course, for checking the crown and contour thereof. The templates shall be equipped with metal or other approved vertical extensions attached to each end, so that the bottom of the template will be at the elevation of the top of the aggregate. At least 3 such templates shall be furnished, and used at intervals of not more than 25 feet.

b. String Lines. String lines, for controlling the finished elevation of the proposed base course, shall be furnished with ample supports and offset along each side of the base course, and shall be maintained until all irregularities have been satisfactorily corrected.

c. Straightedges. Approved straightedges 10 feet in length shall also be furnished and used for testing longitudinal irregularities in the surface of the base course.

2. Any surface irregularities that exceed ½ inch shall be remedied by loosening the surface and removing or adding material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

B. Tests for Depth of Finished Base Course. During the progress of the work, the depth of the base course will be measured by the Borough and unsatisfactory work shall be repaired, corrected, or replaced. The initial layer of fine material placed as a bed and filler (Type A Bases) will be measured and considered as part of the base course in determining the compacted depth of the finished base course.

1. The depth will be determined by cutting or digging holes to the full depth of the completed base course. One depth measurement shall be made for each 1500 square yards, or less, of completed base course. Any section in which the depth is ½ inch or more deficient in specified depth shall be satisfactorily corrected.

2. All test holes shall be backfilled with similar material and satisfactorily compacted. This operation shall be performed under the observation of Borough personnel who will check the depth for record purposes.

C. Field Moisture-Density Tests.

1. Conduct such tests as specified under Site Excavation and Placement of Fill Material: Section 02210.

END OF SECTION