CONSTRUCTION AND MATERIALS SPECIFICATIONS

WEST MANHEIM TOWNSHIP

YORK COUNTY, PA

August, 2007
Amended March, 2011

Prepared By:

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ABBREVIATED TABLE OF CONTENTS

* To view the Standard Details, click the desired link below. To return to the Table of Contents, click the Detail Title (Ex. "Casing Installation) located at the bottom of the Detail.

STANDARD DETAILS

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 Township 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 are defined as those land development and subdivision plans or construction documents approved by the municipality. Drawings shall meet the requirements of the Plan Standards contained herein.

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

Township is defined as West Manheim Township and its full time employees, elected officials and appointed representatives.

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
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
PTM	Pennsylvania Test Method
PVC	Polyvinyl Chloride
SDR	Standard Dimension Ratio
SESC	Soil Erosion and Sedimentation Control
UL	Underwriter's Laboratories, Inc.
WWF	Welded Wire Fabric

END OF SECTION

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SECTION 00160

UTILITY CONFLICT STATEMENT

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.

END OF SECTION

SECTION 01010

GENERAL REQUIREMENTS

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 measures to control traffic when working on or near public roads and streets.

1. Employ traffic control measures in accordance with 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, abandoned pipes, rubbish and windblown debris resulting from construction operations including excessive dust.

F. Protection of Existing Utilities and Structures:

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

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 Company assistance to expect and procedures to follow to prevent damage.

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

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

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 Township 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 TOWNSHIP ROAD OCCUPANCY PERMIT

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

1.05 SEWAGE PUMPING STATIONS

A. Design of pumping stations will be in accordance with the Township Engineer's recommendations. The type of station to be designed (precast, cast-in-place, Submersible, Wetwell/Drywell) will be decided upon in a meeting with the Township and Township Engineer prior to commencing design on the station. The developer is responsible for providing telephone and electrical service to the station along with provisions for emergency power supply.

1.06 GRINDER PUMPING STATIONS

A. Design of grinder pumping stations will be in accordance with the Township and Township Engineer's recommendations. The details of the station to be designed will be decided upon in a meeting with the Township Engineer prior to commencing design on the station.

1.07 SUBMITTALS AND CERTIFICATIONS

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

B. The Developer/Contractor shall provide any additional information required by the Township 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 Township 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 Township 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.

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, and enforce the use of, self-contained toilet units (Jiffy-John type facilities) at the site.

2.03 SEWER AND WATER MAIN SEPARATION

A. Horizontal Separation:

Sewers, including manholes, should be separated at least 10 feet, horizontally, from any existing or proposed water mains. Should local conditions prevent a lateral separation of 10 feet, a sewer may be closer than 10 feet to a water main if:

(a) it is laid in a separate trench; and
(b) the elevation of the top (crown) of the sewer is at least 18 inches below the bottom of the bottom (invert) of the water main.
(c) or based upon recommendations from the Township Engineer.

B. Vertical Separation:

Whenever sewers cross under the water mains, the top of the sewer shall be at least 18 inches below the bottom of the water main.

When the elevation of the sewer cannot be varied to provide the required 18″ vertical separation, relocate the water main, for a distance of 10 feet extending on each side of the sewer, with one full length of water main centered over the sewer so that both joints will be as far from the sewer as possible.

Where a water main crosses under a sewer, provide adequate structural support for the sewer to prevent damage to the water main. Provide at least 18 inches vertical separation.

C. Special Conditions:

Where it is impossible to obtain proper horizontal and vertical separation as specified, construct the pipelines as specified above and, in addition, encase the sewer line with minimum 6″ cement concrete for 10 feet on either side of the water main. All encased pipelines shall be ductile iron pipe, unless specifically approved by the Township, and extend from downstream MH to upstream MH.

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 shall be submitted to the Township.

2.05 FIELD OBSERVATION

A. Field observation shall be at the discretion of the Township. The Township'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 Township Specifications shall be reported to Township 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 West Manheim Township.

2.06 PRECONSTRUCTION MEETING

A. Before starting the work, a conference will be held at the Township 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, Township representative, the Township Engineer, the Township'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 shall furnish three (3) copies of the approved plan to the Township Engineer one (1) week prior to the pre-construction meeting.

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.

B. The Contractor shall identify the location of all newly installed, existing to remain, and 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 inspected, located and recorded by the Contractor.

D. Up-to-date is defined as containing modifications for work performed within the past 30 days.

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

F. At the end of the project, the Contractor's record drawings shall be turned over to the Engineer in Auto CADD format or as indicated in the Subdivision Ordinance, or directed by the Township Engineer.

G. 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. Building permit application will not be approved until record drawings are submitted and approved.

H. Upon the Township Engineer's acceptance of the record drawings, the Contractor shall submit a half size set (11" x 17") of the approved record drawings to the Township.

I. 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 and water lines until all other utilities are installed, and 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. Site excavation and placement of fill material:	Section 02210
2. Trenching, backfilling and compacting:	Section 02221
3. Roadway excavation, fill, and compaction:	Section 02230
4. Soil Erosion and Sedimentation Control	Section 02270
5. 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. Submit two copies of each on-site burning permit if such permits are required.

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

1.04 JOB CONDITIONS

A. 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.

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.

C. Wood Tree Guards:

1. Wood Posts: 2″ x 4″

2. Wood Stringers: 2″ x 2″

D. Wrapping Materials:

1. Burlap: AASHTO M182, Class 1

2. Krinkle - Kraft Waterproof Paper - 4″ width

PART 3 - EXECUTION

3.01 PREPARATION

A. Notify the Township, PA One-Call System and regulatory agencies at least 72 hours prior to beginning any clearing work.

B. Protect benchmarks, utilities, existing trees, shrubs and other landscape features designated for preservation with temporary fencing or barricades satisfactory to the Township. 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.

C. When a private enclosure fence encroaches on the work area, notify the Township and 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.

C. Any existing underground utility to be abandoned shall be removed.

3.03 CLEARING

A. Confine clearing to within the construction limits.

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

C. Where stumps are not required to be grubbed, flushcut 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.

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. Do not deposit or bury on the site debris resulting from the clearing and grubbing work unless authorized in writing by the Township.

C. Debris may be burned on-site if required permits are obtained, notice is given to the fire company and County 911, and if burning operations are conducted in compliance with all regulations.

D. Discarded materials within the right-of-way limits necessary to perform the work shall be removed and properly disposed of at the Contractor's/Developer'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 acceptable to the Township.

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 placed to their original condition and location ,at the Contractor's/Developer'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. Trenching, backfilling and compacting: Section 02221

C. Definitions: NONE

D. Applicable Standard Details:

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, latest revision.

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

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.

D. l mil thick standard bituminous coating, exterior.

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. Treat notches with pine tar, or similar, at time of pipe installation.

B. Bolt On:

1. Stainless steel shell with PVC liner, stainless steel hardware, and UHMW polymer runners.

Centered Type as manufactured By 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 projects around entire circumference of carrier pipe. Projects must have minimum height to pipe bells, similar to RACI type spacers as manufactured by RACI Spacers of North America or approved equal.

2.03 STEEL STRAPPING: ASTM A36

2.04 SAND (Fine aggregate)

A. Section 703.1, 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 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 D 2564 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 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

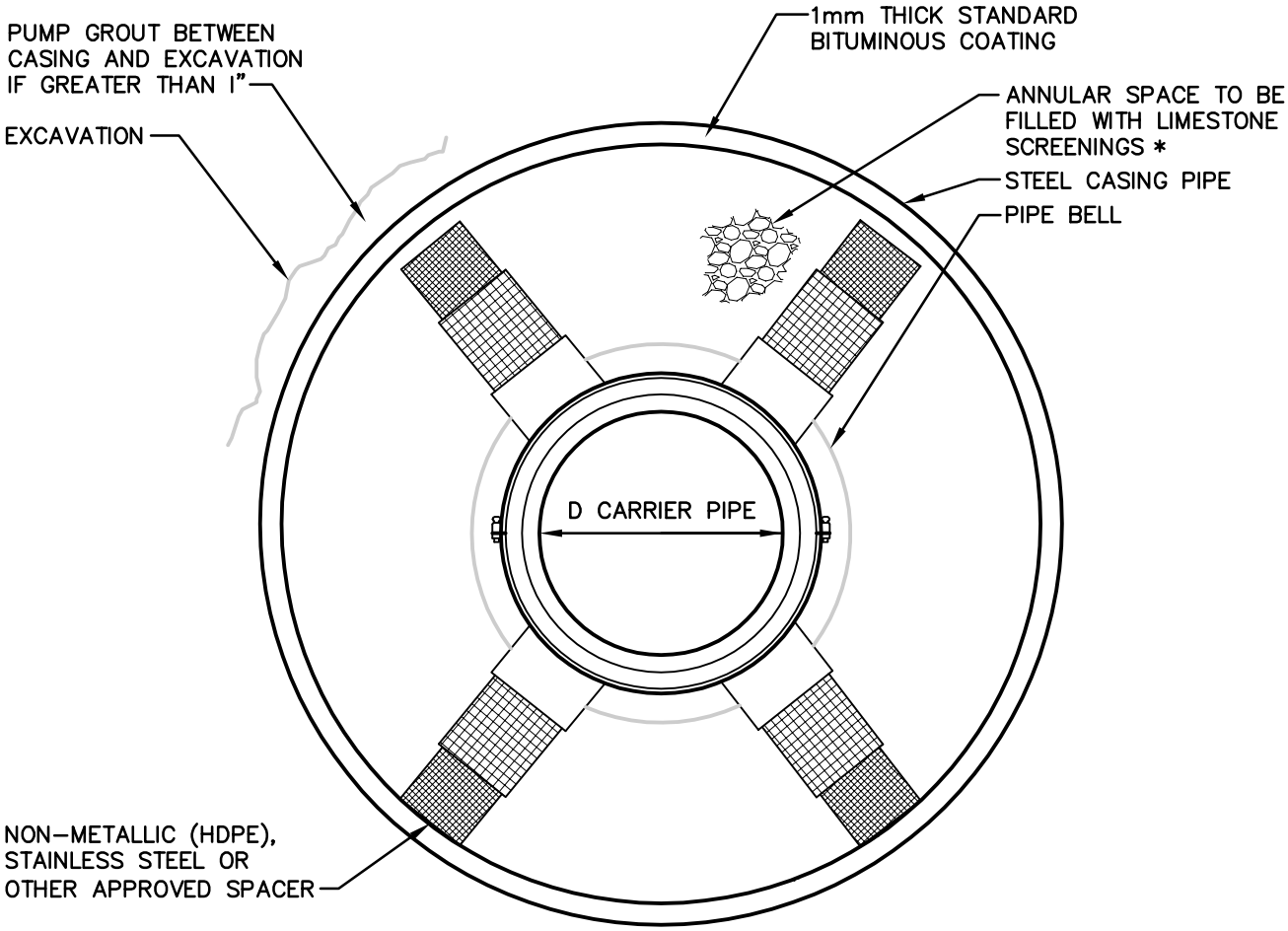
A. Install a carrier pipe without using a casing pipe only with prior approval of the Township and appropriate State agency.

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

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

D. Carefully guide the lateral pipe and joints through the opening, assembling joints prior to inserting 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

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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CASING INSTALLATION

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02150-1
FILE NO.	1204.9.02.00

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. Clearing and grubbing:	Section 02100
2. Trenching, backfilling and compacting:	Section 02221
3. Roadway excavation, fill and compaction:	Section 02230
4. Soil erosion and sedimentation control	Section 02270
5. 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 19, Field Test Manual
Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
Publication RR-459, Occupancy of Highways by Utilities

- 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 Tests Method for 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):

   Designation T89 Determining Liquid Limit of Soils
   Designation 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 a PennDOT approved Soils Testing Laboratory engaged and paid for by the Contractor and approved by the Township.

C. Compaction Testing:

1. Determine compaction by the testing procedure contained in ASTM D698 or ASTM D1557 at the locations and frequencies designated by the Geotechnical Report. If no report exists, location and frequency shall be designated by the Township's onsite representative. Soil samples are to be obtained prior to all construction activities at the following intervals; a) every 500' up to a maximum depth of 10 feet; and b) one sample for each soil type identified by the York County Soils Survey.

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 is UNCLASSIFIED, and includes excavation and removal of all soil, shale, rock, boulders, fill, and all other materials encountered of whatever nature.

B. Control of Traffic:

1. Employ traffic control measures in accordance with Pennsylvania Department of Transportation Publication 213, Work Zone Traffic Control Guidelines.

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 Township.

F. Flowable Fill. As defined in Section 02221 and approved in advance by the Township.

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. Provide and maintain signs, flashing warning lights, barricades, markers, and other protective devices as required to conform with 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 topsoiling 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 Township and recompacted. 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 Township based on nonmovement 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 Township, 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 Township.

3.04 EXCAVATION

A. Perform excavation of borrow material in a manner satisfactory to the Township. 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, regrade area, if necessary, to prevent erosion.

3.05 BLASTING

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

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

C. Provide Township with a copy of the blasting permit.

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. Comply with requirements of 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 York County Conservation District.

3.08 TOPSOILING

A. Topsoiling shall be as specified in Section 02485, Finish Grading, Seeding and Sodding.

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 02220

EXCAVATION FOR UTILITY STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Work of This Section Includes, but is not limited to:

Excavation and Backfill for Structures
Dewatering
Sheeting and Shoring
Site Grading

B. Related Work Specified Elsewhere:

1.Section 02221 - Trenching, Backfilling & Compacting

C. Definitions: None

D. Applicable Standard Details: None

1.02 QUALITY ASSURANCE

A. Testing Agency:

Compaction testing shall be performed by an independent soils testing laboratory engaged and paid for by the Contractor where directed by the Engineer.

B. Referenced Standards:

American Society for Testing and Materials (ASTM):

C33	Specification for Concrete Aggregates
D698	Tests for Moisture-Density Relations of Soils Using 5.5 Lb. Rammer and 12″ Drop
D1556	Test for Density of Soil-in-Place by the Sand-Cone Method
D2922	Test for Density of Soil Aggregation in place by Nuclear Methods (shallow depth)

C. Compaction Testing:

1. Determine compaction by the testing procedure contained in ASTM D698 or ASTM D1557 at the locations and frequencies designated by the Geotechnical Report. If no report exists, location and frequency shall be designated by the Engineer's onsite representative. Soil samples are to be obtained prior to all construction activities at the following intervals: a) every 500' up to a maximum depth of 10 feet; and b) one sample for each soil type identified by the York County Soils Survey.

1.03 JOB CONDITIONS

A. Proceed with caution in the areas of utility facilities and expose them by hand or other excavation methods acceptable to the utility owner.

B. Erect sheeting, shoring, and bracing as necessary for protection of persons, improvements, and excavations.

C. Furnish and maintain barricades, signs and markings for excavated areas. Unattended excavations shall be protected by plating, and/or fencing for protection of vehicular and pedestrian traffic. The Township reserves the right to serve unattended excavations at the expense of the contractor.

D. Select and install a system of dewatering to accomplish groundwater control in excavations.

E. Preserve, protect and maintain operable existing drainage ways, drains and sewers.

1.04 SUBMITTALS

A. Certificates:

Submit a Certificate of Compliance, together with supporting data, from the materials supplier attesting that the composition analysis of backfill materials meets specification requirements.

Submit certified compaction testing results from the soils testing laboratory.

1.05 TOWNSHIP ROAD OCCUPANCY PERMIT

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 MATERIALS FOR BACKFILLING, EMBANKMENTS OR FILLS

A. Well-graded soil aggregate mixture consisting of Groups SW, SC, and SP soils of the Unified Soils Classification.

B. Total content of gravel or rock fragments larger than ½" shall not exceed 20% by weight of the mass.

C. Backfill shall not contain stones larger than 8" in any dimension, topsoil, organic matter, debris, cinders, or frozen material.

D. Select material stone backfill

2.02 PREVIOUS MATERIAL

A. Natural, clean, free-draining sand or gravel conforming to the requirements of ASTM C33

except:

Material passing a No. 100 sieve not to exceed 8%
Material passing a No. 200 sieve not to exceed 5%

2.03 SOURCE OF MATERIALS

A. Use materials for fill from this Contract if they meet the requirements specified herein. If sufficient material meeting these requirements is not available from required excavation, obtain requisite material from other sources.

B. Use only material which has been approved as to quality, location of source and zone of placement in the fill.

C. The Township's Engineer has the right to reject material at the job site by visual inspection, pending sampling and testing.

2.04 SUITABLE BACKFILL MATERIAL

A. State highways, Township roads and driveways: Crushed stone or aggregate (same as Section 02221-3.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavate in sequence and stages which will not subject permanent or temporary structures, installations, or surfaces to unstable conditions.

B. Excavate as required to provide sufficient working space to permit placing, inspection, and completion of the structures.

C. Support the sides of excavations as specified by OSHA.

D. Keep excavation free from water.

E. Haul excavated materials to fill, stockpile or disposal locations.

F. Fill all openings and fractures in the excavation bottom and sides with approved materials. Obtain Township's Engineer's written approval of the foundation excavation before placing any foundation stone bedding or construction concrete.

3.02 BLASTING

A. Blasting will be permitted except in areas where the proximity of structures, underground facilities, or public safety precludes the use of explosives. Nothing in this Section shall relieve the Contractor of his responsibilities for damages, nor shall it result in any responsibility to the Owner or the Engineer precluded in the General Conditions.

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

C. Township notification: Name and license number of blaster to be filed with the Township. Township must be notified of blasting activity 48 hours in advance.

3.03 BACKFILLING STRUCTURES

A. Do not commence backfilling around any structures until such structure has been examined and approved by the Engineer.

B. Do not place backfill until the requirements for concrete curing and waterproofing have been complied with and, if required, until the test cylinders for the particular structure indicate that the concrete has attained the compressive strength specified.

C. When backfilling against structures and where applicable, place backfill material in equal lifts and to similar elevations on opposite sides of structures in order to equalize opposing horizontal pressures. Place material in uniform increments over fill area.

D. Protect structures from damage by construction activity, equipment, and vehicles. Repair or replace damaged structures to the satisfaction of the Owner.

E. Conduct backfilling to obtain compaction requirements as specified. If compaction is not obtained, the Developer/Contractor shall, at his own expense, remove, replace, and retest as many times as is required to obtain the specified compaction.

F. Place fill in layers of uniform thickness for the entire width so that each layer can be uniformly compacted.

   a. Adjust moisture content of the material to within the specified limits by discing or harrowing, if excessively wet; by wetting and thoroughly mixing, if excessively dry. Any fill in place that is disturbed by adjustment of moisture shall be recompacted to the specified range of compaction before placement of the next lift of backfill.

   b. Leave sheeting and shoring in place as long as possible, compatible with the placing and compacting of backfill.

3.04 COMPACTION

A. Compact each layer of material to 95% of the maximum density at optimum moisture content as determined by ASTM D698, Method D.

B. Compaction Testing:

Conduct compaction tests at location where directed by the Engineer during backfilling operations.

3.05 ROUGH GRADING

A. Rough grade to uniform finish contours. Form the bases for terraces, banks and paved areas.

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

C. Grade embankments and fills to smooth compact surface.

D. The minimum degree of finish for all graded areas shall be that ordinarily obtained from bladegrader operations.

3.06 SHORING, SHEETING AND BRACING

A. Install shoring, sheeting and bracing to comply with federal, state, and local code requirements. Responsibility for the safety of the work, personnel and structures rests solely with the Contractor.

B. Carry the bottom of the support system to depth below the main excavation, adequate to prevent ground movement.

C. Follow the excavation closely with sheeting and shoring placement. Do not allow the maximum height of the unsheeted excavations to exceed OSHA specifications.

D. Perform excavation for the installation of sheeting carefully to minimize the formation of voids.

E. If unstable material is encountered during excavation, take measures to contain it in place and prevent ground displacement.

F. Have sufficient quantity of material on hand at all times for sheeting, shoring, bracing and other operations for the protection of the work and for use in case of accident or emergency.

3.07 SURFACE DRAINAGE

A. Intercept and divert surface drainage away from the excavation by the use of dikes, curb walls, ditches, pipes, sumps or other means.

B. Design surface drainage systems so that they do not cause erosion on or off the site, or cause unwanted flow or water.

C. Remove the surface drainage system when no longer required.

D. Remove the debris and restore the site or sites to original condition.

3.08 DRAINAGE AND DEWATERING OF EXCAVATED AREAS

A. Provide and maintain ditches to collect surface water and seepage which may enter the excavations and divert the water into a sump so that it can be pumped into drainage channels.

B. Install a dewatering system to keep excavation dry and free of water.

C. Maintain continuous and complete effectiveness of the installation at all times.

D. Maintain water level below subgrade until concrete work or backfill, or both, have been completed to offset uplift pressures.

E. Dispose of precipitation and subsurface water clear of the work. Comply with provisions of the Sediment and Erosion Control Plan.

F. During dewatering operations, water discharged to a watercourse must be clear and free of silt, mud and other deleterious materials. Construct and maintain settling ponds to prevent stream degradation. Comply with the requirements for dewatering or discharging to a watercourse as required by Federal, state or local codes.

G. Backfill drainage ditches, sumps, and settling basins when no longer required with granular material, or other material as approved by the Engineer.

3.09 FINISHING

A. On completion of the work, clean ditches and channels and finish the site in a neat and presentable condition. Slope areas to provide positive drainage.

B. Place topsoil and seed all areas disturbed by construction as specified in Section 02485, Finish Grading and Seeding, unless otherwise indicated.

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. Clearing and grubbing:	Section 02100
2. Boring and jacking:	Section 02150
3. Soil Erosion and Sedimentation Control	Section 02270
4. Finish grading, seeding and sodding:	Section 02485
5. Trench paving & restoration:	Section 02575

C. Definitions: NONE

D. Applicable Standard Details:

02221-1 Pipe Trench Detail
02221-2 Pipe Bedding Detail
02221-3 Flowable Backfill Detail
02221-4 Stream Crossing (Flumed) Detail
02221-5 Stream Crossing (Bypass) Detail
02221-6 Clay Dike Detail
02221-7 Wetland Crossing Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Regulations Governing Occupancy of Highways by Utilities (67 PA Code, Chapter 459)

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 - Determination-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
D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lbf./ft^3)
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 a PennDOT approved Soils Testing Laboratory engaged and paid for by the Contractor and approved by the Township.

C. Compaction Testing:

1. Conduct compaction tests as directed by the Township 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.

4. Soil samples are to be obtained prior to all construction activities at the following intervals: a) every 500' at a maximum depth of 10'; b) one sample for each soil type identified by the York County Soils Survey.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification attesting that the composition analysis of pipe bedding and select material stone backfill materials 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.

1.04 JOB CONDITIONS

A. Classification of Excavation:

1. All excavation work is UNCLASSIFIED, and includes excavation and removal of all soil, shale, rock, boulders, fill, and all 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. Employ traffic control measures in accordance with Pennsylvania Department of Transportation Publication 213, Work Zone Traffic Control Guidelines.

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 Township 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.

1.05 TOWNSHIP ROAD OCCUPANCY PERMIT

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 PIPE BEDDING MATERIAL

A. Type III and Type IV Bedding Material:

1. AASHTO No. 8 or 57 coarse aggregate, 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. Suitable Backfill Material (highways, driveways, and shoulders):

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

a. Select Material Backfill or
b. Flowable Backfill Material - where directed or approved.

C. Suitable Backfill Material (other than highways, driveways and shoulders)

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 2" 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. Flowable Fill - conforming to material in Table 1:

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

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

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 ***
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 meet density and strength requirements or to adapt to specific site conditions.

** Requires the use of 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 lightweight aggregate or air entraining admixture is used to obtain lightweight properties.

PART 3 - EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Maintain traffic in one or more unobstructed lanes and provide access to all streets and private drives.

B. Provide and maintain protective devices as required by state and local codes, permits and regulations.

C. Notify Township Police Department, EMA Group and School District at least 72 hours in advance of any operations requiring changes to existing traffic patterns.

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

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

C. Provide copy of blasting permit to Township. Township must be notified of blasting activity 48 hours in advance.

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 from the main pipeline to the right-of-way line (in accordance with Section 02610), 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.

C. Length of Open Trench:

1. Do not advance trenching operations more than 100' ahead of completed pipeline, except as specified in the State Highway Occupancy Permit.

3.05 SUPPORT OF EXCAVATION

A. The adequacy of the design and use of sheeting, shoring and bracing installations relative to the nature of the material to be encountered and retained is the sole responsibility of the Contractor and no duty is assumed or to be exercised by the Township 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 the Contractor's expense.

D. Removal of sheeting, shoring, and bracing as backfilling proceeds is the Contractor’s responsibility.

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 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. Type III Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail 02221-2.

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

B. Type IV Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail 02221-2.

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

C. Type V Bedding:
   1. Depth of pipe bedding aggregate as shown on Standard Detail 02221-2.

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

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

E. Pipe embedment material shall be placed, worked by hand or compacted until a minimum of 90% in yards and 95% under driveways, shoulders, roadways and sidewalks is achieved (at optimum moisture content, ± 2%, standard proctor), unless otherwise approved by the Township.

3.09 PIPE LAYING

A. Provide required pipe bedding placed in accordance with the Standard Details.

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 or use restrained joint fittings at all bends, tees, valves, and changes in direction, in accordance with the Drawings and Standard Details.

3.11 BACKFILLING TRENCHES

A. After pipe installation and inspection, backfill trenches l to 12" above the crown of the pipe with specified backfill material, as per Pipe Bedding Detail (02221-2), placed and carefully compacted with approved compactor equipment in layers of suitable thickness to provide specified compaction. Backfill and compact the remainder of the trench with specified backfill material. Refer to drawings and Backfill and Surface Restoration Requirements Table in Section 02575 for trench backfill material and compaction requirements at each specific location.

B. Lift Thickness Limitations:

   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 Township 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 Township.

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 Township 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.

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 STREAM CROSSING

A. Construct pipeline stream crossings as shown on Standard Details 02221-4 and 02221-5 . Comply with provisions of the Sediment and Erosion Control Plan and Section 02270, Soil Erosion and Sedimentation Control.

B. After backfilling, protect the surfaces of the disturbed area in stream channel and a minimum of five feet from the top of bank on both sides with a one foot thick layer of rip rap stone.

3.14 CLAY DIKES

A. Install clay dikes adjacent to stream and wetland crossings as shown on Standard Details 02221-4, 02221-5 and 02221-7 and where indicated on the Drawings, or as deemed necessary by the Township.

B. Construct dikes impervious to the flow of water by backfilling the trench with compacted clay as shown on Standard Detail 02221-6.

3.15 UTILITY MARKING TAPE

A. Install detectable utility marking tape above all plastic pressure pipelines, 12"-18" below final grade. Refer to Sections 02610 and 02722.

3.16 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.

3.17 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, Finish Grading, Seeding and Sodding.

3.18 RESTORATION OF PAVED SURFACES

A. Restore paved surfaces in accordance with Section 02575, Paving Restoration.

3.19 UTILITIES CROSSING STREETS OR ROADS

A. All electrical, telephone and TV cables crossing road shall be installed in conduits or carrier pipes.

3.20 LIMITS OF WORK

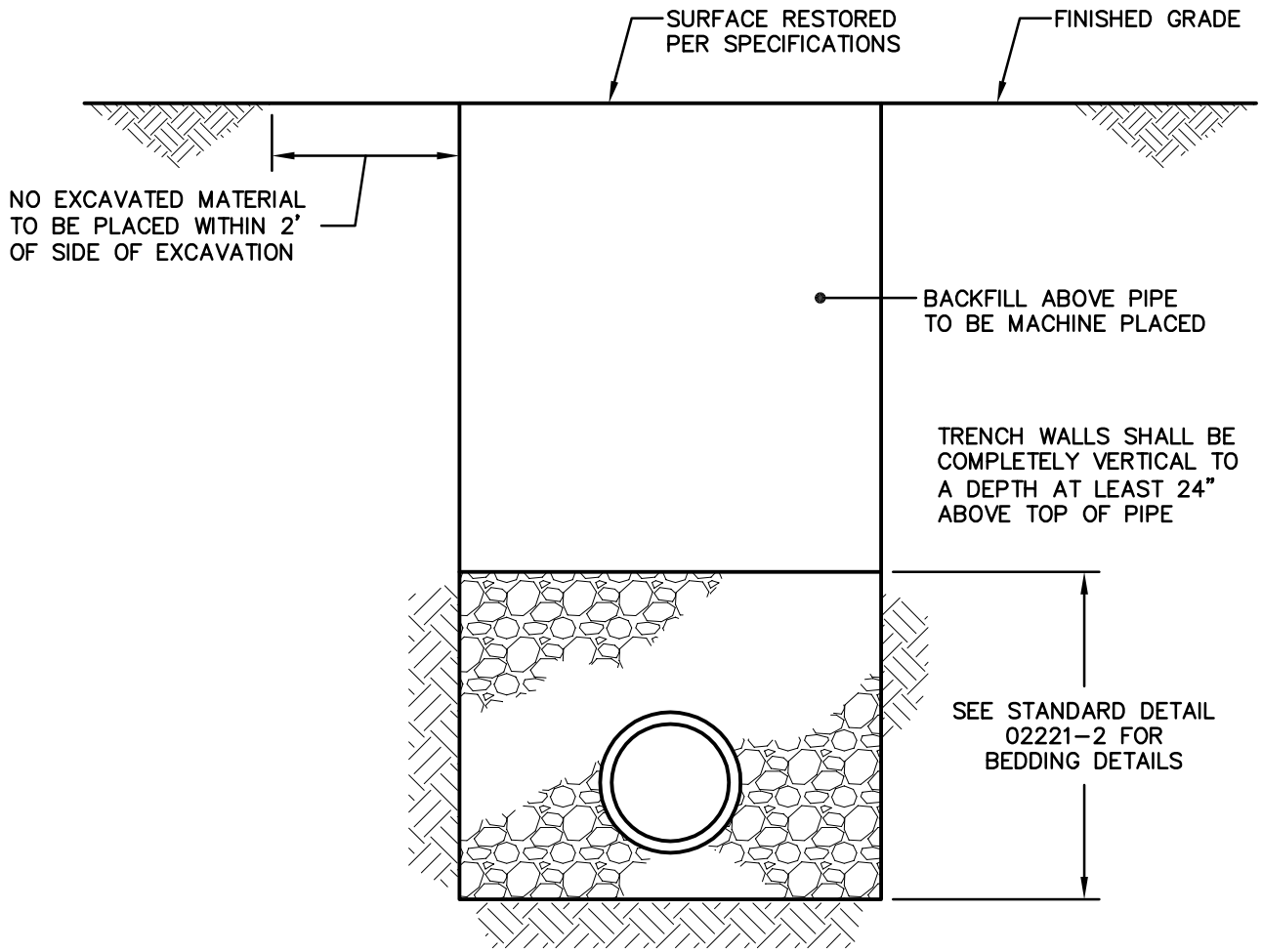
A. All disturbances shall be confined to the Developer's property, street rights-of-way, permanent easements and temporary construction easements as shown on the Drawings.

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

C. All work shall be confined to Municipal 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 has been obtained from the Township.

END OF SECTION



NOTES:

1. SHORING REQUIRED FOR ALL TRENCHES IN ACCORDANCE WITH APPLICATION REGULATIONS LAWS AND SAFETY CODES.
2. BACKFILL AROUND PIPE; CLEAN DRY EARTH, CLAY, FINE GRAVEL, OR SAND, FREE OF ORGANIC MATERIALS, STONE LARGER THAN 2", FROZEN OR WET MATERIAL.
3. PLACE BACKFILL AROUND PIPE BY HAND AND COMPACT IN 6" LAYERS. SEE BACKFILL CHART FOR COMPACTION REQUIREMENTS.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.

Excellence in Civil Engineering

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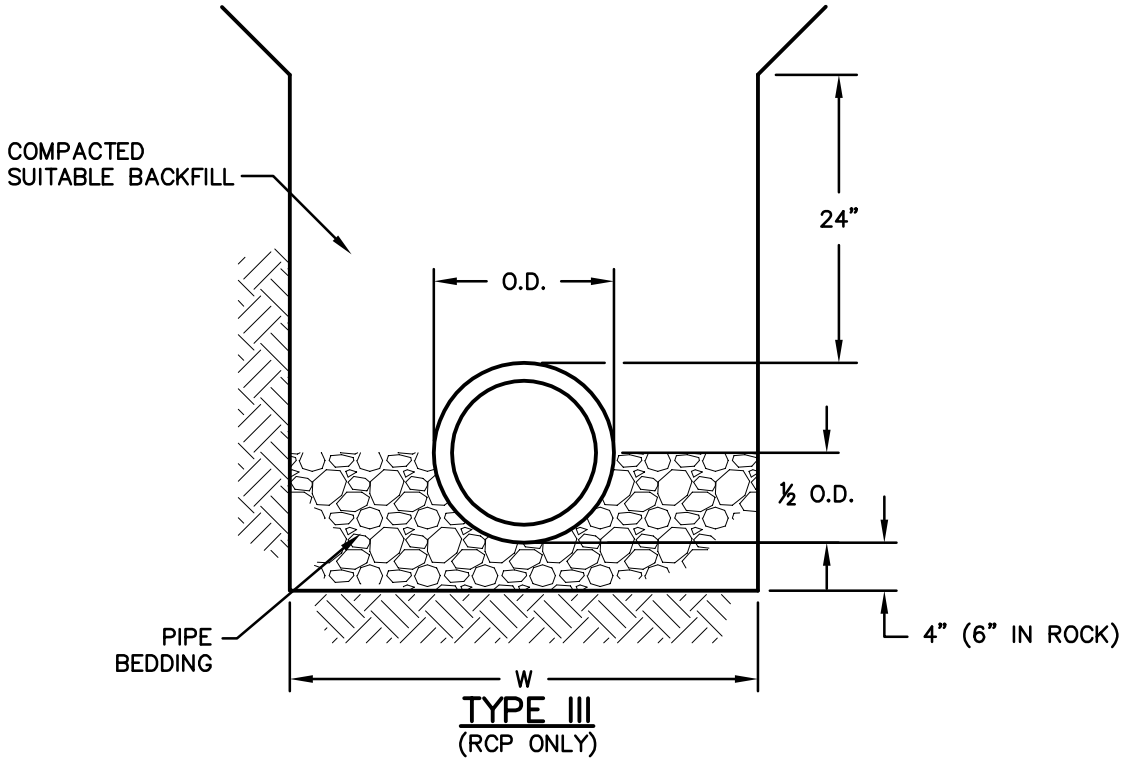
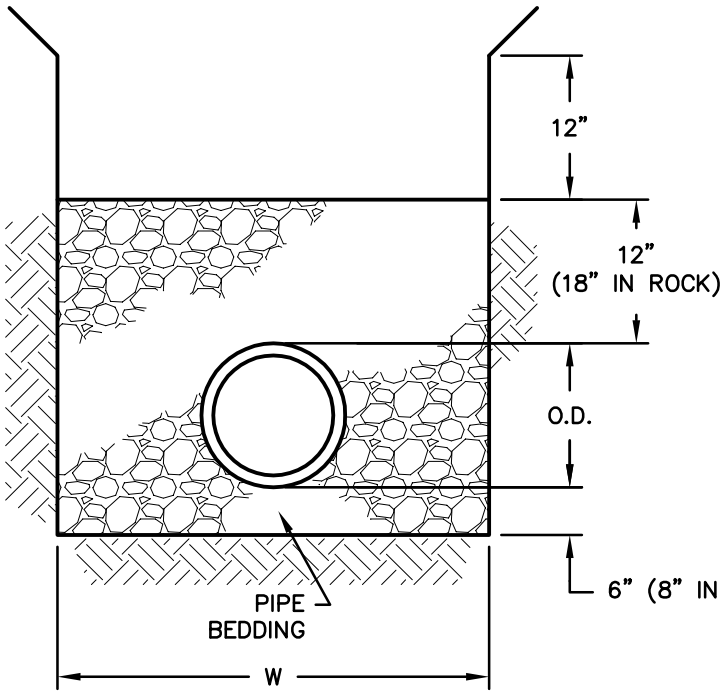
PIPE TRENCH DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

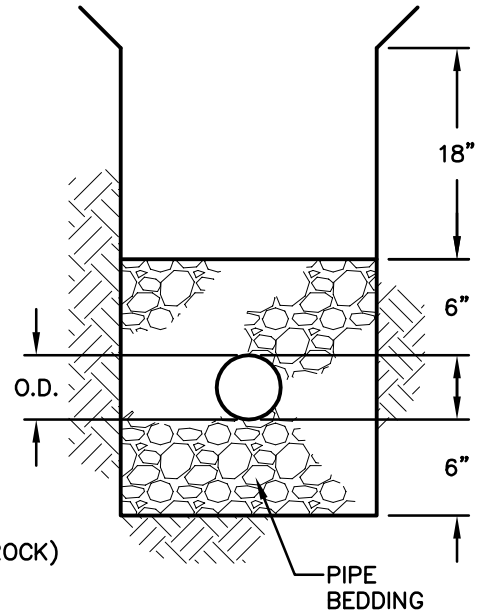
DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-1
FILE NO.	1204.9.02.00



TYPE III
(RCP ONLY)



TYPE IV



TYPE V
(2" DIA. AND SMALLER)

NOTE: TYPE I AND II NOT PERMITTED.

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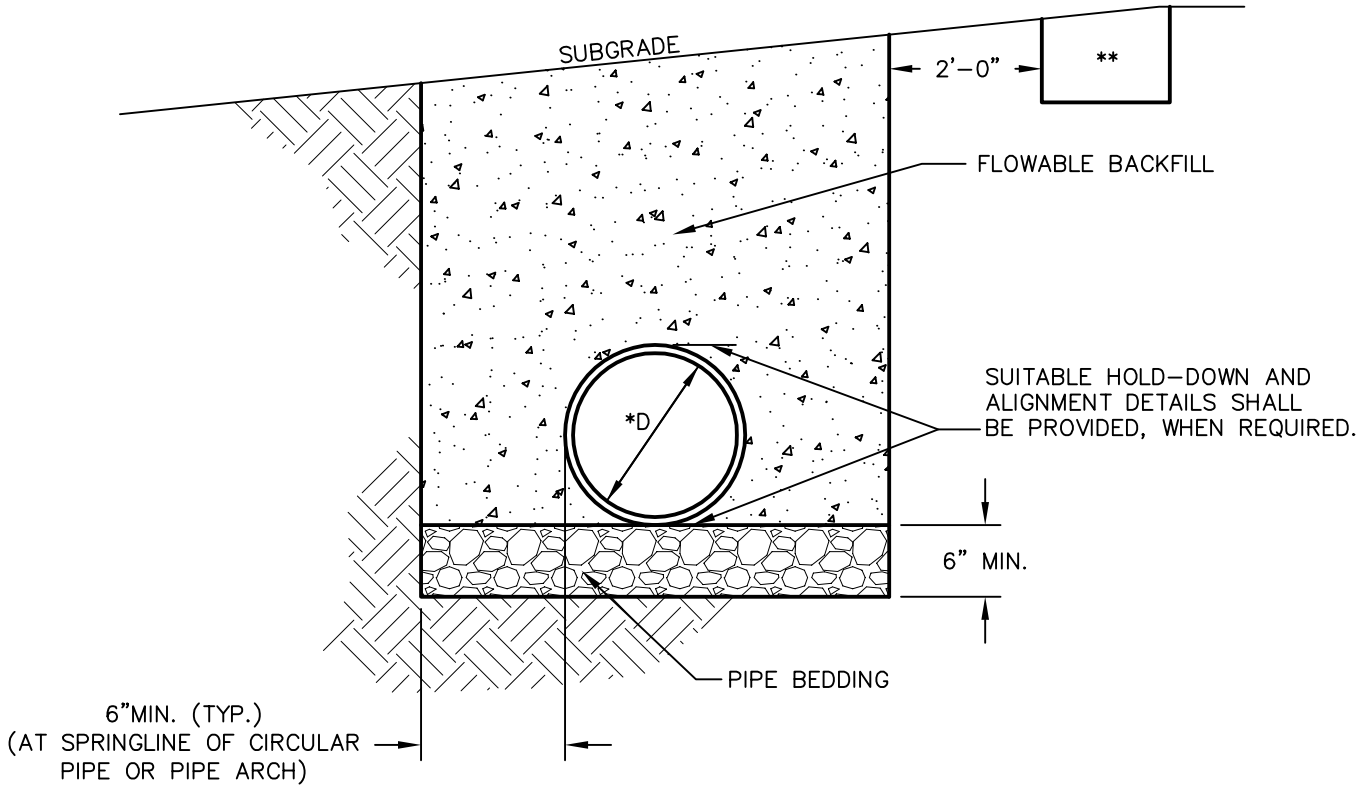
PIPE BEDDING DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-2
FILE NO.	1204.9.02.00



*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.**

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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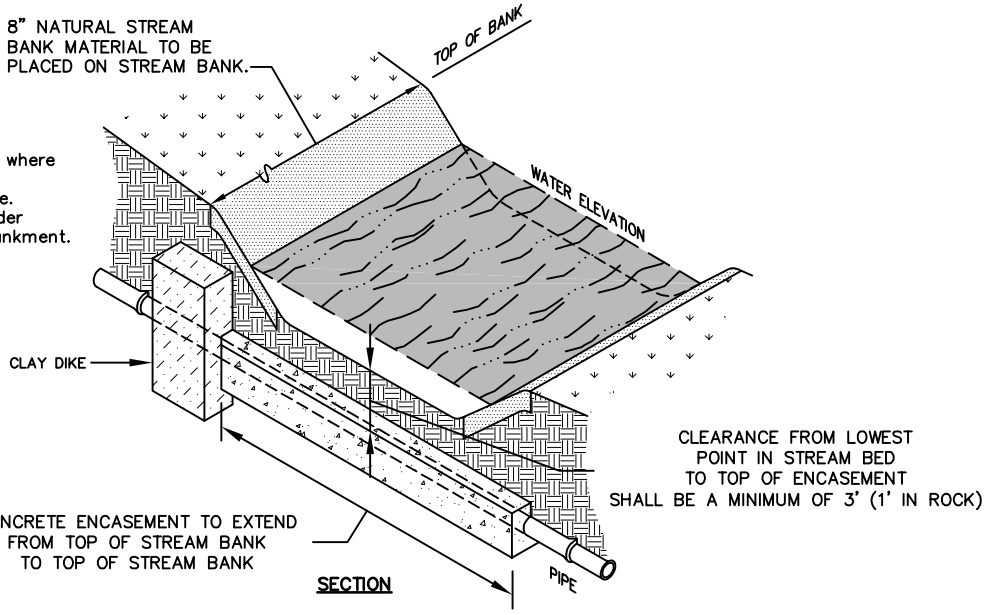
FLOWABLE BACKFILL DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-3
FILE NO.	1204.9.02.00

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



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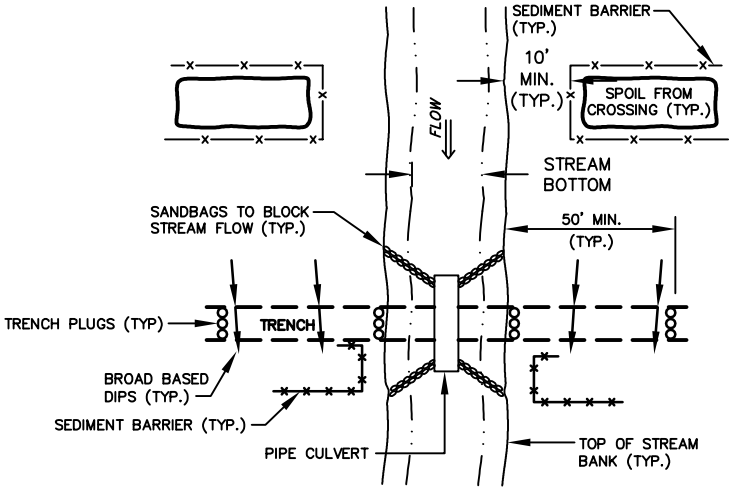

PLAN

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. Stream Crossing bid item includes excavation, backfill, trench plugs, and other work incidental to the stream crossing construction as shown on contract drawings.
11. Pipe, concrete encasement, clay dike are to be paid under their respective bid items.
12. Provide pinning to anchor pipe.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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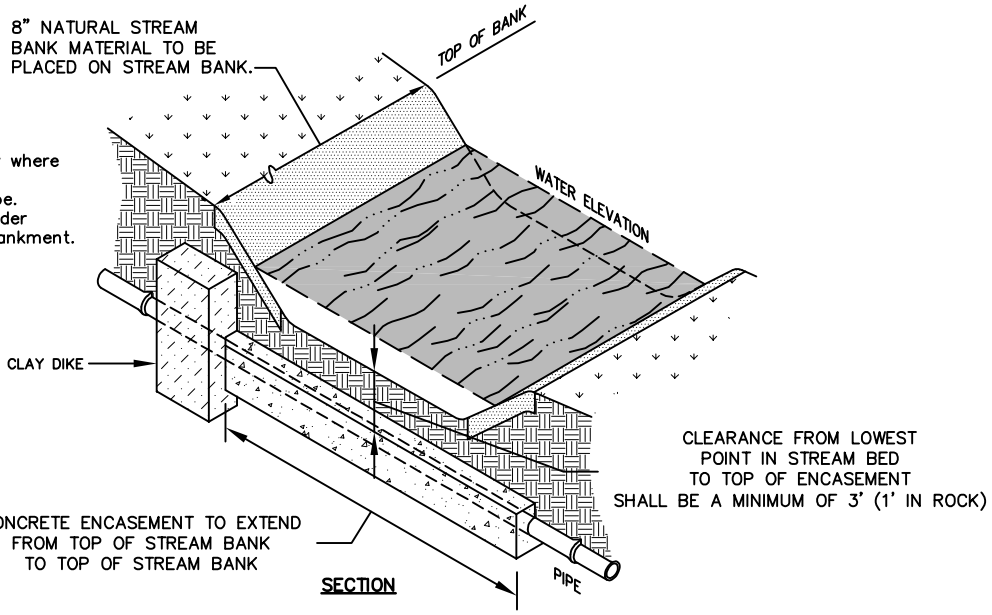
UTILITY LINE STREAM CROSSING (FLUMED) DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-4
FILE NO.	1204.9.02.00

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



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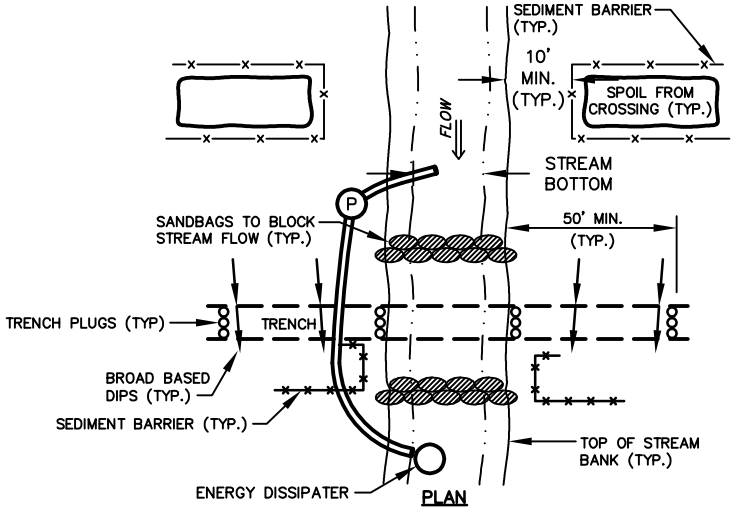

PLAN

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. Stream Crossing bid item includes excavation, backfill, trench plugs, and other work incidental to the stream crossing construction as shown on contract drawings.
11. Pipe, concrete encasement, clay dike are to be paid under their respective bid items.
12. Provide pinning to anchor pipe.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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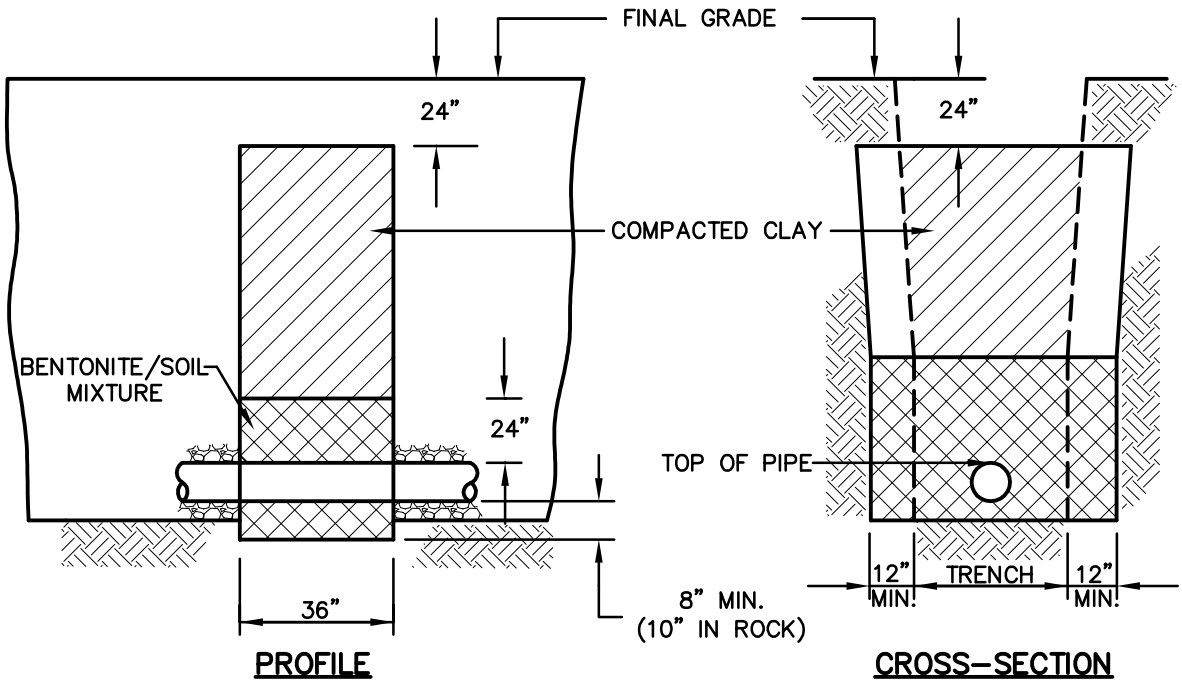
UTILITY LINE STREAM CROSSING (BYPASS) DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-5
FILE NO.	1204.9.02.00



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.
4. THE DEPTH OF CLAY DIKE SHALL EXTEND A MINIMUM OF 2" DEEPER THAN ADJACENT STONE BEDDING ON CONCRETE ENCASEMENT.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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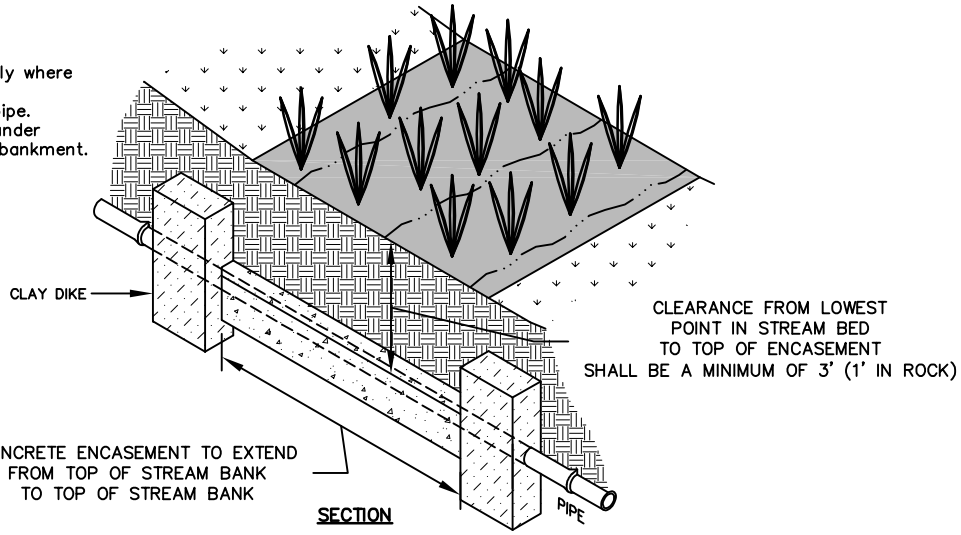
CLAY DIKE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-6
FILE NO.	1204.9.02.00

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



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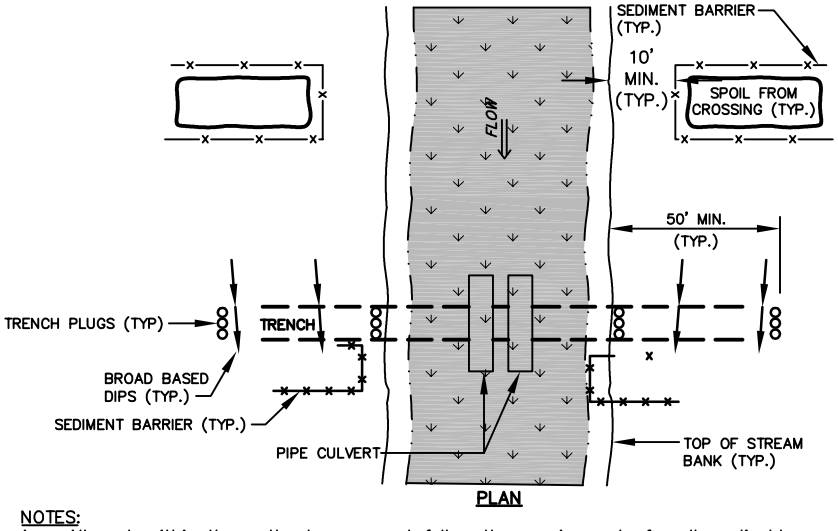

PLAN

NOTES:
1. All work within the wetland 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 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. Wetland Crossing bid item includes excavation, backfill, trench plugs, and other work incidental to the stream crossing construction as shown on Contract Drawings.
12. Pipe, concrete encasement, and clay dike are to be paid under their respective bid items.
13. Provide pinning to anchor pipe.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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UTILITY LINE WETLAND CROSSING (FLUMED) DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02221-7
FILE NO.	1204.9.02.00

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. Clearing and grubbing:	Section 02100
2. Site excavation and placement of fill material:	Section 02210
3. Soil Erosion and Sedimentation Control	Section 02270
4. Finish grading, seeding and sodding:	Section 02485
5. 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: See Section 02500.

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):

D698	Standard Proctor Compaction Test for Moisture - Density Relations of Soils
D1557	Modified Proctor Compaction Test for Moisture - Density Relations of Soils
D2167	Test Method for Density and Unit Weight of Soil in Place by the Rubber-Balloon Method

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

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

Publication 408, Specifications

B. Inspections:

1. Inspection by the Township will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

C. Compaction Testing:

1. Determine compaction by the testing procedure contained in ASTM D698 or ASTM D1557 at the locations and frequencies designated by the Geotechnical Report. If no report exists, location and frequency shall be designated by the Engineer's onsite representative. Soil samples are to be obtained prior to all construction activities at the following intervals: a) every 500' up to a maximum depth of 10 feet; and b) one sample for each soil type identified by the York County Soils Survey.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from aggregate suppliers attesting that materials conform to specifications herein. PennDOT certification (CS 4171) shall be provided with each load of crushed aggregate delivered to the job site.

1.04 JOB CONDITIONS

A. As specified in Section 02210.

B. Control of traffic

1. Reasonable access must be maintained for adjacent property owners and commercial properties.

2. All excavations in access drives, driveways, and state highway right-of-ways shall be backfilled or plated at the end of each work day.

1.05 TOWNSHIP ROAD OCCUPANCY PERMIT

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

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

2.02 GEOTEXTILES

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

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

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 0227, Soil Erosion and Sedimentation Control..

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 Township.

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 Township, and complete compaction testing as required. Compaction testing shall be required for all roadway fill areas in excess of 2'.

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 Township..

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 and/or shown in the “Backfill and Surface Restoration Requirements Table” in Section 02575, construct subbase in accordance with Publication 408 Specifications, Section 350.

3. Construct pavement base drains at sag vertical curves as indicated on Standard Details and at the direction of the Township Engineer.

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 the specified 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, 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 Township.

C. Crushed Aggregate Base Course (Alternate)

1. On prepared subgrade (or subbase if required), construct stone base of PennDOT 2A or 3A Modified coarse aggregate to the specified compacted depth.

   3A Modified - gradation as follows:

Sieve	2-1/2"	1"	3/8"	No. 4	No. 10	No. 40	No. 100
% passing	100	50-100	25-90	20-65	10-50	8-30	0-20

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 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 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 Township.

D. Crushed Aggregate Shoulders

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

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 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 Township and unsatisfactory work shall be repaired, corrected, or replaced. The initial layer of fine material placed as a bed and filler 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 3000 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 Township personnel who will check the depth for record purposes.

C. Field Moisture-Density Tests. Conduct such tests as specified under Site Excavation and Placement of Fill Material: Section 02210.

END OF SECTION

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SECTION 02270

SOIL EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

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

1. Installation of soil erosion and sedimentation control (SESC) measures as per approved plan.
2. Maintenance of SESC measures.
3. Restoration of area and removal of any interim SESC measures placed to protect areas from erosion during stabilization period.

B. Related work specified elsewhere:

1. Clearing and grubbing:	Section 02100
2. Site excavation and placement of fill material:	Section 02210
3. Finish grading, seeding, sodding:	Section 02485
4. Storm drain pipe:	Section 02618

C. Applicable Standard Details:

02270-1 Rock Basin Detail
02270-2 Typical Soil Erosion Control for Structures
02270-3 Silt Barrier Fence Detail
02270-4 Super Filter Fabric Fence and Silt Sock Details
02270-5 Rock Filter Outlet
02270-6 Temporary Diversion Swale Detail
02270-7 Storm Inlet Protection Detail
02270-8 Straw Bale Barrier Detail
02270-9 Stabilized Construction Entrance Detail
02270-10Pumped Water Filter Bag

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications
Publication 72M, Roadway Construction Standards (RC 0-99)

2. Pennsylvania Department of Environmental Protection (PA DEP):

   Erosion and Sediment Pollution Control Program Manual Document No. 363-2134-008, Effective April 15, 2000 or latest revisions thereof as released in accordance with PA Code 25 Chapter 102.

3. Asphalt Institute Specifications

1.03 SUBMITTALS

A. A Soil Erosion and Sedimentation Control plan for this project shall be on site at all times. The CONTRACTOR shall regard this plan as a minimum standard. This plan may not be adjusted by the CONTRACTOR without prior approval of the County Conservation District and other regulatory agencies as applicable, and by means of a Contract Change Order.

1.04 JOB CONDITIONS: Section Not Utilized.

PART 2 MATERIALS

2.01 STONE FOR RIP-RAP

A. Stone used shall be the type and size of rip-rap shown on Drawings and shall meet the requirement of Publication 408, Section 850.

2.02 MATTING FOR EROSION CONTROL

A. The CONTRACTOR shall furnish a certification from the manufacturer that the matting conforms to the requirements prescribed hereinafter.

B. Jute matting for erosion control:

   1. As specified in Publication 408, Section 806.2(a).

C. Excelsior matting:

   1. As specified in Publication 408, Section 806.2(b).

D. Nylon matting:

   1. As specified in Publication 408, Section 806.2(d).

2.03 EROSION CONTROL DEVICES

A. Silt Barrier Fence:

   1. Geotextiles, Class 3: As specified in Publication 408, Section 735.1 (a) (b) (c) (d) and Section 865.2 (a).

2. Mesh Support: As specified in Publication 408, Section 865.2(b).

3. Post:

a. Wood or steel or acceptable plastic with equivalent section and sufficient length for height of fence required.

b. As specified in Publication 408,Section 865.2 (c).

4. Fasteners: As specified in Publication 408, Section 865.2(d).

5. Ground Anchors, Guy Wires: As specified in Publication 408, Section 865.2 (e) (f).

2.04 TEMPORARY COVER

A. Seed: As specified in Section 02485.

B. Seed Mixtures: As specified in Section 02485.

C. Inoculant: As specified in Section 02485.

2.05 SOIL SUPPLEMENT MATERIALS

A. Fertilizer: As specified in Section 02485.

B. Agricultural Lime: As specified in Section 02485.

2.06 MULCHING MATERIALS

A. Straw: As specified in Section 02485.

B. Wood Cellulose Fiber: As specified in Section 02485.

C. Mulching Binder:

1. Emulsified Asphalt: SS-1, CSS-1, CMS-1, MS-2, RS-1, RS-2, CRS-1, or CRS-2. Designations from Asphalt Institute Specifications.

D. Wood Chips: Wood chips, recovered from clearing and grubbing operation will be acceptable as mulch for seeding and shall be used at a rate of 35 cubic yards per acre.

2.07 STORM DRAIN PIPE

A. As specified in Section 02618.

2.08 PUMPED WATER FILTER BAG

A. As specified in Standard Detail 02270-10

2.09 INLET SEDIMENT CONTROL DEVICE

A. Woven polypropylene fabric bag such as Siltsack, as manufactured by ACF Environmental, Inc., Richmond, VA, or approved equal, sized to fit inlet.

PART 3 EXECUTION

3.01 CONSTRUCTION SEQUENCE

A. All earth disturbance activities shall proceed in accordance with the following sequence. Each stage shall be completed and immediately stabilized before any following stage is initiated.

1. Clearing
2. Grubbing
3. Topsoil stripping shall be limited only to those areas described in each stage.

B. At least seven (7) days before starting any earth disturbance activities, the Developer and/or Contractor shall invite all contractors involved in those activities, (the landowner, all appropriate Township officials, the erosion and sediment control plan preparer), and a representative of the County Conservation District to an on-site pre-construction meeting.

C. At least three (3) days before starting any earth disturbance activities, all Contractors involved in those activities shall notify the Pennsylvania One Call System Incorporated at 1-800-242-1776 for the location of existing underground utilities.

D. The Contractor shall clear and grub areas only required to bleared by the proposed construction. The detailed construction sequence listed on the allowed plan shall be strictly followed.

E. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate best management practices to eliminate the potential for accelerated erosion and/or sediment pollution.

F. The Developer shall field mark the limits of disturbance for all work and all waters of the Commonwealth boundaries (ex. Stream buffers, wetland boundaries, spring seeps, and floodway) prior to the start of construction.

G. Upon completion of all earth disturbance activities and permanent stabilized of all disturbed areas, the Developer and/or Contractor shall contact the County Conservation District for an inspection prior to the removal of the Best Management Practices (BMPs) facilities.

H. Upon completion of all earth disturbance activities, removal of all temporary BMPs and permanent stabilization of all disturbed areas, the Developer and/or Contractor shall contact the County Conservation District for final inspection.

3.02 SOIL EROSION AND SEDIMENTATION CONTROL

A. Topsoil stockpile heights shall not exceed 35 feet. Stockpile side slopes must be 2:1 or flatter.

B. A copy of the approved erosion and sediment control plan must be available at the project site at all times.

C. All pumping of sediment laden water shall be through a sediment control BMP, such as a pumped water filter bag or equivalent sediment removal facility, over undisturbed vegetative areas.

D. All building materials and wastes must be removed from the site and recycled or disposed of in accordance with PA DEP's solid waste management regulations at (PA Code 2501 et esq. 271.1 and 287.1 et seq). No building materials, water or unused building material shall be burned, buried, dumped or discharged at the site.

E. The Contractor/Developer shall be responsible for the removal of any excess material and shall ensure that the site(S) receiving the excess has an approved erosion and sedimentation control plan that meets the conditions of PA Code 25, Chapter 102 and/or other State or Federal regulations.

F. Clean Fill is defined as: uncontaminated, non-water soluble, no-decomposable, inert, solid material. The term includes: soil, rock, stone, dredged material, used asphalt, brick, block or concrete from construction and demolition activities that is separate from other waste and is recognizable as such. The term does not include materials placed in or on the waters of the Commonwealth unless otherwise authorized. (The term "used asphalt" does not include milled asphalt or asphalt that has been processed for re-use).

G. Any placement of clean fill that has been affected by a spill or release of a regulated substance must use Form FP-001 to certify the origin of the fill materials and the results of the analytical testing to qualify the material as clean fill. Form FP-001 must be retained by the Developer.

H. Environmental due diligence must be performed to determine if the fill materials associated with the project qualify as clean fill. Environmental due diligence is defined as: investigative techniques, including but not limited to, visual property inspections, electronic database searches, review of property ownership, review of property use history, sanborn maps, environmental questionnaires, transaction screens, analytical testing, environmental assessments or audits. Analytical testing is not a required part of due diligence unless visual inspection and/or review of the past land use of the property indicates that the fill may have been subject o a spill or release of a regulated substance. If the fill may have been affected by a spill or release4 of a regulated substance, it must be tested to determine if it qualifies as clean fill. Testing should be performed in accordance with Appendix A of PA DEP's policy Management of Clean Fill.

3.03 STABILIZATION SPECIFICATIONS

A. Permanent stabilization is defined as a minimum uniform 70% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosions and subsurface characteristics sufficient to resist sliding and other movements.

B. Immediately after disturbance activities cease, the operator shall stabilize the disturbed areas. During non-germinating periods, mulch must be applied at the specified rates. Disturbed areas which are not at finished grade and which will be re-disturbed within 1 year must be stabilized in accordance with the temporary vegetative stabilization specifications. Disturbed areas which are at final grade or which will not be re-disturbed within 1 year must be stabilized in accordance with the permanent vegetative stabilization specifications.

C. An erosion control blanket will be installed on all disturbed slopes steeper than 3:1, all areas of concentrated flows, and disturbed areas within 50' of waters of the Commonwealth.

D. Straw and hay mulch should be anchored immediately after application to prevent being windblown. A tractor-drawn implement may be used to "crimp" the straw or hay into the soil. This method is limited to slopes no steeper than 3:1. The machinery should be operated on the contour. (Note: Crimping of hay or straw by running over it with tracked machinery is not recommended).

E. Asphalt, either emulsified or cut-back, containing no solvents or other diluting agents toxic to plant or animal life, uniformly applied at the rate of 31 gallons per 1000 sq. yd. may be used to tack mulch.

F. Synthetic Binders (chemical binders) may be used as recommended by the manufacturer to anchor mulch provided sufficient documentation is provided to show they are non-toxic to native plant and animal species.

G. Lightweight plastic, fiber, or paper nets may be stapled over the mulch according to manufacturer's recommendations.

H. Tracking slopes is required by running tracked machinery up and down the slope, leaving tread marks parallel to the contour. (Note: If a bulldozer is used, the blade shall be up.) Care should be exercised on soils having a high clay content to avoid over-compaction.

3.04 MAINTENANCE PROGRAM

A. Until the site is stabilized, all erosion and sediment control BMPs must be maintained properly. Maintenance must include inspections of all erosion and sediment control BMPs after each runoff event and on a weekly basis. All preventative and remedial maintenance work, including cleaning, repair, replacement, re-grading, reseeding, re-mulching and re-netting must be performed immediately. If erosion and sediment control BMPs fail to perform as expected, replacement BMPs or modifications of those installed will be required.

B. The permittee or co-permittee must ensure that visual site inspections are conducted weekly, and after each measurable precipitation event by qualified personnel, trained and experienced in

erosion and sediment control, to ascertain that Erosion and Sediment Control (E&S) BMPs are operational and effective in preventing pollution to the waters of the Commonwealth. A written report of each inspection shall be kept, and include:

1. A summary of the site conditions, E&S BMPs and compliance; and
2. The date, time, and the name of the person conducting the inspection.

C. Any sediment removed from BMPs during construction will be returned to the upland areas on site and incorporated into the site grading.

END OF SECTION

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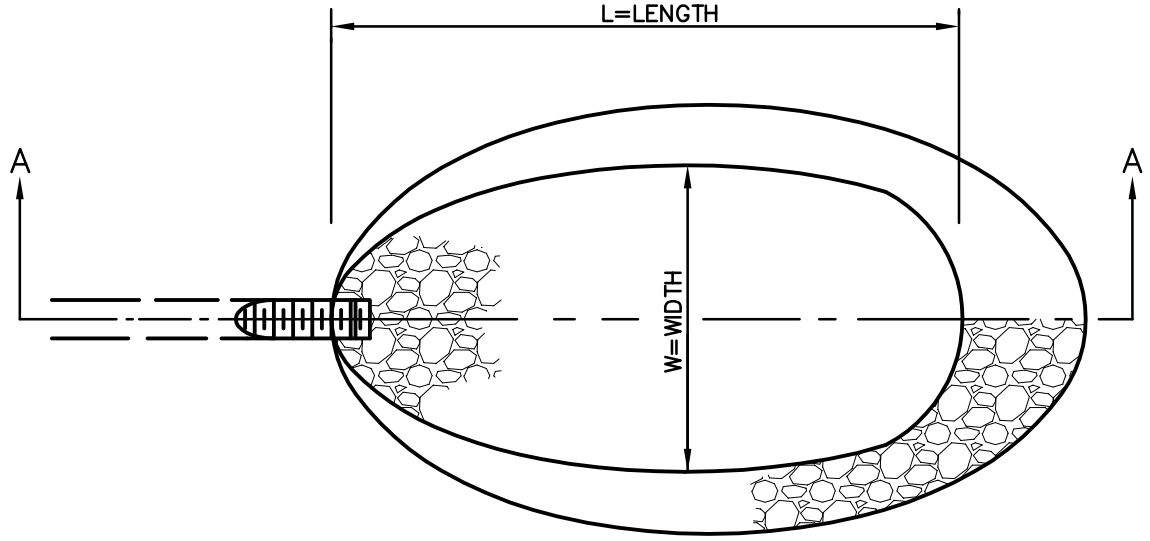
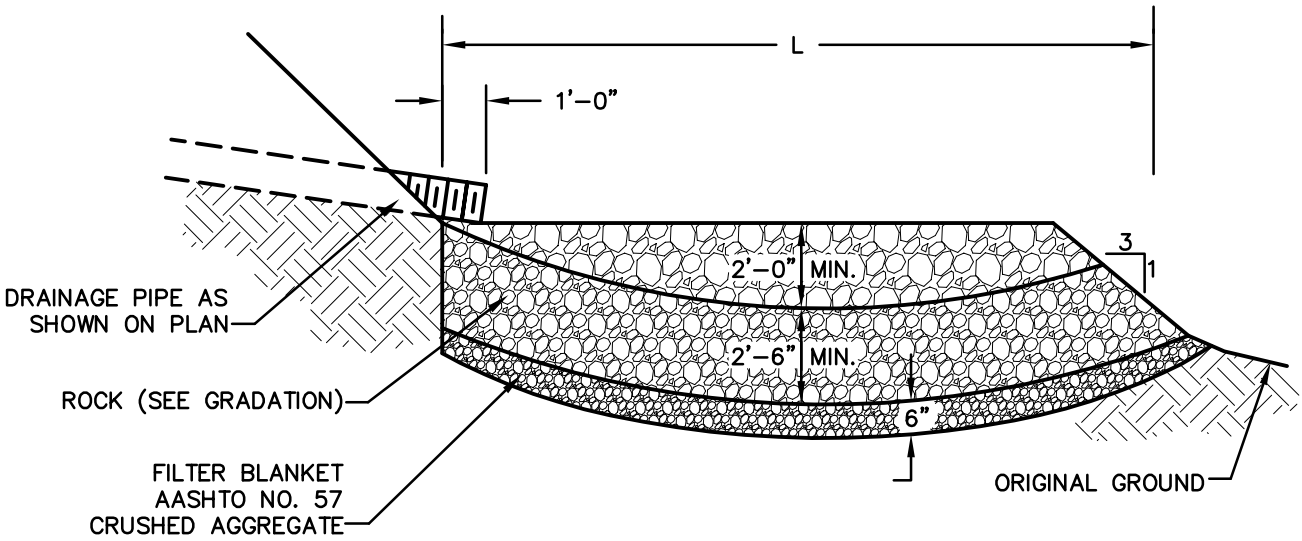


PLAN



SECTION A–A

ROCK GRADATION

ROCK SIZE	MAX. % OF TOTAL WEIGHT SMALLER THAN GIVEN SIZE
36"	100%
24"	50%
12"	10%

"L" AND "W" AS SHOWN ON DRAWINGS

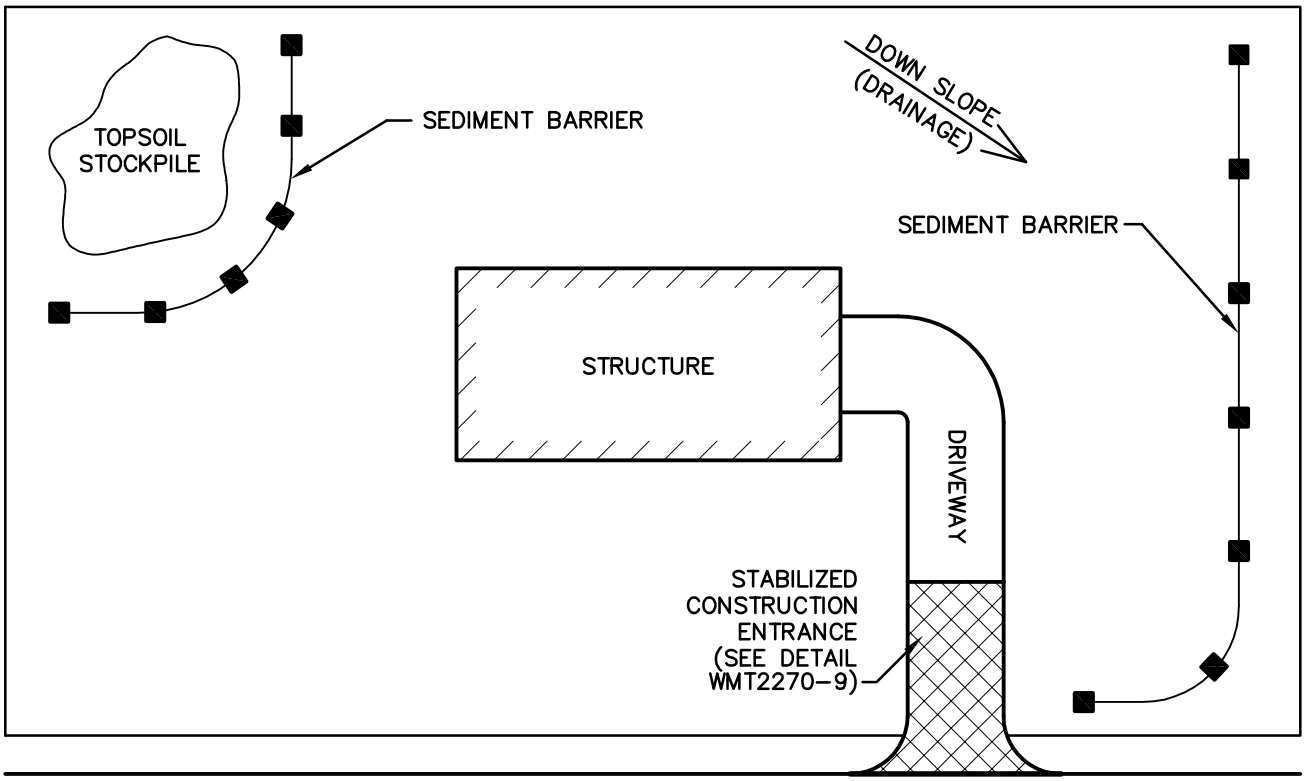
WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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

ROCK BASIN DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-1
FILE NO.	1204.9.02.00



TYPICAL CONSTRUCTION SEQUENCE

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE.
2. INSTALL ACCEPTABLE SEDIMENT BARRIERS ALONG THE DOWNSLOPE EDGE OF THE PROPERTY.
3. STRIP TOPSOIL AND STOCKPILE ON UPSLOPE PORTIONS OF THE AREA.
4. ROUGH GRADE THE AREA.
5. SEED AND MULCH ALL DISTURBED AREAS. TEMPORARY COVER SHALL BE ANNUAL RYE GRASS APPLIED AT A SEEDING RATE OF 10 POUNDS PER 1000 SQUARE YARDS.
6. INSPECT AND MAINTAIN EROSION AND SEDIMENTATION CONTROLS ON A REGULAR BASIS. EROSION AND SEDIMENTATION CONTROLS SHALL NOT BE REMOVED UNTIL THE DISTURBED AREAS ARE STABILIZED.
7. ENSURE ALL VEHICLES LEAVING THE SITE HAVE MUD REMOVED FROM TIRES AND UNDERCARRIAGES.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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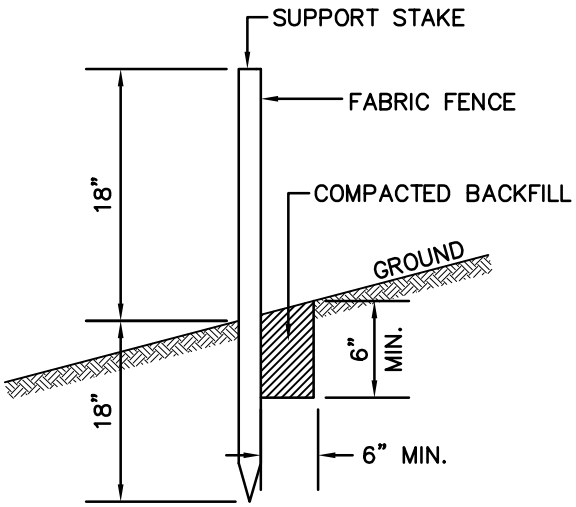
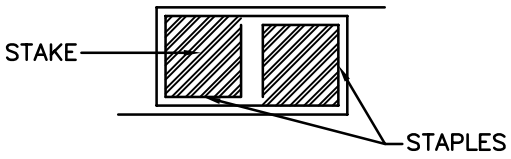
TYPICAL SOIL EROSION CONTROL FOR STRUCTURES

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

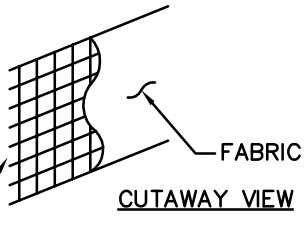
DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-2
FILE NO.	1204.9.02.00

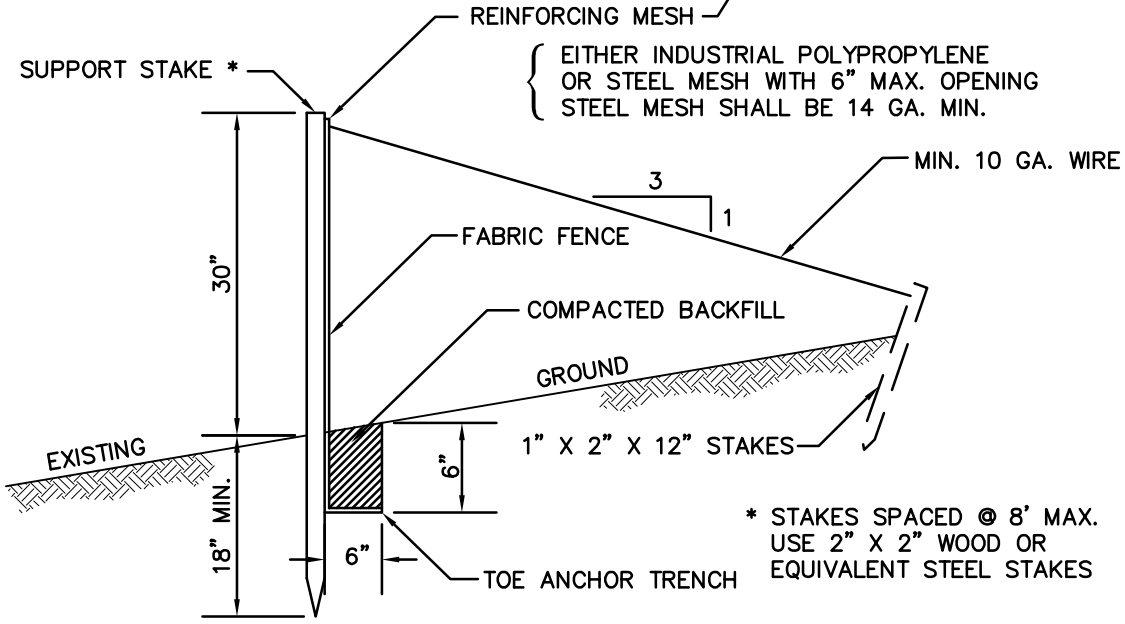


18" SILT FENCE DETAIL



JOINING FENCE SECTIONS





NOTES:

1. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE. BOTH ENDS OF EACH FENCE SECTION MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
2. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
3. ANY FENCE SECTION WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET. STANDARD DETAIL, 02270–5.

30" SILT FENCE DETAIL

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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SILT BARRIER FENCE DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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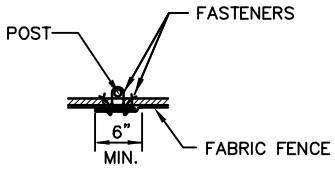
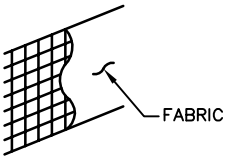
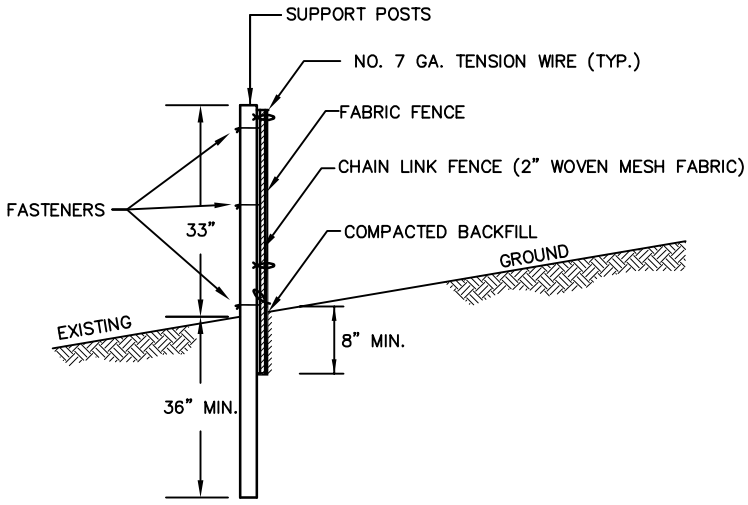
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-3
FILE NO.	1204.9.02.00



JOINING FENCE SECTIONS

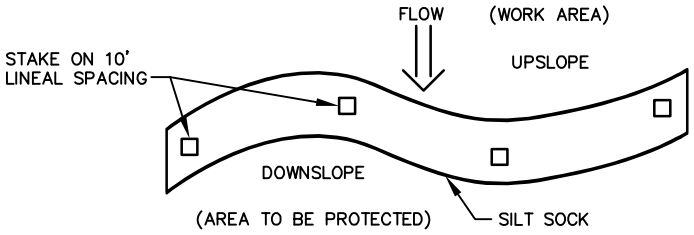


CUTAWAY VIEW

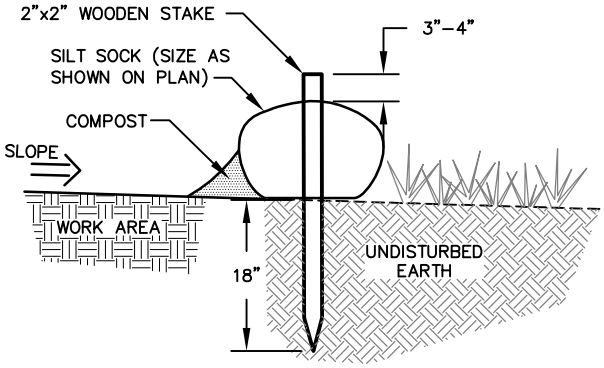


Notes:
1. Posts spaced @ 10' max. Use 2 1/2" dia. galvanized or aluminum posts. Chain Link to Post Fasteners spaced @ 14" max. Use No. 6 Ga. aluminum wire or No. 9 galvanized steel pre-formed clips.
2. Chain Link to Tension Wire Fasteners spaced @ 60" max. Use No. 10 Ga. galvanized steel wire. Fabric to Chain Fasteners spaced @ 24" max. C to C.
3. No. 7 Ga. Tension Wire installed horizontally at top and bottom of chain-link fence.
4. Filter Fabric Fence must be placed at existing level grade. Both ends of the barrier must be extended at least 8 feet upslope at 45 degrees to the main barrier alignment.
5. Sediment must be removed when accumulations reach 1/2 the above ground height of the fence.

SUPER FILTER FABRIC FENCE DETAIL



PLAN VIEW



SECTION VIEW

Notes:
1. Silt sock is to be installed on undisturbed ground.
2. The contractor shall maintain the compost silt sock in a functional condition at all times and it shall be routinely inspected.
3. Where silt sock requires repair, it will be routinely repaired.
4. The contractor shall remove sediments collected at the base of the silt sock when they reach 1/3 of the exposed height of the sock, or as directed by the engineer.
5. The compost silt sock will be dispersed on site when no longer required, as determined by the engineer.
6. In instances where silt sock installation is on ground sloped along the length of the sock, an eight (8) foot "turn out" shall be installed for every one vertical foot of elevation difference.
7. As site grading changes from existing to proposed conditions, it is the contractor's responsibility to relocate and/or replace the silt sock as required to ensure that the silt sock is parallel to site contours and all sediment laden water is prevented from leaving the site.
8. Sock size based on measured width after filled with material.

SILT SOCK DETAIL

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.
Excellence in Civil Engineering
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SUPER FILTER FABRIC FENCE AND SILT SOCK DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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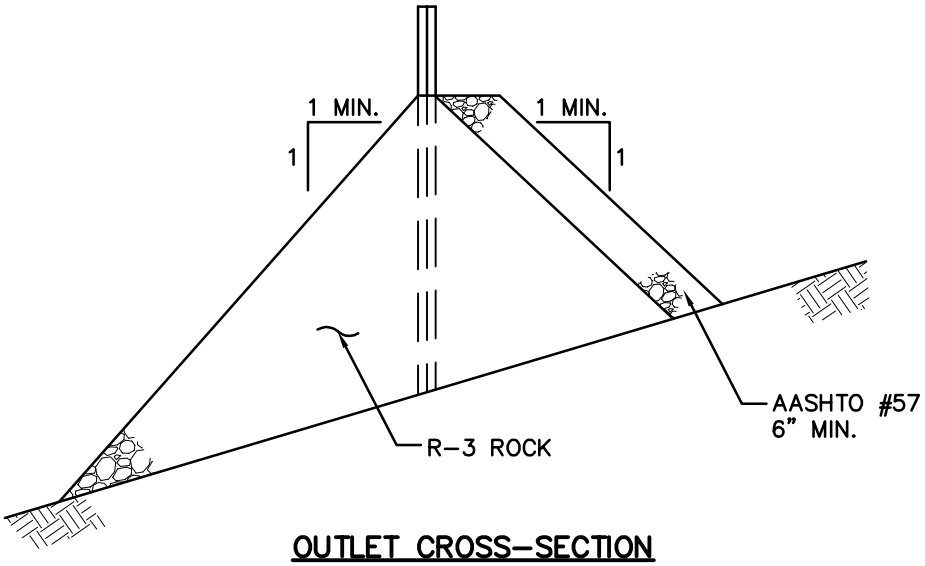
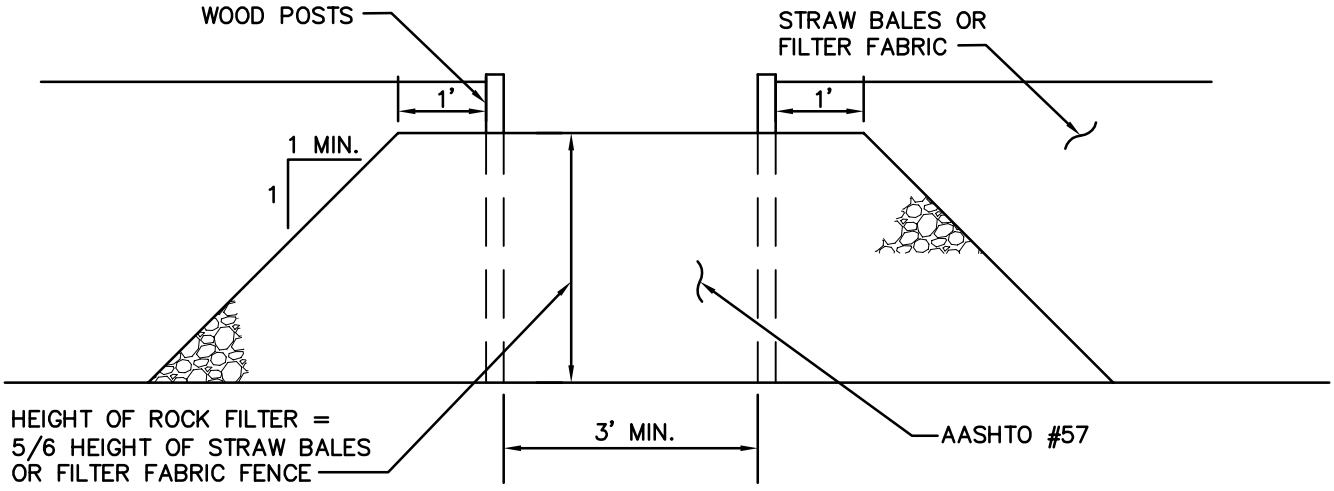
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-4
FILE NO.	1204.9.02.00



OUTLET CROSS-SECTION



UP-SLOPE FACE

Note:
Sediment shall be removed when accumulations reach 1/3 the height of the outlet.

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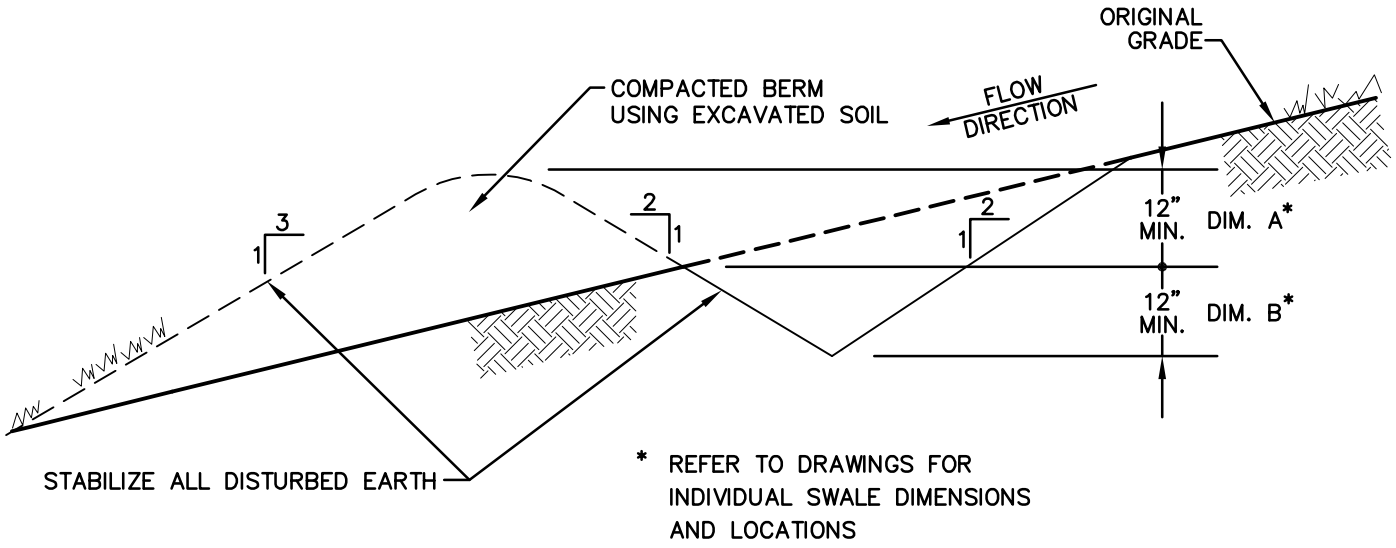
ROCK FILTER OUTLET

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-5
FILE NO.	1204.9.02.00



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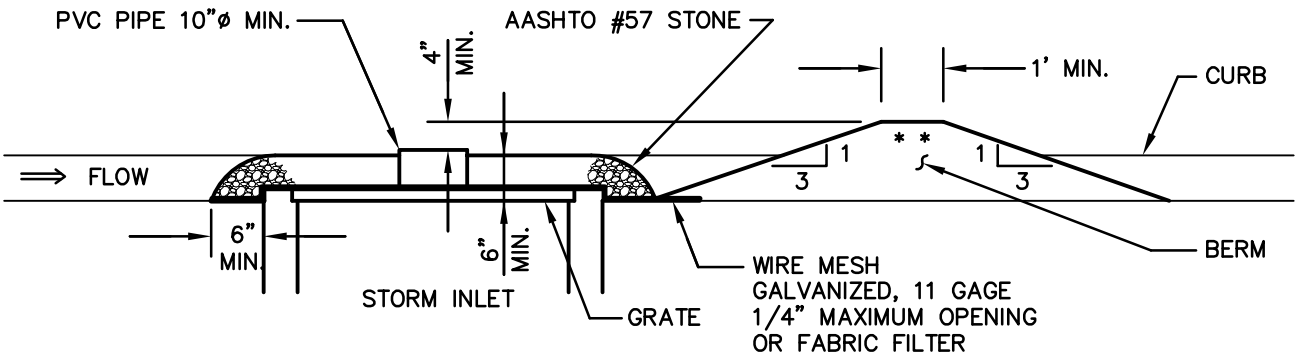
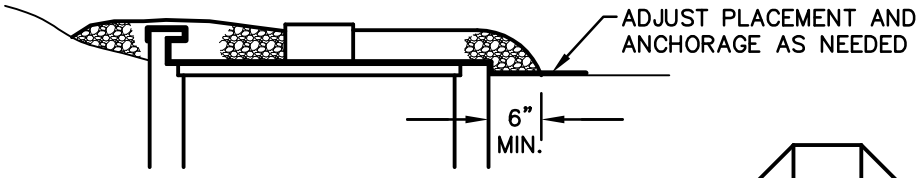
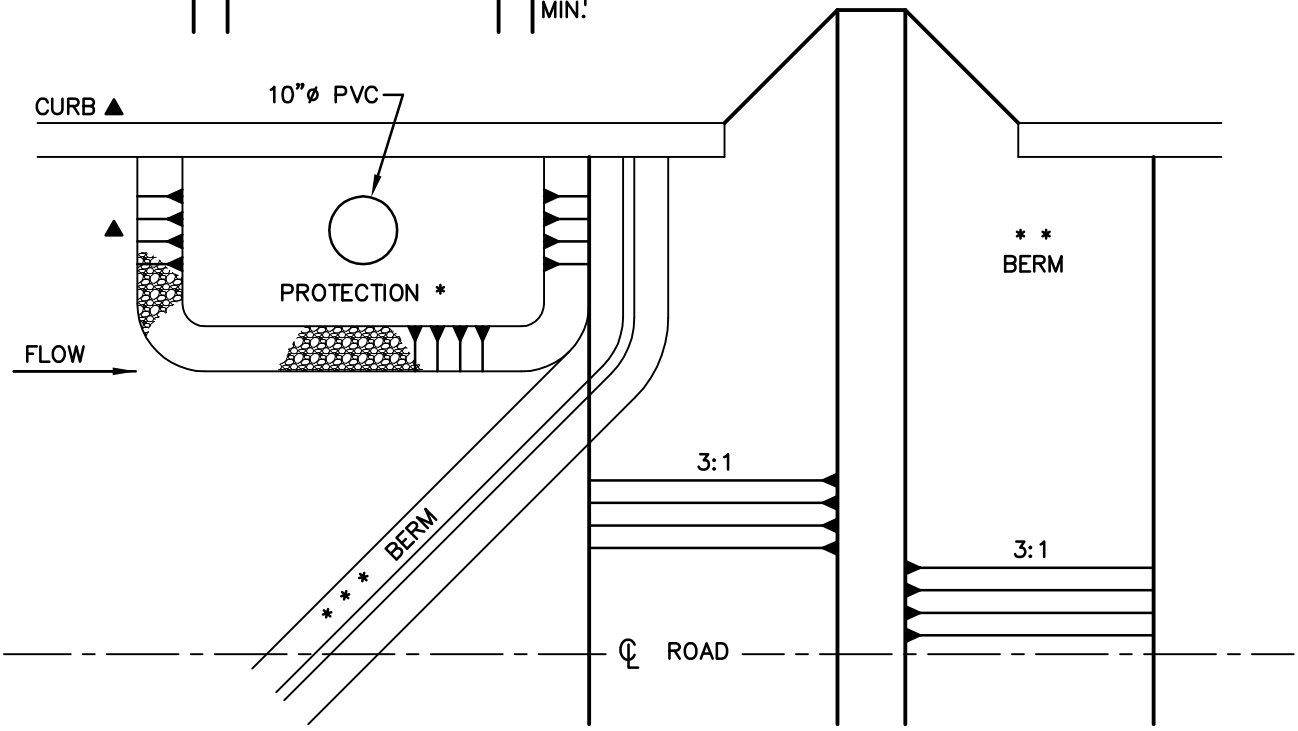
TEMPORARY DIVERSION SWALE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-6
FILE NO.	1204.9.02.00







NOTE– MAXIMUM DRAINAGE AREA = 1 ACRE.

* STONE PROTECTION IS NOT REQUIRED FOR INLETS TRIBUTARY TO SEDIMENTATION BASINS AND SEDIMENT TRAPS. BERMS ARE REQUIRED FOR ALL INSTALLATIONS.

* * EARTHEN BERM TO BE MAINTAINED UNTIL ROADWAY IS STONED. ROAD SUBBASE BERM TO BE MAINTAINED UNTIL ROADWAY IS PAVED.

* * * SIX INCH MINIMUM HEIGHT ASPHALT BERM TO BE MAINTAINED UNTIL ROADWAY SURFACE RECEIVES FINAL COAT.

▲ IF NOT CURBED, CONSTRUCT BERM ON ALL SIDES OF INLET.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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STORM INLET PROTECTION DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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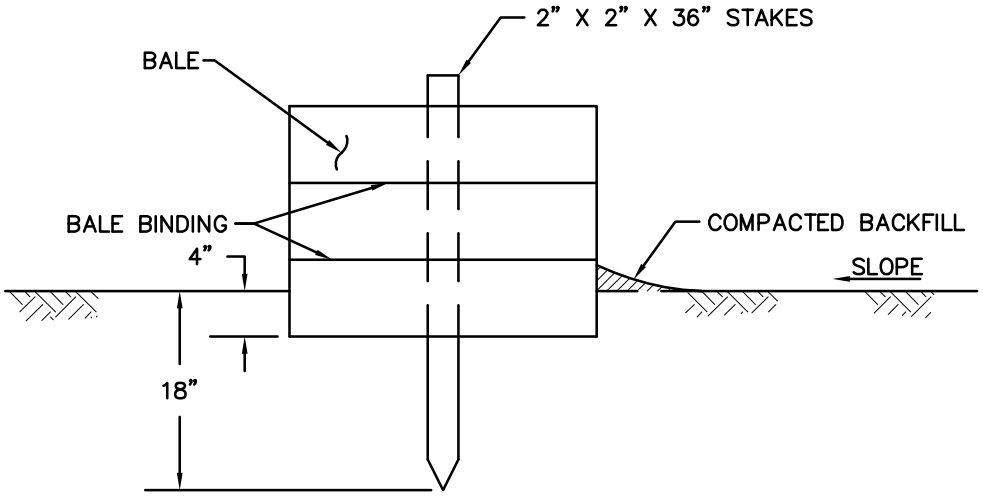
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-7
FILE NO.	1204.9.02.00



Notes:

1. Straw Bale Barriers shall not be used for more than 3 months.
2. Straw Bale Barriers shall be placed at existing level grade. Both ends of the barrier shall be extended at least 8 feet up slope at 45 degrees to the main barrier alignment.
3. Sediment shall be removed when accumulations reach 1/3 the above ground height of the barrier.
4. Any section of Straw Bale Barrier which has been undermined or topped shall be immediately replaced with a Rock Filter Outlet. See Standard Detail 02270–5.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.

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STRAW BALE BARRIER DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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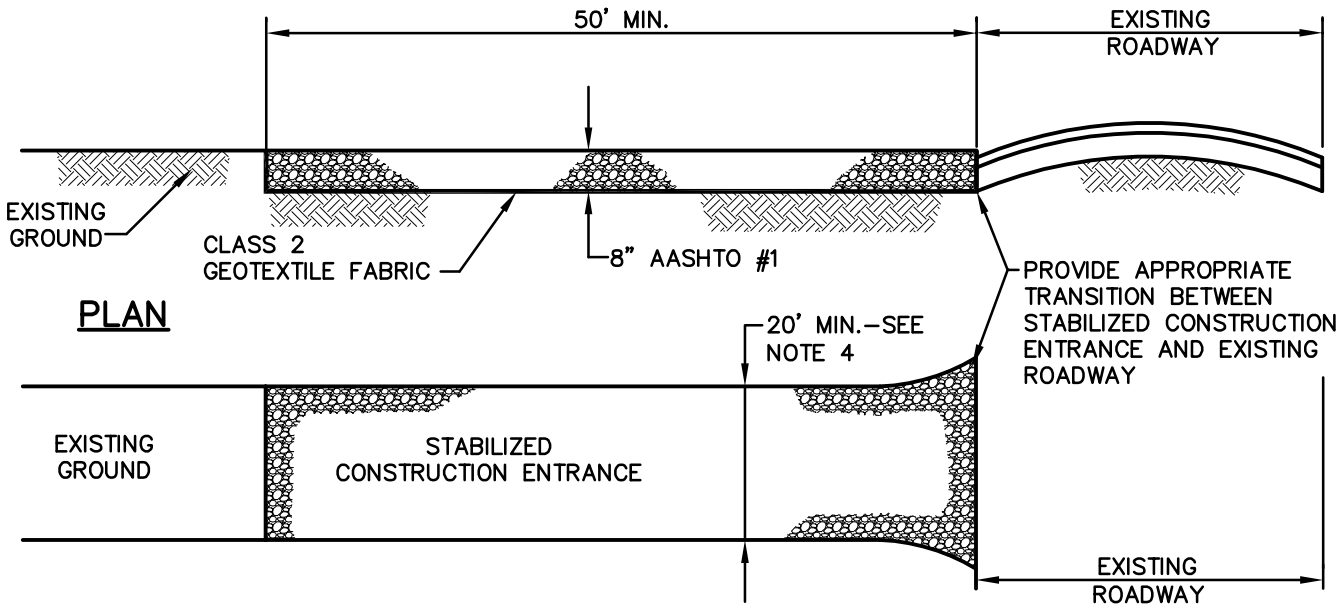
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-8
FILE NO.	1204.9.02.00

SECTION



PLAN

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – AASHTO #1.

2. LENGTH – AS REQUIRED TO BE EFFECTIVE, BUT NOT LESS THAN 50'.

3. THICKNESS – NOT LESS THAN 8".

4. WIDTH – FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, BUT NOT LESS THAN 20'.

5. WASHING – WHEELS SHALL BE CLEAN PRIOR TO ENTRANCE ONTO EXISTING ROADWAY. WHEN WASHING IS REQUIRED IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH, OR WATERCOURSE THROUGH USE OF SAND BAGS, GRAVEL, BOARDS, OR OTHER APPROVED METHODS.

6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO EXISTING ROADWAY, THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO EXISTING ROADWAYS MUST BE REMOVED IMMEDIATELY.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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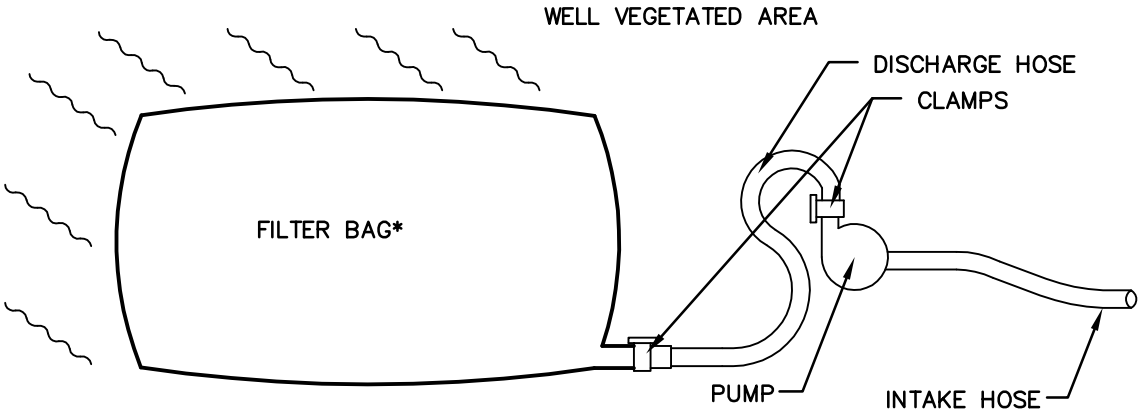
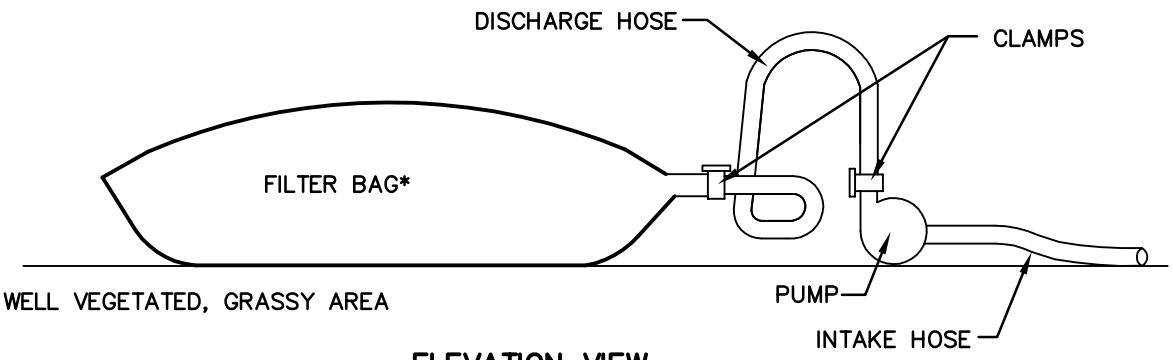
STABILIZED CONSTRUCTION ENTRANCE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-9
FILE NO.	1204.9.02.00



PLAN VIEW



ELEVATION VIEW

Notes:

1. Filter bags shall be made from non–woven geotextile material sewn with high stength, double stitched "J" type seams. They shall be capable of trapping particles larger than 150 microns.
2. A suitable means of accessing the bag with machinery required for disposal purposes must be provided. Filter bags shall be replaced when they become 1/2 full. Spare bags shall be kept available for replacement of those that have failed or are filled.
3. Bags shall be located in well–vegetated (grassy) area, and discharge onto stable, erosion resistant areas. Where this is not possible, a geotextile flow path shall be provided. Bags shall not be placed on slopes greater than 5%. The pump discharge hose shall be inserted into the bags in the manner specified by the manufacturer and securely clamped.
4. The pumping rate shall be no greater than 750 gpm or 1/2 the maximum specified by the manufacturer, whichever is less. Pump intakes should be floating and screened. Maximum pump size shall be a 6"ø pump.
5. Discharge from pump shall be located a minimum of 50 feet from any stream or stable water course. Discharge shall be onto gravel or stone bedding where possible, or a minimum of permanently stabilized grass.
6. Silt fence shall be placed downslope of discharge prior to reaching any stream or water course.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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PUMPED WATER FILTER BAG

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02270-10
FILE NO.	1204.9.02.00

SECTION 02444

CHAIN LINK FENCE

PART 1 GENERAL

1.01 DESCRIPTION

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

1. Chain link fencing
2. Gates: Size and Swing as required by the Township.
3. Fabric and fence coating

B. Related Work Specified Elsewhere:

1. Finish grading, seeding and sodding:	Section 02485
2. Plain and reinforced cement concrete:	Section 03000

C. Definitions: None

D. Applicable Standard Details: None

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

A53 – Pipe, steel, black & hot-dipped, zinc coated, welded and seamless
A121 – Zinc coated (galvanized) steel barbed wire
A123 – Zinc (hot dipped galvanized) coatings on iron and steel products
A392 – Zinc coated steel chain-link fence
F567 – Practice for installation of chain-link fence
F626 – Fence fittings
F668 – Poly (vinyl chloride) (PVC) – coated steel chain link fence fabric
F934 – Standard colors for polymer-coated steel chain fence materials
F1043 – Strength & protective coatings on metal industrial chain link fence framework
F1083 – Pipe, steel, hot-dipped zinc coated (galvanized) welded for fence structures

1.03 SUBMITTALS

A. Manufacturer’s catalogue cuts indicating material compliance.

B. Color selection chart for PVC coating.

C. Compliance Statement: Submit a statement of compliance from the material suppliers together supporting data attesting that the fencing materials meet or exceed specified requirements.

D. Shop drawings: Submit shop drawings of fence layout, including details of gates, fittings and hardware.

1.04 JOB CONDITIONS

A. Locate and protect existing utilities, as specified in Section 02210, Paragraph 1.04.C.

B. Exact location of fencing will be determined by the Developer, in consultation with the Township.

C. If fencing is proposed around the perimeter of storm water detention/retention basin, the Developer/Contractor shall submit details of fencing proposed and it must be approved by the Township prior to installation.

1.05 PRODUCTS DELIVERY, STORAGE AND HANDLING

A. During loading, transporting and unloading, exercise care to prevent damage to materials.

PART 2 PRODUCTS

2.01 CHAIN LINK FENCE FABRIC

A. Two inch diamond mesh of high quality medium carbon steel core wire, hot-dipped galvanized. Minimum tensile strength shall be 100,000 psi, 9 gage wire size.

B. PVC coating shall be thermally fused prior to weaving. Coating thickness 7 mils.

C. Wire shall be imprinted with identification of manufacturer or trade name, country of origin, gage and tensile strength of 12" intervals.

D. Twist and barb top selvage. Twist and knuckle bottom selvage.

2.02 POSTS

A. Line posts shall be 2-1/2" O.D. tubular steel pipe, weighing 3.65 lbs per lineal foot, or SS40.

B. End, corner, angle or pull posts shall be 3" O.D. tubular steel pipe, weighing 5.79 lbs per lineal foot, or SS40.

C. Gate posts shall be 4" O.D. tubular steel pipe, weighing 9.11 lbs per lineal foot, or SS40.

D. All posts shall be hot-dipped galvanized. Posts shall have thermally fused PVC coating if used with PVC coated fence fabric.

2.03 FRAMING AND BRACING

A. Top rail shall be 1-5/8" O.D. tubular steel pipe, weighing 2.27 lbs. per lineal foot, or SS40, hot-dipped galvanized.

B. Bracing ends (for fastening to posts) shall be formed steel.

C. Truss rods shall be steel rods with a minimum diameter of 3/8".

D. All framing shall be hot-dipped galvanized.

E. All framing shall have thermally fused PVC coating, if used with PVC coated fence fabric.

F. No bottom rail required.

2.04 CONCRETE BASES

A. Concrete Minimum 28 Day Compressive Strength of 3,000 PSI.

2.05 BARBED WIRE AND SUPPORTS

A. Barbed wire shall be galvanized steel double wire strands, twisted. 4 point barbs shall be spaced approximately 3" on center.

B. Barbed wire supports shall be 12 gage pressed steel or malleable iron set 45° (inward or outward) from posts. Supports shall withstand 250 lbs. downward pull at end without failure.

C. 3 rows bar bed wire shall be attached to supports.

2.06 HARDWARE AND ACCESSORIES

A. Top Rail Sleeves (for expansion and contraction of top rail) shall be 6" long.

B. Wire Ties - 9 gauge galvanized steel for line post attachment. Double wrap 13 gauge shall be used for attachments to rails and braces.

C. Nuts and Bolts shall be galvanized.

D. Post Caps shall be formed steel, cast malleable iron or aluminum alloy weather tight closure cap.

E. Tension Wire – 7 gauge core wire, galvanized, with tensile strength of 75,000 psi. Hog ring ties 12-1/2 gauge wire shall be used to tie fabric to tension wire.

F. Stretcher Bar – 3/16" x 2/4" steel bar or equivalent fiberglass rod. Length shall be 2" less than full height of fabric sheer fabric meets terminal posts.

2.07 SWING GATES

A. Gate frames shall be 2" O.D. tubular steel pipe weighing 2.72 lbs. per lineal foot, or SS40. Connections shall be welded to form rigid one-piece unit.

B. Provide horizontal center rail on gates over 6' high; vertical center upright on gate leaves over 8' wide.

C. Hinges shall be structurally capable of supporting gate leaf and allow 180° of movement without binding. Non-lift-off type hinge design.

D. Latch - Forked type capable of retaining gate in closed position and have provision for padlock.

E. Latch shall permit operation from either side of gate.

F. Keeper – Provide keeper for each leaf over 5' wide. Keeper shall secure free end of gate when fully open until manually released.

G. For double leaf gates, provide drop rod to hold inactive lead and gate stop pipe to engage center drop rod.

H. Padlock – Provide one padlock to lock both gate leaves with 3 keys. Lock shall conform to Federal Specification FF-P- 10 lb Type EPA with chain.

I. Gate posts shall have heavy ornamental caps.

PART 3 EXECUTION

3.01 GENERAL

A. Ensure property lines and legal boundaries of work are clearly established.

B. Grade areas to receive fencing to eliminate surface irregularities to maintain required clearance.

C. Measure and layout complete fence line; measure parallel to surface of ground.

3.02 POSTS

A. Place terminal post at each fence termination and change in horizontal or vertical direction of 30˚ or more. Space line posts at equidistant spaces, minimum 8', and 10' maximum on centers.

B. Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post (or as shown on Drawings) and depth approximately 6" deeper than bottom of post (42" minimum depth). Excavate deeper as required for adequate support in soft or loose soils and for posts with heavy lateral loads.

C. Place concrete around posts in a continuous pour. Top of concrete shall be 2"-3" below surrounding grade and sloped to direct water away from posts. Maintain position of post (vertically and horizontally) during placement operations.

3.03 BRACING

A. Install horizontal brace at mid-height for fences 6 feet and higher on each side of terminal posts. Install diagonal truss rods, at same posts, adjusting to ensure posts remain plumb.

B. Connect top rails with sleeves. Install bottom rails, if required.

C. Install tension wire at bottom of fabric before stretching fabric and attach at each post with ties.

D. Touch up hardware and accessories with PVC touch up paint provided by manufacturer, as needed.

3.04 FABRIC

A. Attach fence fabric so that fabric remains in tension after pulling force is released. Allow 2" clean space between finished ground and bottom selvage.

B. Attach fabric to bracing, rails and line posts with wire ties $\pm$ 15" on center. Attach fabric to tension wire, if any, with hog ties at 24" on center.

C. Bend ends of wire ties to minimize hazard to persons.

D. Thread tension bar through taut fabric and attach bar to terminal posts with bands or clips spaced at 15".

3.05 BARBED WIRE

A. Uniformly space strands of barbed wire on the support arms. Each strand shall be pulled taut and securely fastened by clips or in slots of each support.

3.06 SWING GATES

A. Set posts in concrete, as specified in above Paragraph 3.02 and attach fabric, as specified in Paragraph 3.04. Locate and place gate stops so that drop rod fully engages.

B. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation of gate leaves.

C. Touch up hardware, as needed, with PVC touch up paint provided by manufacturer to match adjacent finish.

3.07 CLEAN UP

A. Clean up debris and unused material and remove from the site.

END OF SECTION

SECTION 02485

FINISH GRADING, SEEDING, AND SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Placing topsoil
2. Soil conditioning
3. Finish grading
4. Seeding
5. Sodding
6. Mulching
7. Maintenance

B. Related work specified elsewhere:

1. Clearing and grubbing:	Section 02100
2. Excavation for Structures	Section 02220
3. Trenching, backfilling & compacting	Section 02221

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation Publication 408, Specifications. Latest revision.

2. Pennsylvania Seed Act of 1965, Act 187, as amended.

3. Agricultural Liming Materials Act of 1978, P.L.15, No. 9 (3P.S.132-1), as amended.

4. Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86 (3P.S.68.2), as amended.

5. Rules for Testing Seeds of the Association of Official Seed Analysts.

6. Federal and State pesticide acts and registration requirements.

7. American Association of State Highway and Transportation Official (AASHTO):

T194 Determination of Organic Matter in Soils by Wet Combustion.

8. Pennsylvania Department of Agriculture

B. Sod Producer - Company specializing in sod production and harvesting with a minimum five (5) years of experience.

C. Sod Installer - Company specializing in performing this work with a minimum five (5) years experience.

1.03 SUBMITTALS

A. Samples:

1. Unless otherwise directed, furnish three strips of sod, 4-1/2 feet long by 12" wide, laid on 3" of topsoil and tamped in placed. The samples shall be representative of the sod and workmanship to be provided. Include sod source location.

2. Advise the Township of the location of the field, and area within the field, from which the sod is to be taken for approval.

B. Certificates:

1. Prior to use or placement of material, submit a Statement of Compliance from the materials suppliers, together with supporting data, attesting that the composition of the following products meets specification requirements.

a. Topsoil analysis

b. Fertilizer

c. Lime

d. Seed mixture(s)

e. Inoculant

f. Sod

2. If soil tests are performed to justify decreased liming and fertilizer rates, submit certified soil sample analyses, including laboratory's recommended soil supplement formulation.

1.04 JOB CONDITIONS – Section not utilized

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Having a pH of between 6.0 and 7.0; containing not less than 2% nor more than 10% organic matter as determined by AASHTO T194.

B. Fertile friable loam, sand loam, or clay loam which will hold a ball when squeezed with the hand, but which will crumble shortly after being released.

C. Free of clods, grass, roots, or other debris harmful to plant growth.

D. Free of pests, pest larvae, and matter toxic to plants.

2.02 FERTILIZER

A. Basic Dry Formulation Fertilizer:

1. Analysis 10-20-20 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

B. Starter Fertilizer:

1. Analysis 38-0-0 or 31-0-0 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

2.03 LIME

A. Raw ground limestone conforming to Publication 408, Section 804.2(a).

2.04 SEED

A. Fresh, clean, dated material from the last available crop and within the date period specified, with a date of test not more than 9 months prior to the date of sowing. Percentage of pure seed present shall represent freedom from inert matter and from other seeds distinguishable by their appearance. All seeds will be subject to analysis and testing.

B. Deliver seed fully tagged and in separate packages according to species or seed mix. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

TABLE 1 - GRASS AND AGRICULTURAL SEEDS			
Species	Minimum Guaranteed Purity (Percent)	Maximum Weed Seed (Percent)	Minimum Guaranteed Germination
Kentucky Bluegrass (Poapratensis) Domestic origin; min. twenty-one pounds per bushel	98	0.2	80
Perennial Ryegrass (Lolium perenne, var. Pennfine)	98	0.15	90
Kentucky 31 Fescue (Festuca elatior arundinacea)	98	0.15	85
Crownvetch (Coronilla varia, var. Penngift)	99	0.1	65
Pennlawn Red Fescue (Festuca rubra, var. Pennlawn)	98	0.15	85
Annual Rye Grass (Lolium multiflorum)	95	0.15	90
Timothy (Phleum pratense)	98	0.25	85

2.05 SEED MIXTURES

A. See “Seeding Restoration Table” at end of this Section

2.06 INOCULANT

A. Inoculate leguminous seed before seeding with nitrogen fixing bacteria culture prepared specifically for the species.

B. Do not use inoculant later than the date indicated by the manufacturer.

C. Protect inoculated seed from prolonged exposure to sunlight prior to sowing.

D. Reinoculate seed not sown within 24 hours following initial inoculation.

2.07 MULCHING MATERIALS

A. Mulches for seeded areas shall be one, or a combination of, the following:

1. Straw:

a. Cured to less than 20% moisture content by weight.
b. Contain no stems of tobacco, soybeans, or other coarse or woody material free of mature seed bearing stalks or roots of prohibited or noxious weeds.
c. Wheat or oat straw.

2. Wood Cellulose:

a. No growth or germination inhibiting substances.
b. Green, air dried. Packages not exceeding 100 pounds.
c. Requirements:

Moisture content: 12%±3%
Organic Matter: 98.6%±0.2% on the oven dried basis.
Ash Content: 1.4%±0.2%
Minimum Water-Holding Capacity: 1,000%

3. Mushroom Manure:

a. Organic origin, free of foreign material larger than 2" and substances toxic to plant growth.
b. Organic Matter: 20% minimum
c. Water-Holding Capacity: 120% minimum
d. pH: 6.0

B. Sewage sludge compost is not permitted.

2.08 SOD

A. Well-rooted Kentucky Bluegrass (Poa pratensis) sod containing a growth of not more than 10% of other grasses and clovers.

B. Free from noxious weeds such as bermuda grass, wild mustard, crab grass, and kindred grasses.

C. Mow sod in the field to a height of not more than 2-1/2" within 5 days prior to lifting.

D. Cut sod to a depth equal to the growth of the fibrous roots, but in no case less than 1-1/2", exclusive of grass and thatch. Do not cut sod when the ground temperature is below 32°F.

E. Deliver sod to the project site within 24 hours after being cut and place sod within 36 hours after being cut. Do not deliver small, irregular, or broken pieces of sod. Do not deliver more sod than can be laid within 24 hours.

F. During wet weather, allow sod to dry sufficiently to prevent tearing during handling and placing. During dry weather, moisten sod to ensure its vitality and to prevent dropping of the soil during handling. Sod which dries out will be rejected.

2.09 EROSION CONTROL NETTING

A. Biodegradable netting and paper soil stabilization material.

PART 3 - EXECUTION

3.01 TIME OF OPERATIONS

A. Spring Seeding:

1. Preliminary operations for seed bed preparation may commence as soon after February 15 as ground conditions permit.

B. Fall Seeding:

1. Preliminary operations for seed bed preparation may commence after July 15.

3.02 FINISH GRADING

A. Preparation of Subgrade:

1. "Hard pan" or heavy shale:

a. Plow to a minimum depth of 6".
b. Loosen and grade by harrowing, discing, or dragging.
c. Hand rake subgrade. Remove rocks over 2" in diameter and other debris.

2. Loose loam, sandy loam, or light clay:

a. Loosen and grade by harrowing, discing, or dragging.
b . Hand rake subgrade. Remove rocks over 2" in diameter and other debris.

B. Placing Topsoil:

1. Place topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Compact with a roller having not more than 65 pounds per roller foot width to a final compacted thickness of not less than 4".

2. Handrake topsoil and remove all materials unsuitable or harmful to plant growth.

3. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry.

4. Do not handle topsoil when frozen or muddy.

C. Tillage:

1. After seed bed areas have been brought to proper compacted elevation, thoroughly loosen to a minimum depth of 4" by discing, harrowing, or other approved methods. Do not work topsoiled areas when frozen or excessively wet.

2. Liming:

   a. Distribute lime uniformly at the specified rates.
   b. Thoroughly incorporate into the topsoil to a depth of 4".
   c. Incorporate as a part of the tillage operation.

3. Basic Fertilizer:

   a. Distribute basic fertilizer uniformly at the specified rate.
   b. Thoroughly incorporate into the topsoil to a depth of 4".
   c. Incorporate as a part of tillage operation.

D. Finish Grading:

1. Remove unsuitable material larger than ½" in any dimension.

2. Uniformly grade surface to the required contours without the formation of water pockets.

3. Rework areas which puddle by the addition of topsoil and fertilizer and rerake.

3.03 SEEDING

A. Distribute starter fertilizer at the specified rates.

B. Incorporate starter fertilizer into the upper 1" of soil.

C. Uniformly sow specified seed mix by use of approved hydraulic seeder, power-drawn drill, power-operated seeder, or hand-operated seeder. Do not seed when winds are over 15 mph.

D. Upon completion of sowing, cover seed to an average depth of 1/4" by hand reraking or approved mechanical methods.

E. Mulch immediately after seeding, using one of the following methods:

1. Place straw mulch in a continuous blanket at a minimum rate of 1,200 pounds per 1,000 square yards.

   a. Anchor straw mulch by use of twine, stakes, wire staples, paper, or plastic nets.

   b. Emulsified asphalt may be used for anchorage provided it is applied uniformly at a rate not less than 31 gallons per 1,000 square yards.

c. Chemical mulch binders may be used for anchorage if they are applied uniformly at the manufacturer's recommended rate.

d. Chemical mulch binders or a light covering of topsoil may be used for anchorage when the size of the area precludes the use of mechanical equipment.

2. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 square yards. Incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.

3. Spread mushroom manure uniformly to a minimum depth of ½" or to the depth indicated on the drawings.

F. When mulch is applied to grass areas by blowing equipment, the use of cutters in the equipment will be permitted to the extent that a minimum of 95% the mulch is 6" or more in length. For cut mulches applied by the blowing method, achieve a loose depth in place of not less than 2".

G. When mulching by the asphalt mix method, apply the mulch by blowing. Spray the asphalt binder material into the mulch as it leaves the blower. Apply the binder to the mulch in the proportion of 1.5 to 2.0 gallons per 45 pounds of mulch.

1. Protect structures, pavements, curbs, and walls to prevent asphalt staining.

2. Erect warning signs and barricades at intervals of 50 feet or less along the perimeter of the mulched area.

3. Do not spray asphalt and chemical mulch binders onto any area within 100 feet of a stream or other body of water.

3.04 SODDING

A. Prior to sod placement, complete finish grading and moisten prepared surface to receive sod.

B. Do not place sod when the temperature is lower than 32°F.

C. Place sod by hand with tight joints and no overlap. Transverse joints shall be broken or staggered.

D. Place sod so that the top of the sod is flush with the surrounding grade.

E. Use of tools which damage the sod or dumping of sod from vehicles will not be permitted.

F. Water sod to the saturation point immediately after placement.

G. After watering, tamp with an approved tamper to close all joints and insure close contact between sod and sod bed. After tamping, the sod shall present a smooth, even surface free from bumps and depressions. If so directed, use a light roller, weighing not more than 65

pounds per foot of roller width to complete firming and smoothing the sod.

H. When placing sod in ditches, place the strip with the long dimension at right angles to the flow of water. At any point where water will start flowing over a sodded area, the upper edge of the sod strips shall be turned into the soil below the adjacent area and a layer of compacted earth placed over this juncture to conduct the water over the edge of the sod.

I. In ditches and on slope areas, stake each strip of sod securely with at least 1 wood stake for each 2 square feet of sod. Stakes shall be ½" by 1" with a length of 8" to 12". Drive stakes flush with the top of the sod, with the long face parallel to the slope contour.

3.05 MAINTENANCE

A. Maintenance includes watering, weeding, cleanup, edging and repair of depressions, washouts or gullies.

B. Those areas which do not show a prompt catch of grass within 14 days of seeding or sodding shall be reseeded or resodded until complete grass catch occurs.

C. Maintain sodded areas for 3 months from date of substantial completion, mow to maintain maximum height of 2-1/2” or as specified on Drawings.

SEEDING RESTORATION TABLE

RESTORATION CONDITION	TOPSOIL	LIME*	BASIC FERTILIZER	START FERTILIZER	SEED MIX & SOWING RATE (% BY WEIGHT)
Temporary Cover (PaDOT E)	N/A	N/A	N/A	N/A	100% Annual Ryegrass Sow 10#per 1,000 sq. Yds. March 15 through October 15
Roadside; Non-mowed (PaDOT D)	Yes	800#per 1000 Sq. Yds.	10-20-20 @ 140# per 1000 Sq. Yds.	38-0-0@ 50# per 1000 Sq. Yds. or 31-0-0@ 61# per 1000 Sq. Yds.	70% Tall Fescue 30% Pennlawn Red Fescue Sow 21# per 1000 Sq. Yds.
Roadside; Mowed (PaDOT B)	Yes	800# per 1000 Sq. Yds.	10-20-20 @ 140# Per 1000 Sq. Yds.	38-0-0 @ 50# per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass
Bank Areas (PaDOT C)	Yes	800# per 1000 Sq. Yds.	No	38-0-0 @ 50# per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq. Yds.	45% Crownvetch 55% Annual Ryegrass Sow 9# per 1000 Sq. Yds. Anytime except Sept and Oct.
Lawns (PaDOT B)	Yes	800# per 1000 Sq. Yds.	10-20-20 @ 140# Per 1000 Sq. Yds.	38-0-0 @ 50#per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq. Yds.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass Mar. 15 through May/June through Oct 15
Open Fields; Non-Cultivated, Pasture	No No	No No	No	38-0-0 @ 50# per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq. Yds.	100% Timothy Sow 10# per 1000 Sq. Yds. Mar. through May/Aug. Through Sept.

*Unless lesser rate indicate by soils tests Revised 2/1/96

SEEDING RESTORATION TABLE

RESTORATION CONDITION	TOPSOIL	LIME*	BASIC FERTILIZER	START FERTILIZER	SEED MIX & SOWING RATE (% BY WEIGHT)
Open Fields; Cultivated	No	No	No	38-0-0 @ 50# per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq. Yds.	100% Annual Ryegrass Sow 10# per 1,000 Sq. Yds. March 15 through Oct. 15
Roadside;	Yes	800# per 1000 Sq. Yds.	10-20-20 @ 140# per 1000 Sq. Yds.	N/A	N/A
Woods; Sparse	No	No	10-20-20 @ 140# per 100 Sq. Yds.	38-0-0@ 50# per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq. Yds.	100% Red Fescue Sow 36" per 1000 Sq. Yds. Mar 15 thru May/Aug. thru October 15
Sodding	Yes	800# per 1000 Sq. Yds.	10-20-20 @ 140# per 1000 Sq. Yds.	N/A	N/A
Basin Channels	Yes	No	10-20-20 @ 140# per 100 Sq. Yds.	38-0-0@ 50# per 1000 Sq. Yds. or 31-0-0 @ 61# per 1000 Sq. Yds.	50% Tall Fescue, 25% Rough Bluegrass, 15% Reed Canary Grass, 10% Red Top

*Unless lesser rate is indicated by soils test

END OF SECTION

SECTION 02500

BITUMINOUS PAVING AND SURFACING

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Surface preparation
2. Bituminous concrete base course construction.
3. Placement and compaction of bituminous binder and wearing surface.
4. Placement of bituminous seal coat and surface treatment.
5. Placement of street signs and pavement markings.

B. Related work specified elsewhere:

1. Clearing and grubbing:	Section 02100
2. Site excavation and placement of fill material:	Section 02210
3. Roadway excavation, fill, and compaction:	Section 02230
4. Trench paving and restoration:	Section 02575

C. Definitions: NONE

D. Applicable Standard Details:

02500-1	Typical Street Cross Section
02500-2	Typical Paving Section
02500-3	Typical Paving Section, Parking Lot
02500-4	Typical Bituminous Pavement Restoration
02500-5	Typical Paving Notch Detail
02500-6	Bituminous Walk Section Detail
02500-7	Grass Paver Detail

1. The “Backfill and Surface Restoration Requirements” table in Section 02575 lists the specific paving requirements.

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications
Regulations Governing Occupation of Highways by Utilities (67 PA Code, Chapter 459)
Publication 213, Temporary Traffic Control Guidelines.
Publication 27, Specification for Bituminous Mixtures (Bulletin 27)

Publication 37, Specification for Bituminous Materials (Bulletin 25)

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

   D2950 Density of Bituminous Concrete in Place by Nuclear Method.

B. Qualifications

1. Contractor shall have a minimum five (5) years experience performing the work and shall be Pre-Qualified by PennDOT.

2. Contractors that are not PennDOT Pre-Qualified may complete the work only after approval from the Township.

C. Inspections:

1. Inspection by the Township will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

1.03 SUBMITTALS

A. Certification:

1. Submit certification from bituminous and aggregate suppliers attesting that materials conform to Publication 408, Specifications.

2. Submit bituminous concrete mix design for approval.

3. Provide PennDOT certification (PennDOT CS-4171) with each load delivered to the job site.

1.04 JOB CONDITIONS

A. Control of Traffic:

1. Take measures to control traffic during paving operations. Do not allow traffic on newly paved areas until adequate stability and adhesion have been attained and the material has cooled to 140^{o} F or less.

2. Employ traffic control measures in accordance with Publication 213 “Temporary Traffic Control Guidelines,” or latest revision.

3. The Township and all appropriate emergency services/police, fire, ambulance and schools shall be notified by the CONTRACTOR a minimum of 72 hours in advance for any temporary lane closure.

B. Protection of Adjacent Areas:

1. Restore existing surface outside the limits of the work, that has been damaged by the CONTRACTOR's operations, to its original condition at the expense of CONTRACTOR.

2. Reasonable access must be maintained for adjacent property owners and commercial properties.

C. Weather Limitations:

1. Place bituminous paving mixtures in accordance with the weather limitations of PennDOT Publication 408.

PART 2 - PRODUCTS

2.01 BITUMINOUS MATERIALS AND AGGREGATES

A. All bituminous materials and aggregates used in base course construction, paving, and resurfacing are designated in these specifications by, and shall conform to, the applicable portions of the Publication 408 Specifications. The coarse aggregate used in bituminous wearing surfaces or the fine aggregate in the case of FJ-1Wearing surfaces, shall have the following aggregate Skid Resistance Level (SRL) letter designation based on the current Average Daily Traffic (ADT) for resurfacing or anticipated initial daily traffic on new facilities:

ADT	SRL	ALTERNATIVES
20,000 and Above	E	None
5,000 to 20,000	H	E,H, Blend of E and M, Blend of E and G
3,000 to 5,000	G	E, H, G, Blend of H and M, Blend of E and L
1,000 to 3,000	M	E, H, G, M, Blend of H and L Blend of G and L, Blend of E and L
1,000 to Below	L	Any

Note: All blends are 50% by mass and shall be accomplished by an approved method.

B. All Superpave asphalt mixtures shall conform to applicable portions of Publication 408 Specifications. Aggregate shall be provided by approved sources and have the SRL designation as specified above. Mixture shall have the specified Petroleum Grade (PG) as indicated on Contract Drawings. If no PG is indicated, the bituminous mixture shall be PG 64-22.

2.02 STREET SIGNS, POSTS, AND BRACKETS

A. All street signs, posts and brackets shall conform to PennDOT Publication 111M "Pavement Markings and Signing Standards" and the Pennsylvania Manual of Uniform Traffic Control Devices (MUTCD).

2.03 PAVEMENT MARKINGS

A. See Section 02760.

2.04 ALTERNATIVE PARKING SURFACE

A. Grasspave^2 as manufactured by Invisible Structures, Inc., 1600 Jackson Street, Suite 301, Golden, Colorado, 80401 or approved equal.

B. Other alternative parking surfaces may be used only after written approval from the Township.

PART 3 - EXECUTION

3.01 BASE COURSES

A. Bituminous Concrete Base Course - Where indicated on the Contract Drawings and/or shown in the "Backfill and Surface Restoration Requirements" Table, construct bituminous concrete base course to compacted depth in accordance with Publication 408 Specifications, Section 305. Proof roll base course to satisfaction of the Township. Township shall approve, crushed aggregate base course prior to placement of Superpave Base Course.

B. Superpave Asphalt - Where indicated on the Contract Drawings, construct HMA Base Course to compacted depth in accordance with Publication 408, Section 309.

C. Bituminous paver shall be self propelled with activated screed and shall have a minimum paving width of 18'. All exceptions to must be approved by the Township.

3.02 PREPARATION OF EXISTING PAVEMENT SURFACE

A. Clean street surface of all dust, debris, loose stone, earth, or other deleterious material by means of hand brooms or approved power brooms and dispose of properly.

B. Scarify areas shown on drawings. Where the existing base is judged inadequate by the Township, construct new base of the required type as specified in the "Backfill and Surface Restoration Requirements" Table in Section 02575.

C. Seal all cracks in accordance with Publication 408 Specifications. With Township approval, cracks may be filled with PG 64-22.

D. Patch holes and depressions greater than one inch and less than four inches with Superpave HMA 19 mm binder material, compacted in layers not exceeding two inches after compaction.

E. Holes greater than four inches in depth shall be sawed back to sound pavement, and patched with a minimum of six inches of crushed aggregate base course and two inches of Superpave HMA 19mm binder material.

F. When required by the "Backfill and Surface Restoration Requirements" Table, apply tack coat in accordance with Publication 408 Specifications, Section 460.

G. Milling of existing bituminous pavement shall be in accordance with Publication 408, Section 491, to depth and limits specified in the drawings

1. Saw cut all edges at intersections with streets and driveways and at the limits of work.

2. All milled surfaces shall be swept completely. Millings will become the property of the CONTRACTOR and must be disposed of properly.

3. Supply all water as needed.

4. CONTRACTOR shall provide transitions from milled surfaces to non-milled surfaces to allow vehicular traffic during non-working hours.

H. Construct scratch or leveling courses as directed by the Township.

I. Proof roll subgrade before base course placement. If precipitation occurs, then subgrade must be proof rolled again prior to bituminous material placement.

3.03 SURFACE COURSES

A. Bituminous Surface Course Superpave HMA

1. Construct binder course meeting the requirements of Publication 408 Specifications, Section 409 to compacted depth specified in the Backfill and Surface Restoration Requirements Table or Standard Details (for new streets).

2. Construct wearing surface meeting the requirements of Publication 408 Specifications, Section 409 to the compacted depth specified in the Backfill and Surface Restoration Requirements Table or Standard Details (for new streets).

3. Tack coat shall be applied to ensure bonding between courses and shall conform to Publication 408 Specifications, Section 460.

4. Do not allow vehicular traffic on newly compacted Superpave HMA materials until the temperature cools below 140^{o} F.

5. Bituminous paver shall be self propelled with activated screed and shall have a minimum

paving width of 18'. All exceptions to paver requirements shall be approved by the Township.

6. Compaction testing for in-place density shall be conducted during placement of the material, in accordance with PennDOT Publication 408, Section 409. Alternatively, pavement cores, in accordance with Section 409.A, may be substituted. Acceptable density shall be within 90-97% of the maximum theoretical density, as per ASTM D698.

B. Bituminous Surface Course (ID-2)

1. Construct binder course meeting the requirements of Publication 408 Specifications, Section 421 to compacted depth specified in the "Backfill and Surface Restoration Requirements Table".

2. Construct wearing surface meeting the requirements of Publication 408 Specifications, Section 420 to the compacted depth specified in the "Backfill and Surface Restoration Requirements Table".

3. Do not allow vehicular traffic on newly compacted bituminous material until the temperature cools below 140^{o} F.

4. Bituminous paver shall be self propelled with activated screed and shall have a minimum paving width of 18'. All exceptions to paver requirements shall be approved by the Township.

C. Compaction

1. Compact by rolling with steel-wheel, vibration or pneumatic tire rollers or a combination of these to obtain specified layer thickness and until non-movement of material under compaction equipment is achieved, unless other density requirements are specified.

2. The roller pattern and speed shall be monitored by the Contractor and Township to avoid roller marks, pattern segregation and displacement of hot mixtures.

D. Bituminous Seal Coat (single application)

1. Construct bituminous surface treatment in accordance with Publication 408 Specifications, Section 470.

E. Bituminous Surface Treatment (double application)

1. Construct bituminous surface treatment in accordance with Publication 408 Specifications, Section 480.

F. Bituminous Seal Coat (Single Application)

1. Construct bituminous seal coat in accordance with Publication 408 Specifications, Section 470.

G. Bituminous Surface Treatment (Double Application)

1. Construct bituminous surface treatment in accordance with Publication 408 Specifications, Section 480.

3.04 JOINTS

A. Notch

The edge of the overlay shall be saw cut to a depth of 1-1/2" for the entire length of the joint and the detached material removed to a minimum notch width of 12". Notch shall be skewed at a minimum 6:1 unless otherwise noted. A cold planer may be used. The vertical face must be painted with GP 64-22 or the same asphalt material used in mix design (Publication 408).

B. Sealing

All joints to be sealed with rubberized joint sealing material, unless otherwise specified by PennDOT. When wearing course is placed adjacent to curb to form bituminous gutter, seal with hot bituminous material of the class and type designated for wearing course and extend to 12 inches from the curb, applied evenly. The use of PG 64-22 may be permitted when approval is obtained from the Township.

3.05 SIGNS

A. Install signs at locations shown on drawings or otherwise specified by the Township.

B. Post shall be installed in undisturbed earth with anchor top 4" above ground.

C. Where posts are located in concrete, drill the existing concrete to place anchor. If in new concrete, place PVC sleeve in concrete prior to placing post.

3.06 ALTERNATIVE PARKING SURFACES

A. Install parking surface as shown on the drawings and in accordance with the manufacturers' recommendations and Standard Detail 2500-7.

3.07 FIELD QUALITY CONTROL

A. Proof of Product

At the time of material delivery to the site, the Township Representative shall be furnished with a delivery ticket indicating material specifications. The tickets shall include, but not limited to, vehicle identification, date, time, product identification, product quantity (Petroleum Grade, Equivalent Single, Axle Loading (ESALs), Aggregate Size and Skid Resistance Level (for Bituminous Wearing Course) and job mix formula number).

B. Surface Tolerance of Base Course.

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

1. 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 lease 3 such templates shall be furnished, and used at intervals of not more than 25 feet.

2. String Lines. String lines, for controlling the finished elevation of the 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.

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

Any surface irregularities that exceed 1/2 inch shall be remedied by removing or adding bituminous material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

C. Tests for Depth of Finished Base Course.

During the progress of the work, the depth of the base course will be measured by the Township and unsatisfactory work shall be repaired, corrected, or replaced.

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 1,500 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 by and at the expense of the Contractor. This operation shall be performed under the observation of the Township who will check the depth for record purposes.

D. Surface Tolerance of Wearing Course.

After the wearing course has been completed as specified, the surface smoothness shall be checked with straightedges.

1. Straightedges. Approved straightedges 10 feet in length shall be provided by Contractor and used for testing longitudinal irregularities in the surface of the wearing course.

Any surface irregularities that exceed 3/16 inch shall be remedied by removing or adding wearing material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

E. Tests for Depth of Finished Wearing Course.

During the progress of the work, the depth of the wearing course will be measured by the Township and unsatisfactory work shall be repaired, corrected, or replaced.

1. The depth will be determined by cutting or coring holes to the full depth of the completed wearing course. Test holes to be excavated by the Contractor. One depth measurement shall be made for each 1,500 square yards of completed wearing course. Any section in which the depth is 1/4 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 the Township who will check the depth for record purposes.

3.08 PAVEMENT MARKINGS

A. See Section 02760.

END OF SECTION

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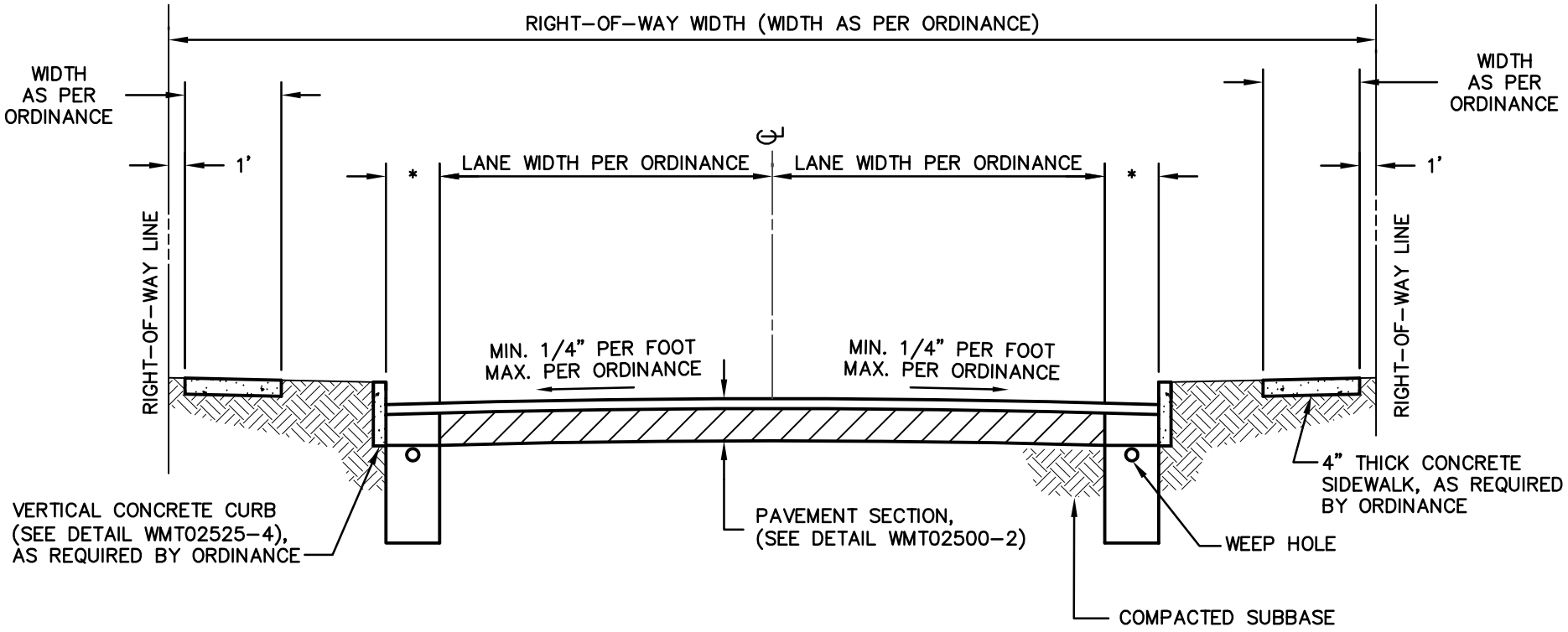
* SHOULDER WIDTH PER ORDINANCE



NOTES:

1. ALL PETROLEUM GRADE TO BE 64-22
2. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES OR INSTALL BASE DRAIN PER RC-30M.
3. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB (SEE DETAIL 02525-3).

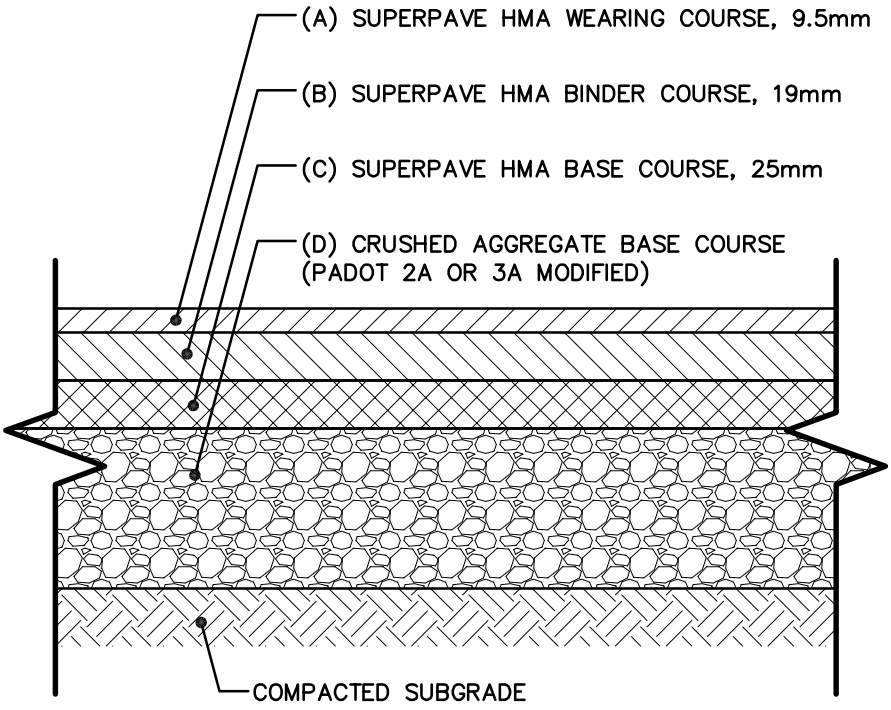
DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02500-1
FILE NO.	1204.9.02.00

WEST MANHEIM TOWNSHIP 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

TYPICAL STREET CROSS SECTION

W. MANHEIM TOWNSHIP — YORK COUNTY , PENNSYLVANIA



	LOCAL	INDUSTRIAL	COLLECTORAL/ARTERIAL*
A	1–1/2"	1–1/2"	1–1/2"
B	2"	3"	2"
C	3"	3"	3"
D	8"	10"	8"

* ALL STATE ROADS SHALL COMPLY WITH PennDOT REQUIREMENTS.

WEST MANHEIM TOWNSHIP 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
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TYPICAL PAVING SECTION

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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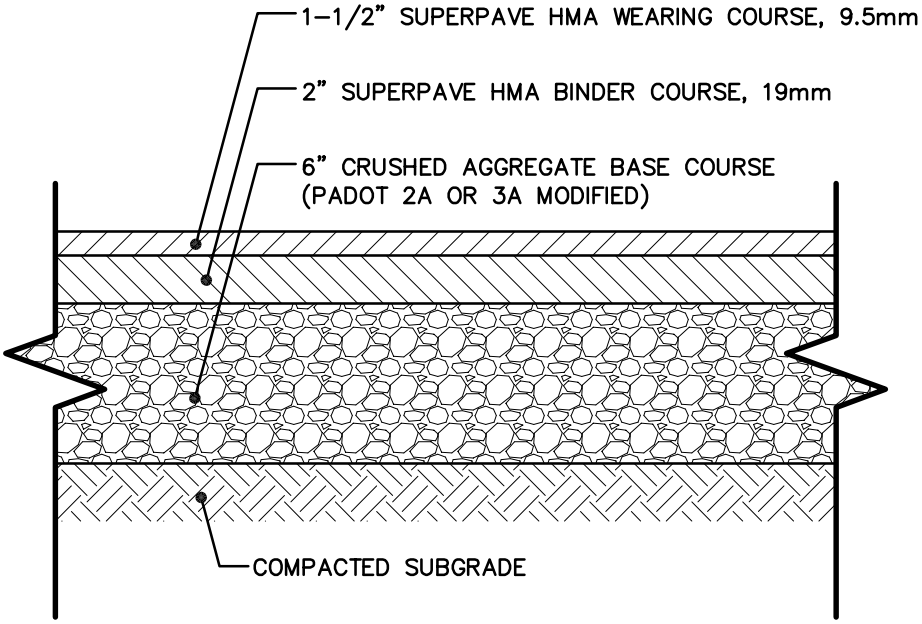
DATE	12/2/2010
DWG. NO.	WMT02500-2
FILE NO.	1204.9.02.00



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TYPICAL PAVING SECTION (PARKING LOTS)

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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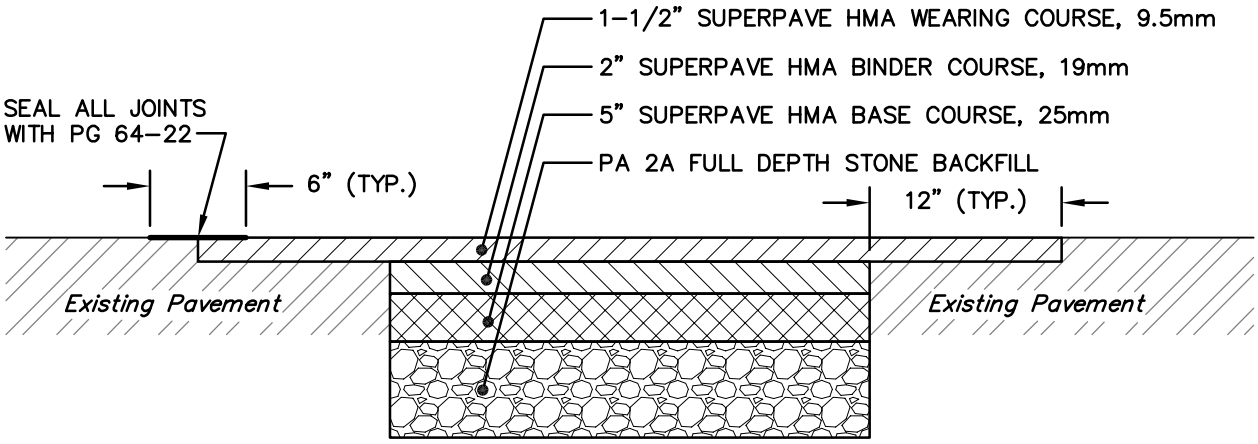
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02500-3
FILE NO.	1204.9.02.00



NOTE:
SEE TOWNSHIP ROAD OCCUPANCY ORDINANCE FOR
FURTHER INFORMATION ON WORK WITH TOWNSHIP STREETS.

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TYPICAL BITUMINOUS PAVEMENT RESTORATION DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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DATE	12/2/2010
DWG. NO.	WMT02500-4
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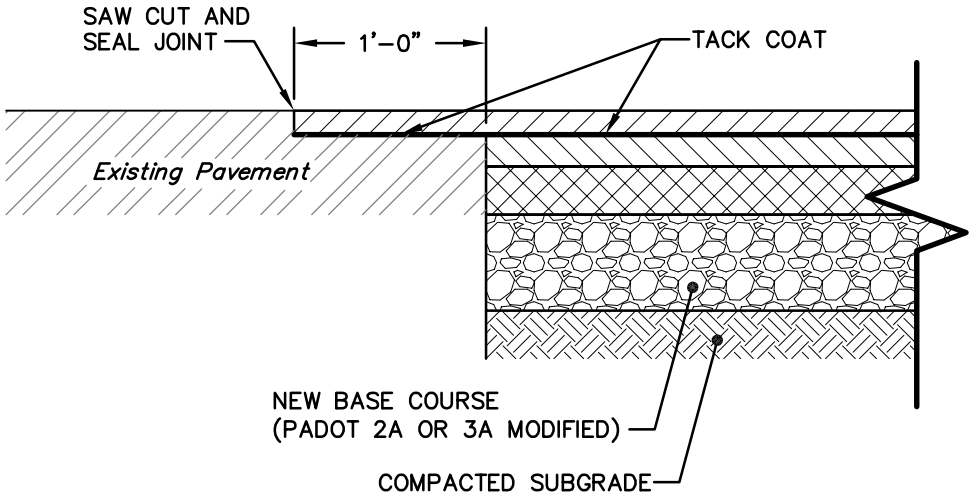

NOTE:
WHERE NEW ASPHALT PAVEMENT MEETS EXISTING ASPHALT PAVEMENT, CUT NOTCH 1'-0" WIDE BY DEPTH OF EXISTING WEARING COURSE.

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PAVING NOTCH DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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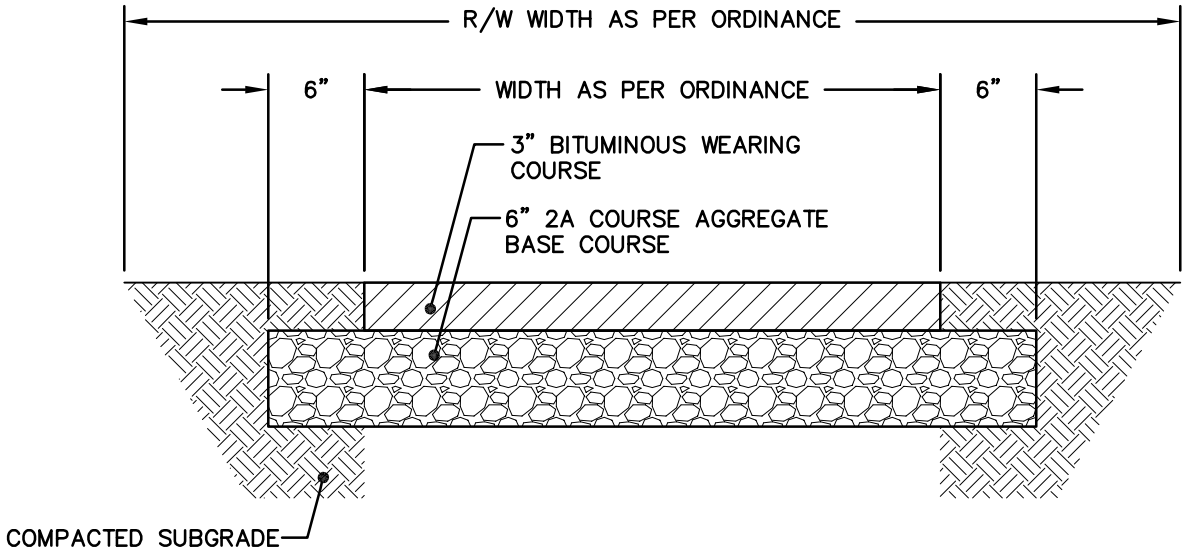

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BITUMINOUS WALK SECTION

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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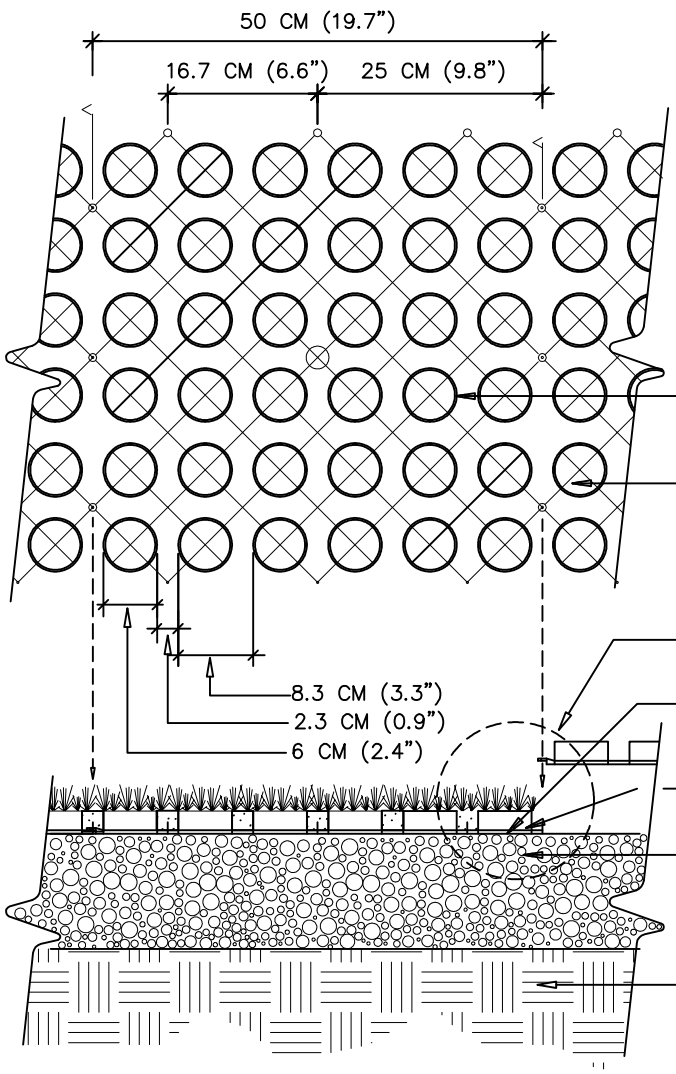


SPECIFICATIONS

UNIT SIZE – 50 CM X 50 CM X 2.5 CM
(20" X 20" X 1")

AVAILABLE IN 9 STANDARD ROLL SIZES

UNIT WEIGHT – 510 GRAMS (18 OZ.)
OR 2.0 KG (4.5 POUNDS)

STRENGTH – 402 KG_2/CM (5720 PSI)

COLOR – BLACK (STANDARD)

RESIN – HDPE (WITH SOME POST–CONSUMER
RECYCLED CONTENT)

PLAN

GRASSPAVE2 SQUARES

ADJACENT GRASSPAVE2 SQUARES

SEE ENLARGEMENT BELOW

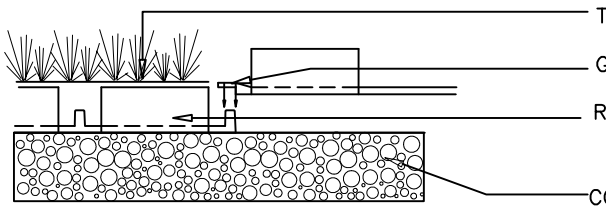
HYDROGROW MIX BELOW RING
SUPPLIED FREE BY MANUFACTURER

RINGS FILLED WITH CONCRETE SAND
(CLEAN, SHARP SAND)

6" MIN. (PennDOT 2A OR 3A MODIFIED STONE)

COMPACTED SUBGRADE,

SECTION



TOP OF GRASS ROOT MASS 6 MM
(1/4") ABOVE TOP OF RING

GRASSPAVE2 ATTACH WITH
SNAP–FIT FASTENERS

ROOT MASS TO FILL
GRASSPAVE2

COMPACTED SANDY GRAVEL
BASE COURSE

ENLARGEMENT

NOTE: GRASS/PLANT TYPES SHALL BE SPECIFIED BY A LANDSCAPE ARCHITECT OR LANDSCAPE DESIGNER.

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ALTERNATIVE PARKING SURFACE

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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FILE NO.	1204.9.02.00

SECTION 02525

CEMENT CONCRETE CURB & SIDEWALK

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Subgrade preparation
2. Construction of cement concrete curb and sidewalk
3. Construction of handicap ramps
4. Construction of stamped (patterned) and colored concrete sidewalk

B. Related work specified elsewhere:

1. Trenching, backfilling and compaction:	Section 02221
2. Finish grading, seeding and sodding:	Section 02485
3. Bituminous paving and surfacing:	Section 02500
4. Trench paving and restoration:	Section 02575
5. Plain and reinforced cement concrete:	Section 03000

C. Definitions: NONE

D. Applicable Standard Details:

02525-1 Concrete Sidewalk Detail
02525-2 Concrete Sidewalk at Driveway Details
02525-3 Slant Concrete Curb Detail
02525-4 Vertical Concrete Curb Detail
02525-5 Curb Terminus

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 72M, Roadway Construction Standard Drawings
Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
De4partment of Justice, Code of Regulations, ADA Standards for Accessible Design

2. American Society for Testing and Materials (ASTM)

A185 Standard Specification for Welded Steel Wire Fabric, Plain, for Concrete Reinforcement

A615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C94 Specification for Ready-Mixed Concrete
C143 Test Method for Slump of Hydraulic Cement Concrete
C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
D994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
E329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

B. Inspections:

1. Inspection by the Township will at a minimum be made of the subgrade, formwork, and any steel prior to placement of the concrete.

2. Township will observe all on-site testing of concrete, unless noted otherwise.

C. Testing:

1. Contractor/Developer shall test concrete strength, slump, air content, and temperature on site as specified in Section 03000, Paragraph 3.11.

2. As specified in Section 03000. On-site testing and laboratory testing will be performed by the same independent testing agency.

1.03 SUBMITTALS

A. Submit concrete mix designs, including strength test records, for review and approval.

B. Submit certified results of compressive strength cylinder tests (from laboratory/testing agency).

C. Submit copies of concrete batch slips.

D. Submit manufacturer literature and specifications for truncated domes to be installed on all curb ramps.

1.04 JOB CONDITIONS

A. Control of traffic:

1. Take measures to control traffic during concreting operations. Do not allow traffic on newly placed concrete until adequate strength has been attained.

2. Employ traffic control measures in accordance with Publication 213, Temporary Traffic Control Guidelines.

3. Notify Township Police Department, Emergency Management Agency, Schools, and Township Office at least 72 hours in advance of any operations requiring changes to existing

traffic patterns.

B. Protection of work area and adjacent areas:

1. Restore existing surfaces outside the limits of the work that have been damaged by the Contractor's operations to their original condition.

2. Contractor shall notify property owners to refrain from applying de-icing materials on new sidewalks; however, damage as a result of salting is the responsibility of the property owner.

C. Coordination with utilities:

1. Coordinate all necessary adjustments of existing utilities to accommodate this work.

2. Provide access to the site for utility work.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Portland concrete shall be air-entrained and have a minimum 28 day compressive strength of 3,300 psi, unless specified higher.

B. Cement concrete criteria for curbs and sidewalks:

Slump:	1" minimum, 5" maximum
Air Content:	4.5% minimum, 7.5% maximum
Temperature:	60°F minimum, 100° maximum
Water/cement ratio:	0.51 minimum

C. For slip formed curb, same as above except with a minimum slump of 1-1/2".

D. For replacement of curb and sidewalk at existing driveways, use air-entrained, PennDOT Class HES (High Early Strength).

2.02 FORMS

A. General requirements:

1. Forms shall be coated with a form release agent just prior to placement of concrete.

B. Straight curbing (or radius greater than 40 feet):

1. Approved metal forms.
2. Wood forms, not less than 2 inch nominal thickness, planed on finish side.

C. Radius curbing:

1. Approved metal forms.
2. Fabricated plywood or hardboard forms.

D. Curbing repairs (less than 10 feet):

1. Approved metal forms.
2. Adjust to match existing conditions.

E. Machine-placed curbing:

1. Straight or radius curbing may be placed with a self-propelled machine approved by the Township.

2.03 REINFORCEMENT

A. As specified in Section 03000, Article 2.02 and as shown on the Standard Details.

2.04 JOINT MATERIAL

A. Joint Filler - Premolded expansion joint material shall be fiber joint filler conforming to ASTM D994.

2.05 FORM COATING MATERIALS

A. As specified in Section 03000, Article 2.04.

2.06 CONCRETE CURING COMPOUNDS

A. As specified in Section 03000, Article 2.05.

2.07 STAMPED COLORED CONCRETE

A. Concrete, reinforcement, joint materials – see above paragraphs.

B. Template Pattern – "old brick running board" by Matcrete (1-800-777-7063), or equal.

C. Pigment – Brick Red #10160 by David Colors, Beltsville, MD or equal

D. Clear Sealer – Sonneborn #800 as manufactured by Sonneborn, or equal.

E. Template release agent – dry blend powder.

2.08 TRUNCATED DOMES

A. The Contractor/Developer shall install detectable warning domes at each handicap ramp. The domes shall be the composite paver kind and be compliant with PennDOT Publication 72M-Standard Drawings RC67M. The detectable warning dome pavers shall be installed according to the manufacturer's recommendations. The pavers shall be safety yellow in color.

Contractor/Developer shall provide to the Township the warranty information for the detectable warning dome pavers for a minimum of one year for failure of the workmanship and materials.

PART 3 - EXECUTION

3.01 CURB CONSTRUCTION

A. Excavate to required depth, remove and dispose of material, and compact the subgrade material to a firm, even surface.

B. Saw cut existing pavement a minimum of 12" from face of new curb. Exposed edges of existing work shall be smooth and square.

C. Forms shall be placed as appropriate to the type of curbing on 2 sides (front and back).

D. Forms shall be securely braced to limit deflection during placement of concrete.

E. Provide openings through curb for drainage pipes. Install one, 2'-0" long, #4 reinforcing bar in the middle of curb centered above the pipe.

F. Concrete shall be placed in accordance with Section 03000, Paragraph 3.06.

G. Variation of more than 1/8" from the established line and grade shall be cause for rejection of that portion of the work.

H. Form or saw contraction joints 3/16" wide and 2" deep at 10-foot maximum intervals on 2 sides (front and top). Saw as soon as possible after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking occurs in the concrete, but in no case later than 24 hours following completion of the curb placement.

I. Provide ½" expansion joints at 60-foot intervals, at the end of each pour, and at the beginning and end of all radii. ½" expansion joint material shall also separate curb from adjacent sidewalks, poles, hydrants, walls and other permanent structures, except that 3/4" thick expansion joint material shall be provided at storm inlets.

J. Unless otherwise indicated on the drawings, the last three feet of curb shall be tapered to a 1-1/2" reveal with expansion joint at the beginning of taper.

K. Finish top surface with wood floats. Provide depressions for drainage, driveways, and ramps for the handicapped as directed by the Township.

L. Tool all exposed edges to the specified radius.

M. Water services and sewer laterals shall be stamped in the curb face as "w" and "s" respectively.

N. Do not remove forms until concrete has set.

O. Begin proper curing in accordance with Section 03000, immediately after placement. Reapply

curing compound 30 days following first application.

P. Correct minor irregularities with a carborundum stone or mortar comprised of two parts fine aggregate to one part cement.

Q. For slip formed curb, uniformly feed the concrete to the machine so the concrete maintains the shape of the section, without slumping after extrusion. Voids or honeycomb on the surface of the finished curb will not be allowed. Immediately after extrusion, perform any additional surface finishing required.

R. Property corners shall be projected to the face of the curb. Location shall be marked by drilling 1/32" diameter hole x 1/8" deep.

S. For relocation of driveway depressions, saw cut and excavate existing depressed curb. Dowell and install 2'-0" long #4 reinforcing bar between existing curb and new curb.

3.02 SIDEWALK CONSTRUCTION

A. Excavate to required depth, remove and dispose of material, including any existing sidewalk, and compact the subgrade material to a firm, even surface.

B. Exposed edges of existing work shall be smooth and square.

C. Construct ramps for the handicapped at all street crossings (as required by ADA regulations and as in Paragraph 3.04) and as directed by the Township. Ramps shall be 6" thick concrete unless otherwise noted. All handicap ramps shall be in accordance with RC 67M of PennDOT Publication 72M.

D. Sidewalks across sanitary main and/or storm sewer shall be 8” thick.

E. Spread AASHTO No. 57 aggregate and compact to the thickness shown on the Standard Details.

F. Concrete shall be placed in accordance with Section 03000, Paragraph 3.06. Hand float to desired line and grade.

G. Score contraction joints at 5-foot intervals to sufficient depth to insure cracking at the joint. Do not saw cut the contraction joints without prior approval from the Township. Also score sidewalks over each drainage pipe placed underneath.

H. Provide 1/4" expansion joint at 30-foot intervals and at the end of each pour. ½" expansion joint material shall also separate adjacent curb, poles, hydrants, walls, and other permanent structures.

I. Apply light broom finish immediately after float finish as specified in Section 03000, Paragraph 3.09.G.

J. Provide depressions for driveways, downspouts, and drainage as directed by the Township or shown on the drawings.

K. Begin proper curing in accordance with Section 03000, immediately following form removal. Reapply curing compound 30 days following first application.

L. Monolithic sidewalk and curb will be allowed at a radius curb ramp only. Mid-block ramps must have separate curb.

M. If specified, provide visual or textural additions to curb ramps.

N. Apply curing compound.

3.03 STAMPED AND COLORED CONCRETE SIDEWALK

A. Excavate, place stone base and place expansion joints and reinforcing similarly to plain concrete sidewalks.

B. Pigment must be thoroughly mixed throughout concrete using rations consistent with manufacturer's recommendation. Apply float finish and edge.

C. Sprinkle release agent onto fresh concrete prior to stamping with template.

D. Remove release agent by power washing approximately 24 hours after stamping is complete, or as recommended by manufacturer.

E. Apply clear sealer to all concrete surfaces.

F. Release agent, pigment and sealer must be from same manufacturer or proven to be compatible with each other.

3.04 HANDICAP ACCESSIBILITY

The following requirements shall be followed in all construction of pedestrian facilities; where these requirements are less stringent or different from ADA or PennDOT requirements, the more stringent requirements shall govern.

A. Sidewalks

1. Sidewalk cross slopes shall not exceed 2%.

2. A minimum of 48" pedestrian path of travel, clear of obstructions, grates and other openings, shall be provided along the run of a sidewalk.

3. Objects shall not project more than 4 inches into the pedestrian path of travel between 27" and 80" above the sidewalk surface unless a detection barrier is provided beneath the object at a maximum of 4" less than the projection into the pedestrian path of travel.

B. Driveway aprons

1. Driveway aprons shall provide a minimum of 48" pedestrian path of travel, clear of obstructions, grates and other openings, in line with the run of a sidewalk with a maximum cross slope of 2%.

C. Curb ramps

1. Curb ramps shall have a maximum slope of 1:12.

2. The sum of the percent slope of the curb ramp and the roadway cross slope, when added together as positive values, shall not exceed 13%.

3. Curb ramps shall have a minimum width of 4 feet.

4. Curb ramps shall be constructed flush, without a reveal, at the edge of the roadway surface.

5. Curb ramps shall be perpendicular to the curb.

6. Curb ramps shall be within the crosswalk if a crosswalk exists.

7. Flares shall be provided at a maximum slope of 1:10 when a curb ramp is located in the pedestrian path of travel.

8. Return curbs shall only be provided in areas outside the pedestrian path of travel or walkway.

D. Diagonal Curb ramps

1. Diagonal curb ramps shall not be permitted in new construction. For projects proposing improvements to handicap facilities, diagonal curb ramps shall be permitted on a case to case basis as determined by the Township.

2. Diagonal curb ramps shall have a minimum 4'x 4' maneuvering space at the bottom of the ramp. The maneuvering space shall have a maximum 2% cross-slope in any direction. The maneuvering space shall be within the projected curb line measured from the point of curvature and point of tangent to the point of intersection of the project curb lines. The maneuvering space shall be within the crosswalk delineation.

3. Diagonal curb ramps having flared sides shall have at least a 24 inch long segment of straight curb located on each side of the curb ramp and within the marked crossings.

E. Detectable Warning Surfaces

1. Detectable warnings shall provide significantly contrasting texture and light reflective color.

2. Detectable warnings shall be the width of the curb ramp and two feet in depth.

3. Detectable warnings shall be provided at a maximum 8” from the roadway surface.

4. Detectable warnings may be considered part of the ramp portion of the curb ramp.

5. Truncated domes within the detectable warnings surface shall provide domes in alignment with the direction of travel.

6. Truncated domes shall have a diameter of 0.9 inches, a height of 0.2 inches and a center to center spacing of 2.35 inches and shall contrast visually with adjoining surfaces, either light on dark, or dark on light.

F. Landing Areas

1. A landing area shall be provided at any curb ramp where there is more than one pedestrian path of travel accessible to the curb ramp.

2. Landing areas shall be provided as required in accordance with Federal regulations.

3. Landing areas shall be a minimum 5’ X 5’ area, clear of any obstructions, with a maximum slope of 2% in any direction. 4’ X 4’ landing with a 60” clear turning diameter maybe be permitted if a written report of noncompliance is submitted for each location proposed and approved by the Engineer.

4. Landing areas shall be provided at the following locations:

- every location the pedestrian path of travel would change direction
- at any location where the rise of a ramp exceeds 30 inches.

5. The landing area shall be at least as wide as the ramp run leading to it.

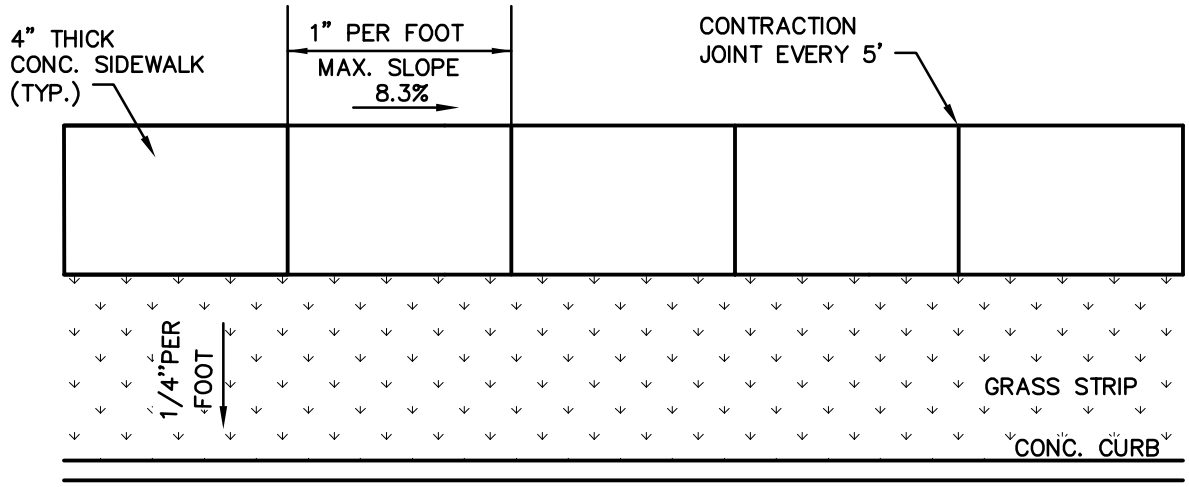
BACKFILLING AND RESTORATION

A. Temporary backfill at curbs shall consist of select granular material per Section 02221, front and back, to within 8" of top of curb.

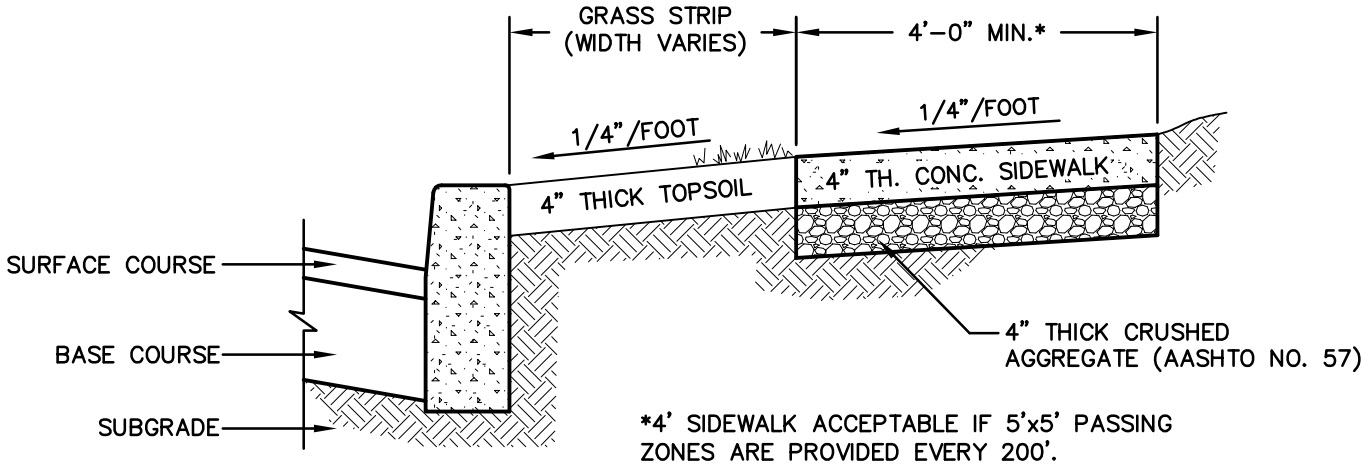
B. Restore adjacent areas as indicated in the “Backfill and Surface Restoration Requirements” Table.

C. All areas shall be backfilled 72 hours after completion of work.

END OF SECTION



PLAN



*4' SIDEWALK ACCEPTABLE IF 5'x5' PASSING ZONES ARE PROVIDED EVERY 200'.

TYPICAL SECTION

NOTE:
ALL SIDEWALK SHALL BE COMPLIANT WITH ADA AND PennDOT RC STANDARDS.

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CONCRETE SIDEWALK DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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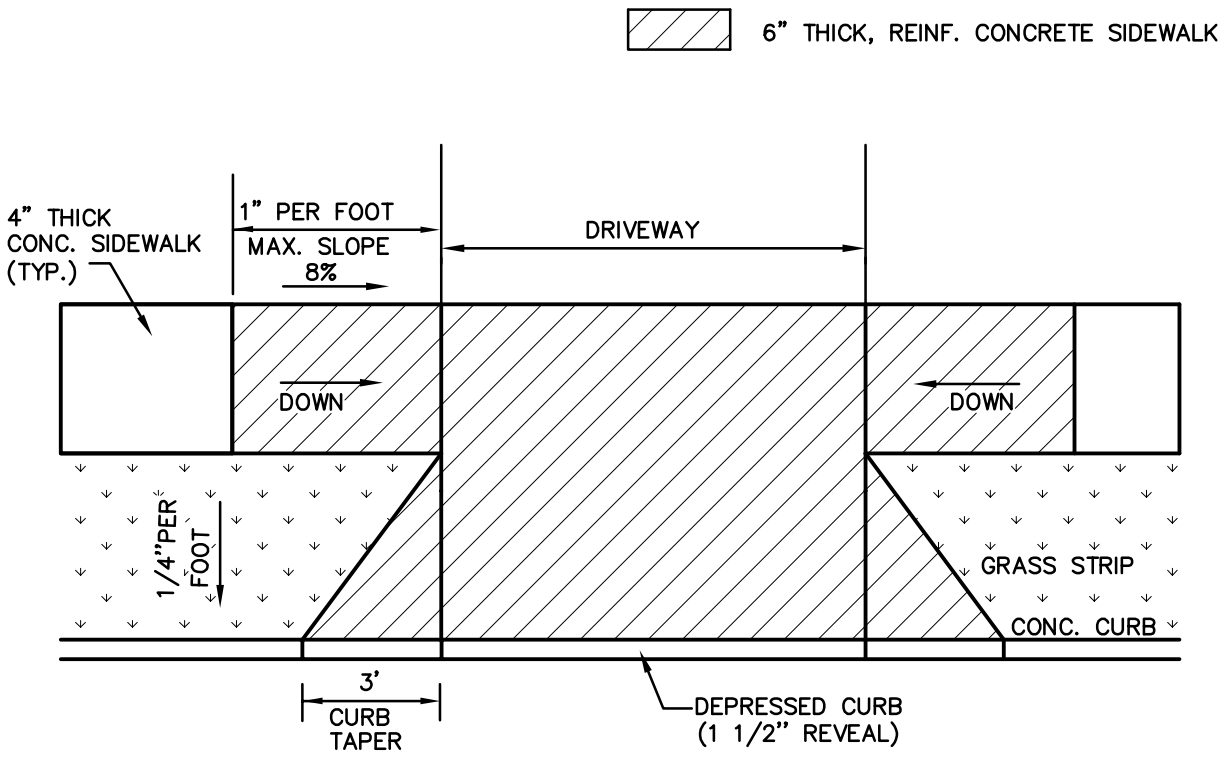
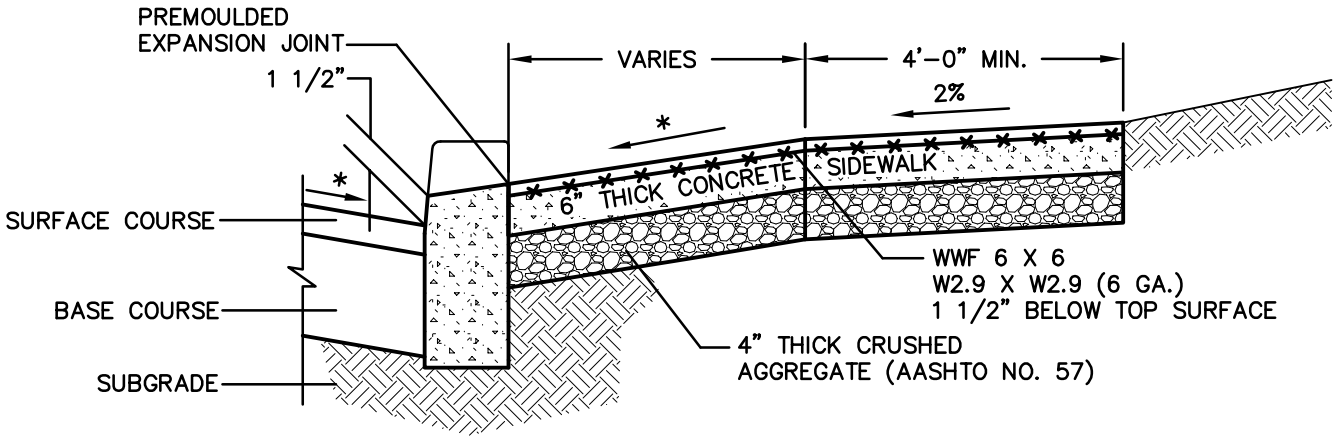


PLAN



* 8% MAX CHANGE IN GRADE BETWEEN ROAD SURFACE AND DRIVEWAY

TYPICAL SECTION

NOTE:
OTHER DRIVEWAY APRONS, IN ACCORDANCE WITH PennDOT RC-67M, MAY BE CONSTRUCTED UPON WRITTEN APPROVAL FROM THE TOWNSHIP.

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CONCRETE SIDEWALK AT DRIVEWAY DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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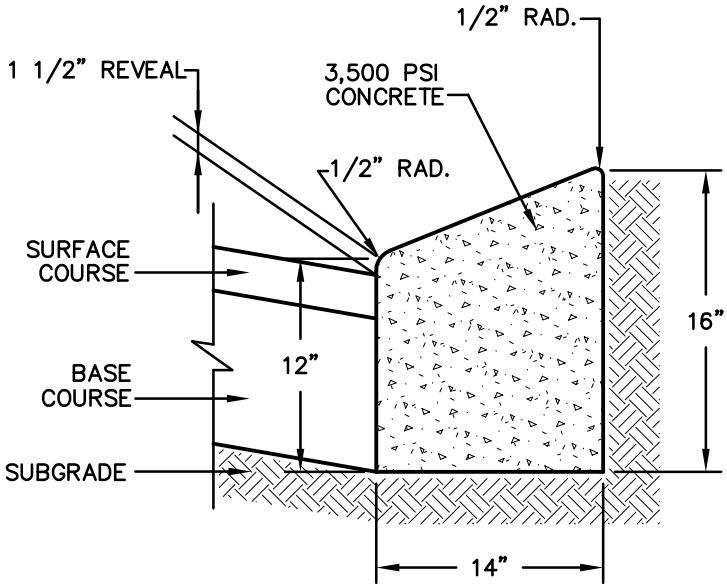
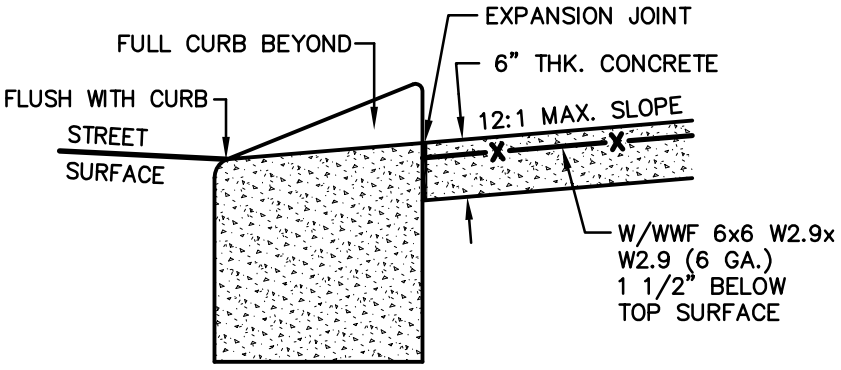


TYPICAL CROSS SECTION



CROSS SECTION AT HANDICAP RAMPS

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SLANT CONCRETE CURB DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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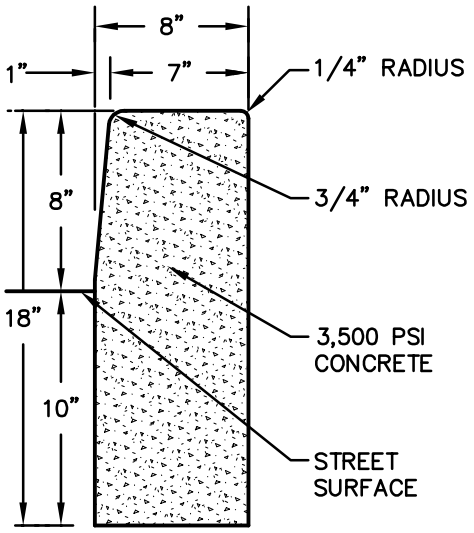
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02525-3
FILE NO.	1204.9.02.00



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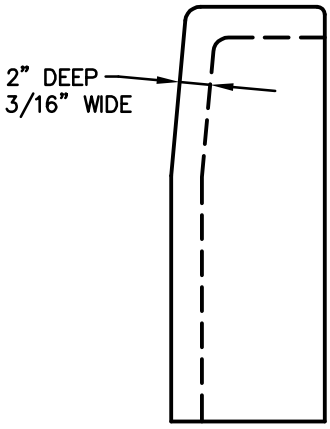

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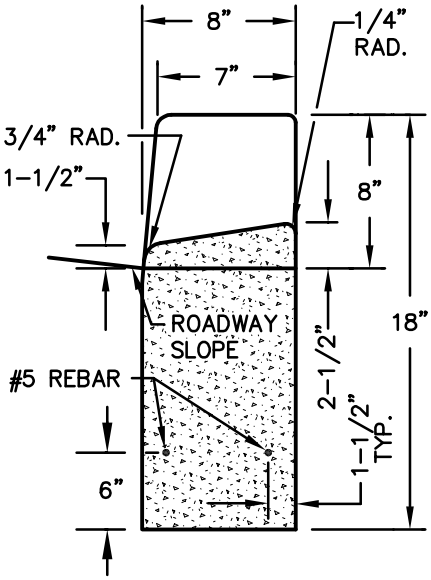
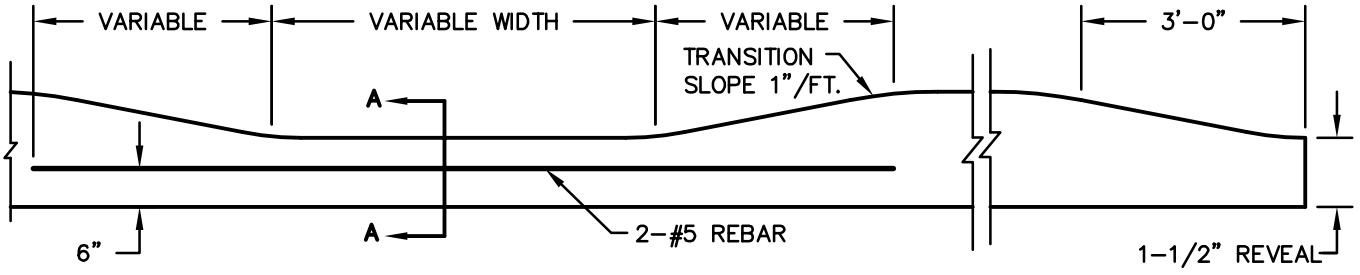


SECTION A-A



DEPRESSED CURBS FOR DRIVES

TERMINAL SECTION

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VERTICAL CONCRETE CURB DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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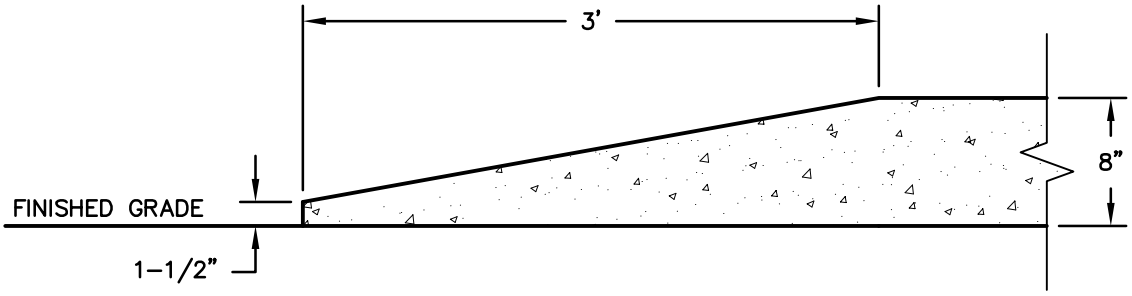
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02525-4
FILE NO.	1204.9.02.00



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CURB TERMINUS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02525-5
FILE NO.	1204.9.02.00

SECTION 02575

TRENCH PAVING AND RESTORATION

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Temporary trench paving
2. Permanent trench paving
3. Shoulder restoration
4. Driveway restoration
5. Concrete Restoration

B. Related work specified elsewhere:

1.	Trenching, backfilling, and compacting:	Section 02221
2.	Roadway excavation, fill and compaction:	Section 02230
3.	Finish grading, seeding and sodding:	Section 02485
4.	Bituminous paving and surfacing:	Section 02500
5.	Plain and reinforced cement concrete:	Section 03000

C. Definitions: NONE

D. Applicable Standard Details:

02575-1 Temporary Trench Paving

"Backfill and Surface Restoration Requirements Table"

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications
Regulations Governing Occupation of Highways by Utilities (67 PA Code, Chapter 459)
Publication 213, Temporary Traffic Control Guidelines
Publication 27, Specification for Bituminous Mixtures (Bulletin 27)
Publication 37, Specification for Bituminous Materials (Bulletin 25)

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

D2950 Density of Bituminous Concrete in Place by Nuclear Method.

B. Inspections:

1. Inspection by the Township will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from bituminous and aggregate suppliers attesting that materials conform to Publication 408 Specifications.

2. Provide bituminous mix designs for approval.

3. Provide material slips and, if available, PennDOT certifications (CS-4171) with each load delivered to job site.

1.04 JOB CONDITIONS

A. Control of Traffic:

1. Take measures to control traffic during paving operations. Do not allow traffic on newly paved areas until adequate stability and adhesion have been attained and the material has cooled to 140° F or less.

2. Employ traffic control measures in accordance with Publication 213 Temporary Traffic Control Guidelines, or latest revision.

3. Notify Township Police Department at least 72 hours in advance of any operations requiring changes to existing traffic patterns.

B. Protection of Adjacent Areas:

1. Restore existing surface outside the limits of the work, that has been damaged by the Contractor's operations, to its original condition.

1.05 Township Road Occupancy Permit

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 CONCRETE

A. As specified in Section 03000, Paragraphs 2.01 and 3.01.

B. Use air-entrained, PennDOT Class HES (High Early Strength).

2.02 BITUMINOUS MATERIALS AND AGGREGATES

A. All bituminous materials and aggregates used in base course construction, paving, and resurfacing are designated in these specifications by, and shall conform to, the applicable portions of the Publication 408 Specifications.

B. The minimum pavement design shall include:

1. PG 64-22
2. Anticipated ESALs and ADT
3. Adequate SRL as specified in Section 02500, Paragraph 2.01.A

PART 3 - EXECUTION

3.01 TEMPORARY TRENCH PAVING

A. Place temporary paving immediately upon completion of trench backfilling. Unpaved trenches shall not remain unpaved longer than five working days after backfilling, nor over weekends and holidays; unless construction activities are restricted by PennDOT to restore after backfill.

B. Shape and compact subgrade material proof roll, then place and compact base course to the required thickness. Apply tack coat to vertical trench sides, in accordance with Publication 408, Section 460.

C. Place temporary paving material. Compact to required minimum thickness with trench roller having a minimum 300 pounds pressure per inch-width of compaction. Restore temporary trench paving in accordance with Standard Detail No. 02575-1.

D. Continuously maintain temporary paving.

3.02 PERMANENT TRENCH PAVING

A. For all Bituminous Surface areas, sawcut existing paving in accordance with 67 PA Code, Chapter 459. Remove temporary paving material.

B. Construct permanent base and surface courses to the required compacted thicknesses shown in Standard Detail No. 02500-2 for Township roads, and in accordance with Publication 408 Specifications for State roads.

C. Maintain permanent paving throughout the maintenance period.

3.03 BITUMINOUS OVERLAY

A. See Section 02500.

3.04 SHOULDER RESTORATION

A. Restore shoulders in accordance with the Backfill and Surface Restoration Requirements Table.

3.05 DRIVEWAYS

A. Trim concrete and bituminous driveway surfaces to remove damaged areas. Saw or cut straight joint lines parallel to the centerline of the trench. Cut offsets at right angles to the trench centerline. Trench roller shall have a minimum 300 pounds of pressure per inch.

B. Restore existing concrete driveways with a 6" layer of concrete reinforced with WWF 6 x 6 - W2.9 x W2.9 (6 ga.) wire mesh, placed 2" from top surface. See Section 03000.

C. Restore existing bituminous driveways in kind; minimum 1½" layer wearing course over 6" layer of select granular material (2RC).

D. Restore earth driveways with a 6" layer of select granular material (2RC).

E. Restore stone or gravel driveways in kind; minimum 6" layer of select granular material (2RC).

F. Restore brick driveways with like bricks placed on a 4" thick wet sand bed. Place bricks in like pattern and spacing.

BACKFILL AND SURFACE RESTORATION REQUIREMENTS TABLE

Trench Surface	Trench Type	Purpose	Reference Section
Bituminous Surface (Trench)	1	Immediate Final Surface	02500 03000
Bituminous Surface (Trench) Local	2	Local Roadway Classification	02500
Bituminous Surface (Trench) Industrial	3	Industrial Roadway Classification	02500
Bituminous Surface (Trench) Arterial/Collector	4	Arterial or Collector Roadway Classification	02500
Concrete Surface	5	Concrete Roadway	03000
Bituminous Surface	6	State Routes	02500
Stone Surface	7	Stone Surfaces	02230
Vegetative Surface	8	Vegetative Surface	02485

END OF SECTION

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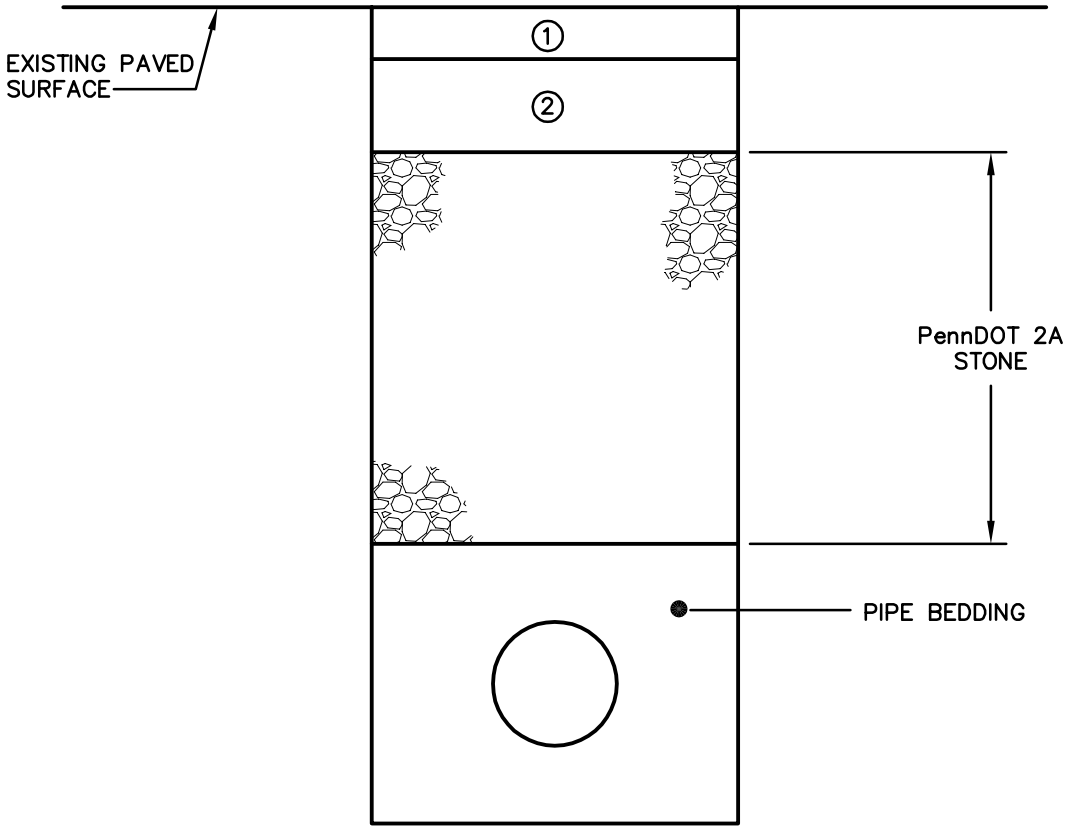

TRENCH TYPE	STREET CLASSIFICATION	①	②
1	–	2" SUPERPAVE BINDER (19mm)	6" TYPE B, HIGH EARLY STRENGTH CONCRETE
2	LOCAL	2" SUPERPAVE BINDER (19mm)	3½" SUPERPAVE BASE (25mm)
3	INDUSTRIAL	3" SUPERPAVE BINDER (19mm)	3½" SUPERPAVE BASE (25mm)
4	ARTERIAL/COLLECTOR	2" SUPERPAVE BINDER (19mm)	3½" SUPERPAVE BASE (37.5mm)
5	CONCRETE	–	6" TYPE B, HIGH EARLY STRENGTH CONCRETE
6	STATE ROUTE	SEE APPROVED PERMIT	SEE APPROVED PERMIT

NOTES:
1. MAINTAIN TEMPORARY PAVING UNTIL PERMANENT PAVING IS PLACED.
2. TEMPORARY RESTORATION SHALL REMAIN IN PLACE FOR 90 DAYS.
3. REMOVE TEMPORARY RESTORATION PRIOR TO CONSTRUCTION OF FINAL BASE.
4. SEE SECTION 02221 FOR PIPE BEDDING AND BACKFILLING.
5. ALL THICKNESSES ARE THE MINIMUM COMPACTED THICKNESS.

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TEMPORARY TRENCH PAVING

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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SECTION 02601

MANHOLES

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Precast concrete manhole sections
2. Precast concrete manhole bases
3. Cast-in-place concrete manhole bases
4. Manhole steps
5. Manhole covers and frames
6. Manhole protective lining

B. Related Work Specified Elsewhere:

1. Trenching, backfilling and compacting:	Section 02221
2. Soil Erosion and Sedimentation Control	Section 02270
3. Finish grading, seeding and sodding:	Section 02485
4. Bituminous paving and surfacing:	Section 02500
5. Sanitary drain pipe:	Section 02610
6. Storm sewer pipe:	Section 02618
7. Sewer testing:	Section 02651
8. Plain and reinforced cement concrete:	Section 03000
9. Cement concrete for utility construction:	Section 03050

C. Definitions:

1. Standard Manhole – manhole with vertical height from top of base (invert) to top of rim greater than five feet (5’).

2. Shallow Manhole – manhole with vertical height from top of base (invert) to top of rim less than five feet (5’).

D. Applicable Standard Details:

1. 02601-1 Cast in Place Manhole Base Detail
2. 02601-2 Precast Manhole Base Detail
3. 02601-3 Standard Manhole Detail
4. 02601-4 Standard Shallow Manhole Detail
5. 02601-5 Drop Connection Detail
6. 02601-6 Manhole Channel Configurations
7. 02601-7 Manhole Cover Anchor Bolt/Adjustment Detail
8. 02601-8 Precast Manholes Typical All Joints

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications
Publication 213, Temporary Traffic Control
Publication RR-459, Occupancy of Highways by Utilities
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

Publication 72M, Roadway Construction Standards (RC-39)

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

A48 Specification for Gray Iron Castings
A185 Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement
A615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
B221 Aluminum-Alloy Extruded Bars, Rods, Shades and Tubes (Alloy 6061-T6)
C139 Specifications for Concrete Masonry Units for Construction of Catch Basins and Manholes
C270 Specifications for Mortar for Unit Masonry
M306 Specifications for Drainage, Sewer, Utility and Related Castings
C443 Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
C478 Specifications for Precast Reinforced Concrete Manhole Sections
C923 Specification for Resilient Connections Between Reinforced Concrete Manhole Structures and Pipes
D1248 Specifications for Polyethylene Plastics Molding and Extrusion Materials.

3. Federal Specifications (FS):

CID A-A-60005 Frame, Covers, Grating, Steps, Sump and Catch Basin Manholes
SS-S-00210 Sealing compound, preformed plastic, for expansion joints and pipe joints.

B. Inspections:

1. Inspections of the manholes by the Township will, at a minimum, be made of materials upon delivery to the job site; of the subgrade, prior to manhole base construction or placement; and of the completed manhole, prior to backfill.

2. Inspections of the frame and covers by the Township will be made upon delivery to the job site; and of the completed installation, prior to backfill.

3. A final inspection of the manhole channels, steps, frames and covers, and all joints will be performed upon completion of all testing, roadway restoration, and/or seeding.

4. Manholes shall be subject to rejection for failure to conform with these specifications or if any one of the following conditions is noted:

   a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.

   b. Defects that indicate incorrect proportioning, mixing, and molding.

   c. Surface defects larger than ½" diameter indicating honey-combed or open texture.

   d. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.

   e. Any continuous crack having a surface width of 0.01 inches or more and extending for a length of 6 inches or more, regardless of position in the section of the wall.

5. Lined manholes will be visually inspected and shall be tested with an approved electrical holiday detector or in accordance with the manufacturers recommendation. Contractor shall be responsible for testing and furnishing reports to the Township.

C. Concrete Testing (For Cast-In-Place Work)

1. As specified in Section 03000.

1.03 SUBMITTALS

A. Certificates:

1. Submit two copies of certification from material suppliers attesting that materials meet or exceed specification requirements.

2. Submit certifications of welders for lining systems.

B. Shop Drawings:

1. Submit details of manhole sections, and precast bases if used.

2. Submit details of manhole frames and covers, including required lettering "Sanitary Sewer" or "Storm Sewer" as applicable.

3. Submit details of manhole steps.

4. Submit manufacturers' descriptive literature for the pipe to manhole flexible connections.

5. Submit manufacturer's descriptive literature for joint sealant compounds.

6. Submit details of adjusting rings.

7. Submit manufacturer's details for interior protective lining systems.

1.04 JOB CONDITIONS

A. As specified in Section 02221.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Precast Concrete Units:

1. After fabrication and curing, transport the manhole and components to the job site. Protect until required for installation.

2. Handle to avoid damage to surfaces, edges and corners and to avoid creation of stresses within the units.

PART 2 - PRODUCTS

2.01 CRUSHED STONE BASE

A. AASHTO No. 57 or AASHTO No. 8 crushed stone or gravel aggregate, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

2.02 MANHOLE BRICK: Not permitted

2.03 CONCRETE MASONRY UNITS: Not Permitted

2.04 CEMENT MORTAR: ASTM C270, Type S

2.05 CEMENT CONCRETE: Section 03050.

2.06 RUBBER GASKETS: ASTM C443

2.07 RESILIENT PIPE-TO-MANHOLE CONNECTION: ASTM C923

A. PSX gaskets as manufactured by Press-Seal Gasket Corporation, Fort Wayne, Indiana, or approved equal.

2.08 NON-SHRINK GROUT: Fastsetting, cement-based mortar such as Waterplug, manufactured by Thoro division of Chem Rex, Shakopee, MN, or approved equal.

2.09 PRECAST CONCRETE MANHOLE BASES AND SECTIONS: ASTM C478

A. 5.5% ± 1.5% air-entrained cement concrete.

B. Eccentric cone or flat slab top sections; minimum 24" access opening.

C. Precast riser sections of length to suit.

D. Precast bases of a design similar to the precast riser sections.

E. Precast drop connections and precast lampholes are not permitted.

F. Manholes shall have a 4' inside diameter unless otherwise noted on the drawings.

G. Precast manhole bases shall be manufactured in accordance with the elevations shown on the grade sheets and shall accommodate lateral hookups as marked in the field.

H. Precast manhole bases and precast concrete channels shall be constructed specifically for the work intended.

I. Precast manhole bases are not permitted with pipes greater than 10.00% unless approved by the Township. Precast manhole bases for pipes greater than 10.00% shall have a minimum 0.5' difference between inverts.

2.10 CASTING MATERIALS

A. Gray Iron Castings shall conform to the requirements of AASHTO M105 Class 35B or ASTM A48 Class 35 B.

B. Castings shall be manufactured true to pattern and component parts shall fit together in a satisfactory manner. They shall be smooth and well cleaned by shot blasting. Circular manhole frames, covers and grates shall be furnished with machined horizontal bearing surfaces unless otherwise specified.

C. All shipments shall include appropriate certification from the producing foundry. The certification shall state that the castings have been produced in facilities operating in accordance with the applicable laws and regulations of the United States and the appropriate state, province, or local unit of government. This certification shall also state that all samples representing each lot have been tested, inspected, and have been found to meet the requirements of this specification and the applicable ASTM material specification listed in Section 3. Certification shall also state the country of origin of the castings. If specified in the order, a report of the test results shall be furnished.

D. Markings

1. Each individual casting shall be identified by the foundry showing the following:

    a. Name of producing foundry and country of manufacture preceded by the words "Made in", such as "Made in USA".
    b. AASHTO designation or ASTM designation number.
    c. Class by number followed by a letter indicating the minimum tensile strength and size of test bar.
    d. Heat identification and cast date (MM/DD/YY).

e. Casting lettering as required.
f. Any markings as required to meet Federal requirements.

E. Records

1. All test results by this specification shall be maintained by the producing foundry for seven years and shall be made available to the purchaser upon request.

2. Re cords of casting certifications issued by a producing foundry shall be maintained by the producing foundry for seven years and shall be made available upon request.

2.11 JOINT SEALANT COMPOUND

A. FS SS-S-00210, preformed, flexible, self-adhering, cold-applied. Joints between manhole base and riser, between risers, between riser and cone, between cone and adjusting rings and cast iron frame, shall be made of RUB'R-NEK, a flexible plastic gasket-type sealant manufactured by K. T. Snyder Company, Inc., of Houston, Texas, or approved equal.

2.12 MANHOLE STEPS

A. Manhole steps shall be made of non-corrosive aluminum, or steel reinforced fiberglass or polypropylene materials.

1. Aluminum alloy steps (Alloy 6061-T6) shall be Model No. F-140, manufactured by Washington Aluminum Company, Inc., of Baltimore, MD, or approved equal and shall have a protective coating consisting of asphalt coating conforming to AASHTO M-190 requirements applied to the portion to be embedded in the concrete.

2. Steel reinforced fiberglass steps shall be Model No. 115 manufactured by R. J. Manufacturing, Inc., of San Antonio, Texas, or approved equal.

3. Steel reinforced copolymer polypropylene plastic steps shall be Model No. PS-2-B or PS-2-PFS, manufactured by M. A. Industries, Inc. of Peachtree City, Georgia, or approved equal.

B. Steps in precast walls shall terminate 1" from outer surface and shall be cast in place wherever possible or grouted with a water proof, non-shrink grout.

2.13 MANHOLE FRAMES AND COVERS

A. Domestic soft, gray cast iron castings: ASTM A48, Class 35B or better; free of bubbles, sand and air holes, and other imperfections. Castings shall be furnished unpainted.

B. Standard frames and covers shall be capable of withstanding an AASHTO HS-25 loading and shall have a minimum 24" clear opening. Watertight frames and covers shall meet AASHTO HS-20 loading requirements.

C. Frame and cover shall have machined bearing surfaces and matched to insure against rocking.

D. Sewer manhole covers shall be marked “West Manheim Sanitary Sewer”. Storm manholes shall be marked as “Storm Sewer”.

E. Standard frames and covers shall be similar to Model No .1835 with neoprene gasket, as manufactured by East Jordan Iron Works, East Jordan, MI, or approved equal.

F. Watertight frames and covers shall be similar t o Model No. 1040, as manufactured by the East Jordan Iron Works, East Jordan, MI, or approved equal.

2.14 REINFORCING STEEL: Section 03000, Article 2.02.

2.15 ADJUSTING RINGS:

A. Precast cement concrete grade adjustment rings shall be cast from 4000 psi concrete (28-day compressive strength), shall be a maximum of 2" thick per ring, and shall be reinforced in accordance with ASTM C478. Split concrete rings are not permitted.

B. Plastic or High Density Polyethylene (HDPE) adjusting rings are not permitted.

C. Infra-Riser Adjustment rubber rings, manufactured by East Jordan Iron Works, East Jordan Michigan, or approved equal, may be substituted for concrete rings, if approved by the Township.

D. Metal extension grade adjustment rings shall be PennDOT approved, and shall be a maximum of 2" thick per ring.

E. Poured in placed concrete adjustment rings shall conform to Standard Detail No. 02601-7.

2.16 WALL PENETRATION SEALS

A. Concrete wall penetration seals shall be “link-seal” as manufactured by Thunderline Corporation, Houston, TX, or approved equal.

B. Use appropriate wall sleeve type as recommended by manufacturer to provide watertight seal/connection.

2.17 PROTECTIVE LINING SYSTEMS

A. Lining systems for new manholes (and wet wells) shall be extruded PVC or HDPE liner cast integral with the inside wall of manhole. Acceptable lining systems are as follows:

1. Ameron T-Lok PVC manufactured by Ameron International, Brea, CA.
2. AGRU Sure Grip HDPE manufactured by Agru America, Inc., Kingswood, TX.
3. Other system approved by Township.

B. Walls, cone section and base (channels) shall be lined with same material. Joints between

sections will be welded in the field by manufacturer certified welders.

C. Lining systems applied to existing manholes for rehabilitation shall be epoxy, PVC sheet, spray on, or a PVC-fiberglass composite material. Acceptable lining for manhole rehabilitation are as follows:

1. Ameron Arrow Lock, manufactured by Ameron International, Brea, CA.
2. Multiplexx Liner manufactured by Terre Hill Concrete Products, Terre Hill, PA.
3. Raven 405 manufactured by RLS Solutions, Broken Arrown, OK.
4. Other system approved by Township.

2.18 MANHOLE INSERTS

A. Manhole inserts shall be Parson Manhole Inserts as manufactured by Parson Environmental Products, Inc., Reading, PA or approved equal.

2.17 STRUCTURAL CONCRETE BONDING AGENT

A. The epoxy bonding agent shall be Nitrobond EP, as manufactured by Fossroc Limited, Coleshill Road, Tamworth, Straffordshire, UK. The bonding agent shall be a two-component, solvent-free epoxy resin. The two components shall be differentially pigmented in order to ensure visually that correct missing has taken place prior to the application. The product shall achieve 70 n/mm^2 compressive strength, 36 N/mm^2 tensile strength, 30% elongation, and 14 N/mm^2 bond strength and water absorption or 0.05%, when tested in accordance to ASTM C881: Type 1, II, III, IV and V, grade 2 class E & F. Nitrobond shall be installed per manufacturer's recommendation.

PART 3 - EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC: Section 02221.

3.02 CUTTING PAVED SURFACE PRIOR TO EXCAVATION: Section 02221.

3.03 BLASTING: As specified in Section 02221.

3.04 EXCAVATION

A. Excavate as specified in Section 02221.

B. Excavate at location marked in the field.

C. Excavate to the required depth and grade for the invert of the man hole plus that excavation necessary for placement of base material.

3.05 CONSTRUCTION

A. Install a minimum of 4" thick compacted crushed stone base.

B. Provide cast-in-place concrete or precast concrete bases.

   1. Construct cast-in-place bases as shown on Standard Detail 02601-1 & 02601-2.

      a. Cast-in-place bases may be constructed with a special form for a joint to match the manhole cylinder sections.

   2. Install precast bases as shown on Standard Detail 02601-1.

      a. Set the precast base on the crushed stone base.

      b. Provide a sealed, flexible resilient connection between pipe and precast base section.

C. Install the proper diameter watertight manholes on precast concrete or poured-in-place concrete bases shown on the drawings.

D. Construct drop connections shown on Standard Detail 02601-5. Encase drop connection in concrete, per Section 03050.

E. Form flow channels in manhole bases. Slope channels uniformly from influent invert to effluent invert, minimum 0.1' drop. Construct bends of the largest possible radius. Form channel sides and invert smooth and uniform, free of cracks, holes or protrusions.

F. Do not permit pipe to project more than 3" into the manhole.

G. Where special gaskets or water stops are recommended by pipe manufacturers for connections at manhole walls, these facilities shall be provided. All pipe connection joints shall be watertight.

H. Seal joints between precast concrete manhole sections with preformed rubber gaskets or joint sealant compound.

   1. Place joint sealant compound on lower section to be compressed by the weight of the upper section.

   2. Place rubber gasket in groove formed in spigot end. Equalize gasket tension.

I. Step placement:

   1. Install manhole sections with steps in proper vertical alignment.

   2. Manhole steps shall be placed perpendicular to the mainline channel, if possible, and not above any channels.

   3. The maximum separation between the top of rim and the first step shall be 26". From the floor to the bottom step shall be 20".

J. Install manhole frames and covers.

1. In all streets and private roadways the final top rim elevation of all manhole frames and covers shall be depressed 1/4" below the elevation of the adjacent street surface. Prior to placing final wearing surface, manhole covers shall be flush with the binder course (temporary surface).

2. Seal joint between manhole frame and manhole with joint sealant compound. All manhole frames and covers shall be bolted down, unless otherwise directed by the Township, utilizing three ¾" diameter anchor bolts.

3. All manholes frames shall be adjusted to finished street grade utilizing no more than two 2-inch (4" total thickness) adjusting rings or PennDOT approved metal extension rings. Brick and stone adjustments shall not be permitted.

4. If the proper adjustment cannot be achieved by the use of two rings, the cone section shall be removed and the proper barrel section inserted or the adjustment shall be poured in place.

5. All concrete adjusting rings shall be parged and plastered on the inside and outside with cement mortar one-half (½") inch in thickness, carefully spread and thoroughly troweled to a smooth surface on the inside only.

6. All manholes (except watertight)to be provided with manhole inserts.

7. Install Infra Riser adjusting rings in accordance with manufacturer's recommendations using approved butyl sealant between cone and ring and between rings.

K. New manholes constructed on existing pipelines:

1. Only cast-in-place manhole bases shall be installed over existing sanitary sewers, unless approved by the Township.

2. Carefully excavate around existing pipeline for placement of the new manhole base.

3. Take all measures necessary to control flow through the existing pipeline and to prevent leakage into the new base.

4. After completion of the manhole, carefully saw and remove the top portion of the existing pipeline.

5. No materials, construction debris, or ground and surface water shall enter the existing pipelines.

6. Upon completion of the connections, a properly sized plumber's stopper shall be placed in the new line and be adequately braced to prevent a "blow-out".

7. The stopper shall not be removed until written permission is granted by the Township.

L. Concrete wall penetration shall be cored at the sizes and locations indicated on the drawings or as recommended by the seal manufacturer. Place water tight seals in the concrete walls in

accordance with manufacturer's requirements. The Township shall be notified prior to penetration of existing facilities.

M. New manholes constructed downstream of force main discharges must be lined. The Township will determine the number of lined manholes required in these locations.

1. Lining system shop drawings must be approved prior to installation.

2. Certified welders will perform any field welding of joints.

3. All defects found during inspection shall be repaired.

N. All new wet wells for pump stations shall be lined.

3.06 SUPPORT OF EXCAVATION: Section 02221.

3.07 CONTROL OF EXCAVATED MATERIAL: Section 02221.

3.08 DEWATERING: Section 02221.

3.09 SHALLOW MANHOLES

A. All manholes less than five (5') feet in vertical height shall have a flat top section without a cone transition section and shall be constructed in accordance with Standard Detail 02601-4.

3.10 BACKFILLING

A. Backfill only after examination of the manhole by the Township.

B. Perform backfilling as specified in Section 02221.

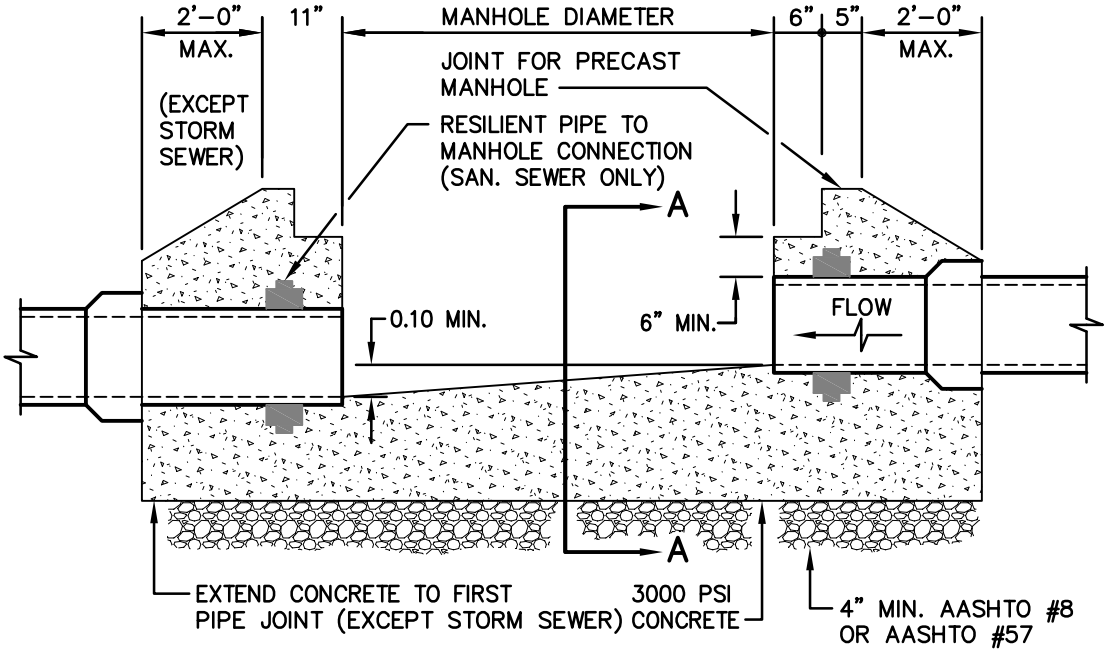
3.11 DISPOSAL OF EXCAVATED MATERIAL: Section 02221.

3.12 RESTORATION OF SURFACE AREAS

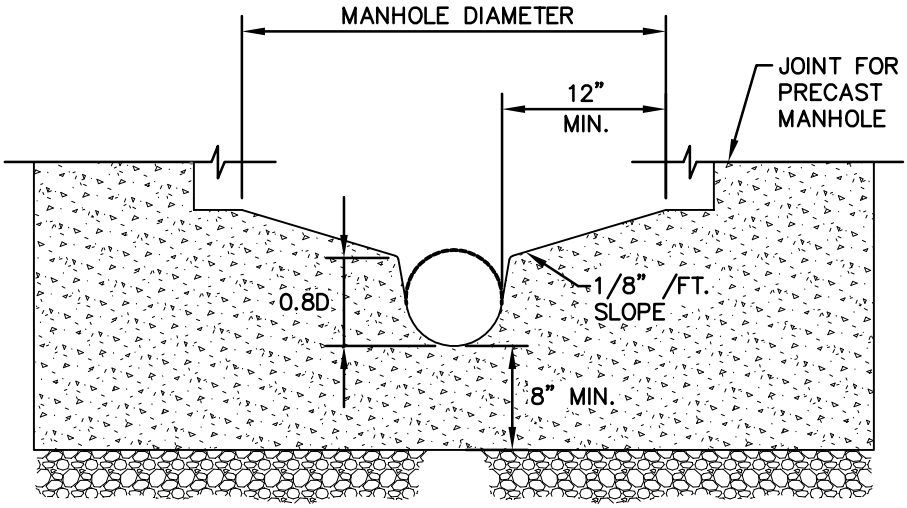
A. Restore paved areas as specified in Section 02575.

B. Restore unpaved surfaces as specified in Section 02221.

END OF SECTION



ELEVATION



SECTION A–A

D = PIPE INSIDE DIAMETER

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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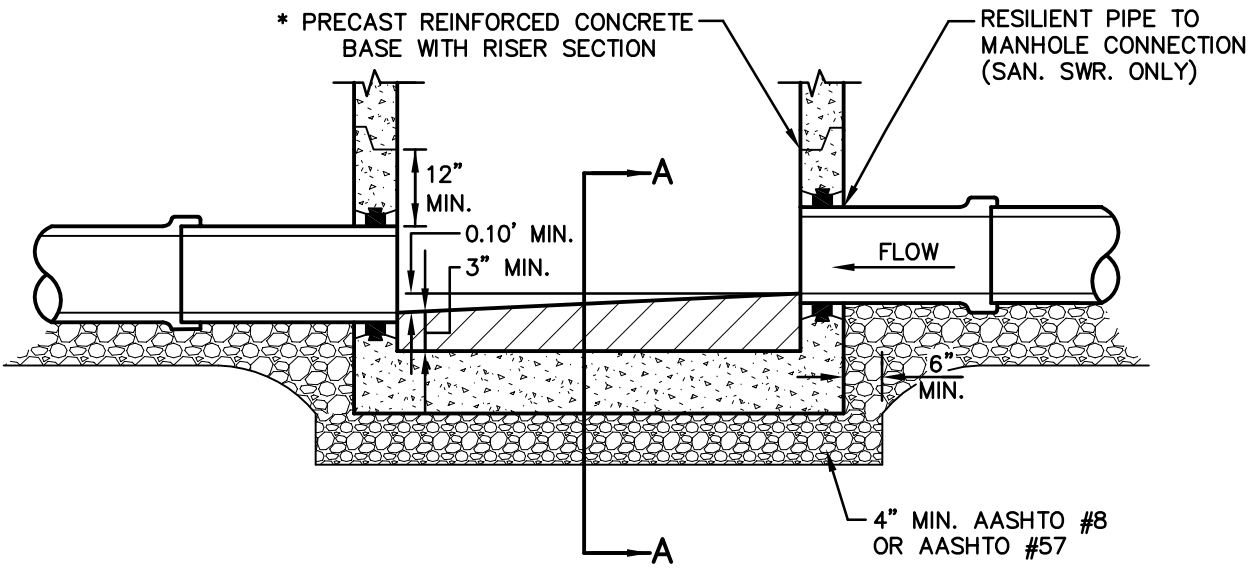
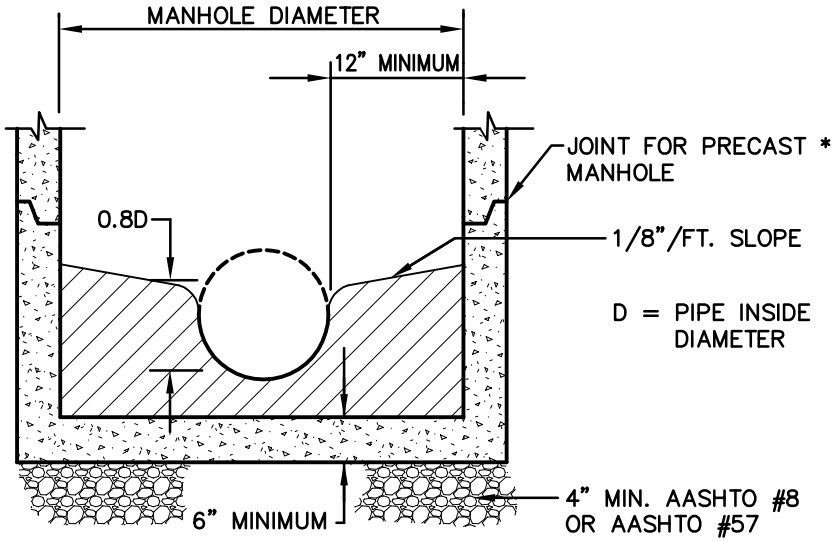
CAST-IN-PLACE MANHOLE BASE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-1
FILE NO.	1204.9.02.00



ELEVATION



SECTION A–A

* DOUBLE RAMNECK BETWEEN ALL MH SECTIONS

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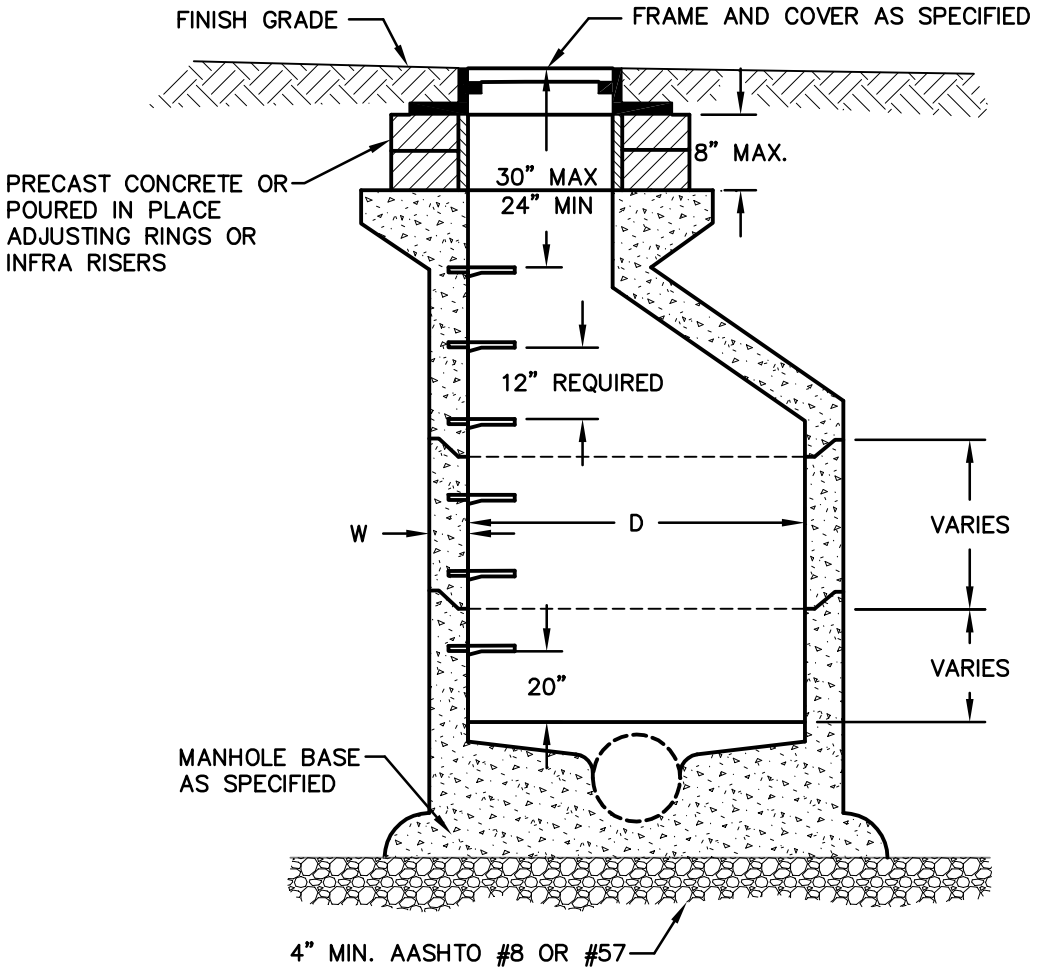
PRECAST MANHOLE BASE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-2
FILE NO.	1204.9.02.00



D	W
4'–0"	5"
5'–0"	6"
6'–0"	7"

* DOUBLE RAMNECK BETWEEN ALL ADJUSTMENTS AND FRAME

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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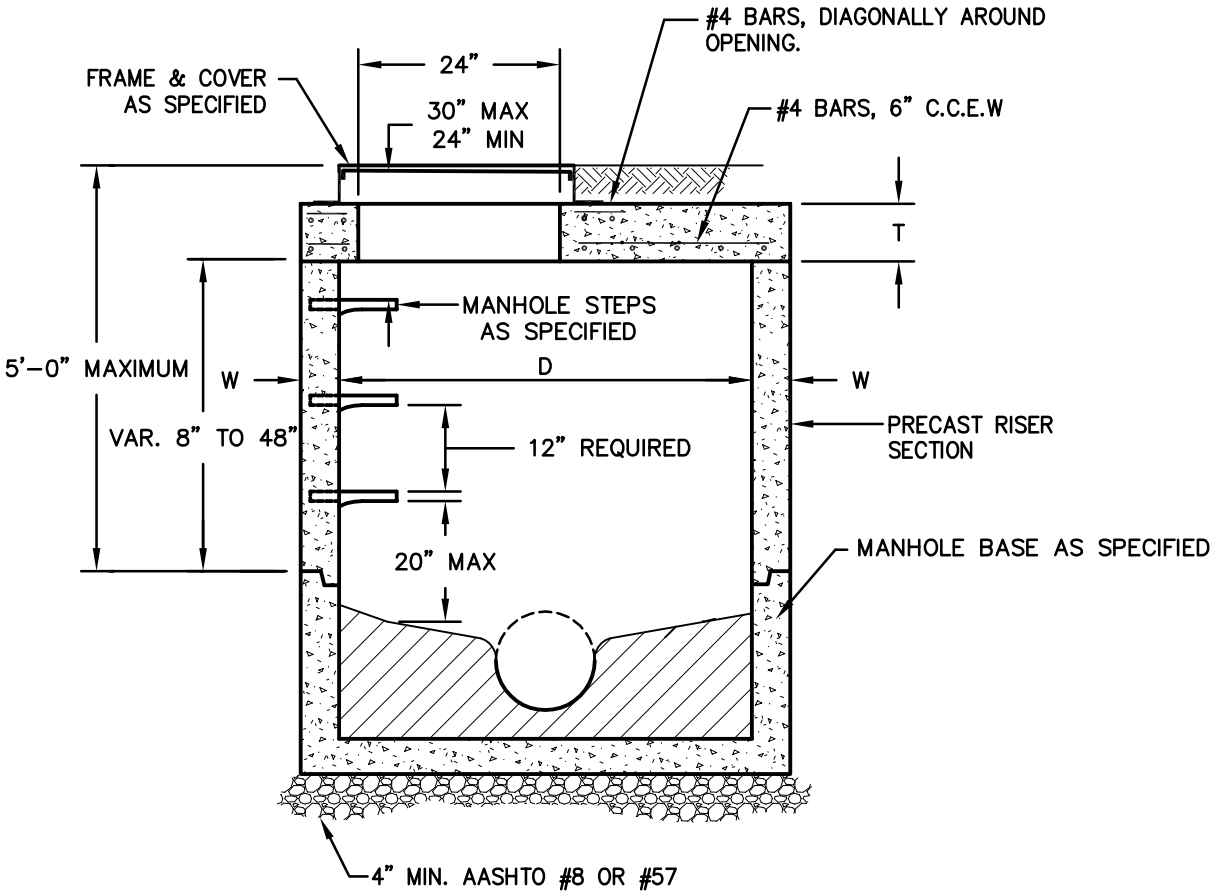
STANDARD MANHOLE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-3
FILE NO.	1204.9.02.00



D	W	T
4'-0"	5"	6"
5'-0"	6"	8"
6'-0"	7"	8"

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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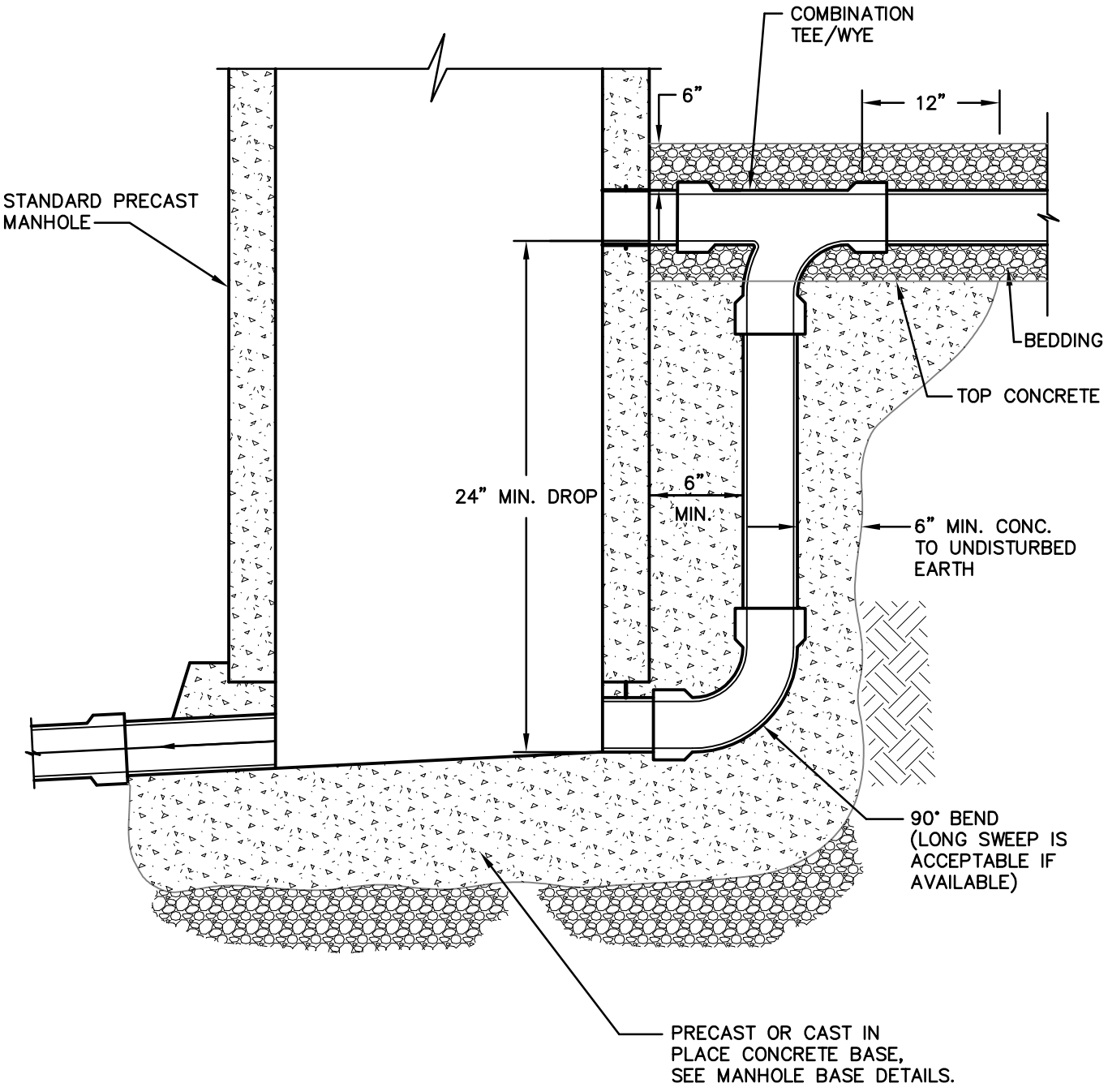
STANDARD SHALLOW MANHOLE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-4
FILE NO.	1204.9.02.00



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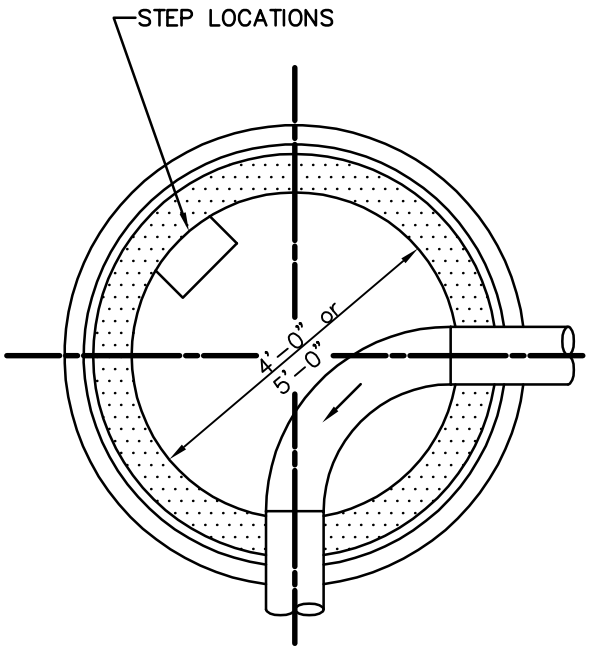
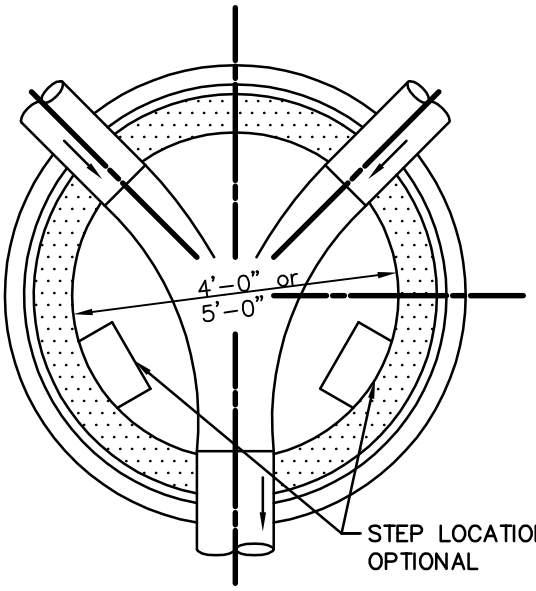
DROP CONNECTION DETAIL

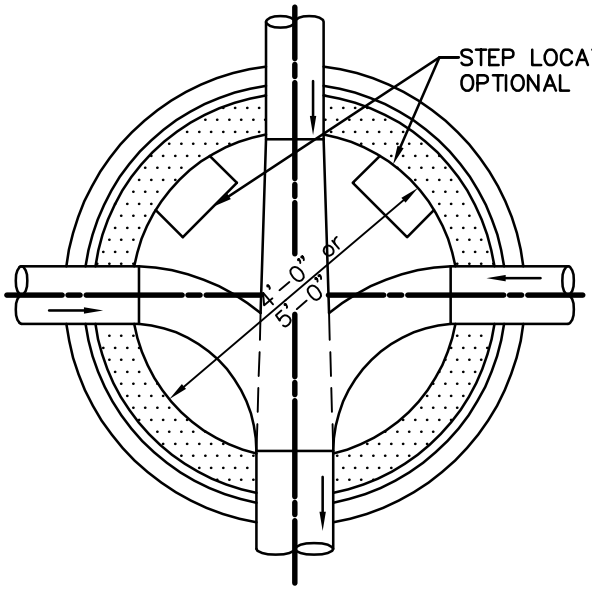
W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

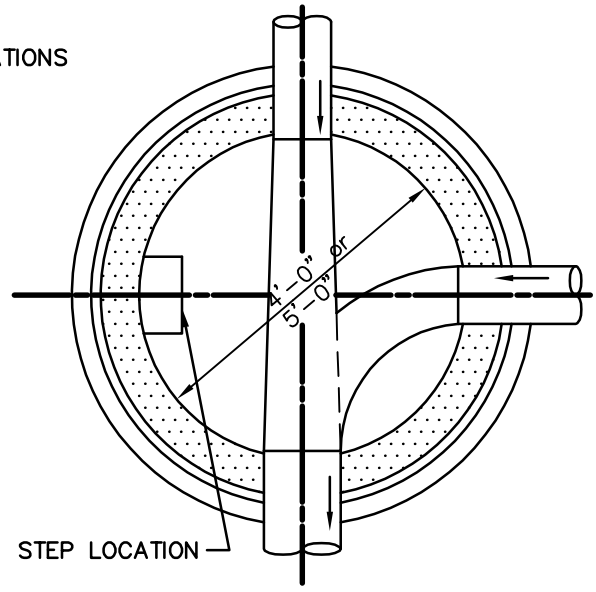
DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-5
FILE NO.	1204.9.02.00





NOTE: ALL BENCHES SHALL
SLOPE @ 1/8" / 1' TOWARD
FLOW CHANNEL





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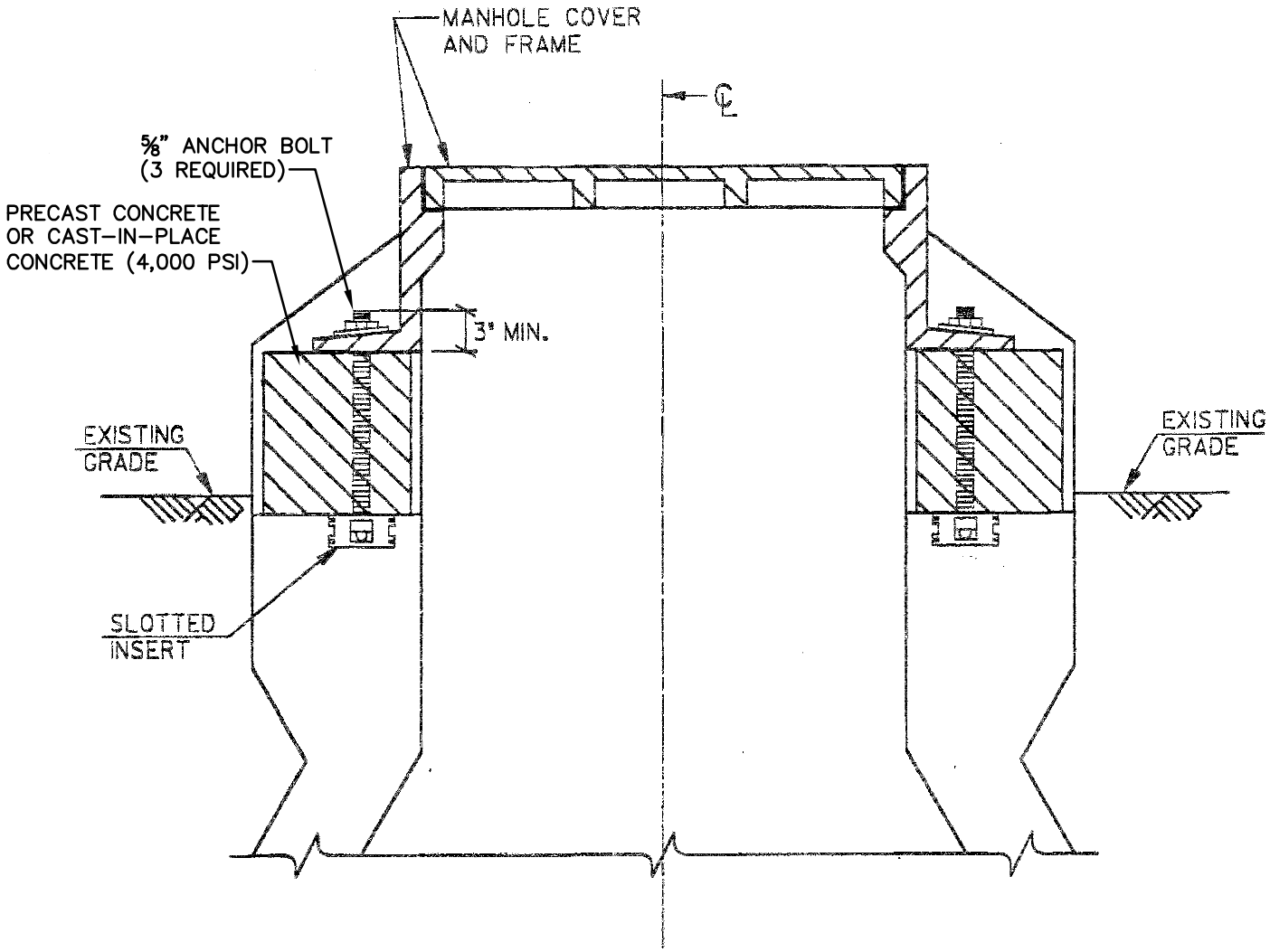
MANHOLE CHANNEL CONFIGURATIONS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-6
FILE NO.	1204.9.02.00



MANHOLE COVER WITH ANCHOR BOLT

NO SCALE

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.

Excellence in Civil Engineering

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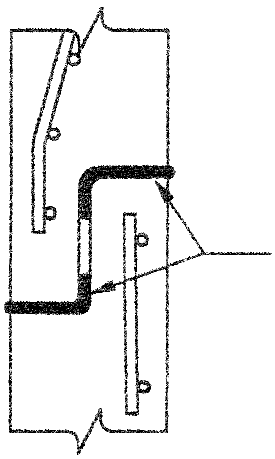
MANHOLE COVER ANCHOR BOLT/ ADJUSTMENT DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-7
FILE NO.	1204.9.02.00



JOINT SHALL BE SEALED WATERTIGHT BY APPLICATION OF PREFORMED JOINT SEALING COMPOUND. JOINT SEALANT COMPOUND SHALL "SQUEEZE-OUT" ON BOTH SIDES OF JOINT. JOINT SEALANT SHALL BE "RUB'R NEK" OR EQUAL.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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PRECAST MANHOLES
TYPICAL ALL JOINTS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02601-8
FILE NO.	1204.9.02.00

SECTION 02602

STORM INLETS, CATCH BASINS, ENDWALLS

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Storm drainage inlets
2. Storm drainage catch basins
3. Storm drainage pipe endwalls
4. Pipe culvert end sections

B. Related work specified elsewhere:

1. Trenching, backfilling and compacting:	Section 02221
2. Soil Erosion and Sedimentation Control	Section 02270
3. Finish grading, seeding and sodding:	Section 02485
4. Bituminous paving and surfacing:	Section 02500
5. Manholes:	Section 02601
6. Storm drain pipe:	Section 02618
7. Plain and reinforced concrete:	Section 03000
8. Cement concrete for utility construction:	Section 03050

C. Definitions: NONE

D. Applicable Standard Details:

02602-1 Inlet/Storm Pipe Installation Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications
Publication 72M, Standards for Roadway Construction

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

A36	Specifications for Carbon Structural Steel
A47	Specifications for Ferrite Malleable Iron Castings
A48	Specifications for Gray Iron Casting
A185	Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement
A536	Specifications for Ductile Iron Castings

A615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
B221 Aluminum-Alloy Extruded Bars, Rods, Shapes, and Tubes (Alloy 6061-T6)
C32 Specifications for Sewer and Manhole Brick
C270 Specifications for Mortar for Unit Masonry

3. Pennsylvania Code

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

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from material suppliers attesting that materials provided meet or exceed specification requirements.

B. Shop Drawings:

1. Submit detailed Shop Drawings, including reinforcing steel details.

C. Submit Concrete Mix Designs, certified results of comprehensive strength tests certified field tests and copies of batch slips for all cast-in-place inlets, catch basins and endwalls.

1.04 JOB CONDITIONS

Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Precast Concrete Units:

1. After fabrication and curing, transport the units to the job site. Protect until required for installation.

2. Handle to avoid damage to surfaces, edges and corners and to avoid creation of stresses within the units.

B. Inspections:

1. Inspection by the Township will, at a minimum, be made of materials upon delivery to the job site; of the subgrade, prior to construction or placement; and of the completed structure, prior to backfill.

2. Precast cement concrete products shall be subject to rejection for failure to conform with these specifications or if any one of the following conditions is noted:

a. Fractures or cracks passing through the wall, except for a single end crack that does not

exceed the depth of the joint.

b. Defects that indicate incorrect proportioning, mixing, and molding.

c. Surface defects larger than ½" diameter indicating honey-combed or open texture.

d. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.

3. Concrete Testing (For Cast-In-Place Work): Section 03000, Paragraph 3.11.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Crushed Stone Subbase:

1. AASHTO No. 8 or 57, Type C, Crushed Stone or Gravel aggregate, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

B. Brick: ASTM C32 Grade SS, solid.

C. Masonry Mortar: ASTM C270, Type S.

D. Malleable Iron Castings: ASTM A47, Grade 35018, Domestic.

E. Ductile Iron Castings: ASTM A536, Grade 60-40-18, Domestic.

F. Structural Grade Carbon Steel: ASTM A36.

G. Cast-in-Plac:oe Cement Concrete: Section 03050.

H. Cast Gray Iron Castings: ASTM A48

2.02 FABRICATIONS

A. Precast Cement Concrete Units:

1. Comply with the requirements of Section 714, Publication 408 Specifications. Concrete shall be Class AA, unless otherwise specified.

2. All reinforcing shall comply with the requirements of Publication 72M.

3. 6 foot inlets shall be similar in all respects to standard inlets except that the longitudinal dimension shall be increased by 24".

4. Modified boxes (PennDOT Type 1, 2 or 3, Modified Type I or Modified Type II) shall have reinforced cover adjustment slabs in accordance with Details in Publication 72M.

B. Pipe Culvert End Sections:

1. Concrete or Metal - Comply with the requirements of Standard Drawing RC-33M, Publication 72M. Metal end sections are prohibited unless specific approval by the Township is granted.

2. Polyethylene end sections shall have smooth interior and be anchored at the flared end. Polyethylene end sections are prohibited, unless specific approval by the Township is granted.

C. Inlet Grates:

1. Comply with the requirements of Standard Drawing RC-34M, Publication 72M, PennDOT approved diagonal or bicycle safe grates only.

2. 6 foot inlet grates shall be similar in all respects to standard inlet grates except that the longitudinal dimension shall be increased by 24".

3. Inlet grates in traffic areas shall be capable of handling HS-25 loading.

4. Welded structural steel grates and frames shall be coated with bituminous paint. All iron castings shall be furnished unpainted.

D. Adjustments

1. Precast Cement Concrete Grade Adjustment Risers: Risers shall be cast from 4000 psi concrete (28-day compressive strength), shall be a minimum of 2" thick, and shall be reinforced as per ASTM A478.

2. Brick adjustments are not permitted.

3. Infa-Riser adjustment rubber rings manufactured by East Jordan Iron Works, East Jordan, Michigan, or approved equal, may be substituted for concrete rings if approved by the Township.

E. Outlet Structures

1. Precast concrete or cast-in-place concrete in accordance with Paragraph A.

2. Construct outlet structures to dimensions shown on the drawings.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavate as specified in Section 02221.

B. Excavate at location marked in the field.

C. Excavate to the required depth and grade for the bottom of the unit plus that excavation necessary for placement of base material.

3.02 CONSTRUCTION

A. Construct inlets and catch basins of either precast cement concrete sections or of cast-in-place cement concrete, and of the type indicated on the drawings.

1. Place precast units on a minimum 4" compacted crushed stone base.

2. Construct cast-in-place units on a minimum 4" compacted crushed aggregate base.

3. Pour channels in inlet boxes to channel flow of water to the outlet pipe and to prevent water from standing in box.

4. Unless units are cast in place, use precast cement concrete grade adjustment risers or Infra-Riser to adjust to grade. Mortar concrete risers in place.

5. Precast inlet tops shall be aligned with base.

6. Place bicycle safe grates in all paved (present or future) areas.

B. Construct endwalls to the dimensions and design indicated on Standard Drawing RC-31M, Publication 72M, and of the type shown on the drawings. Construct endwalls of monolithically cast reinforced concrete.

C. Do not permit pipes to project more than 3" into inlets. Do not expose end of pipe through faces of endwalls.

D. Where indicated on the drawings, provide pipe culvert end sections of the design and dimensions of Standard Drawing RC-33M, Publication 72M.

E. Install polyethylene end sections in accordance with manufacturer's instructions, bedded and anchored as required.

F. Inlet grates shall be constructed flush with the temporary binder course surfaces. Upon final paving, inlet grate will be "sumped" below finished grade.

G. Guards shall be provided on all entrances and discharge structures. The guard bars shall be one-half inch (½") diameter galvanized bars on six inch (6") centers attached to the structure with three eighth inch (3/8") diameter stainless steel anchors.

H. Construct basin outlet structures with inverts, grates and openings at the required elevation shown on the drawings. Connect to new or existing outlet pipes, relaying or adding pipe as needed to meet the structure.

I. At junction of different sized pipes, the pipe crowns should match.

3.03 BACKFILLING

A. Backfill structures only after inspection by the Township.

B. Perform backfilling and compaction as specified in Section 02221.

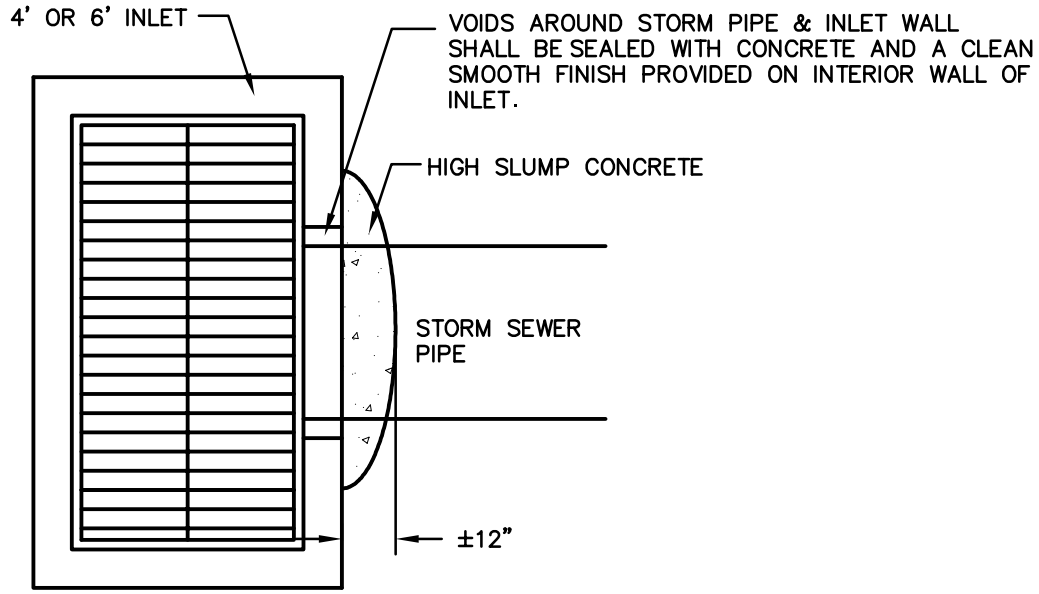
3.04 DISPOSAL OF EXCAVATED MATERIAL: Section 02221.

3.05 RESTORATION OF SURFACE AREAS

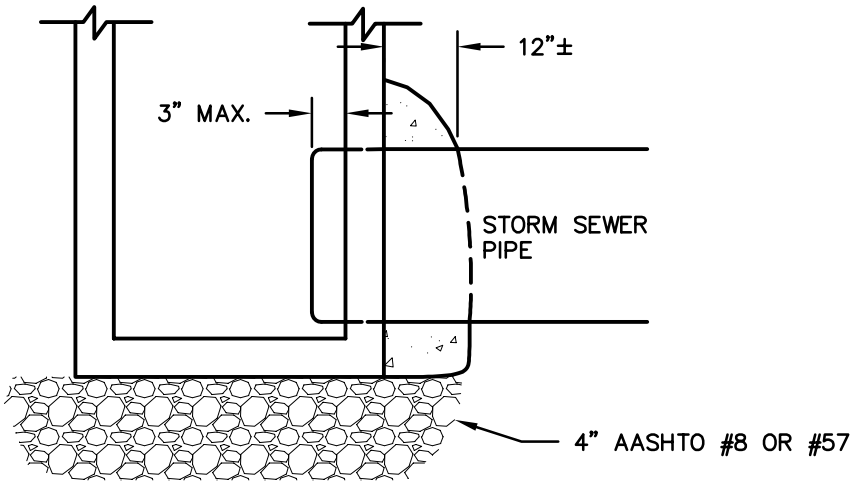
A. Restore paved areas in accordance with Section 02575.

B. Restore unpaved surfaces as specified in Section 02221.

END OF SECTION



PLAN VIEW



ELEVATION

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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INLET/STORM PIPE INSTALLATION DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02602-1
FILE NO.	1204.9.02.00

SECTION 02610

SANITARY SEWER PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Sanitary sewer gravity pipelines
2. Sanitary sewer pressure pipelines
3. Laterals/service connections

B. Related work specified elsewhere:

1. Boring and jacking:	Section 02150
2. Trenching, backfilling and compaction:	Section 02221
3. Soil erosion and sedimentation control	Section 02270
4. Finish grading, seeding and sodding:	Section 02485
5. Trench paving and restoration:	Section 02575
6. Manholes:	Section 02601
7. Sewer pipeline testing:	Section 02651
8. Cement concrete for utility construction:	Section 03050

C. Definitions:

1. Dimension Ratio (DR) - Constant ratio between outside pipe diameter and wall thickness.

2. Standard Dimension Ratio (SDR) - Constant ratio based on Renard numbers and rated for pressure.

D. Applicable Standard Details:

02610-1	Lateral Detail
02601-2	Lateral Detail with Cleanout
02601-3	Subbase Drain Detail
02601-4	Combination Air Release Valve

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American National Standards Institute (ANSI):

A21.4	Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings
A21.10	Gray-Iron and Ductile-Iron Fittings

A21-11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for water or other liquids.

2. American Society for Testing and Materials (ASTM)

A53 Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless
A74 Specification for Cast Iron Soil Pipe and Fittings
C14 Specification for Concrete Sewer, Storm Drain and Culvert Pipe
C76 Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
C425 Specification for Compression Joints for Vitrified Clay Pipe and Fittings
C443 Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets
C564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
D1785 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and120
D1869 Specification for Rubber Rings for Asbestos-Cement Pipe
D2241 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
D2321 Recommended Practice for Underground Installation of Flexible Termoplastic Sewer Pipe
D2564 Specifications for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
D2855 Recommended Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
D3034 Specification for Type PMS Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D3139 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F679 Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

3. American Water Works Association (AWWA):

C301 Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids
C504 Rubber Seated Butterfly Valves
C507 Ball Valves, 6" through 48"
C900 Poly (Vinyl Chloride) PVC Chloride (PVC) Pressure Pipe, 4" through 12" for Water

B. Materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder will be rejected.

1.03 SUBMITTALS

A. Certificates:

1. Submit 2 copies of each manufacturer's certification attesting that the pipe, pipe fittings, joints, joint gaskets and lubricants and detectable warning tape meet or exceed these requirements.

B. Manufacturer's Literature:

1. Submit 2 copies of the manufacturer's recommendations on installation, handling and storage of materials.

C. Details of bypass pumping operation and pump curves. The Contractor shall analyze the existing flow rate and provide pumps with enough capacity to handle daily fluctuations.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling:

1. Do not place materials on private property without written permission of the property owner.

2. During loading, transporting and unloading, exercise care to prevent damage to materials.

3. Do not drop pipe or fittings. Avoid shock or damage at all times.

4. Take measures to prevent damage to the exterior surface or internal lining of the pipe.

B. Storage:

1. Do not stack pipe higher than recommended by the pipe manufacturer.

2. Store PVC pipe and gaskets for mechanical and push-on joints in a cool, dry location out of direct sunlight and not in contact with petroleum products.

3. Place on flat surface with proper support.

PART 2 - PRODUCTS

2.01 VITRIFIED CLAY GRAVITY SEWER PIPE - NOT PERMITTED

2.02 CEMENT CONCRETE SEWER PIPE - NOT PERMITTED

2.03 DUCTILE IRON PIPE

A. Pipe:

1. ANSI A21.51, Thickness Class as indicated on the drawings, minimum Class 52.

2. Standard cement-mortar lining, ANSI A21.4.

3. Standard bituminous coating, interior and exterior.

B. Fittings:

1. Ductile-iron or gray-iron, ANSI A21.10.
2. Provide with standard lining and coating as for ductile iron pipe.

C. Joints:

1. Where not specifically shown on the drawings, pipe joints may be either mechanical joint or push-on joint.

2. Fitting joints shall be mechanical joint, unless specified otherwise.

D. Rubber gaskets, lubricants, gland, bolts and nuts: ANSI 21.11.

2.04 POLY (VINYL CHLORIDE) (PVC) SEWER PIPE

A. Gravity Sewer Pipe and Fittings:

1. Pipe 15" diameter and smaller: ASTM D3034, minimum SDR-35.

2. Pipe 18" to 27" diameter: ASTM F679.

3. Flexible Elastomeric Seals: ASTM D3212
Seal Material: ASTM F477

4. Where specifically approved by the Township, pipe 15” and smaller: ASTM F789 may be substituted.

B. Pressure Sewer Pipe and Fittings:

1. Pressure-Rated:

a. ASTM D2241, Pressure rating as indicated on the drawings, 125 psi minimum.

2. Schedule-Rated:

a. ASTM D1785, Schedule rating as indicated on the drawings, Schedule 40 minimum.

3. Dimension-Rated:

a. AWWA C900, SDR 18 minimum(150 psi); for 4" diameter and larger.

b. AWWA DR 21 minimum (200 psi), for 2" diameter and smaller.

4. Flexible Elastomeric Seals: ASTM D3139
Seal Material: ASTM F477

2.05 CAST IRON SOIL PIPE (PLUMBING)

A. Pipe and Fittings: ASTM A74, Service Class:

1. Hub and spigot or double hub.

B. Joints:

1. Gaskets: Double-seal compression gaskets conforming to physical requirements of ASTM C564.

2.06 STEEL CASING PIPE: Section 02150.

2.07 FLEXIBLE COUPLINGS: Leak proof, PVC compound with stainless steel clamps suitable for the pipe materials as manufactured by Fernco, Inc., Davison, MI, or approved equal, as approved by the Township.

2.08 CLEANOUTS

A. Cleanout riser pipe and fitting shall be PVC SDR 35.

B. Cleanout caps:

1. All cleanout PLUGS shall be brass, counter sunk, designed for 4" riser pipe and meeting Southern Code service weight standards. Use General Engineering Company (GENECO), Frederick, MD, or approved equal.

2.08 SADDLES

A. Model EH, as manufactured by Geneco Products, 55-59 South Carroll Street, Frederick, MD, 21701, or approved equal.

2.09 WARNING TAPE

A. All gravity and pressure sanitary sewer mains shall be marked with Detectable Warning Tape. Detectable warning tape shall be metallic and encased in a protective, high visibility, green color coded inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil. Tape width shall be a minimum 2 inches and have the words "Caution Buried Sewer Line Below", or similar imprinted. Tape shall consist of minimum 5-mil (0.005") overall thickness, with no less than a 35 gauge (0.00035") solid aluminum foil core. 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 elements normally encountered in the soil. All printing shall be encased to avoid ink rub-off. Depth shall be in accordance with the manufacturers specifications. Tape shall be approved by the Engineer prior to installation.

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.

D. All pressure sewer mains shall have Tracer Wire installed in accordance with Section 02722.

2.10 VALVES

A. Plug valves

1. Plug valves shall be of the non-lubricated, eccentric type, and shall be designed for a working pressure of 175 psi for valves 12" and smaller. Valves shall be of round port design. If a rectangular style design is employed, port area shall be a minimum of 100% of the corresponding pipe area.

2. Valves shall provide tight shut-off with rated pressure from either direction, where required. The plug valves shall be manufactured by Dezurik of Sartell, MN, Keystone Valve of Houston, TX, or approved equal.

3. Plug valves shall be furnished with replaceable permanently lubricated sleeve-type 18-8 stainless steel bearings in the upper and lower journals. Valve seats shall be nickel with raised surface completely covered to ensure that the plug face contacts only nickel.

4. Manual gear operators shall be totally enclosed worm and gear type, permanently lubricated. Manual operator components shall withstand, without damage, a pull of 80 to 200 lbs. on the handwheel, with buried service gear units capable of withstanding input torque on the operating nut as required by AWWA C504, Section 3.8.3 and AWWA C507, Section 11, Paragraph 11.9. Gear segment shall be of ductile iron, ASTM A536, Grade 56-45-12 supported on bronze bushings.

5. Plug valves shall be tested in accordance with AWWA C504, Section 5. The leakage test shall be applied to the face of the plug tending to unseat the valve. Certified copies of reports covering proof of design testing as described in Section 5.5 shall be provided to the Township.

B. Combination Air Release Valves

1. Cast iron body and cover, stainless steel float, orifice sent linkage mechanism, mountings and trim. Buna-N orifice valve. 150 psi minimum rated working pressure.

2. Orifice size as indicated on drawings.

2.11 CAST/DUCTILE COUPLINGS

A. For joining steel, cast iron, ductile iron, extra strength vitrified clay or asbestos cement pipe to PVC materials, use cast couplings Model CC-441 manufactured by Smith Blair, Inc., PO Box 5337, Teyallana, TX 79505. Model No. Nylon 242 manufactured by JCM Industries, PO Box 1220, Nashville, TN 75569 or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform trench excavation as specified in Section 02221.

B. Unless otherwise required by the Township, provide for a minimum cover of 4 feet above the top of pipe laid in trenches in non-traffic areas, and 5 feet in traffic areas.

C. Provide Type IV bedding as specified in Section 02221. Place and compact so that the pipe can be laid to the required tolerances in accordance with ASTM D2321.

D. Provide Type V bedding for 2" dia. And smaller pressure sewers, unless otherwise specified.

3.02 LAYING PIPE IN TRENCHES

A. Give ample notice to the Township in advance of pipe laying operations, minimum seventy-two hours.

B. Maintain no less than three batter boards, at 25' maximum interval, or their equivalent between adjoining manholes during pipe laying operations, or use laser alignment instruments.

C. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe or fittings.

D. Lay pipe proceeding up-grade with the bell or groove pointing upstream, unless approved by the Township.

E. Lay pipe to a true uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

F. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

G. Clean and inspect each section of pipe before joining to mark on pipe. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Use lubricant recommended by the pipe and fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe can not be fully inserted into the bell, disassemble joint, inspect for damage, reclean joint components, and reassemble joint.

H. Assemble joints in accordance with recommendations of the manufacturer.

1. Push-on joints:

a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.

b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.

c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket using reference mark at the spigot end of the pipe as a guide. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.

d. Pipe gaps in excess of ¼" in length will not be accepted.

2. Mechanical joints:

a. Wash the socket and plain end. Apply a thin film of lubricant. Slip the gland and gasket over the plain end of the pipe. Apply lubricant to gasket.

b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.

c. Slide the gland into position, insert bolts, and finger-tighten nuts.

d. Bring bolts to uniform tightness. Tighten bolts 180 degrees apart, alternately. Torque Required:

Bolt Size, Inches	Torque, Ft., Pounds
5/8	45-60
3/4	75-90
1	100-120

3. Solvent cemented joints:

a. Chamfer and deburr pipe. Clean socket and plain end. Measure and mark the socket depth on the outside of the pipe.

b. Apply primer to inside socket surface using a scrubbing motion to ensure penetration. Repeated applications may be necessary. Soften surface of male end of pipe to depth of fitting socket by applying a liberal brush coat of primer. Do not pour primer on. Assure entire surface is well softened.

c. Repeat application of primer to inside socket surface, then apply cement to pipe while surfaces are still wet with primer. Apply cement uniformly taking care to keep excess cement out of socket.

d. Immediately after applying the last coat of cement to the pipe, and while both the inside

socket surface and outside pipe surface are soft and wet, forcefully seat the pipe into the socket. Turn the pipe 1/4 -turn during assembly to distribute cement evenly. Assembly should be completed within 20 seconds after the last application of cement. Insert pipe with a steady, even motion. Do not use hammer blows.

e. Hold joint in place until cement has set. Wipe excess cement from the pipe.

4. Coupled joints:

a. Assemble in accordance with the manufacturer's recommendations.

I. Disassemble and remake improperly assembled joints using a new gasket.

J. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed grade as shown on the drawings, or deflection of pipe joints, will be cause for rejection.

K. Place sufficient compacted backfill on each section of pipe, as it is laid, to hold firmly in place.

L. Clean interior of the pipe as work progresses. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.

M. Keep trenches and excavations free of water during construction.

N. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.

O. Joint Deflection:

1. When approved by the Township to deflect pressure sewer mains from a straight alignment horizontally or vertically, do not exceed the following limits:

a. Ductile Iron Pipe: <12" diameter - 5 degree maximum deflection per joint.
>12" diameter - 3 degree maximum deflection per joint

b. PVC Pipe: 4 degree maximum deflection per joint.

c. Reinforced Concrete Pipe: 1 degree maximum deflection per joint.

P. Make connections in accordance with the drawings, and perform any adjustments and ensure a watertight installation. Connections to existing sewers shall be made under the direct observation of the Township. Do <u>not</u> permit any water, earth, debris or other materials to enter the existing sewer system.

Q. As soon as connections are completed, install an adequately sized screwin plug in the existing manhole, tie-off with rope and brace to prevent a "blowout". The stopper is to prevent flow

from the new line from entering the existing system and it shall not be removed until authorization to do so is given by the Township. Routinely remove any accumulated ground and surface water from the line upstream and dispose of properly.

3.03 WYE BRANCHES AND TEES

A. Install wye branches or pipe tees at locations designated concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed.

B. For connections into an existing pipeline, where permitted by the Township, install a wye or tee with Smith Blair or JCM Industries couplings if connecting to vitrified clay or ductile iron pipe. Use PVC solid wall sleeve with gasket if connecting to PVC pipe.

C. Where specifically approved by the Township, for taps into an existing pipeline, core drill pipe and use a saddle wye or tee with stainless steel clamps and install watertight resilient boot. Mount saddles with gasket and secure with metal bands. Layout holes with a template and cut holes with a mechanical hole cutter.

D. Where lateral is not to be installed, install an approved watertight plug, braced to withstand pipeline test pressure thrust.

3.04 LATERALS

A. Construct laterals from the wye branch to a terminal point in accordance with Standard Detail 02610-1 and 02610-2, as specified. Lateral pipe shall be 6" diameter, unless otherwise approved.

B. Install an approved watertight plug, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary marker stake (minimum 2" x 2") extending from the end of the lateral to 1 foot above finished grade.

C. Vertical risers are not permitted.

D. Minimum slope for laterals is 1/8"/ft, unless approved otherwise for larger diameter laterals. The minimum depth under streets shall be 5’. Any deviations must be approved by the Township prior to installation.

E. Drop cleanouts are not permitted.

F. Cleanouts in driveways are not permitted, unless approved by the Township.

3.05 CLEANOUTS

A. Locate cleanout within 12 inches of street right-of-way and edge of sanitary sewer easement.

3.06 CAST-IN-PLACE CONCRETE CONSTRUCTION

A. Conform to the applicable requirements of Section 03050.

3.07 CRADLES AND ENCASEMENT

A. Provide concrete cradles and encasement for pipeline where indicated on the drawings, or as directed by the Township, and in accordance with Standard Detail NC3050-1.

3.08 THRUST RESTRAINT FOR PRESSURE PIPELINES

A. Provide all valves, tees, bends, caps, and plugs with concrete thrust blocks in accordance with Standard Detail 03050-3. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks to contain the resultant force and so pipe and fitting joints will be accessible for repair.

B. Furnish and install, tie rods, clamps, set screw retainer glands, or restrained joints if indicated on the drawings or required by the Township. Protect metal restrained joint components against corrosion by applying a bituminous coating.

3.09 AIR RELEASE OR COMBINATION AIR RELEASE AND VACUUM VALVES

A. Install air release or combination air release and air vacuum valves where shown on the drawings.

B. Construct air release valves including valve vault as shown on Standard Detail 02610-4. Valve and valve vault shall be vertical and plumb.

C. During project start-up, verify that there are no leaks in saddle or plumbing. Verify correct function of valves.

D. Pipe penetrations shall have a manhole boot-type seal.

3.10 CARRIER PIPE IN CASINGS: Section 02150.

3.11 STREAM CROSSINGS

A. Construct sanitary sewer pipeline stream crossings in accordance with Standard Details 02221-4 and/or 02221-5.

B. Provide concrete encased ductile iron pipe backfilled with minimum 3" size stone to the level of the stream bed, between the limits of the stream crossing.

C. Wetland crossings: See Standard Detail 02221-7

3.12 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after examination of pipe by the Township.

B. Backfill trenches as specified in Section 02221.

C. Install the tracer wire along the entire length of PVC force main on top of the pipe bedding but no deeper than 48 inches below finished grade. The pipe bedding (12" cover) shall maintain sufficient separation between the tape and the line.

3.13 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

B. Restore other areas in accordance with Section 02575.

3.14 BYPASS PUMPING

A. Provide one (1) reliable pump capable of handling the existing wastewater flows and daily fluctuations and enough discharge piping to bypass pump from upstream manhole to downstream manhole. Provide one (1) backup pump on-site or provide evidence of ability to obtain backup pump within 30 minutes in case of pump failure. Bypass pumping system shall not allow backup in collection system beyond two (2) manholes. Bypass piping shall be watertight and not allow any discharge to the surface. Any leaks in the system will be just cause to discontinue bypass operation and pipe installation and tie piping back into gravity flow.

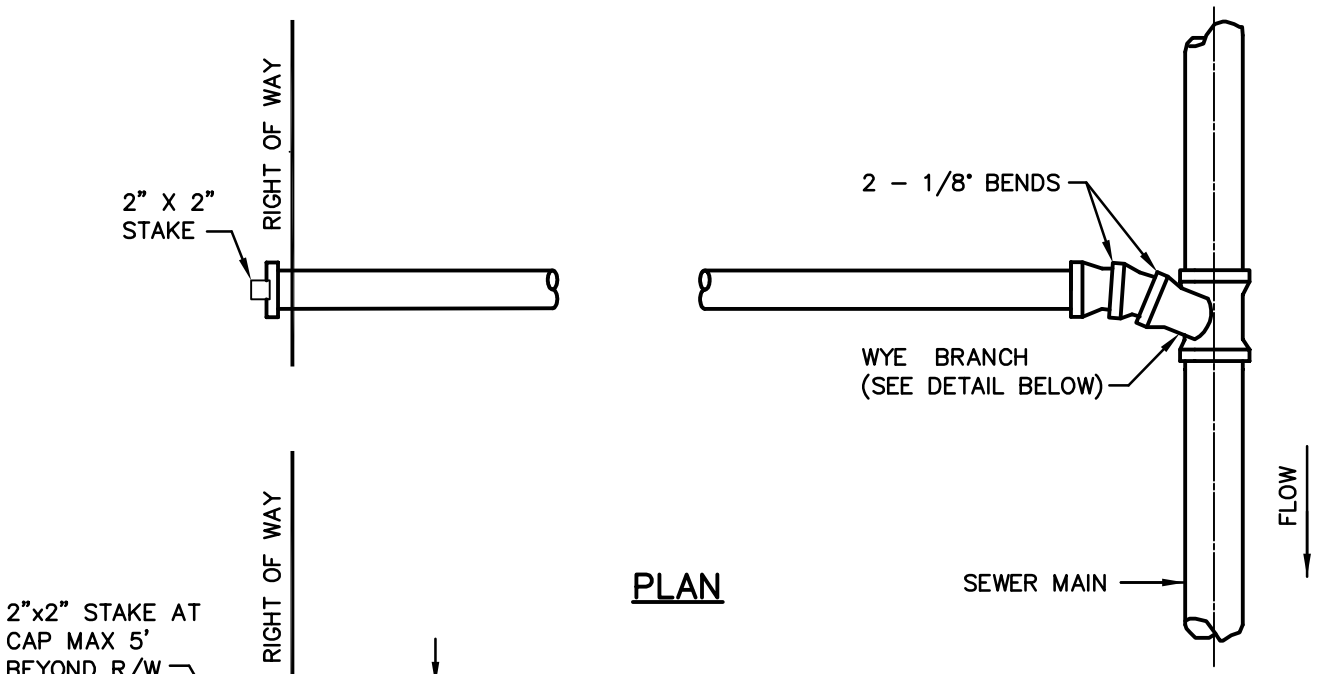
B. At the end of each workday, the bypass pumping shall stop and the new PVC piping shall be connected to the existing piping with a watertight flexible coupling. All trenches shall be properly backfilled and compacted except in the immediate area of the tie-in. Open trenches in traffic areas shall be protected with jersey barriers and steel plating and all trenches shall be protected with construction fencing.

C. The Contractor shall supply necessary equipment for bypassing operations; and inform the Township of such. Bypassing of service connections to be reconnected is not necessary, however; the Contractor will be responsible for notifying customers that their services will be interrupted. Service shall be restored at the end of each working day.

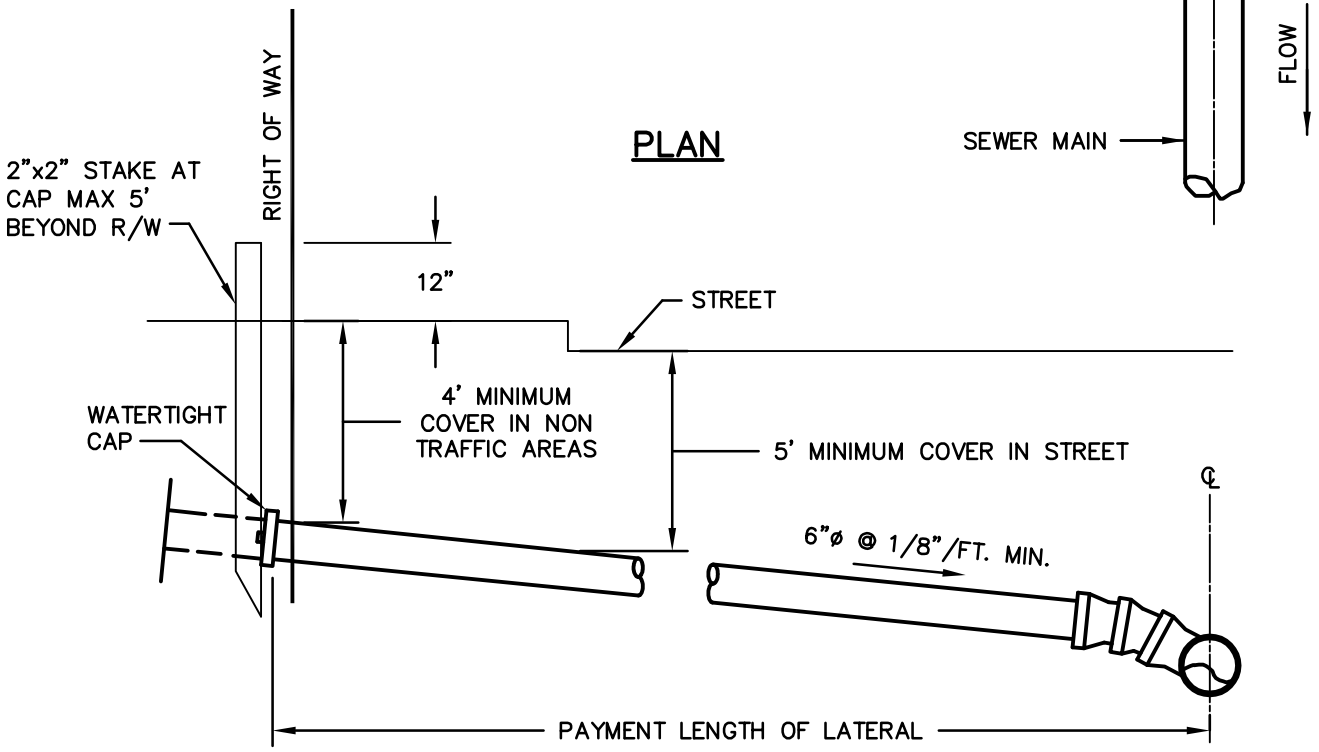
D. Contractor is responsible for design, installation and operation of all bypass pumping. Contractor's plan for proposed bypass pumping system shall include, but not be limited to the staging area for pumps, pump sizes and number to be used; power source and standby power source and schedule for installation and maintaining of bypass pumping lines. Contractor shall size pumps for wastewater flow bypass according to normal flows in the system. Contractor shall reconnect the sanitary sewer pipe at the end of each workday to prevent system overload caused by potential storm events.

E. Plugging the upstream pipe to prevent flow into the construction area is not acceptable in lieu of bypass pumping.

END OF SECTION



PLAN



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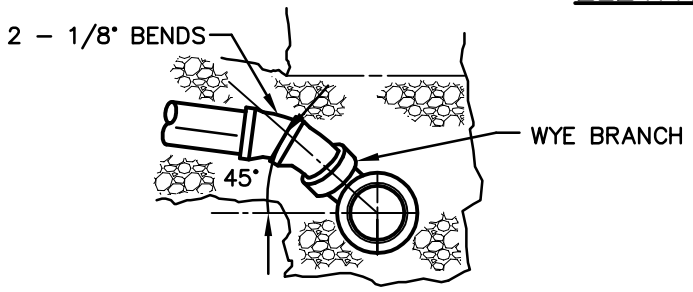


DETAIL

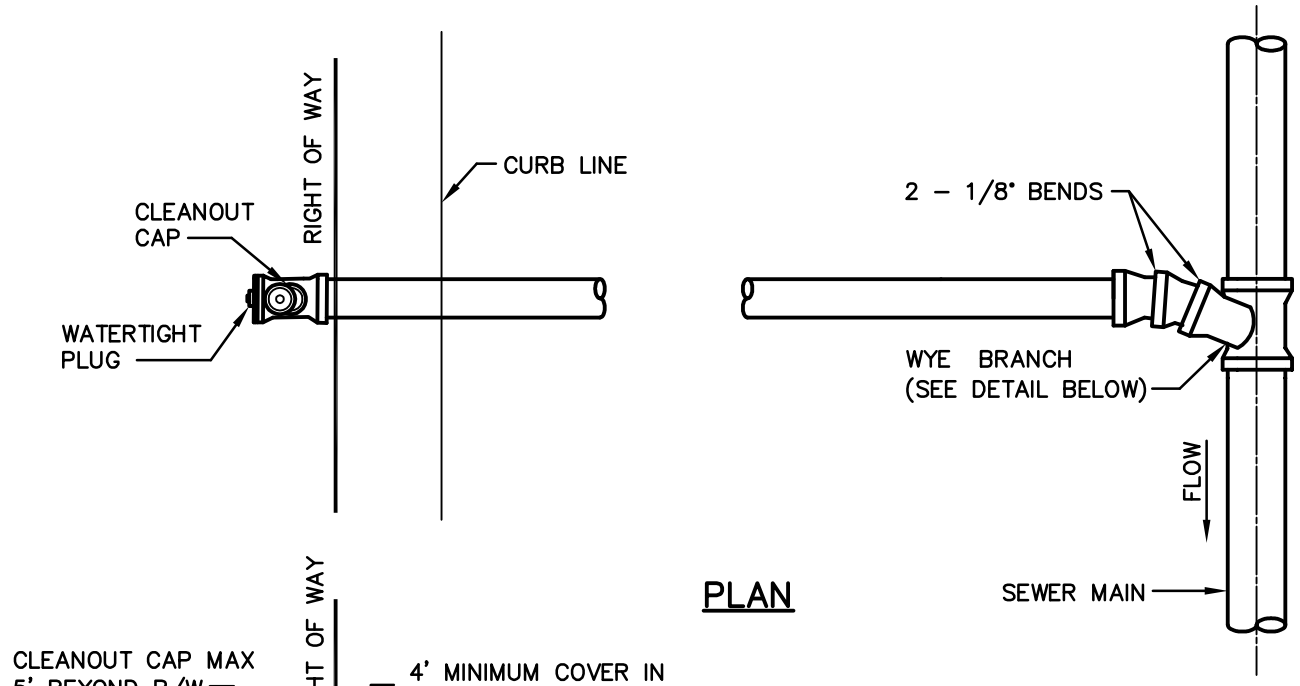
WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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

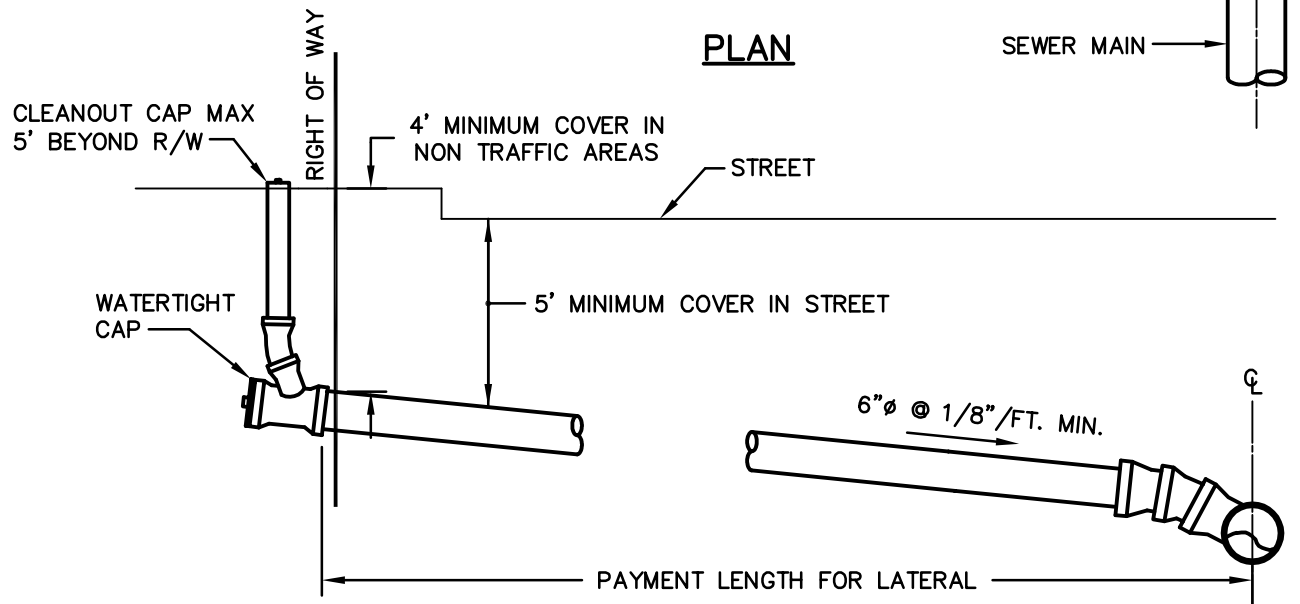
LATERAL DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02610-1
FILE NO.	1204.9.02.00



PLAN



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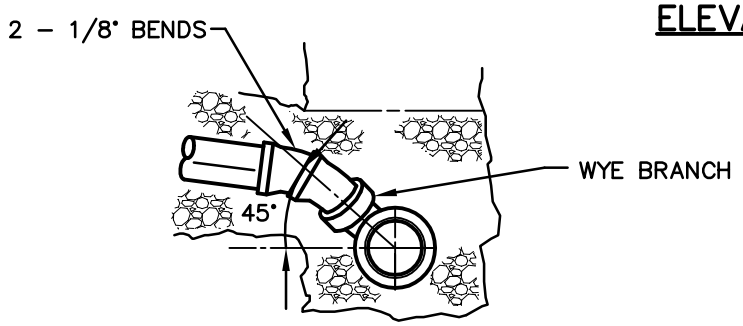

DETAIL

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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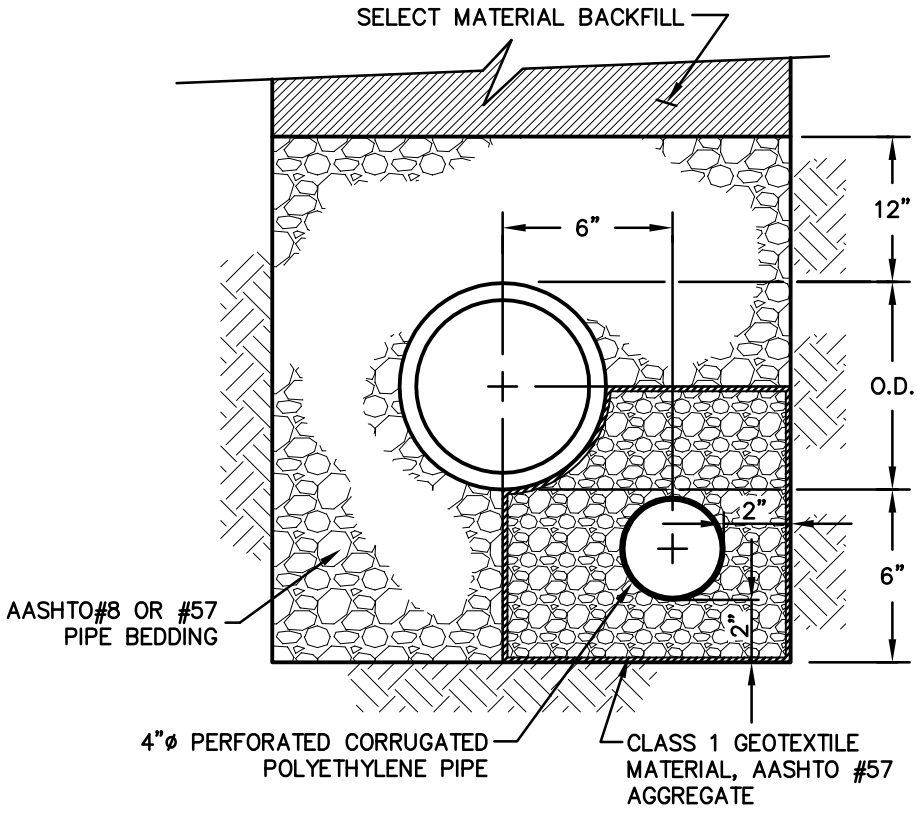
315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
WWW.CSDAVIDSON.COM

LATERAL WITH CLEANOUT DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02610-2
FILE NO.	1204.9.02.00



NOTES:
1. LOCATION OF SUBBASE DRAIN IN TRENCH TO BE MODIFIED TO SUIT FIELD CONDITIONS AND TIE INTO INLETS MANHOLES, OR OTHER EXISTING PIPING. POSITIVE FLOW MUST BE MAINTAINED.
2. SUBBASE DRAIN TO BE USED WITH TYPE IV BEDDING ONLY.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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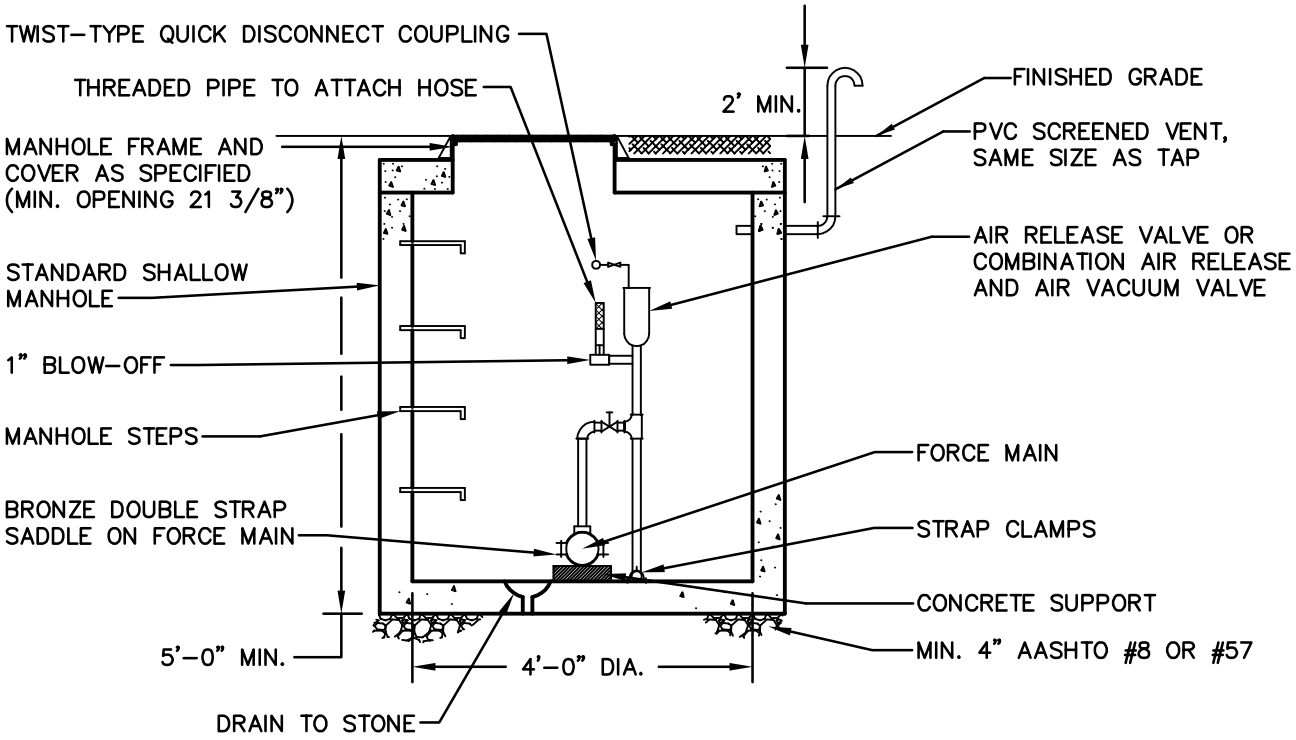
WWW.CSDAVIDSON.COM

SUBBASE DRAIN DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02610-3
FILE NO.	1204.9.02.00

THREADED PIPE TO
ATTACH HOSE



MAIN SIZE	TAP SIZE
4"–12"	2"
14"–20"	3"
24"–36"	4"

WEST MANHEIM TOWNSHIP 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
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COMBINATION AIR RELEASE VALVE

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02610-4
FILE NO.	1204.9.02.00

SECTION 02615

WATER MAINS

PART 1 - GENERAL

1.01 The work of this section includes the installing, testing and repairing of water mains.

1.02 All public water mains in the Township are owned and maintained by The York Water Company.

1.03 Township Road Occupancy Permit

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 All materials shall be in accordance with the requirements of The York Water Company.

PART 3 - EXECUTION

3.01 All work shall be performed in accordance with the requirements of The York Water Company.

END OF SECTION

SECTION 02618

STORM DRAIN PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Storm sewer pipelines

B. Related work specified elsewhere:

1.	Boring and jacking	Section 02150
2.	Trenching, backfilling and compaction:	Section 02221
3.	Soil Erosion and Sedimentation Control	Section 02270
4.	Finish grading, seeding and sodding:	Section 02485
5.	Trench paving and restoration:	Section 02575
6.	Manholes:	Section 02601
7.	Storm inlets, catch basins, endwalls:	Section 02602
8.	Cement concrete for utility construction:	Section 03050

C. Definitions:

1. Polyethylene pipe Type C - full circular cross-section with corrugated surface both inside and outside.

2. Polyethylene pipe Type S - full circular cross-section with outer corrugated pipe wall and smooth inner wall.

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications
Publication 72M, Standards for Roadway Construction

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

C76 Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
C507 Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
D2241 Specification for Poly Vinyl Chloride (PVC) Plastic Pipe (SDR-PR)
D2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and other

Gravity-Flow Applications
F405 Specification for Corrugated Polyethylene (PE) Tubing and Fittings
F667 Large Diameter Corrugated Polyethylene Tubing and Fittings

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

M36 Metallic (zinc or aluminum) coated corrugated steel culverts and underdrains
M246 Precoated galvanized steel sheet for culverts and underdrains
M252 Corrugated Polyethylene Drainage Tubing
M278 Class PS50 Polyvinyl Chloride (PVC) Pipe
M294 and MP6-95 Corrugated Polyethylene Pipe, 12" to 24" Diameter

1.03 SUBMITTALS

A. Certificates:

1. Submit two copies of manufacturer's certification attesting that the pipe, fittings, and joints meet or exceed specification requirements.

B. Manufacturer's Literature:

1. Submit two copies of the manufacturer's recommendations on installation, handling and storage of materials.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. During loading, transporting and unloading, exercise care to prevent damage to materials.

B. Do not drop pipe or fittings. Avoid shock or damage at all times.

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

PART 2 - PRODUCTS

2.01 CORRUGATED POLYETHYLENE PIPE

A. Tube Fittings – 3” to 6”

1. AASHTO M252
2. ASTM F405

B. Pipe and Fittings - l2" to 48"

1. Integrally formed smooth interior.
2. AASHTO M294 and MP6-95
3. ASTM F667

C. Pavement base drains (4” and6" dia.) - AASHTO M304

2.02 REINFORCED CONCRETE PIPE

A. Pipe and Fittings:

1. ASTM C76, Minimum Class II

B. Joints:

1. Tongue and groove or bell and spigot.

C. Minimum diameter: 15 inches

2.03 ELLIPTICAL REINFORCED CONCRETE PIPE

A. Pipe:

1. ASTM C507, minimum class HE-A or VE-II

2.04 CORRUGATED GALVANIZED STEEL PIPE AND PIPE ARCH

A. Pipe and Coupling Bands:

1. Section 601.2, Publication 408 Specifications.

2. AASHTO M36, Type I or AASHTO M218, Type 1, or ASSHTO M274, Type II

3. Metal sheet thickness and corrugation size as indicated on the drawings (minimum 14 ga.).

B. Generally not acceptable. May be used only with specific written approval by Township.

C. Minimum diameter: 15 inches

2.05 POLY (VINYL CHLORIDE) PIPE – 3” to 6”

A. Pipe and Fittings

1. AASHTO M278
2. ASTM D3034

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform trench excavation and associated work as specified in Section 02221.

B. Provide pipe bedding (Type III or IV) as specified in Section 02221. Place aggregate and compact so that the pipe can be laid to the required tolerances.

3.02 LAYING PIPE IN TRENCHES

A. Give ample notice to the Township in advance of pipe laying operations, minimum seventy-two hours.

B. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe.

C. Lay pipe proceeding upgrade with the bell or groove pointing upstream.

D. Lay pipe to a true uniform grade with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

E. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

F. Clean and inspect each pipe and fitting before joining. Align pipe with previously laid sections. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Assemble joints in accordance with the pipe manufacturer's instructions.

G. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed line or grade as shown on the drawings will be cause for rejection.

H. Place and compact sufficient backfill to hold each section of pipe firmly in place as the pipe is laid.

3.03 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after examination of pipe by the Township.

B. Backfill and compact trenches as specified in Section 02221.

3.04 PAVEMENT BASE DRAINS AND PIPE UNDER DRAINS

A. Construct underdrains of the size and type in accordance with the requirements set forth in Section 610, Publication 408 Specifications and as shown on Standard Drawing RC-30M, Publication 72M.

3.05 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

B. Restore other areas in accordance with Section 02575.

3.06 TELEVISION INSPECTION

A. Television Inspection and Record Keeping

1. The television inspection shall be performed on one pipeline section at a time. The inspection shall be performed by pulling the television camera through the line along the axis of the pipe. The inspection shall be performed in a forward and/or backward direction, according to line conditions at the time the inspection is made. **The camera shall advance through the pipe at a slow and steady speed to allow clear viewing of the entire pipe.**

2. The pipeline shall be cleaned, if necessary, to allow for a clear view of the pipeline being inspected. No water used for cleaning or material cleaned from the pipe shall be allowed to flush beyond the section of pipeline being inspected. Under no circumstances shall solids removed from pipeline be allowed to discharge onto streets, ditches, storm drains or streams. All material and water removed from sanitary sewers must be properly disposed at a DEP approved site

3. During the television inspection, a record shall be kept which will include the following information as a minimum:

   a. Date and time of day televised
   b. Starting and ending stations or manhole numbers
   c. Confirm flow direction
   d. Type, size, and material of pipe being televised
   e. Distance reading to identified area
   f. Location of any connections
   g. Quadrant location of leak or defect
   h. Remarks on problem area
   i. Estimated amount of infiltration through cracks, joints or laterals
   j. Estimated depth of pipe sags or deflection
   k. Severity of root problem
   l. Recommended repair method

4. The DVD or CD shall be provided to the Township's field representative at the end of each working day. Audio documentation of the televised lines shall be provided by use of a "voice over" contained on the DVD/CD. Information such as date, time, location, station, observed problem areas, etc. shall be provided on the DVD or CD.

5. All DVDs or CDs shall become the property of the Township. If in the opinion of Township, the data recorded on any DVD or CD is not identifiable, the lines shall be re-televised by the Developer/Contractor.

6. Television inspection shall be completed by the Developer/Contractor prior to acceptance of the line and/or placement of the bituminous wearing course. During the 12th month of the

warranty period, perform a second televised inspection.

END OF SECTION

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SECTION 02640

VALVES AND FIRE HYDRANTS

PART 1 - GENERAL

1.01 The work of this section includes the installing, testing and repairing of water valves and fire hydrants .

1.02 All public water mains in the Township are owned and maintained by The York Water Company.

1.03 Township Road Occupancy Permit

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 All materials shall be in accordance with the requirements of The York Water Company.

PART 3 - EXECUTION

3.01 All work shall be performed in accordance with the requirements of The York Water Company.

SECTION 02642

WATER SERVICE CONNECTIONS

PART 1 - GENERAL

1.01 The work of this section includes the installing, testing and repairing of water service connections.

1.02 All public water mains in the Township are owned and maintained by The York Water Company.

1.03 Township Road Occupancy Permit

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 All materials shall be in accordance with the requirements of The York Water Company.

PART 3 - EXECUTION

3.01 All work shall be performed in accordance with the requirements of The York Water Company.

END OF SECTION

SECTION 02651

SANITARY SEWER TESTING

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Testing Gravity Sewer Pipelines:

a. Lamping
b. Low-pressure air test
c. Infiltration test
d. Deflection test - PVC pipe only
e. Video Inspection

2. Testing Pressure Pipelines:

a. Hydrostatic leakage test

3. Testing Manholes:

a. Vacuum test

B. Related work specified elsewhere:

1.	Manholes:	Section 02601
2.	Sanitary sewer pipe:	Section 02610

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Test Acceptance:

1. No test will be accepted until the results are within the specified limits.

2. The Contractor shall, at his own expense, determine and correct the causes of test failure and retest until successful test results are achieved.

1.03 SUBMITTALS

A. Submit contractor's list of equipment and testing schedule, including procedures and sequence and provisions for disposal of test and flushing water.

B. Submit certificate of test gauge calibration.

1.04 JOB CONDITIONS:

A. Do not allow personnel in manholes during pressure and vacuum testing.

B. Provide relief valves set at 10 psig to avoid accidentally over-pressurizing gravity sewer line during low pressure air testing.

PART 2 - PRODUCTS

2.01 AIR TEST EQUIPMENT

Air compressor
Air supply line
Shut-off valve
Pressure regulator
Pressure relief valve
Stop watch
Plugs
Pressure gauge, calibrated to 0.1 lbs./sq. in.

2.02 INFILTRATION TEST EQUIPMENT

Weirs

2.03 DEFLECTION TEST EQUIPMENT

Go, No-Go mandrels - furnished by Contractor, as approved by the Township.
Pull/retrieval ropes - furnished by Contractor
Certificate of mandrel gauge calibration

2.04 VACUUM TEST EQUIPMENT

Vacuum pump
Pipe plugs
Vacuum hose
Test connections
Vacuum gauge
Vacuum relief valve

2.05 VIDEO INSPECTION

A. Television equipment shall consist of a self-contained camera and monitoring unit connected and equipped with a minimum of 500 feet of cable adequately sized to handle severe service conditions. The camera shall be small enough to pass through a 6 inch inside diameter pipe, and shall be waterproof. The camera shall have an integrally mounted lighting system capable of producing a minimum of 100 foot-candles to light. Picture quality shall be such as to produce a

continuous 650 line resolution picture showing the entire inside periphery of the pipe. Suitable circuitry shall be included in the camera to permit operation up to 2,000 feet from the power source supply without loss of picture resolution.

B. When complete with cable connector, the camera and connectors shall be capable of withstanding pressures in excess of 400 psi, and shall be completely gas explosion-proof and waterproof. Operation temperature ranges of the camera shall be from 40°C to 80°C.

C. The main line camera shall have an auxiliary camera capable of televising laterals up to 25 L.F. from the main.

D. DVD or CD style with audio capabilities for "voice over" documentation. DVDs or CDs shall be new for each project.

2.06 NON-SHRINK GROUT

A. Fastsetting, cement based mortar such as Waterplug, manufactured by Thoro Division of Chemrex, Shakopee, MN, or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Backfill trenches in accordance with Section 02221.

B. Provide pressure pipeline with concrete reaction support blocking.

C. Clean and flush pipeline with high pressure water to remove debris. Collect and dispose of flushing water and debris in accordance with Federal, State and local regulations. Water shall not be discharged to sanitary sewer system.

D. Plug outlets, wye-branches and laterals. Brace plugs to offset thrust.

3.02 TESTING GRAVITY SEWER PIPELINES

A. Lamping:

1. After flushing and cleaning, lamp gravity pipeline in the presence of the Township inspector.

2. Assist the Township inspector in the lamping operation by shining a light at one end of each pipeline section between manholes. The Township inspector will observe the light at the other end. Pipeline that has not been installed with uniform line and grade will be rejected. Remove and re-lay rejected pipeline sections. Re-clean and lamp until pipeline section achieves a uniform line and grade.

B. Low Pressure Air Test:

1. Test each newly installed section of gravity sewer line, including service connections.

2. Slowly introduce air pressure to approximately 5.0 psig.

    a. If ground water is present, determine its elevation above the springline of the pipe by means of a piezometric tube. For every foot of ground water above the springline of the pipe, increase the starting air test pressure reading by 0.5 psig. Do not increase pressure above 10 psig.

3. Allow pressure to stabilize for at least five minutes. Adjust pressure to 3.5 psig or the increased test pressure as determined above if ground water is present. Start the test.

4. Test:

    a. Determine the test duration for a sewer section with a single pipe size from the table below:

Low Pressure Air Test - Test Times			
Nominal Pipe Size(in.)	Time Min./100 Ft.	Nominal Pipe Size (in).	Time Min./100 Ft.
4	.3	21	3.0
6	.7	24	3.6
8	1.2	27	4.2
10	1.5	30	4.8
12	1.8	33	5.4
15	2.1	36	6.0
18	2.4		

    b. Record the drop in pressure during the test period. If the air pressure has dropped more than 1.0 psig during the test period, the line is presumed to have failed. If the 1.0 psig air pressure drop has not occurred during the test period, the test shall be discontinued and the line will be accepted.

    c. If the line fails, determine the source of the air leakage, make corrections and retest the entire section between manholes.

    d. All laterals installed into manholes shall be air tested or included in the vacuum test.

    e. All tests subject to 5 psig. for 5 minutes, minimum, regardless of pipe length.

C. Testing Pipe Over 36" Diameter:

1. Pipe over 36" diameter shall be subjected to a visual interior inspection.

D. Infiltration Test:

1. Use only when leakage is visible.

2. Maximum Allowable Infiltration: 50-gallons per inch of pipe diameter per mile per day for the section under test.

E. Deflection Testing of Plastic Sewer Pipe:

1. Perform vertical ring deflection testing on all portions of PVC sewer piping, in the presence of the Township inspector, after backfilling.

2. The maximum allowable deflection for installed plastic sewer pipe shall be limited to 5% of the original vertical internal diameter.

3. Perform deflection testing with a properly sized 'Go, No-Go' mandrel, as approved by the Township.

4. Pipe exceeding the allowable deflection shall be located, excavated, replaced, and retested at the sole expense of the Contractor, including surface restoration.

5. Perform final flush of all portions of sanitary sewer prior to connection of any new facilities.

6. During the 12th month of the warranty period, perform a second vertical ring deflection test on all portions of PVC sewer piping, in the presence of the Township inspector, including preparation in accordance with Paraphrap 3.01.

3.03 TESTING PRESSURE PIPELINES

A. Hydrostatic Leakage Test (ASTM C900): 200 psi/30 min

1. Test each newly laid pressure pipeline, including any valved section thereof, hydrostatically at 1.5 times the working pressure of the pipeline based on the elevation of the lowest point in the pipeline corrected to the elevation of the test gauge. Obtain test pressure from the Township.

2. Slowly fill the section to be tested with water, expelling air from the pipeline at the high points. Install corporation stops at high points if necessary. After all air is expelled, close air vents and corporation stops and raise the pressure to the specified test pressure.

3. Observe joints, fittings and valves under test. Remove and replace cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

4. After visible deficiencies are corrected, continue testing at the same test pressure for an additional two hours to determine the leakage rate. Maintain pressure within plus or minus 5.0 psi of test pressure. Leakage is defined as the quantity of water supplied to the pipeline

necessary to maintain test pressure during the period of the test.

5. Compute the maximum allowable leakage by the following formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

Where: L is the allowable leakage in gallons/hour
N is the number of joints in the section tested
D is the nominal diameter of the pipe in inches
P is the average test pressure in psig

Note: Perform calculation based on 2 hour test

If the line under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size.

6. If the test of the pipe indicated leakage greater than that allowed, locate the source of the leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of the amount of leakage.

3.04 TESTING MANHOLES

1. Test all new manholes for exfiltration utilizing the vacuum test method and equipment developed by NPC Systems, Inc., Milford, NH, or approved equal.

2. The Contractor shall provide the necessary labor, equipment or materials to conduct the vacuum test.

3. The testing shall be done after complete assembly of the manhole, including frame and cover.

4. The Contractor shall plug the pipe openings, taking care to securely brace the plugs and the pipe.

5. With the vacuum tester set in place:

   a. Inflate the compression band to effect a seal between the vacuum base and the structure at the top of the manhole frame.
   b. Connect the vacuum pump to the outlet port with the valve open.
   c. Draw a vacuum to 10" of Hg. and close the valve.

6. A vacuum of 9in. of Hg. or more shall be maintained for at least the period of time indicated in the following table in order to successfully complete the test:

Depth of Manhole (ft.)	TIME (sec). Diameter of Manhole (in.)		
	48"	60"	72"
up to 10	30	30	30
12	30	30	34
14	30	32	40
16	30	37	45
18	32	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

7. If the manhole fails the initial test, the Contractor shall locate the leak and make proper repairs. Leaks and lift holes shall be filled with Waterplug, manufactured by Thoro System Products, Inc., of Miami, Florida, or approved equal.

3.05 TELEVISION INSPECTION

A. Television Inspection and Record Keeping

1. The television inspection shall be performed on one pipeline section at a time. The inspection shall be performed by pulling the television camera through the line along the axis of the pipe. The inspection shall be performed in a forward and/or backward direction, according to line conditions at the time the inspection is made. **The camera shall advance through the pipe at a slow and steady speed to allow clear viewing of the entire pipe.**

2. The pipeline shall be cleaned, if necessary, to allow for a clear view of the pipeline being inspected. No water used for cleaning or material cleaned from the pipe shall be allowed to flush beyond the section of pipeline being inspected. Under no circumstances shall wastewater solids removed from pipeline be allowed to discharge onto streets, ditches, storm drains or streams. All residue material and water removed from sanitary sewers must be properly disposed at a DEP approved site

3. During the television inspection, a record shall be kept which will include the following information as a minimum:

   a. Date and time of day televised
   b. Starting and ending stations or manhole numbers
   c. Confirm flow direction
   d. Type, size, and material of pipe being televised
   e. Distance reading to identified area
   f. Location of any connections
   g. Quadrant location of leak or defect

h. Remarks on problem area
i. Estimated amount of infiltration through cracks, joints or laterals
j. Estimated depth of pipe sags or deflection
k. Severity of root problem
l. Recommended repair method

4. The lines may be plugged during inspection. The DVD or CD shall be provided to the Township's field representative at the end of each working day. Audio documentation of the televised lines shall be provided by use of a "voice over" contained on the DVD/CD. Information such as date, time, location, station, observed problem areas, etc. shall be provided on the DVD or CD.

5. All DVDs or CDs shall become the property of the Township. If in the opinion of Township, the data recorded on any DVD or CD is not identifiable, the lines shall be re-televised by the Developer/Contractor.

6. Television inspection shall be completed by the Developer/Contractor prior to acceptance of the line and/or placement of the bituminous wearing course. During the 12th month of the warranty period, perform a second televised inspection.

END OF SECTION

SECTION 02653

TESTING AND DISINFECTING WATER MAINS

PART 1 - GENERAL

1.01 The work of this section includes the testing and disinfecting of water mains.

1.02 All public water mains in the Township are owned and maintained by The York Water Company.

1.03 Township Road Occupancy Permit

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 All materials shall be in accordance with the requirements of The York Water Company.

PART 3 - EXECUTION

3.01 All work shall be performed in accordance with the requirements of The York Water Company.

END OF SECTION

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SECTION 02722

LOW-PRESSURE SEWER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Sanitary sewer low-pressure pipelines
2. Service connections
3. In-line cleanouts
4. Terminal cleanouts

B. Related Work Specified Elsewhere:

1. Section 02221 - Trenching, Backfilling & Compacting
2. Section 02610 - Sanitary Sewer Pipe
3. Section 02651 - Sewer and Manhole Testing

C. Applicable Standard Details:

1. 02722-1 Typical Pressure Sewer Service Connection Plan
2. 02722-2 Pressure Sewer Trench and Bedding Detail
3. 02722-3 Service Valve Detail
4. 02722-4 Valve Box Detail
5. 02722-5 In-line Cleanout Detail
6. 02722-6 Terminal Cleanout Detail

1.02 REFERENCES

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

1. ASTM D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (vinyl Chloride) (CPVC) Compounds
2. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
3. ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
4. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
5. ASTM D3139 - Joints for Plastic Pressure Pipes Using Flexible Elastometric Seals
6. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
7. ASTM F477 - Elastometic Seals (Gaskets) for Joints Plastic Pipe
8. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fitting for Polyethylene (PE) Pipe and Tubing
9. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fitting Materials
10. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based
11. ASTM 1055 - Standard Specification for Electrofusion Type

Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing

1.03 SUBMITTALS

A. Shop Drawings and Product Data:

1. Submit manufacturer's catalog data, literature, illustrations and specifications.
2. Submit shop drawings of valves and valve operators including dimensions, net assembled weight of each size valve furnished, construction details, and materials of components.
3. Submit manufacturer's installation instructions.
4. Submit manufacturer's maintenance instructions and complete parts lists.

B. Certificates:

1. Submit a Certificate of Compliance, together with supporting data, from the materials supplier(s) attesting that valves, accessories, and specialities meet or exceed specification requirements.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

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

B. Do not drop pipe or fittings.

1.05 TOWNSHIP ROAD OCCUPANCY PERMIT

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 POLYCHLORIDE (PVC) SEWER PIPE

A. Pressure Sewer Pipe and Fittings:

1. Pipe: ASTM D2241, SDR21.
2. Flexible Elastometric Seals: ASTM D3139.
3. Seal Material: ASTM F477.
4. Fittings: ASTM D2466, Socket type, Schedule 40.
5. Solvent Cement: ASTM D2564.

2.02 HIGH DENSITY POLYETHYLENE PIPE

A. Pressure Sewer Force Main:

1. High Density Polyethylene (HDPE), 160 psi rated, SDR 11, Iron Pipe Size (IPS) pipe, size as indicated on the plans.
2. The outside pipe diameter (OD) and minimum wall thickness (MWT) shall be as follows:

IPS (Inches)	OD (Inches)	MWT (Inches)
2	2.375	0.216
3	3.500	0.318
4	4.500	0.409
6	6.625	0.602

3. Materials used shall have a PPI/ASTM standard thermoplastic material designation code of PE3408 and a material classification conforming to Grade P34 for ASTM D-3350.
4. Pressure sewer force mains when installed in public right-of-ways shall have all pipe data heat indented in a "Green" stripe on the wall of the pipe.
5. Pipe shall be supplied in the maximum length available to avoid joints.
6. Field splices shall be in accordance with ASTM D3261 (Butt heat fusion) or by approved electrofusion fittings manufactured in accordance with ASTM F 1055 and rated at a minimum operating pressure of that of the pipe.
7. Fittings and adapters to valves and other equipment shall be in the strict accordance with the recommendations of the pipe manufacturer.

B. Pressure Sewer Service Laterals:

1. Shall be 1-1/4" High Density Polyethylene (HDPE), 160 psi rated, SDR 11, Iron Pipe Size (IPS) pipe with an outside diameter of 1.660 inches with a minimum wall thickness of 0.151 inches.
2. Materials used shall have a PPI/ASTM standard thermoplastic material designation code of PE3408 and a material classification conforming to Grade P34 for ASTM D-3350.
3. Pressure sewer service lateral shall be solid "Green" in color.
4. Pipe shall be supplied in minimum lengths of 500 feet to avoid joints.
5. Field splices shall be in accordance with ASTM D3261 (butt heat fusion) or by approved electrofusion fittings manufactured in accordance with ASTM F1055 and rated at a minimum operating pressure of that of the pipe.

2.03 UTILITY MARKING TAPE AND TRACER WIRE

A. All gravity and pressure sanitary sewer mains shall be marked with Detectable Warning Tape. Detectable warning tape shall be metallic and encased in a protective, high visibility, green color coded inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil. Tape width shall be a minimum 2 inches and have the words "Caution Buried Sewer Line Below", or similar imprinted. Tape shall consist of minimum 5-mil (0.005") overall thickness, with no less than a 35 gauge (0.00035") solid aluminum foil core. 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 elements normally encountered in the soil. All printing shall be encased to avoid ink rub-off. Depth shall be in accordance with

the manufacturers specifications. Tape shall be approved by the Engineer prior to installation.

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.

D. All pressure sanitary sewer mains shall be marked with tracing wire. Highly visible test stations shall be provided at least every 1000'. The tracing wire shall be 12-gauge THHN copper tracing wire. Test stations shall be 3-sided and include internal terminals for tracing wire. The test station marker post shall be flexible and be green in color. Decals with the text

"Warning Sewer Pipeline" as well as PA One Call information shall be included on the test stations..

2.04 VALVES

A. Ball Valves

1. Bronze body, solid bronze tee head, ASTM B62. Compression type union inlet and outlet. Double Buna-N-O-rings in stem, spherical ball, molded Buna-N rubber seats. Size as indicated on the Contract Drawings.

B. PVC Check Valves

1. Gravity-operated, ball type providing full-ported passageway when open.
2. 150 psi working pressure.
3. Flowmatic 208C, or equal

2.05 ADJUSTABLE VALVE BOXES

A. Plastic; PVC, ABS, or reinforced olefin polymers.

B. Plastic top tube, belled bottom; bell arched and flanged; slide friction adjustment.

C. Cast iron top collar and lid; lid cast with "Sewer".

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform trench excavation to the line and grade indicated on the Drawings and as specified in Section 02221 - Trenching, Backfilling and Compacting.

B. Unless otherwise indicated on the Drawings, provide for a minimum cover of 4'-0" above the top of piping laid in trenches.

C. Provide Type IV bedding as indicated on Standard Detail 02722-2; place aggregate in a manner to avoid segregation, and compact to the maximum practical density so that the pipe can be laid to the required tolerances.

3.02 LAYING PIPE IN TRENCHES

A. Give ample notice to the Engineer in advance of pipe laying operations.

B. Lower pipe into trench using handling equipment designated for the purpose to assure safety of personnel and to avoid damage to the pipe. Do not drop pipe.

C. Lay pipe proceeding upgrade with the bell or groove pointing upstream.

D. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bedding or grade.

E. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

F. Clean and inspect each pipe and fitting before joining. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction and ground movement. Use lubricant recommended by the pipe or fitting manufacturer for maing joints. If unusual joining resistance is encountered or if the pipe cannot be fully inserted into the joint, disassemble joint, inspect for damage, re-clean joint components, and re-assemble joint.

G. Do not deflect joints in pressure piping more than the maximum recommended by the pipe manufacturer.

H. Place sufficient backfill on each section of pipe, as it is laid, to hold pipe firmly in place.

I. Clean the interior of the pipe as the work progresses.

J. Keep trenches and excavation free of water during construction.

K. When the work is not in progress, and at the end of each workday, securely plug ends of pipe and fittings to prevent trench water, earth or other substances from entering the pipe or fittings.

3.03 THRUST RESTRAINT

A. Provide pressure pipeline with restrained joints or concrete thrust blocking at all bends, tees, and changes in direction; construct concrete thrust blocking in accordance with Standard Details 02615-2 and 02615-3. If restrained joints are utilized, submit design calculations showing determination of restrained lengths and submit joint restraint details. Methods of joints restraint shall utilize devices specifically designed for the application for which manufacturer' s data is available for the application. Submit manufacturer's literature for approval.

3.04 SERVICE VALVES AND CLEANOUTS

A. Provide service valves, in-line cleanouts, and terminal cleanouts where indicated on the Drawings.

B. Construct as indicated on Standard Details 02722-3 through 02722-6.

3.05 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after elimination of pipe laying by the Township Engineer.

B. Install detectable warning tape and tracer wire above all sanitary sewer pressure pipeline, at manufacturer recommended depth.

C. Backfill pipeline trenches in accordance with Section 02221.

3.06 HYDROSTATIC LEAKAGE TEST

A. Hydrostatically test each newly laid pressure pipeline, including any valved section thereof, in accordance with Section 02651.

END OF SECTION

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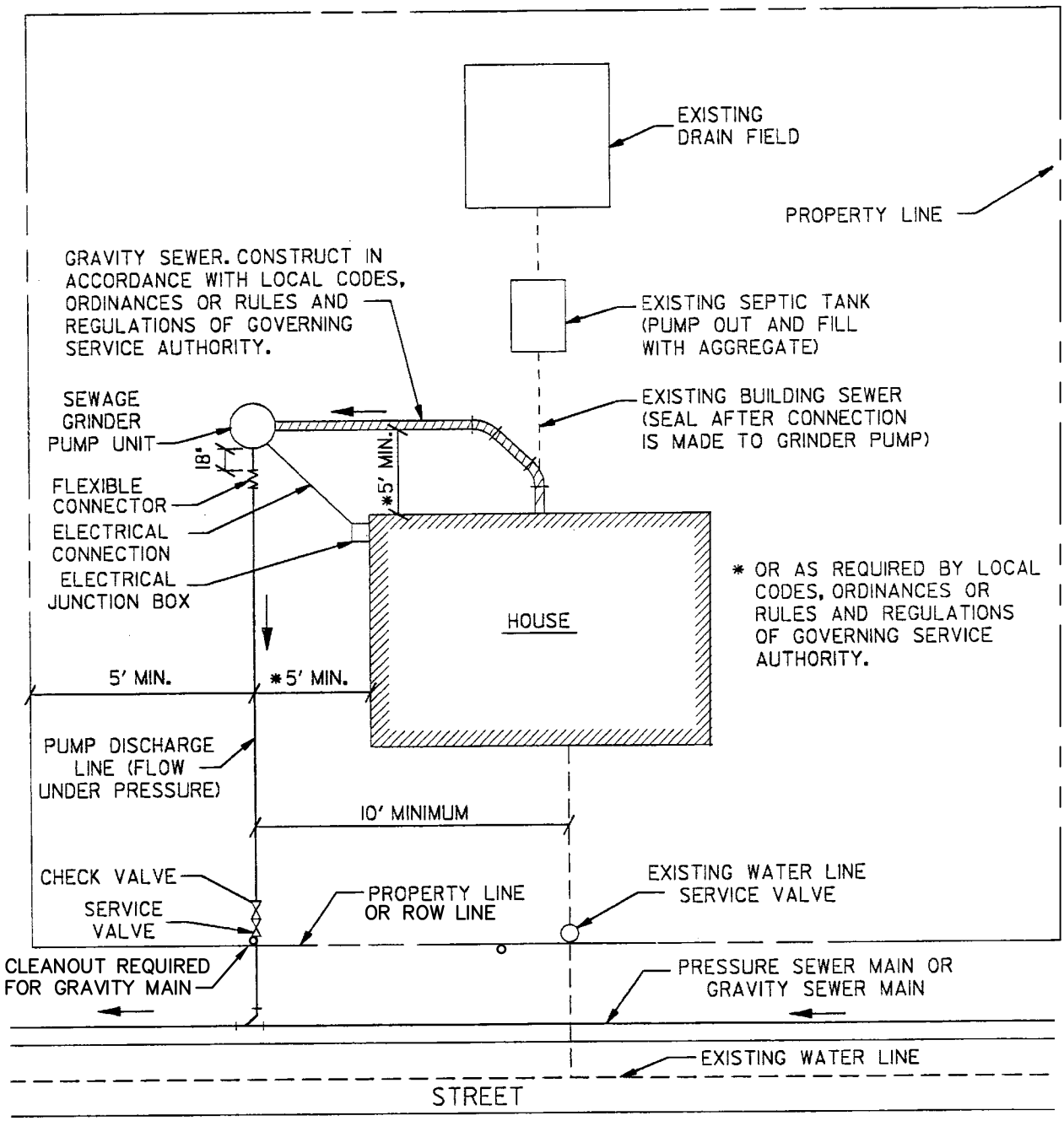

LEGEND:

- EXISTING WATER LINE
- EXISTING DRAIN LINE
- BUILDING SEWER
- SGP DISCHARGE LINE

NOTE:
DISCHARGE LINE CHECK VALVE NOT REQUIRED FOR CONNECTION TO GRAVITY SEWER MAIN. NEED CLEANOUT AT PROPERTY LINE.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.
Excellence in Civil Engineering
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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
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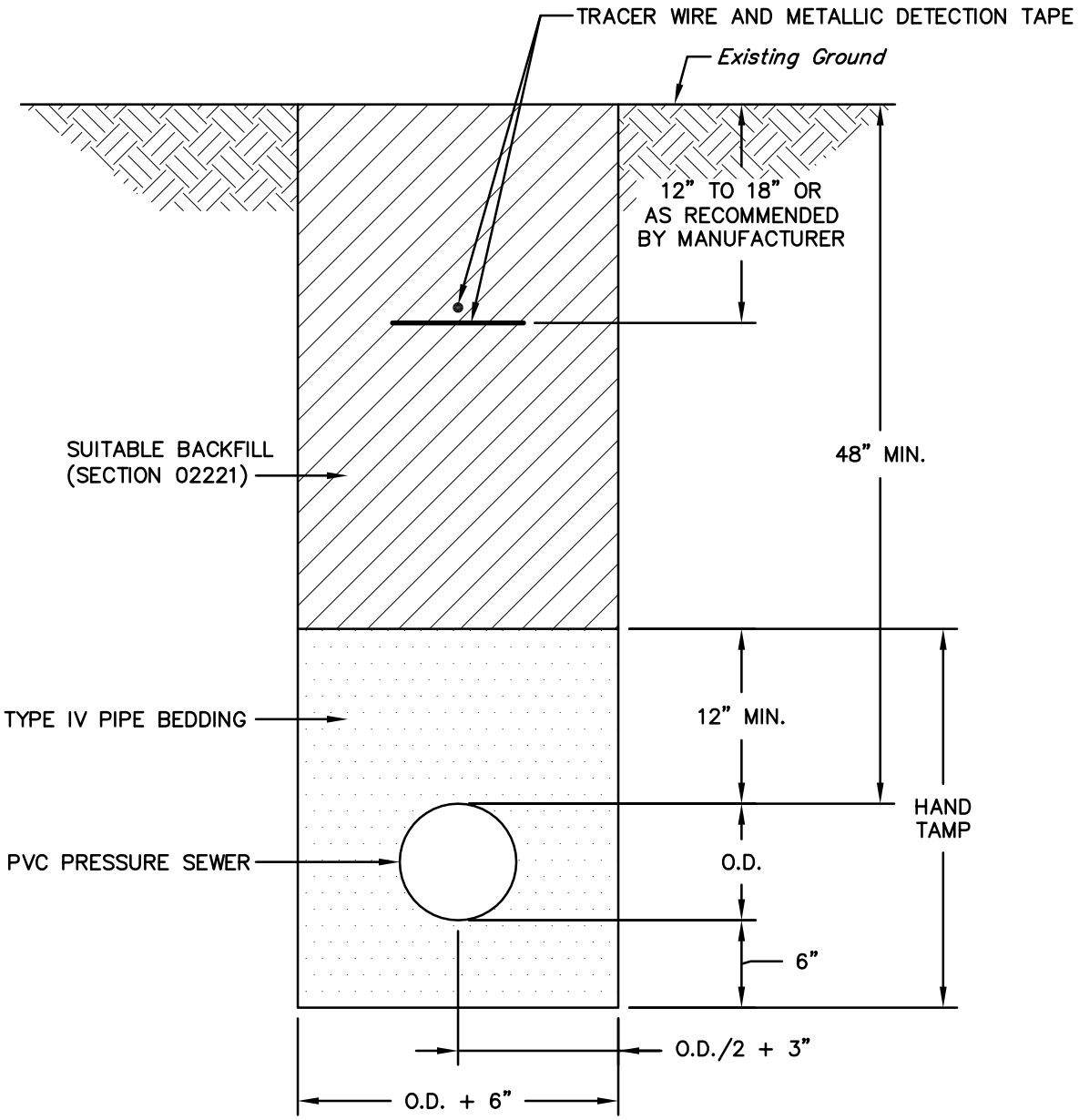
TYPICAL PRESSURE SEWER SERVICE CONNECTION

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02722-1
FILE NO.	1204.9.02.00



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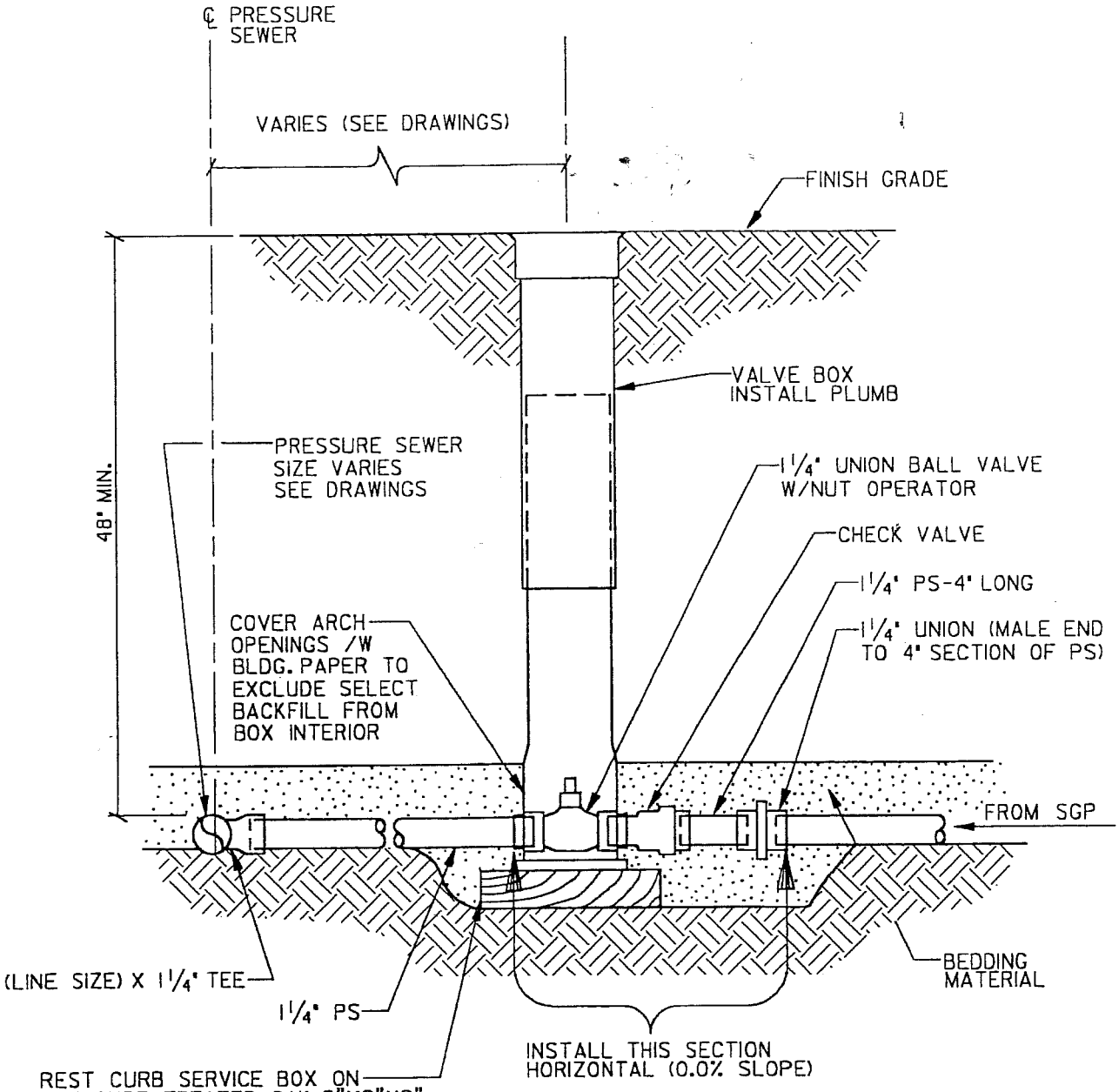
PRESSURE TRENCH

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02722-2
FILE NO.	1204.9.02.00



NOTES:

1. MAINTAIN 4 FT. MINIMUM COVER OVER PRESSURE SEWER.
2. OAK BOARDS OR CONCRETE BRICKS TO REST ON UNDISTURBED EARTH OR FIRM SUBGRADE.
3. ALL PVC CONNECTIONS SHALL BE SOLVENT WELD EXCEPT WHERE OTHERWISE NOTED.
4. SGP - SEWAGE GRINDER PUMP.

NOT TO SCALE

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SERVICE VALVE ASSEMBLY FOR PRESSURE SEWER SYSTEM

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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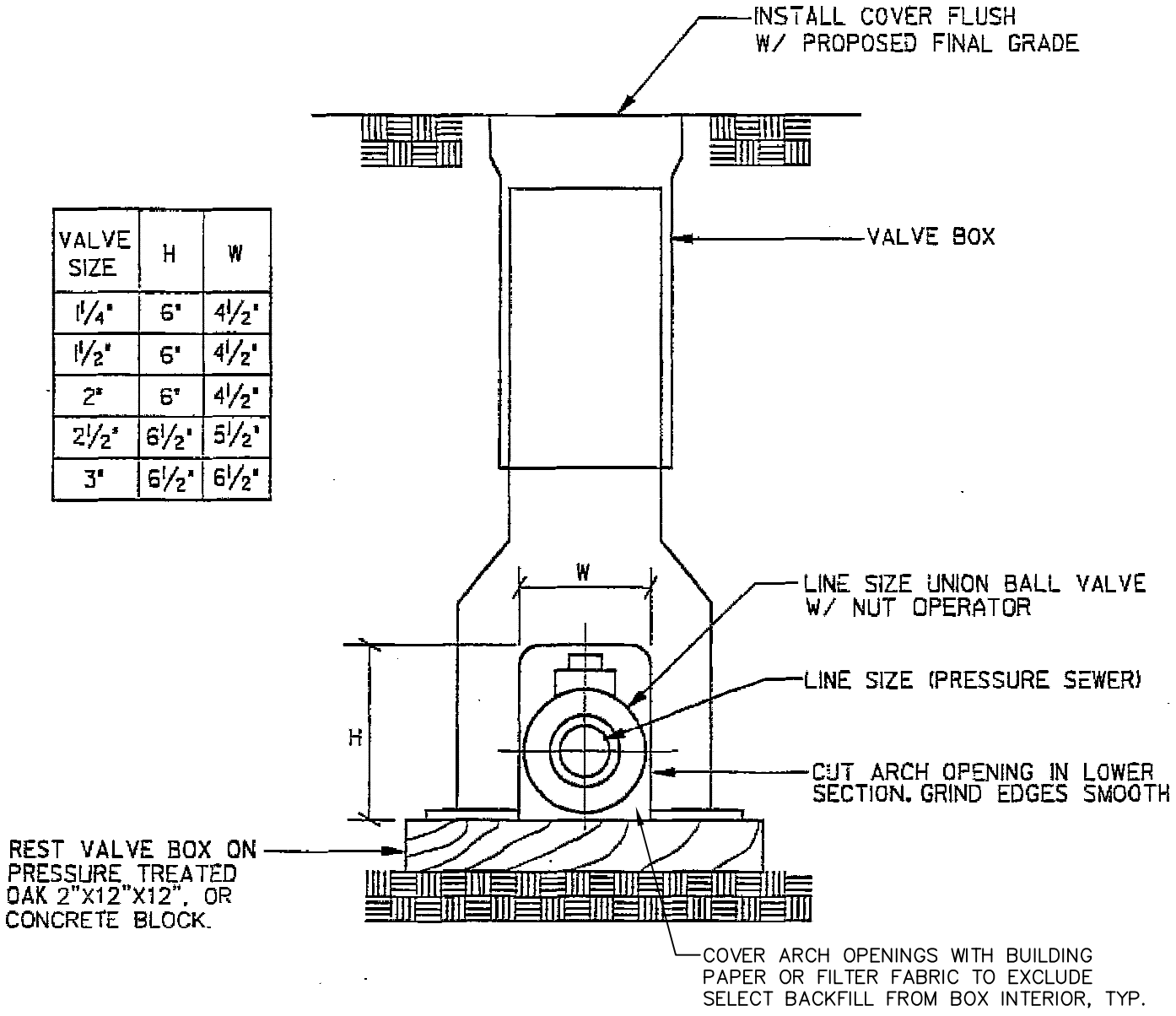
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02722-3
FILE NO.	1204.9.02.00

VALVE SIZE	H	W
1¼"	6"	4½"
1½"	6"	4½"
2"	6"	4½"
2½"	6½"	5½"
3"	6½"	6½"



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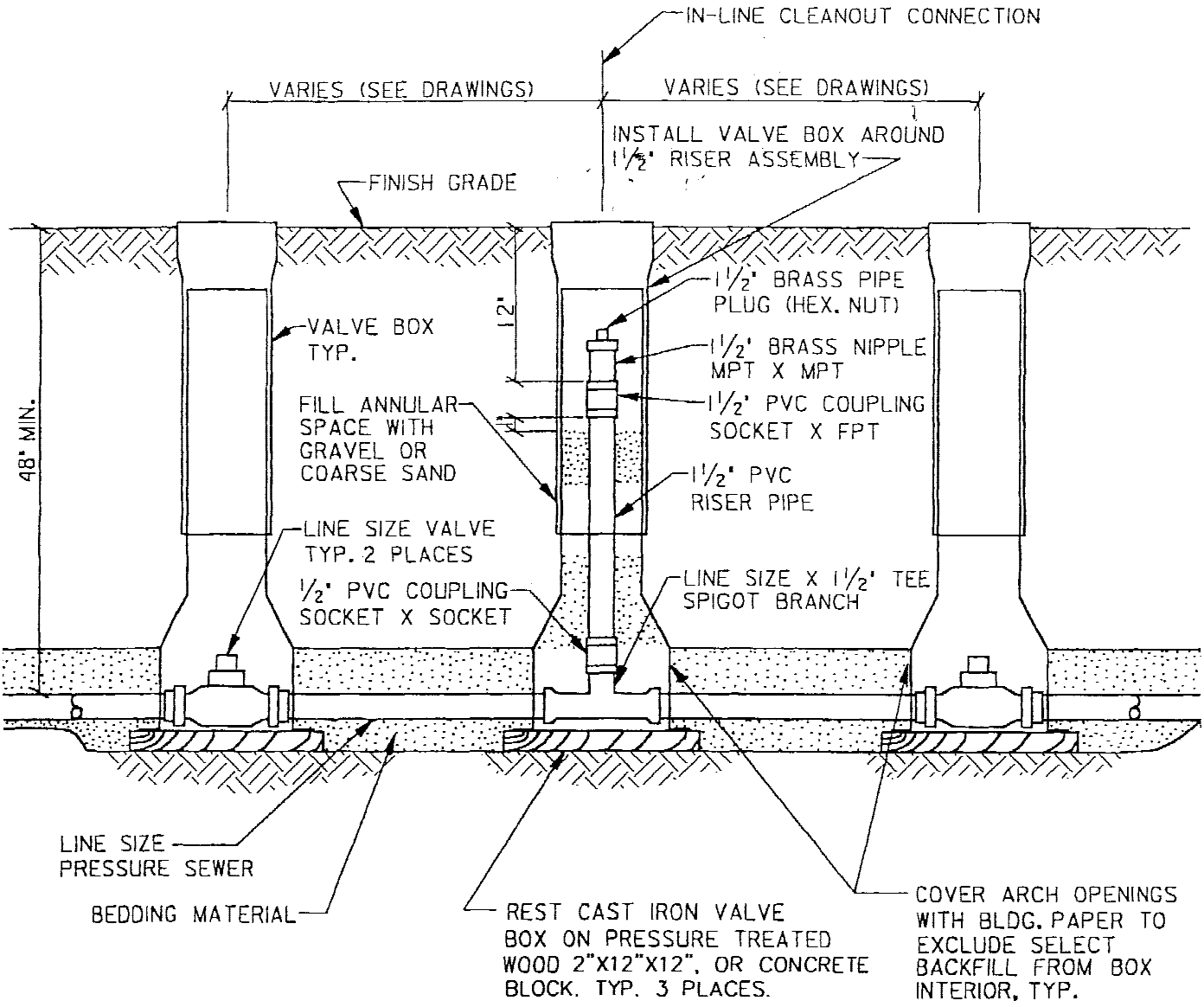
VALVE BOX DETAIL FOR PRESSURE SEWER SYSTEM

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02722-4
FILE NO.	1204.9.02.00



NOTES:

1. PRESSURE TREATED WOOD BOARDS OR CONCRETE BLOCK TO REST ON UNDISTURBED EARTH OR FIRM SUBGRADE.
2. ALL PVC CONNECTIONS SHALL BE SOLVENT WELD EXCEPT WHERE NOTED OTHERWISE, OR APPROVED BY TWP. ENGINEER.
3. ALL HDPE CONNECTIONS SHALL BE FUSION WELD EXCEPT WHERE NOTED OTHERWISE, OR APPROVED BY TWP. ENGINEER.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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IN-LINE CLEANOUT CONNECTION FOR PRESSURE SEWER SYSTEM

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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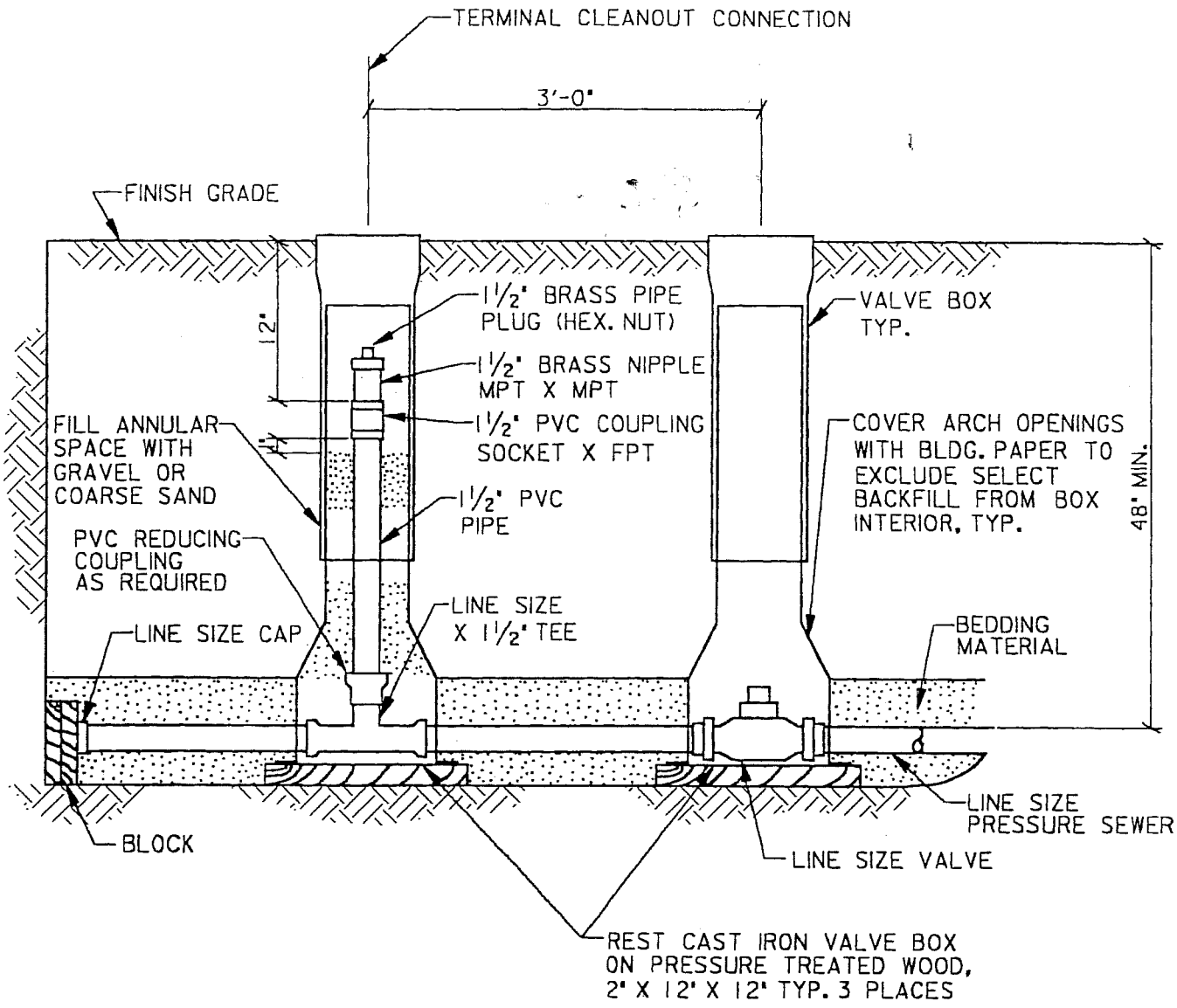
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02722-5
FILE NO.	1204.9.02.00



NOTES:

1. PRESSURE TREATED WOOD BOARDS OR CONCRETE BLOCK TO REST ON UNDISTURBED EARTH OR FIRM SUBGRADE
2. BLOCK FOR LINE SIZE CAP TO REST AGAINST UNDISTURBED EARTH.
3. ALL PVC CONNECTIONS SHALL BE SOLVENT WELD EXCEPT WHERE NOTED OTHERWISE, OR APPROVED BY TWP. ENGINEER.
4. ALL HDPE CONNECTIONS SHALL BE FUSION WELD EXCEPT WHERE NOTED OTHERWISE, OR APPROVED BY TWP. ENGINEER.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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TERMINAL CLEANOUT CONNECTION FOR PRESSURE SEWER SYSTEM

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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DATE	12/2/2010
DWG. NO.	WMT02722-6
FILE NO.	1204.9.02.00

SECTION 02745

VALVE VAULTS AND METER BOXES (CONCRETE)

PART 1 - GENERAL

1.01 The work of this section includes the construction of valve and meter vaults and meter boxes.

1.02 All public water mains in the Township are owned and maintained by The York Water Company.

1.03 Township Road Occupancy Permit

A. Developer/Contractor must obtain a road occupancy permit prior to commencing work.

PART 2 - PRODUCTS

2.01 All materials shall be in accordance with the requirements of The York Water Company.

PART 3 - EXECUTION

3.01 All work shall be performed in accordance with the requirements of The York Water Company.

END OF SECTION

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SECTION 02760

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 DESCRIPTION

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

1. Application of traffic lines, markers or legends on roadway surfaces.
2. Surface preparation.
3. Removal of any conflicting pavement markings.
4. Inlaid thermoplastic pavement markings

B. Related Work Specified Elsewhere:

1. Bituminous paving and surfacing:	Section 02500
2. Trench paving and restoration:	Section 02575

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 68, Regulations - Traffic Signs, Signals and Markings
Publication 213, Temporary Traffic Control Guidelines

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

D868 Standard Method of Evaluating Degree of Bleeding of Traffic Paint
D1309 Standard Test Method for Settling Properties of Traffic Paint During Storage

3. The Institute of Transportation Engineers (ITE):

"A Model Performance Specification for the Purchase of Pavement Marking Paints and and Powders", approved September 25, 1977.

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

M247 Glass Beads Used in Traffic Paints
M249 White and Yellow Reflective Thermoplastic Striping Materials (Solid Form)

5. Manual on Uniform Traffic Control Devised for Streets and Highways, latest edition (MUTCD).

B. Qualifications:

1. Installer shall specialize in application of traffic lines and pavement markings and have five years documented experience in Pennsylvania.

2. Installer shall be PennDOT prequalified for this work.

1.03 SUBMITTALS

A. Letter of certification from the paint manufacturer stating that traffic line paint supplied meets either PennDOT's spec for Traffic Line Paint (required type) or the referenced ITE spec. This letter shall accompany the delivery of the material and be given to the Township prior to the installation of pavement markings. Contractor shall also supply material slips with each delivery.

B. Application method, material and manufacturer's required mixing instruction and surface preparation details.

C. Schedule of operations.

D. Inlaid thermoplastic pavement markings.

1. Product data sheet from manufacturer.

2. A four (4) square foot pre-cut sample of each lot or batch for each color for testing physical properties, if required.

3. Certification from manufacturer that the CONTRACTOR has been properly trained in the handling and installation of the product.

1.04 JOB CONDITIONS

A. Control of Traffic:

1. Take measures to control traffic during line painting operations. Line painting machine shall not appreciably impede traffic flow in adjacent lanes while painting centerline and one lane shall be left completely open to traffic when painting edgelines.

2. Employ traffic control measures in accordance with Publication 213, Temporary Traffic Control Guidelines.

B. Temperature and Weather Restrictions:

1. Painted traffic lines and markings shall not be placed when the ambient temperature is less than 40 degrees Fahrenheit.

2. Cold plastic markers or legends shall be applied only when the surface temperature is 60 degrees Fahrenheit or higher unless otherwise directed by the Township.

C. Protection of Markings:

1. Protect markings during and after application using barrier cones or other devices to keep traffic off newly applied markings until track free.

D. Environmental Requirements:

1. Adhere to manufacturer's data on air and surface temperature limits and relative humidity during application and curing of coatings. Schedule coating work to avoid dust and airborne contaminants.

E. Material Storage:

1. If paint is stored for more than two (2) months, invert containers several days prior to use.
2. Store glass bead in a cool, dry place.
3. All products shall be protected from weather and freezing.

1.05 WARRANTY

A. The CONTRACTOR shall guarantee to replace, at his expense, that portion of the pavement marking installed under this Contract which, in the opinion of the Township, has not remained effective in performing useful daylight and nighttime service for a period of 6 months from the date of installation. The required service is defined as 90% of markings being effective and in place.

PART 2 PRODUCTS

2.01 PAINT

A. Paint shall be PennDOT Paint Type 1, unless otherwise noted, and shall consist of either an alkyd resin type or a combination of alkyd resin type modified with chlorinated rubber ready-mixed white and yellow traffic paints, for use on bituminous and Portland cement concrete pavements. These paints shall be reflectorized for night visibility, if specified, by adding reflective spheres before the paint dries or sets, using the drop-on or pressurized methods.

B. Traffic paint shall consist of a ready-mixed pigmented binder in a one package system. When applied at the wet-film thickness of 15 mils, the paint shall be suitable for application to traffic bearing surfaces such as Portland cement concrete, bituminous pavements, and plain or vitrified brick surfaces of streets, highways, bridges, tunnels and parking lots.

C. Pigments:

1. White - Any combination of pigments provided the finished paint meets all the requirements specified herein. Sufficient suspending and dispersing agents shall be used to prevent excessive settling.

2. Yellow - Any organic yellow pigment provided if does not contain any of the metals listed in EPA Code of Regulations 40. Sufficient suspending and dispersing agents shall be used to

   prevent excessive settling. Color of dry paint film shall match Color No. 33538 of Federal Standard 595a.

D. Binder: The supplier may use any combination of ingredients, except tall oil resins, provided the finished paint meets all the requirements herein. Sufficient amounts of anti-skinning agents shall be used to prevent skinning. Sufficient resin solids, compatible thinners and driers, if necessary, shall be used.

2.02 GLASS SPHERES

A. Glass spheres shall meet the requirements of Publication 408, Section 1103.14 (a)2. and all current supplements.

B. Glass beads shall be in units of 50 lbs. and packed in moisture-proof bags. The beads shall be stored in a cool dry place.

2.03 COLD PLASTIC PAVEMENT MARKINGS

A. Pigmented plastic which contains glass beads and capable of being attached to bituminous and/or cement concrete pavement by means of a factory applied, pressure-sensitive adhesive.

B. Pigments shall meet requirements in Section 1103.14(a)1. in Publication 408.

C. Glass beads - AASHTO M247.

2.04 HEAT APPLIED THERMOPLASTIC MARKINGS

A. A durable, retro-reflective pavement marking material suitable for use as roadway, intersection, commercial or private delineation markings. Must be composed to hydrocarbon resin, aggregates, pigments, binders and glass beads which have been factory produced as a finished product, which is designed to meet the requirements of the current edition of the MUTCD. The thermoplastic material conforms to AASHTO M249, with the exception of the relevant differences due to the material supplied in a preformed state.

B. The markings must be a resilient white or yellow hydrocarbon thermoplastic product with uniformly distributed glass beads throughout the entire cross sectional area. Lines, legends and symbols are capable of being affixed to bituminous and/or Portland concrete pavements by the use of the normal heat of a propane type of torch. Other colors shall be available as required.

C. The markings must be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics, such that it is capable of fusing with itself and previously applied thermoplastic when heated with the torch.

D. The markings must be able to be applied in temperatures down to 32 degrees F. without any special

storage, preheating or treatment of the material before application.

E. Pigments:

White: Sufficient titanium dioxide pigment is used to ensure a color similar to Federal Highway White, Color No. 17886, as per Federal Standard 595a.

Yellow: Sufficient yellow pigment is used to ensure a color similar to Federal Highway Yellow, Color No. 15358, as per Federal Standard 595a. The yellow pigment must be of organic origin only.

F. Environmental Resistance: The material must be resistant to deterioration due to exposure to sunlight, water, oil, gasoline, salt or adverse weather conditions.

2.05 METHYL METHACRYLATE MARKINGS (MMA)

A. A durable, cold applied, 2 component material composed of resins in reactive monomers, pigment, plasticizer, fillers and/or glass beads, and is to be reacted just prior to application with a benzoyl-peroxide catalyst. It shall be suitable for use as roadway, intersection, commercial or private delineation markings on asphaltic or Portland cement surfaces.

B. Color shall be as required by project (white and/or yellow).

C. MMA shall be lead free and cure to a minimum 99% solids when reacted as per the manufacturer's instructions. All mixed material shall cure to a no track condition within 15 minutes of application at min. 40 mils wet at 77^{o} F.

D. Applied markings shall not deteriorate due to ultraviolet light, water, oil, pavement oil, salt and adverse weather conditions.

E. Material shall be capable of conforming to pavement contours, breaks and faults through action of traffic at normal pavement temperatures.

2.06 RAISED PAVEMENT MARKERS

A. Plowable or non-plowable as per Section 1103.05(c) in Publication 408 and the Contract Drawings.

1. Plowable: Shaped to fit in a depression in the pavement.

2. Non-plowable: Attached to roadway surface by use of pressure sensitive adhesive.

B. Plastic, retro-reflective surface, color and one-way or two-way marker as indicated on Contract Drawings.

1. Retroflectors shall be prismatic type, acrylic plastic molded polycarbonate or other suitable material suitable material designed to provide strength, abrasion resistance, impact resistance, resilience and adhesion. The retroreflective shall be ultimately stabilized grade material which provides resistance to color change of long periods of outdoor exposure.

2. The retroreflective surface shall contain two (2) prismatic reflective faces to reflect light in two (2) directions. The surface of the reflective face shall be protected by a permanently bonded glass face or other transparent, abrasion resistant material. Reflective face colors hsall be selected by the Township

2.07 INLAID THERMOPLASTIC MARKINGS

A. The inlaid thermoplastic pavement markings shall be provided pre-cut in sizes to conform to the specified pattern, widths and shapes shown on the drawings. The material shall be packaged in accordance with accepted commercial standards and, when stored in a cool dry area indoors, shall be suitable for use for one year after the date of purchase. The pattern and color for insert and surrounding shall be as specified on the drawings.

B. Accepted pre-cut inlaid thermoplastic pavement marking materials shall be the thermoplastic material for inlay into hot mix asphalt (HMA). The inlaid thermoplastic material shall have a minimum thickness of 90 mils (2.3mm), and consist of a mixture of high quality polymeric materials, pigments and fibers, and glass beads distributed throughout the cross-section, and with a reflective layer of glass beads bonded to the top surface.

C. Softening Point: The softening point shall be measured by the Ring and Bell method as described in ASTM D-36-95 (2000). Acceptable range shall be 210-250_F (100-120_C).

D. Bond Strength: Thermoplastic bond strength to asphalt substrate shall be measured by Cross-Cut Test as described in ASTM D-3359. A minimum of 50% of thermoplastic bond surface shall exhibit attached particles of asphalt.

E. Acceptable manufacturer for inlaid thermoplastic marking is Streetprint Duratherm at (800).688.5653, unless noted on Contract Drawings.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Clean the surface of the roadway before application of traffic lines or pavement markings to provide a clean, dry roadway surface which is free of loose dirt and other debris, to the satisfaction of the Township.

B. The surface cleaning for Cold Plastic markings shall include as a last operation the use of compressed air or a fine bristled broom over the application area to provide a dust-free surface.

C. New concrete road surfaces shall be cured at least seven (7) days prior to marking. Remove curing compounds prior to applying markings.

D. MMA markings may be placed on top of existing MMA markings which are in good condition. Other non-MMA markings must be mechanically removed prior to placement of new MMA markings. Remove chipped or flaking MMA markings prior to placing new MMA markings.

3.02 APPLICATION OF PAINTED MARKINGS

A. Paint: Paint shall be dispensed in a wet film thickness of 15 ±1 mils. The rate of application of paint on bituminous surface treatment roads may be 25% greater. The Township will determine whether roadways require an increased application rate.

B. Glass Beads: Glass beads shall be applied at a rate of six (6) pounds per gallon of paint.

C. Apply new pavement markings and "touch-up" existing markings within the limits of work. The finished project shall match the Contract Drawings.

3.03 EQUIPMENT FOR PAINTED MARKINGS

A. The line painting machine type shall be such that it shall not appreciably impede the traffic flow in adjacent lanes while painting the centerlines of the roadway and one lane shall be left completely open to traffic when painting edgelines.

B. The line-painting machines used on this project shall be capable of a simultaneous application of two parallel lines in either a solid or broken pattern in forming the centerline. It shall also be capable of the automatic dispensing of glass beads onto the painted surface at the required application rate, by the pressurized glass gun method.

C. The machinery shall also be capable of providing a paint line in 4-inch, 6-inch and 8-inch widths.

D. Each piece of machinery used to apply centerlines and edgelines shall be equipped with a measuring device which automatically and continuously measures to the nearest foot, the length of each line placed.

E. Legends shall be applied with equipment approved by the Township; hand brushes or rollers are not permitted. Glass beads may be hand applied.

3.04 CENTERLINE APPLICATION

A. Where existing centerlines are visible and properly located, the new centerlines shall be applied directly over the existing pattern. Where centerlines do not exist, or existing centerlines are improperly located, as determined by the Township, the new centerlines shall be applied at the correct location. If the existing markings have to be removed to allow correct placement of the new markings, such work shall be done in accordance with Section 963 of Publication 408. This work is incidental to the application of the new centerline.

B. In general, on two-lane roadways, the centerline shall evenly divide the roadway; however, if a portion of the roadway on either or both sides is to be utilized for parking, the centerline shall evenly divide the traveled way.

C. Apply the centerline in its proper location; any centerline pattern placed more than six (6) inches from the center of the roadway or traveled way shall be removed and replaced by the CONTRACTOR at his own expense.

3.05 EDGELINE APPLICATION

A. Field-check all roadways shown on the drawings which require application of edgelines. Only those roadway sections which are 20 feet or greater in width for more than 50 percent of their length shall be painted with edgelines.

3.06 APPLICATION OF COLD PLASTIC MARKINGS

A. Inlaids: Place material on new bituminous surface just before final compaction. Roll material into new surface to achieve flush finished surface.

B. Surface applied: Apply onto the existing, cleaned surface of concrete or bituminous roadways.

C. Use compatible "adhesive activator" or "primer sealer" if recommended by adhesive manufacturer.

3.07 APPLICATION OF HEAT APPLIED THERMOPLASTIC MARKINGS

A. Asphalt: The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied at ambient and road temperatures down to 32 degrees F. without any preheating of the pavement to a specific temperature. The pavement shall be clean, dry and free of debris. Supplier must enclose application instructions with each box/package.

B. Portland Concrete: The same application procedure shall be used as described under above paragraph 3.07 A. However, a compatible primer sealer may be applied before application to assure proper adhesion.

3.08 APPLICATION OF METHYL METHACRYLATE MARKINGS

A. Apply MMA markings using one method chosen from the three listed below, depending on project type and size:

1. Extrude using trowel, drag box, push cart or shoe. (Applicable for all types of markings). Recommended film thickness is 90 mils; drop on glass rate of 10 lbs./100 sq. ft.

2. Stencil Spray using spray applicator (for all types of markings). Recommended film thickness for transverse markings and symbols is 90 mils; 60 mils for longitudinal markings.

3. Truck Spray using driven vehicle and paint guns to apply longitudinal lines. Recommended film thickness is 40 mils with a double drop of glass beads.

3.09 RAISED PAVEMENT MARKERS

A. Install markers as per manufacturer's requirements and the drawings, according to the MUTCD pavement. Installation shall be performed so as not to cause damage to the surrounding pavement. The CONTRACTOR shall be responsible for repairing any damage pavement surfaces at no additional cost. The edges of pavement markings shall be a minimum of (4") four inches from pavement joints.

1. The pavement shall be cut to the dimensions and depth recommended by the manufacturer.

2. All cutting shall be performed to minimize airborne dust and similar dust. All debris from cutting shall be vacuumed up from the pavement out and adjacent pavement surfaces and disposed of properly.

3. Only install raised pavement markers when the amibent and pavement temperatures are above 50_F.

4. The epoxy resin adhesive material shall follow manufacturer's recommendations for proportioning, mixing, and application.

5. The pavement markers shall be immediately placed into the epoxy-filled pavement cut.

B. CONTRACTOR shall provide manufacturer certification that all raised pavement markers meet all current federal and state regulations previously state.

3.10 INLAID THERMOPLASTIC PAVEMENT MARKINGS

A. Pre-cut inlaid thermoplastic pavement marking material shall be furnished and installed by the CONTRACTOR at the locations and with the proper dimensions or as directed by the Township at the appropriate time and after the completion of the asphalt surface.

B. The surface shall be clean and free of all dust, silt, debris and, most importantly, chemical residue from de-icing materials. If de-icing material has been used on the road in the past, cleaning shall be carried out using pressure washing.

C. Placement shall be in accordance with the Manufacturer's recommendations and the installers shall posses an appropriate Certification of training from the Manufacturer.

D. Layout and imprinting of the pattern into the surface of the hot mix asphalt (HMA) shall be as per the drawings or specifications. Imprinting shall be carried out after the HMA paving work has been completed. The asphalt surface shall be re-heated to make the upper portion of the asphalt surface pliable enough to accept the imprint of the template. The application of heat to existing asphalt surface shall be done using reciprocating infra-red heating equipment.

E. The asphalt surface temperature shall not exceed 325^{o}F (163^{o}C). The temperature of the asphalt surface shall be regularly monitored during the reheating process, to avoid over heating and degradation of the asphalt cement. Direct flame heaters and non-reciprocating heaters shall not be allowed to be used for this purpose. Once the asphalt has reached imprinting temperature, the templates shall be placed in position and pressed into the surface using vibratory plate compactors.

F. Supply and install the inlaid thermoplastic panels on completely dry asphalt, in the imprinted area. Heat shall be gently applied to the surface using reciprocating infra red heaters, slowly raising the surface temperature until the thermoplastic material in the panels start to liquefy and flow, but no higher than 325^{o}F. Once the thermoplastic material has liquefied, the heat source shall be removed and the surface allowed to cool to ambient temperature. Only once the asphalt surface and the thermoplastic has reached ambient temperature may the road to be opened to traffic.

END OF SECTION

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SECTION 02852

GUIDE RAIL

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes installation of steel guide rail on bridges and along roadways, including any excavation, concrete work and restoration of paved or unpaved surfaces.

B. Related work specified elsewhere:

1. Bituminous paving and surfacing: Section 02500
2. Plain and reinforced cement concrete: Section 03000

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (latest revisions):

Publication 408, Specifications
Publication 72M, Roadway Construction Standards (RC)
Publication 219M, Bridge Construction Standards (BC)

B. Qualifications:

1. Guide Rail Installer - shall be a firm that specializes in this work, has minimum 5 years documented experience in Pennsylvania and is PennDOT pre-qualified to perform this work.

1.03 JOB CONDITIONS

A. Control of traffic shall be in accordance with PennDOT Publication 213, Temporary Traffic Control Guidelines, or latest revision.

B. Protection of existing utilities and structures:

1. Take all precautions to protect existing utilities and structures. Comply with requirements of Pennsylvania Underground Utility Protection Law.

2. Advise each person operating power equipment for excavation of the type and location of utility lines at the job site.

3. Immediately notify utility owner and Township of any damage to a utility line.

PART 2 - PRODUCTS

2.01 GUIDE RAIL

A. All rail elements, posts, offset brackets, base plates, other hardware and end sections shall be in accordance with PennDOT Publication 408, Section 1109, including galvanizing.

2.02 ANCHOR BOLTS

A. Anchor bolts shall be in accordance with PennDOT Publication 408, Section 1105 and as shown on drawings.

2.03 CONCRETE

A. Concrete for end anchorage shall be Class A cement concrete in accordance with PennDOT Publication 408, Section 704.

PART 3 - EXECUTION

3.01 APPROACH GUIDE RAIL

A. Ensure property lines and legal boundaries of work are clearly established.

B. Remove any existing railing and install new guide rail in accordance with PennDOT Publication 408, Section 620.

C. Install guide rail at the post spacings, lengths and with end treatments as shown on the drawings. Restore ground surface to pre-existing conditions.

3.02 STRUCTURE MOUNTED RAILING

A. Install new guide rail on the new or existing structure as shown on the drawings.

3.03 CLEAN UP

A. Clean up debris and unused material and remove from the site.

END OF SECTION

SECTION 02901

LANDSCAPE PLANTING

PART 1 GENERAL

1.01 DESCRIPTION

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

1. Furnishing and planting trees, shrubs and grasses.
2. Transporting trees and shrubs.
3. Maintenance.
4. Fertilizing and mulching.

B. Related Work Specified Elsewhere:

1. Finish grading, seeding and sodding: Section 02485

C. Definitions:

1. Weeds - vegetative species other than specified species to be established in a given area. Weeds include dandelion, crabgrass, chickweed, poison ivy, bermuda grass, thistles and similar species.

D. Applicable Standard Details:

1. PennDOT Publication 72M, Standard for roadway construction, latest edition.
2. See drawings.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Horticultural Standards, Latest edition of rules and grading, adopted by the American Association of Nurserymen.
2. Standardized Plant Names, American Joint Committee on Horticulture Nomenclature.
3. ANSI 260.1 of American Association of Nursery.

B. Qualifications:

1. Nursery: Company specializing in growing and cultivating plants with five (5) years of experience.
2. Installer: Company specializing in installing and planting plants and placing mulch, with five (5) years of experience.

3. CONTRACTOR shall be PennDOT pre-qualified for this work prior to bid opening.

1.03 JOB CONDITIONS

A. Protect underground utilities and structures. Comply with local and State requirements to locate facilities to avoid damage.

B. Control of Traffic:

1. Traffic on OWNER's streets may be limited as required with advance approval from the ENGINEER. The CONTRACTOR must notify the ENGINEER three (3) days in advance for traffic limitations.

2. Allowable work hours are as follows: 7:00 a.m. to 7:00 p.m.

C. Protection of Adjacent Areas:

1. Precautions shall be taken in regard to the damage of OWNER's or State streets by any other heavy equipment.

D. Coordination with Utilities:

1. The CONTRACTOR will be responsible to place any and all PA One Calls. CONTRACTOR shall provide all serial numbers to ENGINEER prior to commencing work.

2. Coordination with OWNER's maintenance crews will be the responsibility of the ENGINEER; however, the CONTRACTOR will be responsible to notify the ENGINEER of required actions as they become apparent to the CONTRACTOR.

3. Coordination with utility companies for any utility adjustments is the responsibility of the CONTRACTOR.

E. Safety Precautions:

1. All open trenches, excavation areas, and the perimeter of the project shall be fenced and barricaded during non-construction periods.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with local, State and Federal laws relative to plant material shipment.

B. CONTRACTOR shall identify any stockpile locations to ENGINEER prior to construction.

C. During loading, transporting and unloading material, CONTRACTOR shall exercise care to prevent damage.

PART 2 PRODUCTS

2.01 PLANT STOCK

A. All plant material shall be true to type and name, in accordance with the current edition of Standardized Plant Names. Each plant or plant group shall be labeled with not less than the plants common name and size. Each plant shall be typical of the species or variety specified. All stock shall be free from disease, insect infestations, mechanical injuries, broken branches, or other defects and also meeting the following requirements.

1. Nursery Stock shall have been grown in a certified nursery for a period of at least two (2) full growing seasons. The use of mechanical digging equipment at the nursery will be permitted only when its use is not deemed detrimental to nursery stock survival.

2. Plants shall not be collected from native areas.

3. Balled and Burlapped Plants (B&B) shall have a firm ball composed of original, undisturbed soil, wrapped with untreated burlap and laced with biodegradable lacing to hold the root ball firm and intact. All plants found with broken, loose or manufactured root balls, will be rejected. Trees shall have a well developed root system and a straight stem.

4. Container-Grown Plants shall have been grown for a least one (1) year, but not more than two (2) years, in the same container and shall not exist in a “pot-bound” condition.

5. Bare Root Plants shall have a live, well balanced root system with moist, fibrous root hairs free from rot and mold.

B. Plant material shall be handled, packed and stored using good nursery practices. Materials shall be available for inspection in the nursery before digging. The ENGINEER reserves the right to tag selected plants, indicating acceptable form, shape and culture practices, in compliance with detailed specifications.

C. Any plant material which is designated as rejected material shall be segregated and removed from the planting site within 48 hours.

D. All plant material shall be free of insect, disease and any mechanical injury.

E. Tree types shall be in accordance with Contract Drawings.

2.02 WRAPPING MATERIAL

A. Approved wrapping material shall be crinkle-Kraft waterproof paper 30-30-30 in 4” widths or approved equal.

2.03 FERTILIZER

A. Commercial fertilizer shall conform to the requirements of the Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86 (3P.S.68.2), as amended. Fertilizer shall have an analysis of 0-20-0, 20-10-5 (10 gram tablets) or 16-8-16 and shall be packaged in 4 ounce, individual, heat-sealed, polyethylene envelopes. Add fertilizer to plant pits at the rate recommended by the manufacturer.

B. Balance root system with moist, fibrous root hairs free from rot and mold.

2.04 MULCH

A. All mulch shall be free from foreign material, coarse stems, and any substances toxic to plant growth. Material shall be suitable, shredded not decomposed, between 1/4" and 2" in any dimension.

B. The color of the mulch shall be selected by the OWNER.

2.05 BACKFILL MIX FOR PLANTINGS

A. Backfill mix, if needed, shall consist of a homogeneous mixture of 20% peat (either shredded reed sedge peat or spaghnum moss peat, or a combination of both from fresh water sites) and 80% topsoil by volume.

B. Construction debris may not be used as backfill mix.

2.06 STAKES AND GUYS

A. Where required, stakes shall be rough-sawn, red or white cedar, southern yellow pine, or acceptable hardwoods free from knots, rot, or other defects which may impair the strength of the stake. Steel channel bar posts, rolled from Standard Carbon Steel Rails, and meeting ASTM A499 may be used in lieu of wood stakes.

B. All wire for bracing and guying trees shall be #12 gage, galvanized, and shall meet ASTM A392, Class II requirements.

2.07 HOSE GUARD

A. To protect trees and shrubs from guy wire damage, an acceptable hose guard shall be utilized.

2.08 WEED BARRIER MAT

A. Each area where a tree is proposed to be planted shall have nonwoven 100% polyester fiber fabric manufactured for this specific purpose. The weed barrier mat shall extend to the limits of the planting island.

2.09 TREE PROTECTORS

A. If shown on the Contract Drawings, all newly planted trees shall have a tree protector device installed around the base. The protector shall be corrugated polyethylene solid pipe (ASTM D1248, ASTM F405) of a minimum diameter of 2X greater than the caliper of the tree, and a length of 18". Galvanized steel or aluminum, perforated protectors may be used but must have a rubber hose guard lining at the top.

B. Before placing, samples or manufacturers catalog cuts of the devices shall be submitted for review and acceptance.

PART 3 EXECUTION

3.01 TEMPORARY STORAGE

A. All plant material not planted immediately shall be properly stored. Obtain, provide, and prepare a suitable healing-in site or arrange for a well-ventilated and cool storage shed located near the planting site. Temporarily store container-grown or balled and burlapped plants in a protected area, with containers or balls 6 inches apart. Fill all voids with moist mulch to the top of the container or ball.

B. Bare root plant material which arrives at the planting site shall be immediately removed from the transport vehicle. Roots shall be covered with wet burlap or mulch to prevent drying. Protect the plant material from sun and wind and keep fresh by fine mist spraying, or by other acceptable methods.

C. Protect plants at all times. All material left out of the ground, unprotected overnight, with roots exposed to sun and wind, or unprotected during transit, unloading, storage, heating in or during actual planting operations will be rejected.

D. The planting areas shall be stripped of existing mulch and topsoil, (which can be stored for reuse).

3.02 LAYOUT OF PLANTINGS

A. Delineate the tree installation locations, bed and planting area outlines. Identify the plants to be placed at the delineated locations. Do not start excavation or cultivation until the locations and outlines have been accepted by the ENGINEER or OWNER.

B. Should obstructions prevent planting at the indicated locations, alternate locations or deletions will be determined by the ENGINEER.

3.03 BED PREPARATION

A. For areas indicated for tree installation, prepare the area in the following manner to attain the designed finished grade:

1. Where indicated on Contract Drawings, remove existing tree or stump, including any existing concrete, bricks or blocks. Remove sod and all undesirable growth, add additional topsoil, if required to re-establish grade. Each planting area shall promote positive drainage when complete.

2. Uniformly spread 3 inches of peat, and then thoroughly incorporate it into the soil to a minimum depth of 6 inches. As directed during this blending operation, remove and dispose of undesirable material larger than 2 inches in any dimension.

3. Each planting area shall have a minimum of 3” of settled mulch on top of the plantings.

3.04 PREPARATION OF PLANTS

A. For bare root shrubs, vines, and seedling transplants, dig pits with vertical sides and flat bottoms large enough to accommodate roots without crowding. For balled and burlapped plants, the pit shall be twice the width of the ball diameter. For common periwinkle, pachysandra, and ivy, provide only four (4) inches of backfill mix beneath and around all sides of the root system.

B. All plant pits designated for bare root or balled and burlapped plant stock shall be dug prior to removing plants from temporary storage. Immediately before planting, scarify, loosen, or roughen the sides of the plant pit.

C. If the soil conditions are deemed favorable to healthy plant growth, the ENGINEER may direct the CONTRACTOR to dig the pit up to three (3) times the root spread or balled diameter.

3.05 PRUNING

A. Broken or badly bruised branches shall be removed with a clean cut. Pruning cuts over 3/4" diameter shall be painted over with approved tree paint.

B. Root pruning shall only be performed to remove damaged or broken main roots. Cut immediately above the damage with a clean oblique cut.

C. Typical top pruning, as directed, shall be performed appropriately for each species, variety, size, or planting location. Typical pruning samples will serve as a guide for subsequent pruning throughout the project.

D. Prune the tops of deciduous shrubs prior to or immediately following planting. Prune according to best horticultural practices regarding natural or desired form and growth characteristics of the individual species. Unless otherwise directed, remove one-fourth to one-third of the potential leaf bearing surface from deciduous plants. Only trim or thin evergreens when and as directed.

3.06 PLANTING OR TRANSPLANTING

A. Planting shall be performed when soil and climatic conditions are favorable, and according to the following schedule. Where local conditions warrant and at the direction of the ENGINEER, these dates may be extended:

1. Deciduous Trees and Shrubs: October 15- June 15

2. Evergreen Trees: March 1- May 15 and August 1- September 15

3. Seedlings and Seedling Transplants: March 1- May 15

B. Plants shall be set plumb and at the specified depth. Plant material shall be handled by the packaging material and not by the stem or branches. Remove plant containers or pre-formed root protection devices which restrict root development immediately prior to planting. Balled and burlapped material shall be placed in the plant pits intact. Set the root collar at the finished grade.

C. Bare root material shall be planted immediately. To prevent root drying, use wet burlap, straw, hay or other protective measures.

D. Fertilize in accordance with the fertilizer schedule. Cultivate and completely tamp backfill mix around the ball or toots, in a manner that fills voids and eliminates air pockets. Use extreme care to avoid damaging roots during backfilling and tamping operations. When backfilling is two-thirds complete, on balled and burlapped material, cut the lacing around the main stem or trunk then lay the burlap back. Thoroughly water the plant. After absorption of all water, complete the backfill operation and water again.

E. For each planting area, install the weed barrier mat to match the diameter of the plant pit or other designated area and staple. The weed barrier mat shall be installed to the extent of the planting island. Mulch areas required. The weed barrier mat shall have a minimum of 3" of mulch on top of it.

F. Wrap deciduous shade flowering tree trunks from the ground line to the lowest main branches, overlapping the wrap. Tie the wrapping at the top middle, and bottom and at a minimum of two other places.

G. If staking and guying is required, perform that operation immediately after completion of backfilling.

H. Install tree protectors around the base of deciduous and flowering trees with the bottom of the protector extending through the mulch and being in contact with the backfill material.

3.07 MULCH APPLICATION

A. All plants shall be mulched with tanbark shredded mulch to a uniform depth of 3", settled depth, placed after planting.

B. Remove weeds and deleterious materials prior to placing mulch. Place mulch within two (2) days after planting.

C. Rake mulch surface smooth and even. Soak full depth of mulch thoroughly with water the same day.

3.08 MAINTENANCE OF PLANTING

A. All plants shall be maintained in a living, healthy condition until the entire project has been accepted. Plants are required to be growing in place at least 60 days prior to project acceptance. During this period of establishment, perform necessary maintenance functions such as weeding, spraying, remulching and watering, as required or directed.

B. Watering shall be performed during the period of establishment promptly and with sufficient personnel and equipment to complete any directed operation within five (5) calendar days of such direction.

C. Tighten guys and stakes that may become loosened. At the end of the guarantee period, CONTRACTOR shall remove all guying material.

3.09 CLEAN UP

A. The planting site shall be left in an acceptable condition, with all debris and undesirable excavated material satisfactorily removed from the site and suitably disposed of. The acceptable condition may also require seeding and mulching of disturbed areas within the limits of work.

3.10 REPLACEMENT AND GUARANTEE

A. Within the required establishment period and prior to acceptance of the project, all plants determined by the ENGINEER not to be alive or in a healthy condition shall be replaced with plants of the same species, size, and quality as originally indicated and specified. Replacement may be directed to be made at the beginning of the next planting seasons.

B. CONTRACTOR shall guarantee all plants for a period of one (1) year from the date of acceptance. Date of acceptance is defined as the inspection after the last of total planting is installed. Inspection will be performed by the OWNER and ENGINEER when requested by the CONTRACTOR.

C. CONTRACTOR shall maintain all plantings for 90 days following project completion and provide maintenance instructions for the OWNER.

END OF SECTION

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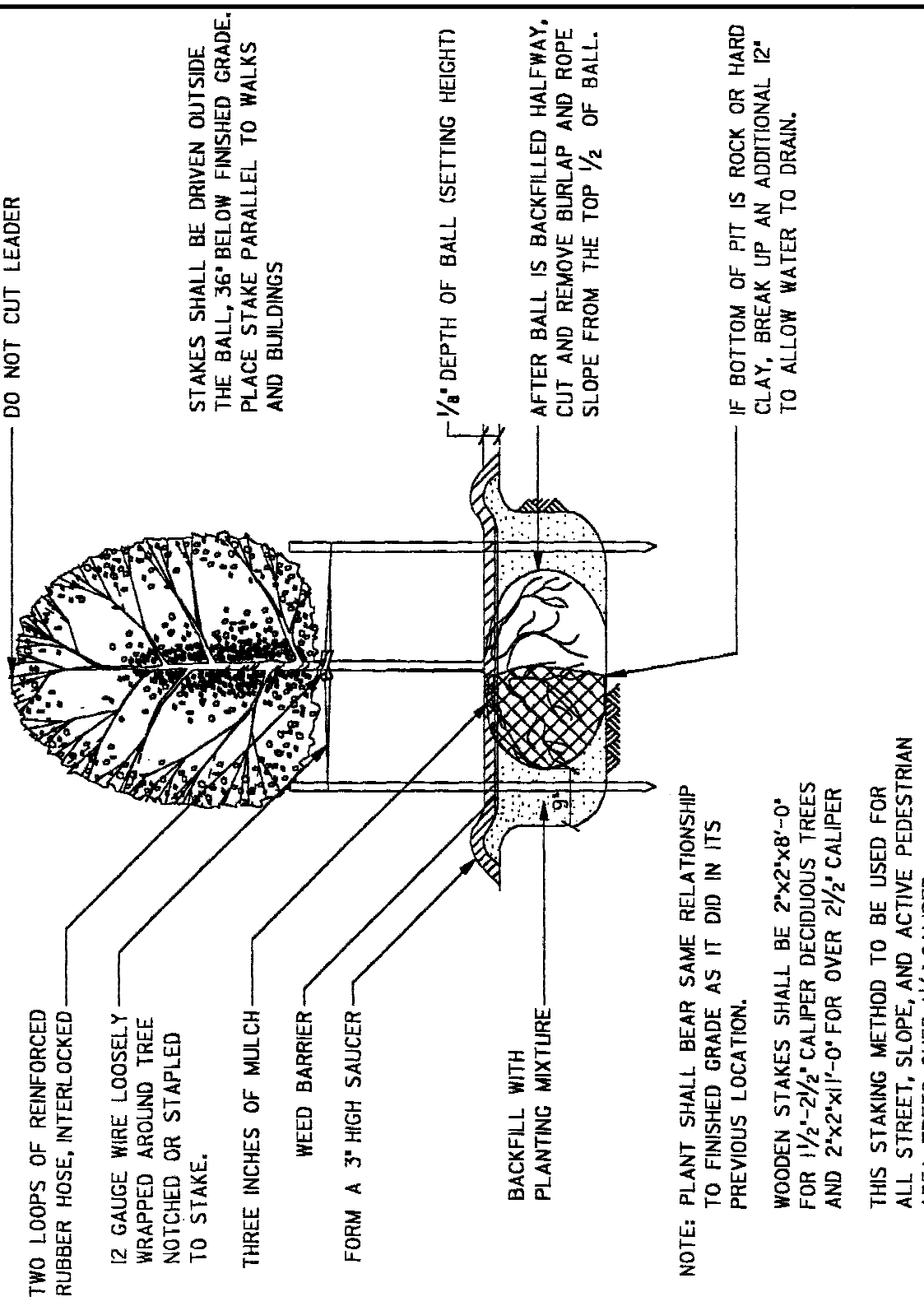

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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PLANTING AND STAKING METHODS FOR TREES

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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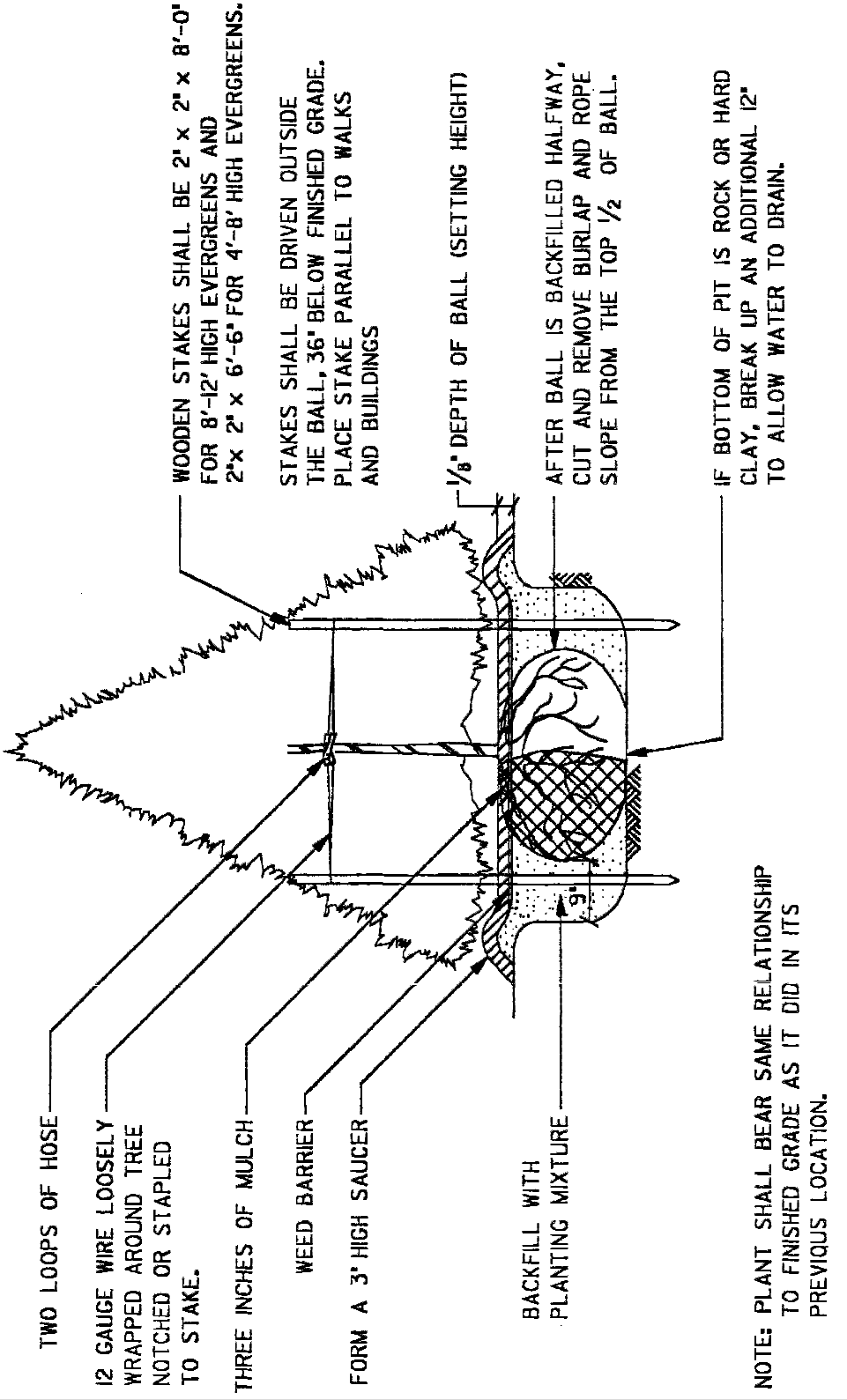
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02901-1
FILE NO.	1204.9.02.00



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PLANTING AND STAKING METHODS FOR EVERGREEN TREES

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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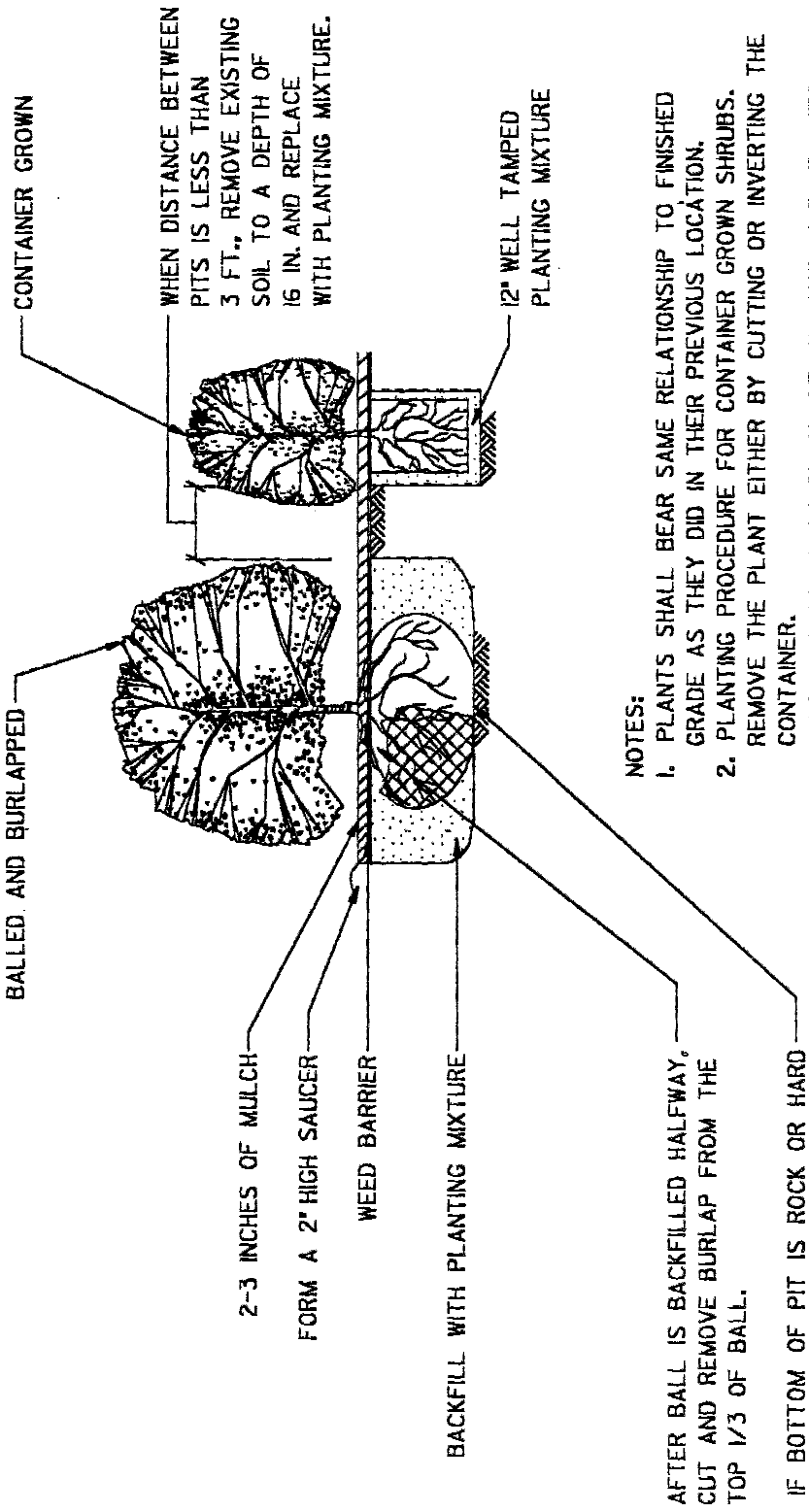
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT02901-2
FILE NO.	1204.9.02.00



NOTES:

1. PLANTS SHALL BEAR SAME RELATIONSHIP TO FINISHED GRADE AS THEY DID IN THEIR PREVIOUS LOCATION.
2. PLANTING PROCEDURE FOR CONTAINER GROWN SHRUBS. REMOVE THE PLANT EITHER BY CUTTING OR INVERTING THE CONTAINER.
3. USE A KNIFE OR SHARP BLADE TO MAKE 4-5 1" CUTS THE LENGTH OF THE ROOT BALL.
4. PLANT SHRUB OR TREE 1-2" ABOVE THE EXISTING GRADE. APPLY 3" THICK LAYER OF MULCH.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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PLANTING METHODS FOR SHRUBS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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FILE NO.	1204.9.02.00

SECTION 03000

PLAIN AND REINFORCED CEMENT CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Construction of cast-in-place plain and reinforced cement concrete structures.
2. Concrete curbs and sidewalks.
3. Trench restoration of concrete roadways and driveways.
4. Testing of cast-in-place concrete for curbs, sidewalks, and utility related structures.

B. Related Work Specified Elsewhere:

1. Cement concrete curb and sidewalk:	Section 02525
2. Cement concrete for utility construction:	Section 03050

C. Definitions:

1. Exposed construction - Permanently exposed to view.

2. Concrete - Normal weight concrete for which density is not a controlling attribute, made with aggregates of the types covered by ASTM C33, and having unit weights in the range of 135 to 160 lb. per cubic foot.

3. f'c - The design compressive strength of the hardened concrete at an age of 28-days.

D. Applicable Standard Details: NONE

E. Work shall conform to all requirements of ACI 301-05, published by the American Concrete Institute, Farmington Hill, MI, except as modified by these specifications.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Concrete Institute (ACI)

ACI 117 Standard Specifications for Tolerance for Concrete Construction and Materials.
ACI 301 Specifications for Structural Concrete.
ACI 315 Details and Detailing of Concrete Reinforcement.
ACI 318 Building Code Requirements for Reinforced Concrete.

2. American Society for Testing and Materials (ASTM)

A185 Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
C33 Standard Specification for Concrete Aggregates
C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C94 Standard Specification for Ready-Mixed Concrete
C138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
C150 Standard Specification for Portland Cement
C171 Standard Specification for Sheet Materials for Curing Concrete
C172 Standard Practice for Sampling Freshly Mixed Concrete
C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
C192 Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C260 Standard Specification for Air-Entraining Admixtures for Concrete
C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
C494 Standard Specification for Chemical Admixtures for Concrete
D698 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft^3)
D994 Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D1752 Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
E329 Standard Specification for Agencies Engaged in Construction Inspection and/or Testing

3. National Ready-Mixed Concrete Association, 900 Spring Street, Silver Spring, MD 20910: Check list for certification of ready-mixed concrete production facilities.

B. Testing Agencies:

1. Testing services shall be performed by an independent testing agency acceptable to the Township at the Contractor's expense.

2. All testing agencies shall meet the requirements of ASTM E329.

1.03 SUBMITTALS

A. Submit manufacturer's or supplier's certification for the following materials verifying compliance with these Specifications:

1. Portland cement
2. Coarse and fine aggregates
3. Any specified concrete admixtures
4. Reinforcing steel
5. Joint forming and filling materials
6. Form coating materials
7. Concrete curing compounds

B. Submit concrete mix designs, including strength test records, for review and approval.

C. Submit certified results of compressive strength cylinder tests.

D. Submit copies of concrete batch slips.

E. Submit to the Township, for review and approval, detailed Shop Drawings for the fabrication and placement of all reinforcement steel. Marked-up copies of drawing details will not be accepted for review. Approval shall be obtained before fabrication commences.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Cement - Unless otherwise specified, portland cement shall be Type I cement conforming to ASTM C150.

B. Aggregates - Aggregates for normal weight concrete shall meet the requirements of ASTM C33.

C. Water - Mixing water for concrete shall be clean, potable water meeting the requirements of ASTM C94.

D. Admixtures - Concrete admixtures, when required and/or approved for use by the Township Engineer, shall conform to the following Specifications:

1. Air-entraining admixtures - ASTM C260.
2. Water-reducing, retarding and accelerating admixtures - ASTM C494.

2.02 REINFORCEMENT

A. Reinforcing Bars - All reinforcing bars shall be deformed, except spirals, which may be plain

bars. Reinforcing bars shall be Grade 60, billet-steel conforming to the requirements of ASTM A615, including supplementary requirement on the Contract Drawings.

B. Welded Wire Fabric - Welded wire fabric shall be fabricated from smooth or deformed wire of the size and spacing required on the drawings and shall conform to the requirements of ASTM A185, except welded intersections shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.

2.03 JOINT MATERIALS

A. Joint Filler - Premolded expansion joint filler shall be of the type required by the drawings and shall conform to ASTM D994, ASTM D175l, or ASTM D1752.

B. Waterstop - The material, design and location of waterstops in joints shall be as indicated on the drawings.

2.04 FORM COATING MATERIALS

A. Form release agents shall be non-staining, liquid chemical coatings free of kerosene, oil and wax which effectively prevent absorption of moisture into the forms and bonding of the concrete to the forms.

2.05 CONCRETE CURING COMPOUNDS

A. Curing compounds shall be clear, non-staining liquid coatings containing no oil or wax and conforming to ASTM C309, such as Safe-Cure, Sealtight 1100, Klear Seal R-75 or Enviocure Clear 500 or similar material.

PART 3 – EXECUTION

3.01 PROPORTIONING

A. General - Concrete for all parts of the work shall be of the specified quality and capable of being placed without excessive segregation. When hardened, concrete shall develop all characteristics required by these Specifications.

B. Strength - Unless otherwise specified, the minimum 28-day compressive strength of the concrete, f'c, shall be 3000 psi.

C. Durability - All concrete which will be subjected to potentially destructive exposure, including freezing and thawing, weather, and/or deicer chemicals, shall be air-entrained and shall conform to the air content limits of ACI 301 moderate exposure.

D. Cement Content - The water-cement ratio shall not exceed 0.50 by weight and the cement factor shall not be less than 6.0 bags of cement (94 pounds each) per cubic yard of concrete.

E. Slump - The concrete shall be proportioned and produced to have a slump of not less than 1

inch and not more than 4 inches if consolidation is to be by vibration. Maximum slump may be 5 inches if consolidation is to be by methods other than vibration. The slump shall be determined by ASTM C143.

F. Maximum size of coarse aggregate - The nominal maximum size of coarse aggregate shall not be more than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between reinforcing bars, and shall in no case exceed 1 inch.

G. Admixtures - All concrete admixtures, when required or approved for use, shall be used in strict conformance with the manufacturer's instructions.

H. Selection of Proportions - Proposed concrete proportions shall be subject to acceptance by the Township based on demonstrated ability to produce concrete meeting all requirements of this Specification. Proportions of materials for concrete shall be established to provide adequate workability and proper consistency to permit concrete to be worked readily into the forms and around reinforcement without excessive segregation or bleeding under conditions of placement to be employed. Concrete proportions shall be established on the basis of previous field experience or laboratory trial batches as specified in ACI 301.

3.02 FORMWORK

A. Forms shall be used, wherever necessary, to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances.

B. Earth cuts shall not be used as forms for vertical surfaces unless required or permitted.

C. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the contractor. The formwork shall be designed for loads and lateral pressure and for design considerations, wind loads, allowable stresses, and other applicable requirements of the controlling local building code.

D. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Chamfer strips shall be placed in the corners of forms to produce beveled edges on permanently exposed surfaces. Interior corners on such surfaces and the edges of formed joints will not require beveling unless required by the drawings.

E. Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be of a commercially manufactured type. Non-fabricated wire shall not be used. Form ties shall be constructed so that the ends or end fasteners can be removed without causing appreciable spalling at the surface of the concrete. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 diameters or twice the minimum dimension of the tie from the formed surface of concrete to be permanently exposed to view except that in no case shall this distance be less than 3/4 in. When the formed surface of the concrete is not to be permanently exposed to view, form ties may be cut off flush with the formed surfaces.

F. Tolerances:

1. Unless otherwise specified, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 301.

2. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project sufficient control points and bench marks to be used for reference purposes to check tolerances.

G. Preparation of Form Surfaces:

1. All surfaces of forms and embedded materials shall be cleaned of all accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed.

2. Before placing the reinforcing steel or the concrete, the surfaces of the forms shall be covered with an acceptable coating material that will effectively prevent absorption of moisture, prevent bond with the concrete, and not stain the concrete surfaces.

H. Removal of Forms:

1. When repair of surface defects or finishing is required at an early age, forms shall be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

2. Top forms on sloping surfaces of concrete shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by the specified curing.

3. Wood forms for wall openings shall be loosened as soon as this can be accomplished without damage to the concrete.

4. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

5. Forms and shoring in the formwork used to support the weight of concrete in beams, slabs and other structural members shall remain in place until the concrete has reached the minimum 28-day compressive strength.

3.03 REINFORCEMENT

A. Welding - Welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

B. Fabricate and place all reinforcing in accordance with ACI 117.

C. Templates shall be furnished for placement of all column dowels and anchor bolts.

D. Bending or straightening of bars partially embedded in concrete shall not be permitted.

3.04 JOINTS AND EMBEDDED ITEMS

A. Construction, control, and expansion joints shall be constructed in accordance with the drawings.

B. All sleeves, inserts, anchors, and embedded items required for adjoin work or for its support shall be placed prior to concreting.

C. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

D. Placing Embedded Items - Expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.05 PRODUCTION OF CONCRETE

A. Production Method - All concrete shall be ready-mixed concrete batched, mixed and transported in accordance with ASTM C94. Plant equipment and facilities shall conform to "Certification of Ready-Mixed Concrete Production Facilities (Checklist with Instructions)" of the National Ready-Mixed Concrete Association.

B. When concrete arrives at the project with slump below that suitable for placing, as indicated by the designer's Specifications, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Discharge of the concrete shall be completed within 1-1/2 hours, or before the truck drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates. Truck batch slips must include time of batching, total drum revolutions upon arrival at site, and quantity of water (in gallons) per cubic yard available to be added to attain the maximum design water-cement ratio.

3.06 PLACING

A. Preparation Before Placing:

1. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

2. Formwork shall be completed; snow, ice and water shall be removed; reinforcement shall be secured in place; expansion joint material, anchors, and other embedded items shall be positioned; and the entire preparation shall be accepted.

3. Concrete shall not be placed on frozen ground.

B. Conveying:

1. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained. Do not use aluminum pipes or chutes.

2. Conveying equipment shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements:

   a. Truck mixers, agitators and non-agitating units and their manner of operation shall conform to the applicable requirements of ASTM C94.

   b. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An acceptable arrangement shall be used at the discharge end to prevent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.

   c. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1’ vertical to 2’ horizontal and not less than 1’ vertical to 3’ horizontal. Chutes more than 20 ft. long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

   d. Pumping or pneumatic conveying equipment shall be capable of pumping the specified mix with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 2 in. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

C. Depositing:

1. General - Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as indicated on the drawings. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior acceptance has been obtained.

2. Segregation - Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any

procedure which will cause segregation.

3. Consolidation - All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting, or planes of weakness. Internal vibrators used shall be the largest size and the most powerful that can be properly used in the work. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 18 in. apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse aggregate back from the formed surface.

D. Protection:

1. Unless adequate protection is provided, concrete shall not be placed during rain, sleet, or snow.

2. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

3. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints and should not exceed 90^{o}F. When the temperature of the steel is greater that 120^{o}F, steel forms and reinforcement shall be sprayed with water just prior to placing the concrete.

3.07 REPAIR OF SURFACE DEFECTS

A. General - Surface defects, including tie holes, shall be repaired immediately after form removal.

B. Repair of Defective Areas:

1. All honeycombed and other defective concrete shall be removed down to sound concrete. If chipping is necessary the edges shall be perpendicular to the surface or slightly undercut. No featheredges will be permitted. The area to be patched and an area at least 6 in. wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1 part cement to 1 part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream, and then well brushed into the surface.

2. The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the course aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume. White portland cement shall be substituted for a part of the gray portland cement on exposed concrete in order to produce a color matching the color of the surrounding

concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

3. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the pre-mixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least 1 hr. before being finally finished. The patched area shall be kept damp for 7 days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.

C. Tie Holes - After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.

D. Proprietary Materials - If approved by the Township, proprietary compounds for adhesion or as patching ingredients may be used in lieu of or in addition to the foregoing patching procedures. Such compounds shall be used in accordance with the manufacturer's recommendations.

3.08 FINISHING OF FORMED SURFACES

A. General:

1. After removal of forms the surfaces of concrete shall be given one or more of the finishes specified below in locations designated by the drawings.

2. When finishing is required to match a small sample furnished to the Contractor, the sample finish shall be reproduced on an area at least 100 sq. ft. in an inconspicuous location designated by the Township before proceeding with the finish in the specified location.

B. As-Cast Finishes:

1. Rough form finish - No selected form facing materials shall be specified for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 1/4 in. in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imparted by the forms.

2. Smooth form finish - The form facing material shall produce a smooth, hard, uniform texture on the concrete. It may be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper or other acceptable material capable of producing the desired finish. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection. Material with raised grain, torn surfaces, worn edges, dents, patches, or other defects which will impair the texture of the concrete surface shall not be used. Tie holes and defects shall be patched. All fins shall be completely removed.

C. Rubbed Finishes - The following finishes shall be produced on concrete with a smooth form finish. Where a smooth rubbed finish is to be applied, the forms shall have been removed and necessary patching completed as soon after placement as possible without jeopardizing the structure.

1. Smooth rubbed finish - Smooth rubbed finish shall be produced on newly hardened concrete no later than the day following form removal. Surfaces shall be wetted and rubbed with carborundum brick or other abrasive until uniform color and texture are produced. No cement grout shall be used other than the cement paste drawn from the concrete itself by the rubbing process.

2. Grout cleaned finish - No cleaning operations shall be under taken until all contiguous surfaces to be cleaned are completed and accessible. Cleaning as the work progresses shall not be permitted. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint. White portland cement shall be substituted for a part of the gray portland cement in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or a spray gun. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, burlap, or other means. After the surface whitens from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap. The finish shall be kept damp for at least 36 hours after final rubbing.

3. Cork floated finish - Remove forms at an early stage, within 2 to 3 days of placement where possible. Remove ties. Remove all burrs and fins. Mix one part portland cement and one part fine sand with sufficient water to produce a stiff mortar. Dampen wall surface. Apply mortar with firm rubber float or with trowel, filling all surface voids. Compress mortar into voids using a slow-speed grinder or stone. If the mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with a fog sprayer. Produce the final texture with a cork float using a swirling motion.

D. Unspecified Finish - If the finish is not designated on the drawings, the following finishes shall be used as applicable:

1. Rough form finish - For all concrete surfaces not permanently exposed. Tie holes and defects shall be patched and fins over ¼” in height rubbed off.

2. Smooth rubbed finish - For all concrete surfaces permanently exposed. Apply on newly hardened concrete within one day following form removal. Surfaces shall be wetted and rubbed until uniform color and texture are produced.

E. Related Unformed Surfaces - Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3.09 SLABS

A. General - Concrete for slabs shall be as specified in Article 3.01.

B. Preparation of subgrade for slabs on ground:

1. The subgrade shall be well drained and of adequate and uniform loadbearing capacity. The minimum in-place density of the subgrade soils shall be not less than 95% of its maximum dry weight density at its optimum moisture content, plus or minus 2%, as determined by ASTM D698.

2. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50^{o}F long enough to remove all frost from the subgrade.

3. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall not be standing water on the subgrade nor any muddy or soft spots when the concrete is placed.

C. Edge Forms and Screeds:

1. Edge forms and intermediate screed strips shall be set accurately to produce the designated elevations and contours of the finished surface, and shall be sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates or acceptable compacting type screeds.

2. When formwork is cambered, screeds shall be set to a like camber to maintain the proper concrete thicknesses.

D. Placement:

1. Mixing and placing shall be carefully coordinated with finishing. Concrete shall not be placed on the subgrade or forms more rapidly than it can be spread, straightedged, and darbied or bull floated. These operations must be performed before bleeding water has an opportunity to collect on the surface.

2. To obtain good surfaces and avoid cold joints, the size of finishing crews shall be planned with due regard for the effects of concrete temperature and atmospheric conditions on the rate of hardening of the concrete.

E. Jointing - Joints in slabs on grade shall be located and detailed as indicated on the drawings. If saw-cut joints are required, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking.

F. Consolidation - Concrete in slabs shall be thoroughly consolidated. Internal vibration shall be

used in beams and girders of framed slabs and along the bulkheads of slabs on grade. Consolidation of slabs shall be obtained with vibrating screeds, roller pipe screeds, internal vibrators, or other acceptable means.

G. Finishes:

1. Scratched finish - After the concrete has been placed, consolidated, struck off and leveled, the surface shall be roughened with stiff brushes or rakes before final set.

2. Floated finish - After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Floating with a hand float or with a bladed power trowel equipped with float shoes, or with a powered disc float shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 10-ft. straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled. The slab shall then be refloated immediately to a uniform sandy texture.

3. Troweled finish - The surface shall first be float-finished. It shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be free of trowel marks, uniform in texture and appearance. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding.

4. Broom or belt finish - Immediately after the concrete has received a float finish, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

H. Unspecified Finish - When type of finish is not specified on the drawings, the following finishes shall be used as applicable:

1. Scratched finish - For surfaces intended to receive bonded applied cementitious applications.

2. Floated finish - For surfaces intended to receive roofing, waterproofing membranes, or sand bed terrazzo.

3. Trowel finish - For floors intended as walking surfaces or for reception of floor coverings.

4. Broom or belt finish - For sidewalks and garage floors and ramps.

I. Finishing Tolerances - as specified on the drawings.

3.10 CURING AND PROTECTION

A. General - Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete.

B. Preservation of Moisture:

1. For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing:

   a. Application of acceptable moisture-retaining covering as approved by the Township.

   b. Application of a curing compound conforming to ASTM C309. The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. It shall not be used on any surface against which additional concrete or other material is to be bonded unless it is proven that the curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded applications.

2. Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal the concrete shall be cured.

3. Curing shall be continued for at least 7 days. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the strength, f'c. Moisture retention measures may also be terminated when the temperature of the concrete is maintained at least at 50^{o}F for the same length of time that laboratory-cured cylinders, representative of the concrete in-place, require to achieve 85 percent of f'c.

C. Temperature, Wind, and Humidity:

1. Cold weather - When the mean daily outdoor temperature is less than 40^{o}F, the temperature of the concrete shall be maintained between 50^{o} and 70^{o}F for the required curing period. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hr. unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

2. Hot weather - When necessary, provision for windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

3. Rate of temperature change - Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as

possible and shall not exceed 5^{o}F in any 1 hr. or 50^{o}F in any 24-hr. period.

D. Protection from mechanical injury - During the curing period, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials or methods, by application of curing procedures, and by rain or running water.

3.11 TESTING

A. General - Concrete materials and operations will be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Township for final acceptance.

B. Testing Services - The following testing services shall be performed by the designated testing agency:

1. Conduct strength tests of the concrete during construction in accordance with the following procedures:

   a. Secure composite samples in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.

   b. Mold and cure four (4) specimens from each sample in accordance with ASTM C31. Any deviations from the requirements of this Standard shall be recorded in the test report.

   c. Test specimens in accordance with ASTM C39. Two (2) specimens shall be tested at 28 days for acceptance and two (2) shall be tested at 7 days for information. The acceptance test results shall be the average of the strengths of the specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result. Should both specimens in a test show any of the above defects, the entire test shall be discarded.

   d. Make at least one strength test for each 50 cu. yd., or fraction thereof, of each mixture design of concrete placed in any 1 day. When the total quantity of concrete with a given mixture design is less than 20 cu. yd., the strength tests may be waived by the Township Engineer if, in his judgement, adequate evidence of satisfactory strength is provided, such as strength test results for the same kind of concrete supplied on the same day and under comparable conditions to other work or other projects.

2. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using ASTM C143.

3. Determine air content of the concrete sample for each strength test in accordance with either

ASTM C231, ASTM C173, or ASTM C138.

4. Determine temperature of the concrete sample for each strength test.

C. Additional Services When Required - The following services shall be performed by the testing agency when required by the Township at the Contractor's expense:

1. Inspect concrete batching, mixing and delivery operations to the extent deemed necessary by the Township.

2. Sample concrete at point of placement and perform required tests.

3. Review the manufacturer's report for each shipment of cement and reinforcing steel and conduct laboratory tests or spot checks of the materials as received for compliance with specifications.

4. Mold four (4) additional specimens from each sample (in addition to those required in Section 03000, Paragraph 3.11.B.1.b) in accordance with ASTM C31 and field cure in or on the structure providing the same method of cure for the specimens as that which the structure receives.

D. Other Services As Needed - The following services shall be performed by the testing agency at the Contractor's expense:

1. Additional testing and inspection required because of changes in materials or proportions requested by the Contractor.
2. Additional testing of materials or concrete occasioned by their failure by test or inspection to meet specification requirements.

E. Duties and Authorities of Designated Testing Agency:

1. Representatives of the agency shall inspect, sample and test the materials and the production of concrete as required by the Township. When it appears that any material furnished or work performed by the Contractor fails to fulfill specification requirements, the testing agency shall report such deficiency to the Township and the Contractor.

2. The agency shall report all test and inspection results to the Township and Contractor immediately after they are performed. All test reports shall include the exact location in the work at which the batch represented by a test was deposited. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.

3. The testing agency and its representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Documents, nor to approve or accept any portion of the work.

F. Responsibilities and Duties of Contractor:

1. The Contractor shall provide the necessary testing services for the following:

a. Qualification of proposed materials and the establishment of mixture designs.

b. Other testing services needed or required by the Contractor.

2. The use of testing services shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with these specifications.

3. The Contractor shall submit to the Township Engineer the concrete materials and the concrete mix designs proposed for use with a written request for acceptance. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. No concrete shall be placed in the work until the Contractor has received such acceptance in writing.

4. To facilitate testing and inspection, the Contractor shall:

a. Furnish any necessary labor to assist the testing agency in obtaining and handling samples at the project or other sources of materials.

b. Advise the testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

c. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hrs. as required by ASTM C31.

3.12 EVALUATION AND ACCEPTANCE OF CONCRETE

A. Evaluation of Test Results:

1. Test results for standard molded and standard cured test cylinders shall be evaluated separately for each specified concrete mixture design. Such evaluation shall be valid only if tests have been conducted in accordance with procedures specified herein.

2. For evaluation, each specified mixture design shall be represented by at least five tests.

B. Acceptance of Concrete - The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength f'c, and no individual strength test result falls below the specified strength f'c by more than 500 psi.

C. Testing of Concrete In Place:

1. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by the Township to determine relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection.

2. Core tests

   a. Where required, cores at least 2 in. in diameter shall be obtained and tested in accordance with ASTM C42. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60^{o} to 80^{o}F, relative humidity less than 60 percent) for 7 days before testing and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C42.

   b. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores shall be determined by the Township to least impair the strength of the structure. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, it shall be replaced with a new core.

   c. Concrete in the area represented by a core test will be considered adequate if the average strength of the cores is equal to at least 85 percent of specified strength f'c and if no single core is less than 75 percent of the specified strength f'c.

   d. Core holes shall be filled with low slump concrete or mortar. See Article 3.07, Repair of Surface Defects.

3.13 ACCEPTANCE OF STRUCTURE

A. General:

1. Completed concrete work which meets all applicable requirements will be accepted without qualification.

2. Completed concrete work which fails to meet one or more requirements but which has been repaired to bring it into compliance will be accepted without qualification.

3. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected as provided in these Specifications. In this event, modifications may be required to assure that the work complies with the design intent.

B. Dimensional Tolerances:

1. Formed surfaces resulting in concrete outlines smaller than permitted by the tolerances of ACI 301 shall be considered potentially deficient in strength and subject to the provisions of Article 3.13.D, herein.

2. Formed surfaces resulting in concrete outlines larger than permitted by the tolerances of ACI may be rejected and the excess material shall be subject to removal. If removal of the excess material is permitted, it shall be accomplished in such a manner as to maintain the strength of the section and to meet all other applicable requirements of function and appearance.

3. Concrete members cast in the wrong location may be rejected if the strength, appearance or function of the structure is adversely affected or misplaced items interfere with other construction.

4. Inaccurately formed concrete surfaces exceeding the limits of ACI 301, and which are exposed to view, may be rejected and shall be repaired or removed and replaced if required.

5. Finished slabs exceeding the allowable tolerances may be repaired provided that strength or appearance is not adversely affected. High spots may be removed with a terrazzo grinder, low spots filled with a patching compound, or other remedial measures performed as permitted.

C. Appearance:

1. Other concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired only by acceptable methods.

2. Concrete not exposed to view is not subject to rejection for defective appearance.

D. Strength of Structure:

1. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, including but not necessarily limited to the following conditions:

a. Low concrete strength as designated in Article 3.12.

b. Reinforcing steel size, quantity, strength, position, or arrangement at variance with the requirements of Article 3.03, Reinforcement, or the drawings.

c. Concrete which differs from the required dimensions or location in such a manner as to reduce the strength.

d. Curing less than that specified.

e. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

f. Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

g. Poor workmanship likely to result in deficient strength.

2. Structural analysis and/or additional testing may be required when the strength of the structure is considered potentially deficient.

3. Core tests may be required when the strength of the concrete in place is considered

potentially deficient.

4. If core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be required and their results evaluated in accordance with ACI 318.

5. Concrete work judged inadequate by structural analysis or by results of a load test shall be reinforced with additional construction if so directed by the Township, or shall be replaced, at the Contractor's expense.

6. The Contractor shall pay all costs incurred in providing the additional testing, analysis and/or engineering services required by this section.

7. The Township will pay all costs of additional testing and/or analysis which is made at his request and which is not required by these Specifications.

END OF SECTION

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SECTION 03050

CEMENT CONCRETE FOR UTILITY CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to cast-in-place cement concrete for:

1. Reaction and support blocking
2. Cradles and encasements
3. Miscellaneous utility related cast-in-place cement concrete construction

B. Related work specified elsewhere:

1. Trenching, backfilling and compaction:	Section 02221
2. Trench paving and restoration:	Section 02575
3. Manholes:	Section 02601
4. Storm inlets, catch basins, endwalls:	Section 02602
5. Sanitary sewer pipe:	Section 02610
6. Plain and reinforced cement concrete:	Section 03000

C. Definitions: NONE

D. Applicable Standard Details:

1.	03050-1	Concrete Encasement Detail
2.	03050-2	Concrete Anchor Detail
3.	03050-3	Special Concrete Encasement for Frost Protection Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

   Publication 408, Specifications

B. Inspections:

1. Inspections by the Township will, at a minimum, be made of the subgrade, formwork, supports, and reinforcement prior to placement of the concrete; and of the concrete prior to backfilling.

C. Testing:

1. As specified in Section 03000.

1.03 SUBMITTALS

A. Submit concrete mix designs, including strength test records, for review and approval.

B. Submit certified results of compressive strength cylinder tests.

C. Submit copies of concrete batch slips.

PART 2 - PRODUCTS

2.01 CEMENT CONCRETE

A. As specified in Section 03000.

B. For work involving a time constraint, use PennDOT Class HES (High Early Strength).

2.02 REINFORCEMENT STEEL

A. As specified in Section 03000.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Comply with Section 03000 for construction requirements including formwork, placement, curing, and protection of cement concrete.

B. Excavate and shape trench bottoms and sides to accommodate thrust block forms, encasements, manhole bases, drop connections, inlets and vaults.

C. Support pipes, valves and fittings at the required elevation with brick or concrete block. Do not use earth, rock, wood, or organic materials as supports.

D. Provide spacers, chairs, bolsters, ties and other devices for properly placing, spacing, supporting and fastening reinforcement in place.

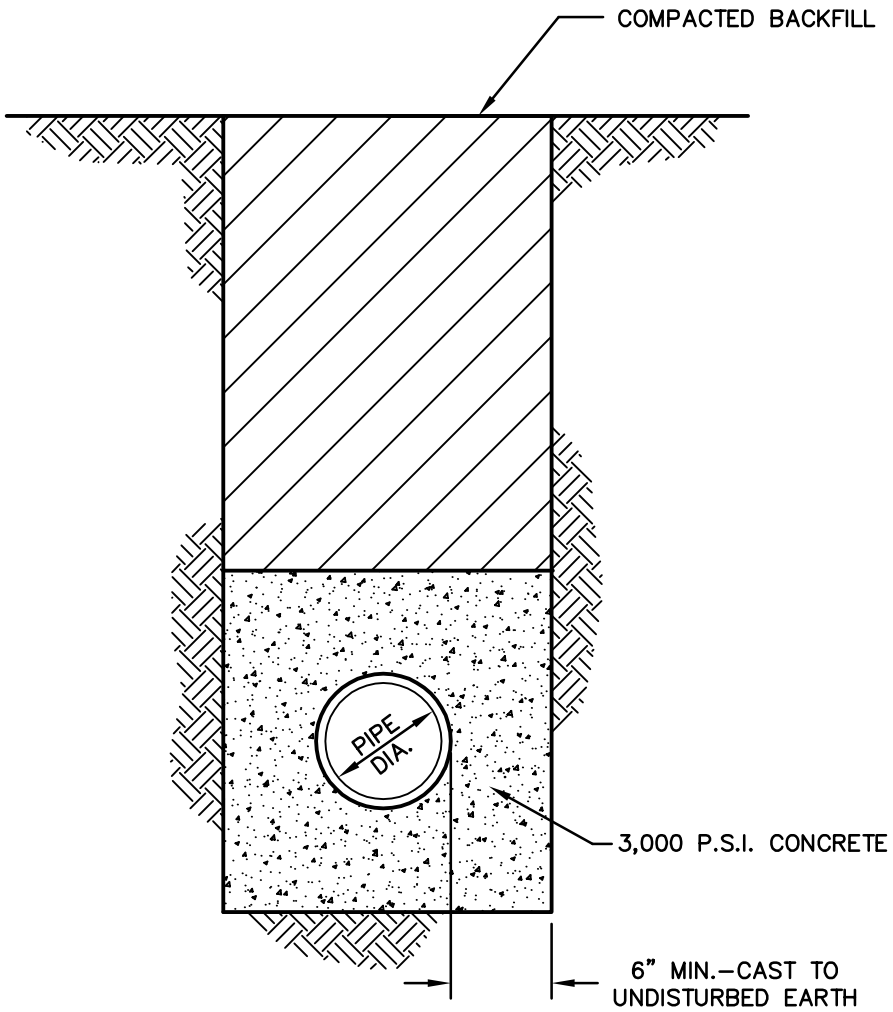
E. Place concrete utilizing all possible care to prevent displacement of pipes or fittings. Return displaced pipes or fittings to line and grade immediately.

F. Insure tie rods, nuts, bolts and flanges are free and clear of concrete.

G. Do not backfill structures until concrete has achieved its initial set and forms are removed.

H. Perform backfilling and compaction as specified in Section 02221.

END OF SECTION



WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

C.S.Davidson, Inc.

Excellence in Civil Engineering

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50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
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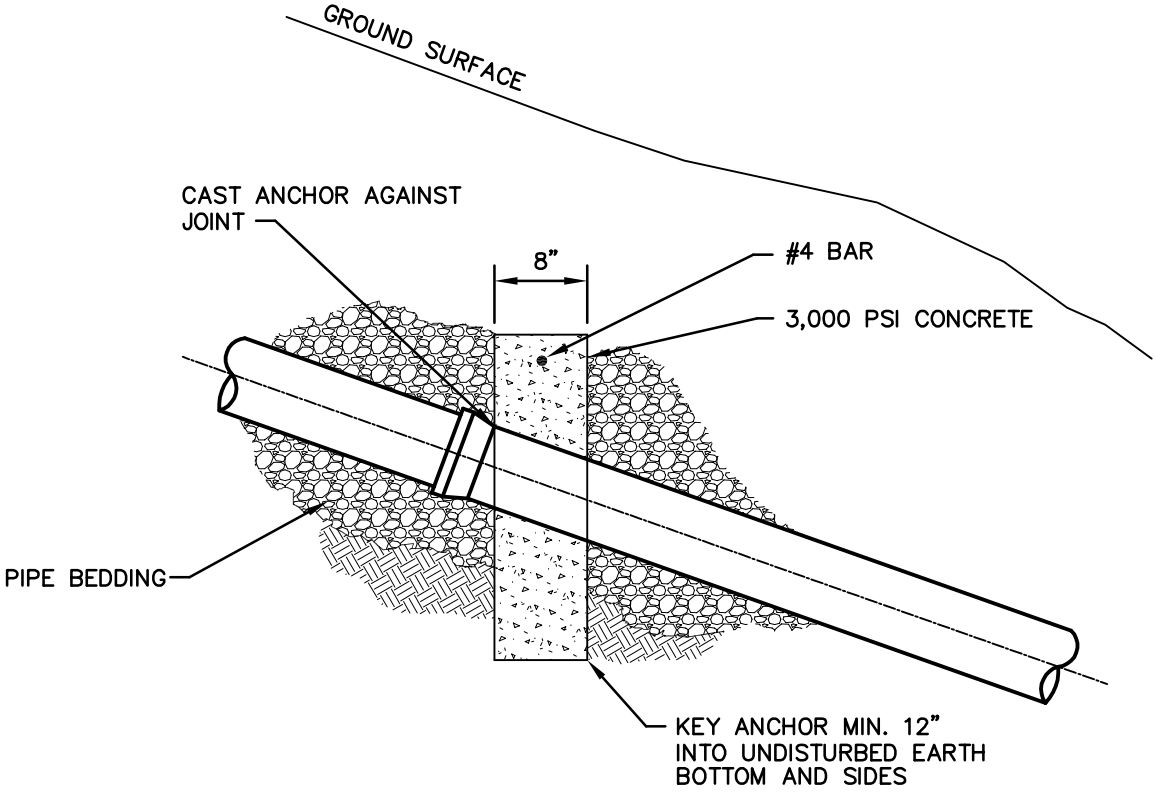
CONCRETE ENCASEMENT DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT03050-1
FILE NO.	1204.9.02.00



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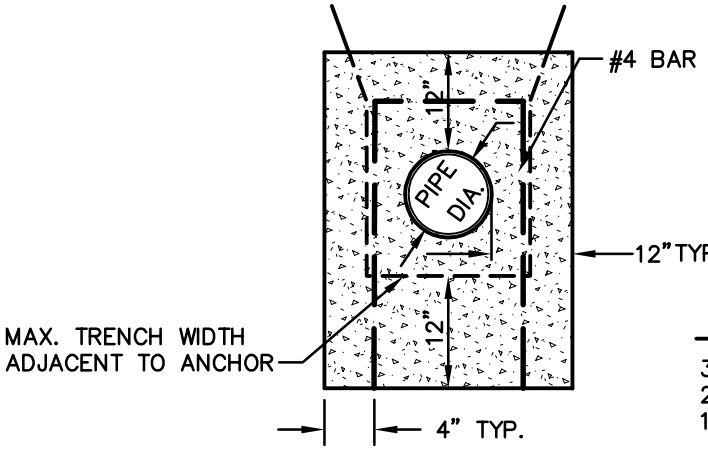

MAXIMUM SPACING

36' O.C. 20% TO 35% SLOPES
24' O.C. OVER 35% TO 50% SLOPES
16' O.C. OVER 50% SLOPES

ELEVATION

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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CONCRETE ANCHOR DETAILS

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
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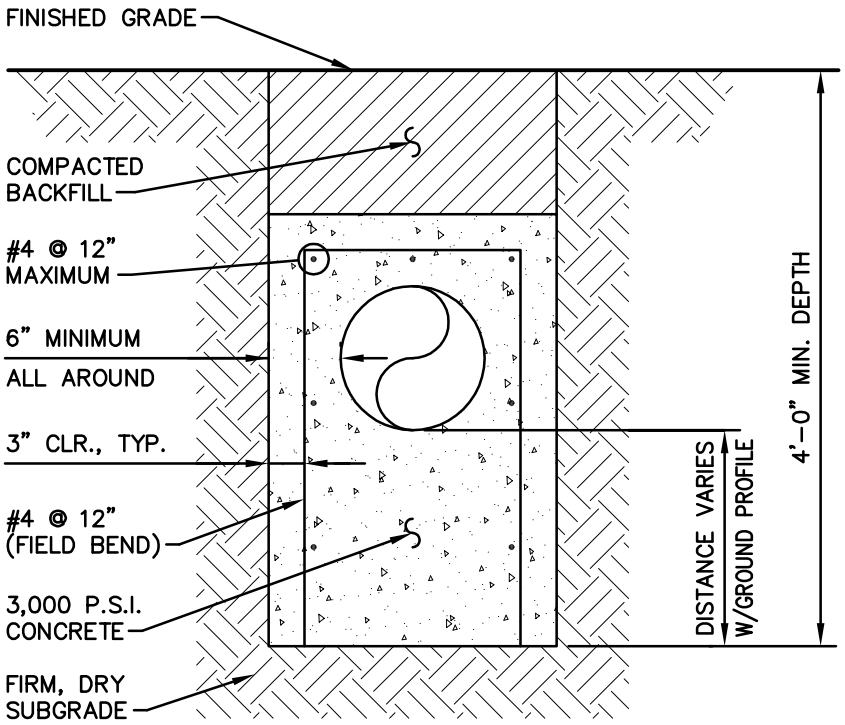
FILE NO.	1204.9.02.00



NOTES:

- STABILIZE PIPE & REINFORCEMENT WITHIN EXCAVATION TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT.
- THE USE OF FLOWABLE FILL WILL NOT BE ALLOWED AS A SUBSTITUTE MATERIAL.
- REBAR SPACING CAN BE INCREASED IF APPROVED BY ENGINEER.

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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315 W. JAMES ST., SUITE 102 LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690
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SPECIAL CONCRETE ENCASEMENT FOR FROST PROTECTION DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
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SCALE	N.T.S.
DATE	12/2/2010
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FILE NO.	1204.9.02.00

SECTION 16500
STREET LIGHTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The Work of this Section includes, but is not limited to the installation of conduits, poles, controls, lighting fixtures, lamps and wire necessary for a complete and functioning street lighting system.

B. Related work specified elsewhere:

1.	Trenching, backfilling and compacting:	Section 02221
2.	Plain and reinforced cement concrete:	Section 03000
3.	Cement concrete for utility construction:	Section 03050

C. Definitions: None

D. Applicable Standard Details:

16500-1	Street Lighting Service Detail
16500-2	Community Street Light Pole Detail
16500-3	Individual Lamp Post Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1.

ANSI	American National Standard Institute
ASTM	American Society for Testing and Materials
NEMA	National Electrical Manufacturers Association
NECS	National Electrical Safety Code
NFPA	National Fire Protection Association
UL	Underwriters' Laboratories, Inc.
IESNA	Illuminating Engineering Society of North America
IEEE	Institute of Electrical & Electronics Engineers
IPCEA	Insulated Power Cable Engineers Association
OSHA	Occupational Safety & Health Administration
NEC	National Electrical Code

2. Pennsylvania Department of Transportation (PennDOT), latest revision

   a. Publication 72M, Roadway Construction Standard Drawings
   b. Publication 111M, Traffic Control Pavement Markings & Signing Standards
   c. Publication 213, Temporary Traffic Control Guidelines
   d. Publication 408, Specifications

B. Inspections:

1. Upon completion of work, Developer shall secure an electrical inspection from an electrical inspection agency acceptable to the authority having jurisdiction and the local electric company.

C. Testing:

1. All electrical conductors, after installation of wiring and apparatus has been completed, shall be tested by the Contractor to insure continuity, proper splicing, freedom from ground (except "made ground" and those required for protection) and insulation resistance in accordance with Underwriters' requirements. The Contractor shall furnish and employ suitable instruments such as ammeters, volt meters, meggars, etc.

2. Prior to testing or adjusting, the Contractor shall consult with the Township to determine the intended function of any equipment, wiring or systems. The Contractor shall then perform such tests and make the necessary adjustments to ensure that the required function is obtained.

3. Equipment and wiring systems not specified as requiring a specific test shall be tested in operation to determine that all design functions are satisfactorily performed.

1.03 SUBMITTALS

A. General Layout

1. All land development within the Primary Growth Area shall provide a community lighting system within the public right-of-way in accordance with the West Manheim Township Zoning and Subdivision and Land Development Ordinances.

2. All land development outside of the Primary Growth Area shall provide lighting at each street intersection and an individual lamp posts for each lot proposed in accordance with the West Manheim Township Zoning and Subdivision and Land Development Ordinances.

B. Submit (in triplicate) Certificate of Compliance following electrical inspection.

C. Voltage drop calculations, prepared by a Professional Engineer licensed in Pennsylvania.

D. Photometric data for lighting fixtures and point by point maintained footcandle print out that includes maximum maintained footcandles, minimum maintained footcandles, average maintained footcandles, maximum : minimum ratio, average : minimum ratio.

E. Efficiency and candle power distribution curve for each type of lighting fixture.

F. Catalog cuts and dimensional data for poles and lighting fixtures proposed.

G. Concrete base design.

H. Electrical As-builts.

1.04 JOB CONDITIONS

A. Codes and Standards:

1. All electrical work shall meet the requirements of National Electric Code of the National Fire Protection Association. In addition, any state, municipal or other authority's laws, rules or regulations applicable to the work shall be followed.

2. Where applicable, all materials and equipment shall bear the label of approval of the Underwriters Laboratory, Inc.

3. Photometric performance of the installed lighting system shall be within guidelines established by The Illuminating Society of North America.

4. Reference to the codes and standards listed herein shall constitute the minimum acceptable requirements. Where drawings and specification requirements exceed those of the codes listed herein, Contractor shall follow the drawings and specifications.

1.05 COORDINATION OF DEVELOPMENT STREET LIGHTING

A. The electric company's street lighting service is only available to the Township. The developer shall coordinate street lighting requests with the Township and all street lighting shall conform to the Township's and electric company's street lighting specifications.

B. The developer shall provide the electric company with a preliminary plan showing proposed locations of street light standards. The electric company does not design or approve design of street lighting systems.

C. The electric company returns plan showing the available source(s) for the street light feed(s) and, if not previously provided, this document will list material requirements.

D. Developer shall provide street light luminaire(s) which is equipped to operate with the material, as specified herein and as approved the electric company.

E. Requirements:

1. Street lights shall be spaced at regular intervals as specified by footcandle calculations. Minor adjustments to spacing may be made to accommodate lot lines, driveways, etc.

2. Developer shall provide the electric company with a final plan showing location of facilities (street lights, service equipment, conduit and cable routing, etc.) and size and type of cables and fusing.

3. Prior to excavating, the contractor shall call the PA One Call system.

4. Developer shall install facilities in accordance with requirements of the electric company, the Township, the manufacturer, the National Electric Code, and final plan. The Developer is required to provide and/or install:

a. Meter(s) for community lighting should be pedestal mounted near a pad mounted transformer within the development.

b. All trenching and backfilling, including service cable from source to junction box.

c. All cable, conduit, foundations, standards, luminaries, lamps, and photoelectric controls as per developer agreement with Township.

d. Service equipment at each source location designated by the electric company to facilitate street lighting cable connections.

5. Developer shall secure an electrical inspection from the electric company's accepted electrical inspection agency before the electric company will energize.

6. Upon receipt of a street lighting agreement from the Township and the electrical inspection certificate, the electric company will:

a. Install service to the line side of the service equipment.

b. Install on each streetlight standard an identification tag to show grid location and an additional tag to show the maintenance agreement, lamp type and size.

7. Note that a contract for energy and maintenance of fixtures with the Township and the electric company is required prior to the electric company energizing the street lighting system

1.06 CALCULATIONS

A. Voltage drop shall be calculated to ensure voltage drop will not exceed the requirements of the National Electrical Code.

B. Point by point footcandle calculations shall be performed to verify that lighting system photometric performance conforms to the IESNA recommendations, as adopted by the Township.

PART 2 PRODUCTS

2.01 LAMPS

A. Induction, Fluorescent or LED Lamps meeting the following requirements:

Lamp Watts:	100W	150W	250W
Ballast Code:	S54	S55	S50
Lamp Volts:	55V	55V	100V
Light Center Length:	5"	5"	5"
Burning Position:	Any	Any	Any
Base Type:	Mogul	Mogul	Mogul

B. Other technologies may be permitted with specific approval by the Township.

2.02 BALLASTS

A. HID Fixture Ballasts: HID fixture ballasts shall conform to the following:

1. High power factor.
2. No inrush current condition.
3. Current during warm-up shall be less than normal operating current.
4. Lamp starting to -20 degrees F for outdoor ballasts.
5. Input line voltage range plus or minus 10 percent, minimum.
6. Fused, fuse located in had hole at bottom of pole.

B. Manufacturer: Advance.

C. Substitutions: General Electric, Universal, or same manufacturer as lighting fixture manufacturer.

2.03 POLES

A. Street Light Pole:

1. All poles shall have a hand hole near base of pole.
2. All anchor bolt nuts shall be covered, either by metal pole base cover furnished with pole or by nut covers furnished by pole manufacturer.
3. All anchor bolts shall be hot dip galvanized.
4. Lighting standards shall have each luminaire separately ballasted. Each ballast shall be separately fused with all fuses located near the hand hole of the pole base, where easily accessible.
5. Weep holes shall be provided in the base of the pole shaft to prevent any accumulations of water.
6. The pole shall contain a hand hole sufficiently large to allow inspection of splices, ground connection, and fuses, and ability to repull circuitry between poles. A ground pad shall be welded inside, ground smooth and tapped to receive a 1/4-20 thread, for lugged connection to ground rod.
7. Pole finish shall be polyester powder coat paint, color as approved by Township and/or the electric company.
8. Pole shall be 12 feet high above finish grade, including base; 12 feet high at intersections.
9. Manufacturer: As approved.

2.04 FUSE AND FUSE HOLDER

A. Fuse and fuse holder for the fuse disconnect in the customer's junction box shall be per the electric company's requirements, fuse size as required.

2.05 LIGHTING FIXTURES

A. Collector/Arterial Roads

1. Volts: 120V.
2. Arm mounted, show box (90^{o} cutoff).
3. Type: High pressure sodium or metal halide.
4. Description: Die-cast aluminum housing, fully enclosed and gasketed. UL listed "suitable for wet locations: Polycarbonate, or impact resistant glass lens. NEMA Type III distribution.
5. On projects that electric company will maintain lighting fixtures after installation, fixtures shall conform to electric company's requirements.
6. Manufacturer: As approved (same as pole manufacturer).

B. Local Roads

1. Volts: 120V.
2. Mounting: Post-top.
3. Type: High pressure sodium or metal halide.
4. Description: Die-cast aluminum housing, fully enclosed and gasketed. UL listed "suitable for wet locations: Impact and heat resistant glass lens. NEMA Type III distribution.
5. On projects that electric company will maintain lighting fixtures after installation, fixtures shall conform to electric company's requirements.
6. Manufacturer: As approved (same as pole manufacturer).

2.06 STRUCTURAL REQUIREMENTS

A. All poles, concrete bases, fixtures shall be installed as an integral unit to withstand 100 mph winds, 120 mph gusts.
B. All pole embedded depths and/or concrete bases shall be shown on the drawings, shall be designed by and the design drawings sealed by a Professional Engineer, licensed in Pennsylvania, taking into account soil conditions at the location of the pole.
C. All dimensions of the pole, base plate, material type and thickness, and welding information shall appear on the shop drawings along with wind loading for pole and lighting fixtures.

2.07 PHOTO ELECTRIC CONTROL

A. Photo electric controls must be suitable for use with an EEI-NEMA standard twist lock receptacle, shall have a maximum load capability of 1800 volt-amperes, shall be equipped with suitable type surge protection, and have the following characteristics:

1. Operating Voltage: 120V
2. Voltage Range: 105-130V
3. Time Delay: 10 Sec. Max.

2.08 CONDUIT

A. All conduit shall conform to the electric company's specifications.

2.09 WIRE

A. All wire and cable shall conform to the electric company's specifications:

2.10 CONNECTORS

A. All connectors (splice or lug) shall conform to the electric company's specifications.

2.11 TAPE

A. All tape shall conform to the electric company's specifications.

2.12 WIRE MARKERS

A. Wire Marker shall conform to the electric company's specifications.

2.13 GROUND RODS

A. Ground Rods shall conform to the electric company's specifications.

2.14 GROUND CONNECTORS

A. Ground Connector shall conform to the electric company's specifications.

PART 3 EXECUTION

3.01 RACEWAY INSTALLATION

A. PVC conduit shall be installed as required by the electric company.

3.02 WIRING METHODS

A. Wiring shall be installed in raceways unless otherwise permitted by the electric company.

3.04 GROUND ROD INSTALLATION

A. Ground rods shall be installed as required by National Electric Code near the customer's junction box for the electrical service ground and in conformance with the electric company's specifications.

3.04 GROUNDING

A. Equipment Grounding:

1. Grounding shall be in accordance with National Electrical Code and the electric company's requirements.

B. Grounding Tests :

1. Ground resistance of main system grounding point shall be inspected and shall not exceed values required by National Electrical Code and the electric company.

3.05 EXCAVATION

A. Excavate trenches and for pole bases as specified in Section 02221. Provide 30" minimum cover from the top of the conduit to the finished grade elevation.

3.06 PAVING AND RESTORATION

A. Paving and restoration shall be as specified in Section 02575.

3.07 CONCRETE

A. Concrete shall be placed in accordance with specified in Sections 03000 and 03050.

3.08 MAINTENANCE

A. Maintenance of a Community Lighting System, and all lighting within the public right of way, shall be the responsibility of the Developer, their heirs or assigns until such time that the system is adopted by the Township, in accordance with the West Manheim Township Subdivision and Land Development Ordinance.

B. Maintenance of individual lamp posts shall be the responsibility of the property owner of such lot.

3.09 AS-BUILT PLANS

A. An "As-built" plan showing the electric conduit layout and lighting fixtures shall be submitted to the Township.

END OF SECTION

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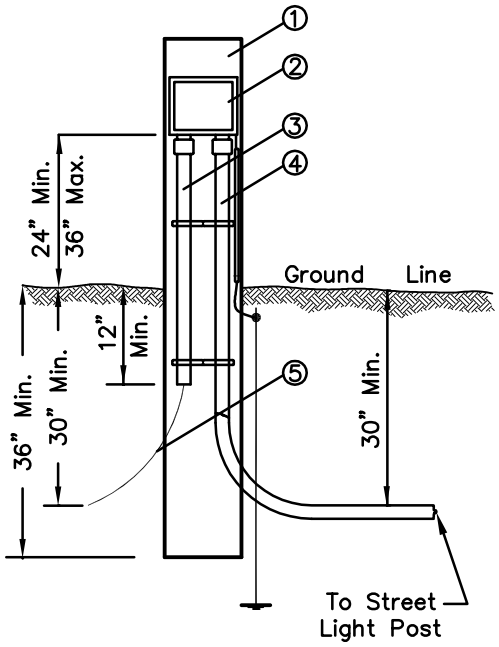

INSTALLATION REQUIREMENTS

① SERVICE SUPPORT

Service support shall be a solid 6 inch by 6inch pressure treated timber with a minimum setting depth of 36 inches. If service is from underground facilities, the service support must be located a minimum of 24 inches and a maximum of 72 inches from the rear of the transformer foundation, handhole or pedestal. If service is from overhead facilities, the service support must be a minimum of 60 inches or a maximum of 72 inches from the pole.

② SERVICE DISCONNECT EQUIPMENT

Provide a manual reset breaker or fused disconnect with associated grounding installed in accordance with the requirements of the National Electrical Code (NEC) and any local terminal lugs must accept #12 AWG solid through #4 AWG standed on disconnect equipment rated greater than 30 amps. Enclosure must prevent access by unauthorized persons and shall be a NEMA Type 3R.

③ SERVICE LATERAL CONDUIT, CONNECTORS AND CLAMPS

The minimum size service lateral conduit is 3/4 inch schedule 40 PVC on 30 amp disconnect equipment and 1 inch schedule 40 PVC on disconnect equipment rated greater than 30 amps. This conduit must extend from the service disconnect to 12 inches below ground line.

④ DISTRIBUTION CONDUIT, CABLE, CONNECTORS AND CLAMPS

This equipment must meet the requirements of the NEC and any local municipal codes.

⑤ Service Lateral Conductors (Provided by electric company)

WEST MANHEIM TOWNSHIP CONSTRUCTION & MATERIAL SPECIFICATIONS

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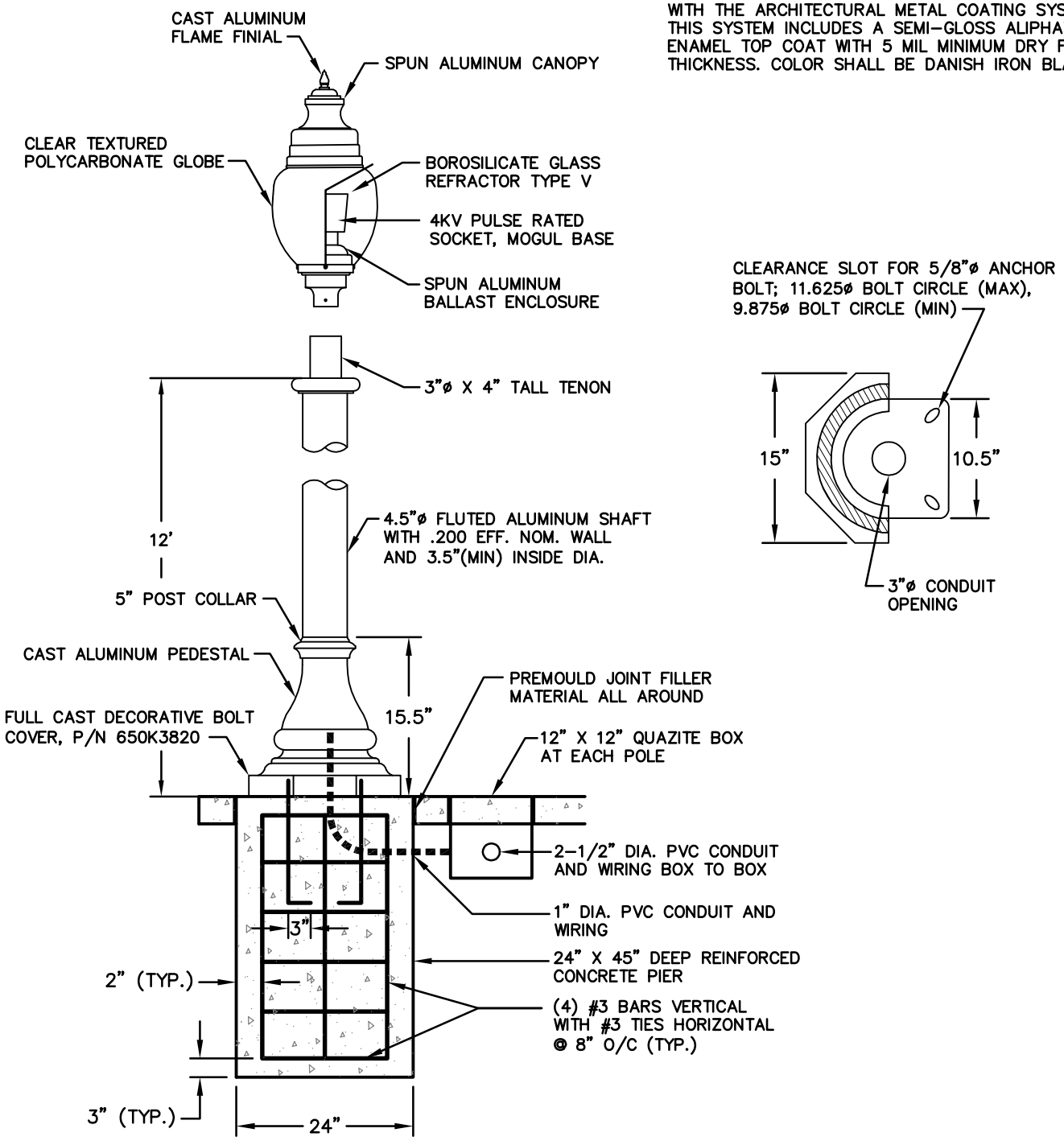
STREET LIGHTING SERVICE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT16500-1
FILE NO.	1204.9.02.00

NOTES:
1. INSTALL PER TOWNSHIP STANDARDS WITH INSPECTION REQUIRED PRIOR TO BACKFILLING.
2. ANCHOR BOLTS SHALL BE HOT DIP GALVANIZED STEEL. BOLT CIRCLE TEMPLATE SHALL BE PROVIDED.
3. ALL EXPOSED METAL SURFACES SHALL BE FINISHED WITH THE ARCHITECTURAL METAL COATING SYSTEM. THIS SYSTEM INCLUDES A SEMI-GLOSS ALIPHATIC ENAMEL TOP COAT WITH 5 MIL MINIMUM DRY FILM THICKNESS. COLOR SHALL BE DANISH IRON BLACK.



WEST MANHEIM TOWNSHIP 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
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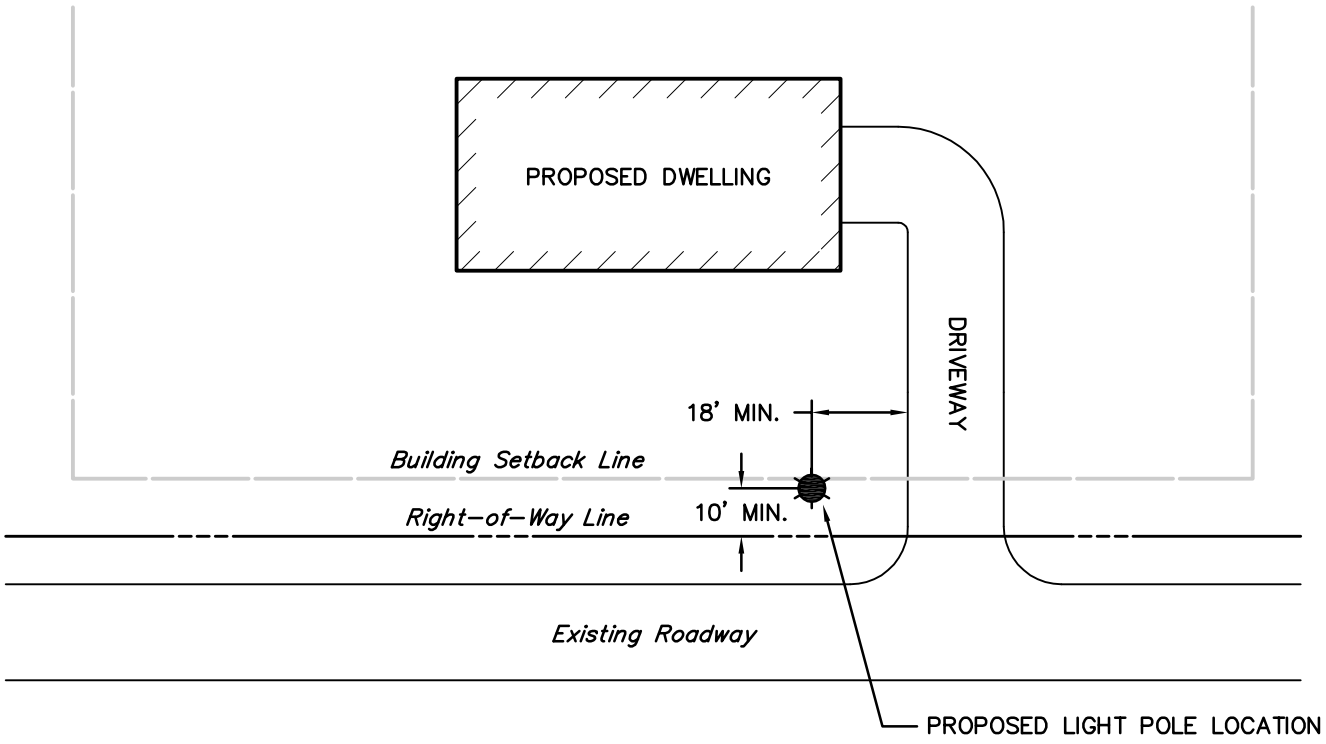
COMMUNITY STREET LIGHT POLE DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

DRAWN BY	CRP
CHECKED BY	
SCALE	N.T.S.
DATE	12/2/2010
DWG. NO.	WMT16500-2
FILE NO.	1204.9.02.00



INDIVIDUAL LAMP POSTS SHALL BE INSTALLED AT ALL NEW DWELLINGS IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:

A. POLE FOUNDATIONS – CONCRETE FOOTER
B. POLE HEIGHT – 7 FEET ABOVE GRADE
C. WATTAGE – 75 MERCURY VAPOR OR 50 WATT METAL HALIDE
D. CONTACTS – PHOTOELECTRIC CELL
E. LOCATION – OUTSIDE BUT WITHIN 10 FEET OF ROAD RIGHT-OF-WAY. POLE LOCATION IS TO BE SHOWN ON THE BUILDING PERMIT APPLICATION DRAWING
F. GLOBE, MATERIAL – SHATTERPROOF TRANSPARENT GLASS OR PLASTIC
G. POST, MATERIAL – CAST IRON, CAST ALUMINUM OR STEEL
H. POLE DIAMETER – 3 INCHES. ALL TO HAVE AN ⅛ INCH MINIMUM WALL THICKNESS
I. THE PROPERTY OWNER IS RESPONSIBLE FOR THE PERPETUAL OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, UTILITY FEES AND ANY OTHER INCIDENTALS ASSOCIATED WITH THE INSTALLATIONS AND OPERATION OF THE LIGHT ON THEIR RESPECTIVE PROPERTY.

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INDIVIDUAL LAMP POST DETAIL

W. MANHEIM TOWNSHIP YORK COUNTY , PENNSYLVANIA

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