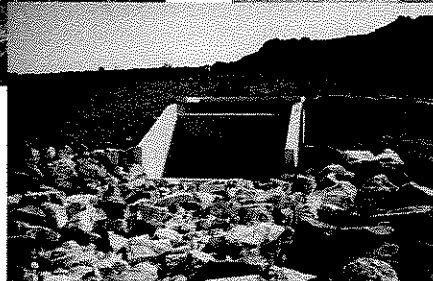
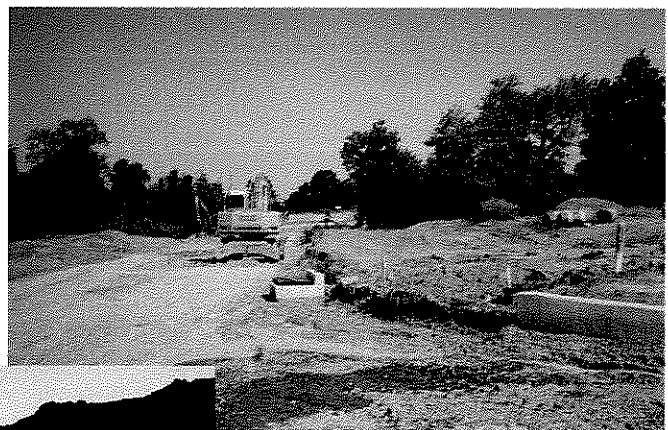


JACKSON TOWNSHIP

CONSTRUCTION AND MATERIALS SPECIFICATIONS



C.S. Davidson Project No. 2384.1.00.04

C.S. DAVIDSON, INC.

Consulting Engineers

38 N. Duke Street

York, PA 17401

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SECTION 00100

TERMS AND ABBREVIATIONS

I. TERMS

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

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

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

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

Drawings 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.

Municipality is defined as Jackson Township and its full-time employees, elected officials and appointed representatives and Authorities.

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
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
BCBC	Bituminous Concrete Base Course
DI	Ductile Iron
ESAL	Equivalent Single Axle Load
FS	Federal Specifications
HES	High Early Strength
HMA	Hot Mix Asphalt
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

ABBREVIATIONS (cont'd)

NEC	National Electric Code
NECS	National Electric Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
O.D.	Outside Diameter
OSHA	Occupational Safety & Health Administration
PA DEP	Pennsylvania Department of Environmental Protection
PE	Polyethylene
PennDOT	Pennsylvania Department of Transportation
psi	pounds per square inch
PTM	Pennsylvania Test Method
PVC	Polyvinyl Chloride
SDR	Standard Dimension Ratio
SESPC	Soil Erosion and Sediment Pollution Control
UL	Underwriters' Laboratories, Inc.
WWF	Welded Wire Fabric

END OF SECTION

SECTION 00150

PLAN, DESIGN AND CONSTRUCTION STANDARDS

I. SKETCH PLAN STANDARDS

A. Index or Key Map

1. Maximum Drawing Size: None
2. Scale: 1" = 50' or 1" = 100'
3. Details To Be Shown:
 - a. Street Layout with Names
 - b. Lot Layout with Numbers
 - c. Existing and Proposed Water Mains with Pipe Sizes
 - d. Existing and Proposed Sanitary Sewers with Pipe Sizes
 - e. Direction of Flow
 - f. Pump Station Location and Force Main with Pipe Size
 - g. Topography with 5' Contour Intervals
 - h. Streams, Springs, Wetlands, and Marshes
 - i. Accurate Location Map with North Arrow
 - j. State Highway Route Numbers
 - k. Public versus Private Streets
 - l. Public versus Private Sewers
 - m. Phases of Construction
 - n. Existing and Proposed Manholes with Numbers
 - o. Existing and Proposed Stormwater Management Facilities
 - p. Existing and Proposed Water Valve and Hydrant Locations
 - q. Zoning and Municipal Boundaries

II. PRELIMINARY PLAN STANDARDS

- A. See Requirements in Subdivision and Land Development Regulations

III. FINAL PLANS

- A. See Requirements in Subdivision and Land Development Regulations

IV. STORMWATER PLANS

- A. See Requirements in Stormwater Management Regulations

V. SOIL EROSION AND SEDIMENT POLLUTION CONTROL PLAN

- A. Obtain Requirements from York County Conservation District Office

VI. CONSTRUCTION DRAWINGS

A. Plans and Profiles - Design Documents

1. Maximum Drawing Size: 24" x 36"
2. Plan Scale: 1" = 50'

3. Profile Scale: 1" = 50' Horizontal; 1" = 5' Vertical
4. Profiles shall be shown on same Drawing as Plan Portion
5. Plan Details to be Shown:
 - a. Same as Sketch, Preliminary, and Final Plans
 - b. Adjoining Sheet Numbers at Sewer Intersections
 - c. Match Lines, if Utilized
 - d. Existing and Proposed Utilities with Pipe Sizes
 - e. Storm Drainage Facilities with Pipe Sizes
 - f. Stormwater Detention Facilities with Limits of Impoundment and Maximum Water Elevation
 - g. Pertinent Physical Features such as Buildings, Fences, Driveways, Landscaping, Poles, Street Lighting, etc.
 - h. Lateral Locations and Depth of Cover at Right-of-Way
 - i. Sanitary Sewer for Other Utility Easements
 - j. Soil Erosion And Sedimentation Control Facilities Plan
 - k. Street Addresses for Each Lot or Unit
6. Profile Details to be Shown:
 - a. Existing Ground Profile
 - b. Finished Grade Profile
 - c. Sanitary Sewer Design and Manhole Numbers
 - d. Pipe Size, Pipe Material, Pipe Length, and Slope
 - e. Manhole Invert and Top Rim Elevations
 - f. All Utility and Storm Pipe Crossings Showing Separation Distances to Sanitary Sewers
 - g. Indicate Watertight Frames and Covers
 - h. Parallel Water Mains, Storm Drainage, and Stream Profiles

B. Cover Sheet Plan Notes

1. Plans shall clearly indicate the differences between existing and proposed facilities.
2. Access to the sanitary sewer lines must be maintained at all times. One of the following notes shall be added to subdivision plans prior to recording:
 - a. "The Owner(s) shall not construct, plant, or maintain any structures, sheds, buildings, fences, trees, shrubbery, stormwater management facilities, wiring, etc. within the sanitary sewer rights-of-way, to ensure a free and clear access to all facilities. Bituminous paving, installation of utilities or changes in ground contours within the sanitary sewer rights-of-way may be permitted by written consent of the Municipality."
 - b. "The Owner(s) shall not construct, plant, or maintain any structures, sheds, buildings, trees, stormwater facilities, parallel or near parallel utilities, or similar items within the sanitary sewer rights-of-way. The Owner(s) at his/her or their own risk may install wiring, construct fences, or plant shrubbery (less than 6' high) within said rights-of-way without any future claims against the Municipality, because of fence or shrubbery removal. Any fences installed within said rights-of-way shall be constructed in such a way that two sections can be easily removed, with the maximum fence section not less than eight (8) feet in width per section. In lieu of the two removable sections, one sixteen (16) foot wide or two eight (8) foot wide gates at each fence crossing of the sanitary rights-of-way may be substituted."

3. Where applicable, the following notes shall be added:
 - a. "All work shall be installed and tested in accordance with the latest edition of the Jackson Township Construction and Materials Specifications and shall conform to the Plan, Design and Construction Standards for Sanitary Sewers unless specific waivers have been granted. It is the contractor's responsibility to be aware of applicable standards and specifications as well as the required methods of construction. All deviations from the plans must be approved prior to construction."
 - b. "The Owner hereby grants the municipality or its representative a general access easement across the entire lot for access to the public sewer and sampling manholes."
 - c. "Approval of "as-built" sanitary sewer plans by the Municipal Engineer shall be required prior to occupancy of any building. These Record Drawings shall be submitted to the Engineer thirty (30) days prior to occupancy."
 - d. "The Developers shall furnish three (3) extra sets of approved plans, showing the locations and depths of all laterals, and final specifications to Municipal Engineer for future inspection use."
 - e. "The Developer shall submit three (3) sets of all grade (or cut) sheets, conforming to approved plans, to the Municipal Engineer prior to beginning work. Any proposed changes in the approved design shall be indicated in red on the plans submitted in reference to the note above."
 - f. "The Developer shall give the Municipal Engineer at least three (3) working days (72 hours) notice prior to beginning work to assign an inspector to the project and review plans and grade sheets. No work may begin until grade sheets have been reviewed by the Municipal Engineer."
 - g. "Sanitary sewer costs and engineering expenses shall be tabulated separately by manhole section to accommodate calculations under PA Act No. 203, if the developer desires reimbursement at a later date."
 - h. "Developer offers for dedication to the Jackson Township Sewer Authority all sanitary sewer collector and/or interceptor lines constructed by the developer with appurtenances and a twenty-foot wide perpetual easement consisting of ten feet on either side of the centerline thereof for the maintenance, repair, replacement or enlargement thereof, together with the right of ingress, egress and regress therefore."

C. Plan and Profiles Record Drawings (As-Builts)

1. Final sanitary sewer design and location as constructed, including bearings and distances along sanitary sewer rights-of-way.
2. The following information shall be shown for the end of all sanitary sewer laterals:
 - a. Pipe Station, Measured from Closest Downstream Manhole.
 - b. Depth of Lateral, Measured from the Ground Surface to the Top of Pipe.
 - c. Length of Lateral, Measured from the Sewer Main.
 - d. Distance to Closest Property Corner.
 - e. Swing Ties Referenced to at Least Two (2) Permanent Points.
 - f. Elevation of Lateral Pipe, if available.
3. As-Built survey of entire pump station site or water storage facilities.
4. Public water - Obtain requirements from York Water Company.

DESIGN STANDARDS

I. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (PA DEP) DESIGN STANDARDS

- A. All Public Sewer Systems shall be designed in accordance with standards published by PA DEP in the Domestic Wastewater Facilities Manual, latest revision.
- B. In case of conflict between the PA DEP Design Standards and Authority Design Standards, the PA DEP Design Standards generally overrule, provided the most restrictive and conservative design criteria is applied.

II. SUPPLEMENTAL DESIGN STANDARDS

- A. Unless ductile iron (DI) pipe is utilized, all other pipes shall have the following minimum cover:
 - 1. Sixty (60") inches under streets and driveways.
 - 2. Forty-eight (48") inches under non-traffic areas.
 - 3. Thirty-six (36") inches with DI pipe and concrete encasement.
- B. Watertight manholes and covers shall be provided in and along all drainage swales.
- C. Where justified and recommended by the Municipal Engineer, DI piping shall be furnished at no additional cost by the Developer. The minimum cover for DI piping is forty-two (42") inches.
- D. The following limitations apply to the use of drop connections:
 - 1. No drop connections on interceptors.
 - 2. No inside splashes permitted.
 - 3. Inside drop connections not allowed.
- E. A minimum of six (6') feet horizontal separation shall be maintained between sanitary sewers and storm drainage pipes, inlets, curbs, and other utilities, except for public water, where ten (10') feet is preferred.
- F. A minimum of twelve (12") inches vertical separation shall be maintained between the top of the sanitary sewer pipe and all other pipes crossing above, except that eighteen (18") inches of vertical separation shall be maintained at public water crossings, with sewer line under the water main.
- G. Special design provisions shall be submitted for other pipes crossing under existing sanitary sewers.
- H. Sanitary sewers constructed through fill shall be constructed of ductile iron pipe.
- I. Compaction tests in accordance with the Jackson Township Construction and Material Specifications shall be required for manholes installed on fill ground.
- J. Sanitary sewer inverts shall be constructed at least thirty-six (36") inches below parallel streams in order to facilitate stream crossings.

- K. Manhole Channel Slope - For the same size pipe, the fall through each manhole or the difference between the influent and effluent pipes at each manhole shall be 0.10' to 0.12'. In situations involving different size piping, the 0.8 point shall be matched in accordance with the PA DEP Design Standards. Precast manhole bases shall be constructed accordingly.
- L. Where possible, all Public Sewer Systems shall be constructed within the street cartway. Manholes in easements shall be constructed in driveways or parking areas to provide proper access. Driveways and parking areas shall therefore be constructed to the Municipality's minimum roadway standards (excluding curbs and sidewalks) in order to support the weight of the sewer maintenance equipment. The entire easement area must be accessible to the Municipal equipment. The entire easement area must be accessible to the municipality's equipment. Where proposed designs include stream crossings, culverts must be designed and permitted to allow for maintenance vehicle access. The Municipality shall not assume responsibility for damages to private property as a result of performing sanitary sewer maintenance operations.
- M. If required, control manholes, to accommodate periodic sampling of industrial wastes, shall be installed. The design and construction details must be approved by appropriate wastewater treatment facility personnel.
- N. Major residential, commercial, and industrial service connections involving more than 5,000 GPD shall be made at manholes.
- O. All pumping facilities offered for public use shall be designed to be compatible with existing municipal pumping facilities and have a minimum pumping capacity of 80 gallons per minute.
- P. Private sanitary sewers involving 25 EDUs or more shall be designed in accordance with the standards above.
- Q. All terminal manhole runs shall have a 1.00% minimum grade.

III. SOIL EROSION AND SEDIMENT POLLUTION CONTROL (SESPC) DESIGN STANDARDS

- A. All facilities shall be designed in accordance with standards developed by PA DEP. All applicable permits shall be secured from the York County Conservation District.

IV. PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (PennDOT) DESIGN STANDARDS

- A. All facilities to be constructed within State Highway rights-of-way shall be designed in accordance with standards developed by PennDOT.

CONSTRUCTION STANDARDS

**I. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (PA DEP)
CONSTRUCTION STANDARDS**

- A. All Public Sewer Systems shall be constructed in accordance with the standards published by PA DEP in the Domestic Wastewater Facilities Manual, latest revision.
- B. All Public Sewer Systems shall be installed in accordance with the conditions of the Bureau of Water Quality Management (B.W.Q.M.) Permit or planning module approval letter issued by PA DEP and as modified below:
 - 1. During construction, no changes affecting any engineering design parameter shall be made from the plans, designs, and other approved data unless the Developer shall first receive written approval thereof from PA DEP. The sewerage facilities shall be constructed under the Developer's expert engineering supervision and competent inspection.
 - 2. The Public Sewer System shall have adequate foundation support as soil conditions require. Trenches shall be backfilled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from injury by water, freezing, drying or other harmful conditions until cured.
 - 3. Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the standing of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.
 - 4. No stormwater from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers.
 - 5. The Developer shall file with PA DEP "As-Built" plans showing the correct plan of all sewers and sewerage structures as actually constructed.
 - 6. The Developer shall construct the sewerage facilities in a manner compatible with good conservation methods in order to minimize the adverse effect on the environment.
 - 7. The local waterways patrolman of the Pennsylvania Fish Commission shall be notified by letter when the construction of a stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish Commission if the use of explosives is required. The Developer shall notify the local waterways patrolman by telephone when explosives are to be used.
 - 8. Cross connections between the potable water supply and the Public Sewer System constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply

may become contaminated from an inferior water supply from any part of a sewerage system is hereby specifically prohibited. The Developer is further warned against permitting to be made permanent or temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

- C. The Developer shall secure a National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for qualifying sites.
- D. The Developer shall secure all applicable PA DEP permits for earth disturbance, stream crossings, and encroachments, including wetlands disturbances.

II. SANITARY SEWER CONSTRUCTION STANDARDS

- A. No public sanitary sewer work can begin until a B.W.Q.M. Permit or planning module approval letter is secured by PA DEP. No design changes are permitted without approval from the Municipality.
- B. All work shall be installed and tested in accordance with the latest edition of the Jackson Township Construction and Material Specifications.
- C. The Developer shall furnish three (3) extra sets of approved plans, showing the locations and depths of all laterals, and final specifications to Municipal Engineer for future inspection use.
- D. The Developer shall submit three (3) sets of all grade (or cut) sheets, conforming to approved plans, to the Municipal Engineer prior to beginning work. Any proposed changes in the approved design shall be indicated in red on the plans submitted above.
- E. The Developer shall give the Municipal Engineer at least three (3) working days (72 hours) notice prior to beginning work to assign an inspector to the project and review plans and grade sheets. No work may begin until grade sheets have been reviewed by the Municipal Engineer.
- F. All manholes shall be adjusted to finished street grades so that the elevation of the manhole frame and cover shall be 1/8" to 1/4" below the adjoining roadway surface.
- G. The Municipal Engineer or his designated representative shall observe all connection work to existing sanitary sewers. In general, only poured in place manhole bases shall be constructed on existing sewers. Precast bases may be used on low flow lines with pipes tied off or bypassing pumping used with prior approval of the Engineer.
- H. After all site work has been completed, should any sanitary sewers be subject to inflow, the municipality will require the Developer to furnish plastic manhole inserts.
- I. All eight (8") inch diameter sanitary sewer main and six (6") inch diameter lateral work will be subject to periodic observations by representatives of Municipal Engineer and the municipality's sewer maintenance personnel. All testing will be conducted in the presence

of the Engineer or his designated representative. The cost of all inspections will be borne by the Developer.

- J. If the project is constructed in phases or sections, each portion of the eight (8") inch diameter sanitary sewer shall terminate with a manhole and stub and stopper. Stubs may not extend more than seven (7') feet from the center of any manhole.
- K. Where possible, manhole steps shall be placed perpendicular to the manhole channel.
- L. The use of precast drop connections is prohibited.
- M. Precast manhole bases shall be constructed specifically for the job intended. Precast manholes shall be constructed from the measurements obtained from grade sheet information.
- N. All sewerage facilities offered to the Municipality for public use shall be subject to a 18 month warranty period. A maintenance bond shall be furnished to the Municipality in a form and amount acceptable to the Municipal Solicitor.
- O. All sewer mains shall be cleaned and flushed by developer and televised by municipal maintenance personnel prior to release of the maintenance bond.
- P. Upon completion of the project or each phase, one set of "As-Built" mylars and three (3) paper copies shall be furnished by the Developer to the Engineer. Occupancy of any dwelling will be denied if these plans have not been submitted.

III. SOIL EROSION AND SEDIMENT POLLUTION CONTROL (SESPC) CONSTRUCTION STANDARDS

- A. At least seven (7) days before earth moving will begin, the Developer, by telephone or certified mail, shall notify the York County Conservation District of the date for beginning of construction and invite a representative to attend a preconstruction conference with the Developer's Contractor.
- B. All applicable SESPC facilities shall be in place and approved by the County Conservation District prior to the public sewer system installation.
- C. By approval of the plans, neither the Commonwealth of Pennsylvania, PA DEP, or the municipality assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.
- D. If at any time the SESPC activities undertaken pursuant to a permit or the discharge of the effluent therefrom is causing or contributing to pollution of the waters of the Commonwealth, the Developer shall forthwith adopt such remedial measures as are acceptable to the Department.
- E. A permit or approval does not authorize any earth disturbance controlled by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by local ordinances.

- F. The Developer's Contractor shall have his SESPC plan available at the site of the activity at all times. All earthmoving activities shall be undertaken in the manner set forth in the plan identified with this permit. Revisions to the plan shall be approved by PA DEP.
- G. The SESPC measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected to insure effective control.
- H. When erosion control measures and facilities are completed, the Developer shall notify the York County Conservation District so that an inspection of the measures and facilities may be made by a representative of the County Conservation District.
- I. No stormwater, sewage or industrial wastes shall be admitted to the erosion and sedimentation measures and facilities without the approval of PA DEP.
- J. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.
- K. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than twenty (20) days, interim stabilization measures shall be implemented promptly.
- L. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any SESPC facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.
- M. The responsibility of carrying out the permit conditions shall rest with the Developer or other responsible manager of earthmoving that affects the approved erosion controls.
- N. The Developer shall be responsible to implement, without charge, any additional soil erosion and sediment pollution control measures as may be directed by the York County Conservation District.

**IV. PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (PennDOT)
CONSTRUCTION STANDARDS**

- A. No public sanitary sewer work in State Highway rights-of-way may begin until a Highway Occupancy Permit is secured from PennDOT by the Developer in name of the Municipality.
- B. All work in State Highway rights-of-way shall comply with the permit and PA Code Title 67, Chapter 459 Regulations, "Occupancy of Highways by Utilities", latest revision.
- C. All construction materials and techniques shall comply with PennDOT Publication 408 Specifications, latest revision.
- D. All Traffic Control Guidelines procedures shall comply with PennDOT Publication, Work Zone Traffic Control Guidelines, latest revision.

END OF SECTION

SECTION 00160

UTILITY CONFLICT STATEMENT

00150-10

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 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 sediment pollution 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 utilized

1.03 SUBMITTALS

A. Permits:

1. Burning in the Municipality is allowed; however, specific requirements are the responsibility of the contractor.
2. For off-site disposal, submit two copies of the agreement with each property owner releasing the Municipality 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 to be saved or restored.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Fencing:
 - 1. Orange plastic safety fence, 4 foot high minimum.
 - 2. Undamaged picket snow fence, 4' high, formed of wooden slats, tightly woven with wire cable.
 - 3. Soil-set fence posts, studded "T" type, 6' high.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify the Municipality 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 Municipality. 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 property owner at least 5 days in advance of the clearing/grubbing operations to permit its removal, 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 on the property.

3.02 UTILITY RELOCATIONS

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

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

3.03 CLEARING

- A. Confine clearing to within the construction limits.
- B. Clear in a manner that will avoid damage to 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. The 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 Municipality.
- C. Debris may be burned on-site if required permits are obtained, 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 expense.

3.07 RESTORATION

- A. Repair all injuries to bark, trunk, limbs, and roots or remaining plants by properly 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 Municipality.
- C. Remove protective fences, enclosures and guards upon the completion of the project.

- D. Restore guard posts, guide rail, signs and other interferences to the condition equal to that existing before construction operations.
- E. Fences, mail boxes, and signs within the line of work shall be carefully removed, stored, and upon completion of backfill, reset or replaced to their original condition and location, at the Contractor's expense.

END OF SECTION

SECTION 02150

BORING AND JACKING

PART 1 GENERAL

1.01 DESCRIPTION

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

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

B. Related Work Specified Elsewhere:

1. Trenching, backfilling and compacting: Section 02221

C. Definitions: NONE

D. Applicable Standard Details:

CT 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 (PennDOT), latest revisions, Publication 408 Specifications.
3. American Railway Engineering Association, manual for railway engineering.

B. Contractor Qualifications:

1. Construction operations shall be undertaken only by an experienced Contractor 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 Municipality. 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.
- C. If boring is obstructed, relocate or jack or tunnel crossing as approved by the Municipality.

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. 1 mil thick standard bituminous coating, interior and exterior.

2.02 CASING SPACERS

- A. Non-metallic:
 - 1. High density polyethylene (HDPE) with no metal bolts or attachments. Spacers shall strap onto carrier pipe and slide easily into casing but shall not move during installation.

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

B. Stainless Steel (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. 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. Provide with notches to accommodate fastening. Treat notches at time of pipe installation.

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 - as specified in Section 02221.

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 CT 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 two (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 stainless steel weephole.

- E. Completely fill annular space between carrier pipe and casing pipe with limestone screenings. If in a State highway right-of-way, fill annular space with flowable fill.

3.04 CARRIER PIPE INSTALLATION WITHOUT CASING PIPE

- A. Bore the opening with a boring auger to the determined vertical and horizontal alignment.
- B. Do not overcut boring excavation by more than 1" greater than the outside diameter of the lateral pipe.
- C. Carefully guide the lateral pipe and joints through the opening, assembling joints prior to inserting into the boring.

END OF SECTION

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PUMP GROUT BETWEEN CASING AND EXCAVATION IF GREATER THAN 1"

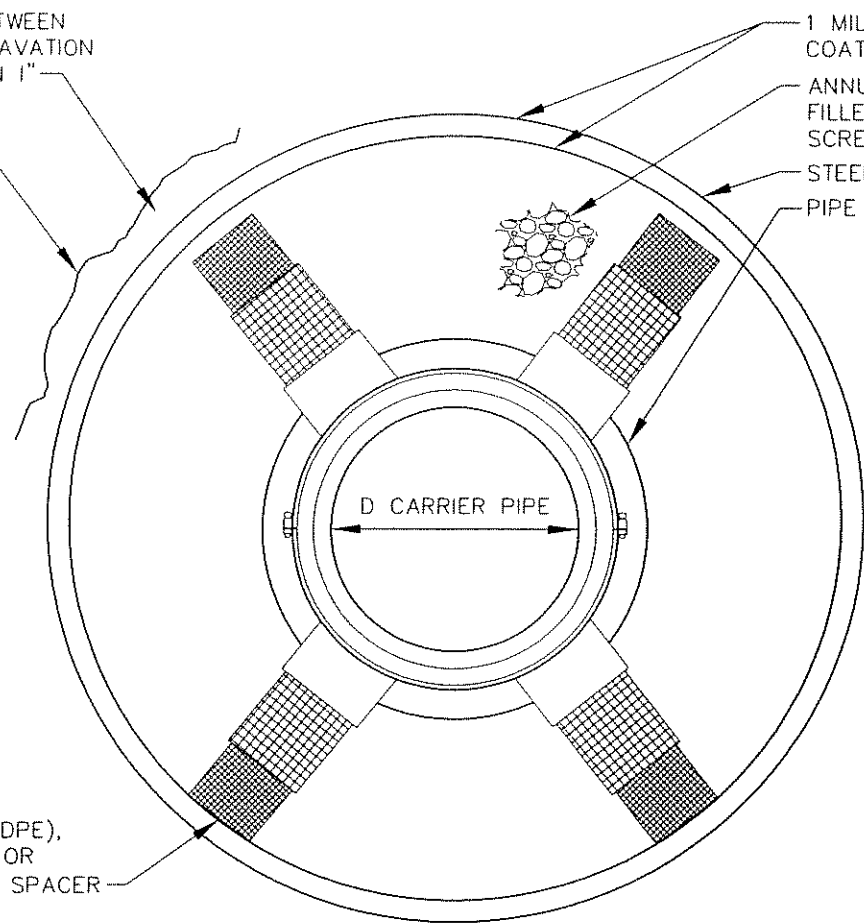
EXCAVATION

1 MIL. BITUMINOUS COATING, BOTH SIDES

ANNULAR SPACE TO BE FILLED WITH LIMESTONE SCREENINGS *

STEEL CASING PIPE
PIPE BELL

NON-METALLIC (HDPE), STAINLESS STEEL OR OTHER APPROVED SPACER



NOTE:

DO NOT SUPPORT CARRIER PIPE ON BELLS

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

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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CASING INSTALLATION

DATE: 3/31/03

DRAWN BY: APS

CHK. BY:

NO. CT 02150-1

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 sediment pollution control: | Section 02270 |
| 5. Finish grading, seeding, and sodding: | Section 02485 |

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications

Publication 213, Work Zone Traffic Control Guidelines

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 Determine In-Place Density and Moisture Content of Construction Materials by Use of Nuclear Gauges

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

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

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

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

B. Testing Agency:

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

C. Compaction Testing:

1. Determine compaction by the testing procedure contained in ASTM D698 or ASTM D1557

1.03 SUBMITTALS

A. Certificates:

1. Submit certified compaction testing results from the Soils Testing Laboratory.

B. One copy of approved Soil Erosion Control Plan, including approval letter from York County Conservation District.

1.04 JOB CONDITIONS

A. Classification of Excavation:

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

B. Control of Traffic:

1. Employ Traffic Control Guidelines measures in accordance with 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 Underground Utility Protection Law. 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, subject to approval and inspection by the Municipality or other specifically designated personnel, 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 Municipality.
- F. Flowable Fill. As defined in Section 02221.

PART 3 EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC

- A. Coordinate the work to ensure the least inconvenience to traffic and maintain traffic on one or more unobstructed lanes unless closing of the roadway is authorized.
- B. Maintain access to all streets and private drives and for emergency vehicles.
- C. 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 Municipality 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, gravel and sand parking areas and not less than 90% in yards, fields and sand areas.

When the material is too coarse to satisfactorily use these methods, compaction will be determined by the Municipality based on non-movement of the material under the compaction equipment.

- B. Fill material placed in areas inaccessible to the compaction equipment shall be placed in uniform loose layers not exceeding 4 inches in depth and compacted by means of approved mechanical tampers to the density requirements herein specified.
- C. When a previously constructed fill requires additional material to bring it to required elevation, the top of the fill shall be thoroughly scarified before the required additional material is placed.

- D. Material containing moisture in excess of that percentage which will ensure satisfactory compaction shall not be placed in the fill and fill material shall not be placed on material that has become unstable due to excessive moisture.
- E. Frozen fill material shall not be placed in fills, and fill material shall not be placed on frozen material. If during construction the top of the fill freezes, all frozen material shall be removed before additional material is placed.
- F. In no case shall waste material be disposed of in the flood channel or floodway area of any stream.
- 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 Municipality.

3.04 EXCAVATION

- A. Perform excavation of borrow material in a manner satisfactory to the Municipality. 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 borrowing operations are complete, regrade area, if necessary, to prevent erosion.

3.05 BLASTING

- A. Notify Municipality at least 24 hours in advance of any blasting activity with the Municipality.
- B. Blasting is the sole responsibility of the Contractor and no duty is assumed or to be exercised by Municipality relative thereto.
- C. Blasting work shall be supervised by licensed and experienced personnel and performed in conformance with applicable Federal, State and local codes.

3.06 CONTROL OF EXCAVATED MATERIAL

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

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

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.

3.08 TOPSOILING

- A. Topsoiling 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 be 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.

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 sediment pollution control: | Section 02270 |
| 4. Finish grading, seeding and sodding: | Section 02485 |
| 5. Trench Paving and restoration: | Section 02575 |

C. Definitions: NONE

D. Applicable Standard Details:

- CT 02221-1 Pipe Bedding Details
- CT 02221-2 Stream Crossing Detail
- CT 02221-3 Clay Dike Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

- Publication RR-459, Occupancy of Highways by Utilities
- Publication 408, Specifications
- Publication 213, Work Zone Traffic Control Guidelines
- Publication 72M, Standards for Roadway Construction
- Publication 19, Field Test Manual

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

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

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

C33	Specifications for Concrete Aggregates
D698	Test Method of Laboratory Compaction Characteristics of Soil Using Standard Effort
D2922	Test for Density of Soil and Soil Aggregate in Place by Nuclear Methods
D1557	Modified Proctor Compaction Test

B. Testing Agency:

1. Compaction testing shall be performed by a PennDOT approved Soils Testing Laboratory approved by the Municipality.

C. Compaction Testing:

1. Conduct compaction tests as directed by the Municipality during backfilling operations.
2. Determine compaction in state highways and shoulders by the testing procedure contained in PTM No. 106, Method B or PTM No. 402.
3. Determine compaction in areas other than state highways and shoulders by the testing procedure contained in ASTM D698 or ASTM D2922.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from aggregate suppliers attesting that the pipe bedding and select material stone backfill materials conform to the specifications herein.

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. Excavation work 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 Guidelines measures in accordance with 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 Municipality 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.

PART 2 PRODUCTS

2.01 - PIPE BEDDING MATERIAL

A. Type III and Type IV Bedding Material:

1. AASHTO No. 57 or AASHTO No. 8 coarse aggregate, Table C, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

B. Type V Bedding:

1. AASHTO No. 10 coarse aggregate conforming to Section 703, Publication 408. Do not use slag or cinders.

2.02 - BACKFILL MATERIAL

A. Select Material Backfill:

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

B. Flowable Backfill Material:

1. Material conforming to PennDOT Special Provision S94 (S2060130), Type A or B as shown in Table 1. DO NOT USE FLY ASH IN MIXES USED WITH DUCTILE IRON PIPE.

C. Suitable Backfill Material (Highways, driveways, and shoulders):

1. From top of pipe bedding material to subgrade elevation:
 - a. Select Material Backfill
 - b. Flowable Backfill Material - Where directed or approved

D. 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.

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 %)

Properties & Criteria	Type A	Type B	Type C	Type D
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 Municipality 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. See Section 02210.

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 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 Municipality 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. Work shall be in accordance with approved SESPC plan and guidelines of the York County Conservation District.

3.07 DEWATERING

- A. Keep excavations dry and free of water. Dispose of precipitation and subsurface water clear of the work.
- 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 CT 02221-1.
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 CT 02221-1.
2. Provide Type IV bedding when installing all other pipes larger than 2" diameter.

C. Type V Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail CT 02221-1.
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 pipe bottom 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 density of 90% in yards and 95% under roadways and sidewalks is achieved (at optimum moisture content, $\pm 2\%$, standard proctor).

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.

3.11 BACKFILLING TRENCHES

A. After pipe installation and inspection, backfill trenches to 12" above the crown of the pipe with specified backfill material placed and carefully compact with approved compaction

equipment in layers of suitable thickness to provide specified compaction. Backfill and compact the remainder of the trench with specified backfill material. Refer to 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 Municipality 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 Municipality.

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 Municipality 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 be removed from the construction area, and legally disposed of.

3.13 ROUGH GRADING

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

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

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

3.14 RESTORATION OF UNPAVED SURFACES

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

B. Restore grassed areas in accordance with Section 02485, Finish Grading, Seeding and Sodding.

3.15 LIMITS OF WORK

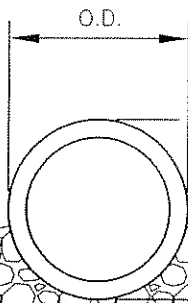
A. All disturbance shall be confined to the project site, street rights-of-way, permanent easements, and temporary construction easements shown on the Construction Drawings.

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

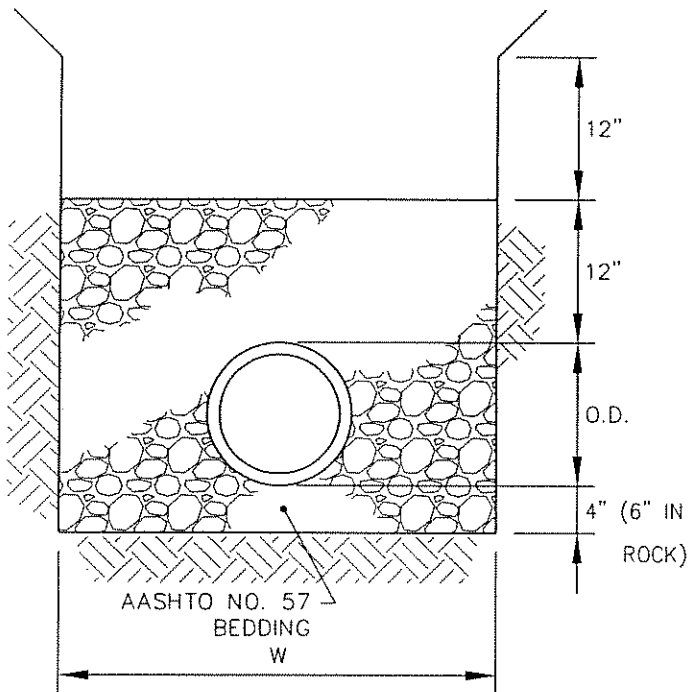
END OF SECTION

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

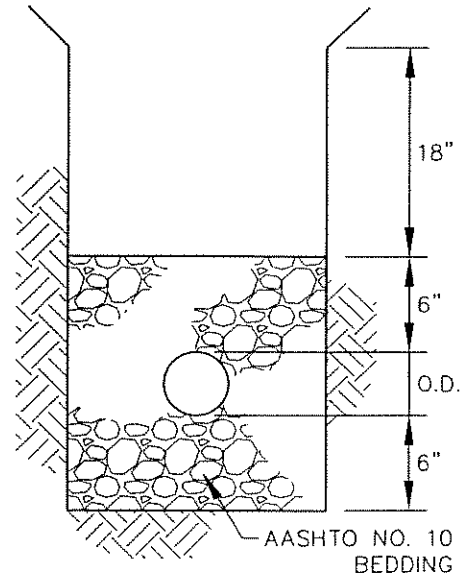
AASHTO NO. 57
BEDDING



TYPE III
(RCP ONLY)



TYPE IV



TYPE V
(2" DIA. AND SMALLER)

NOTE: TYPE I AND II NOT PERMITTED.

NOTE: NOT TO SCALE

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PIPE BEDDING DETAILS

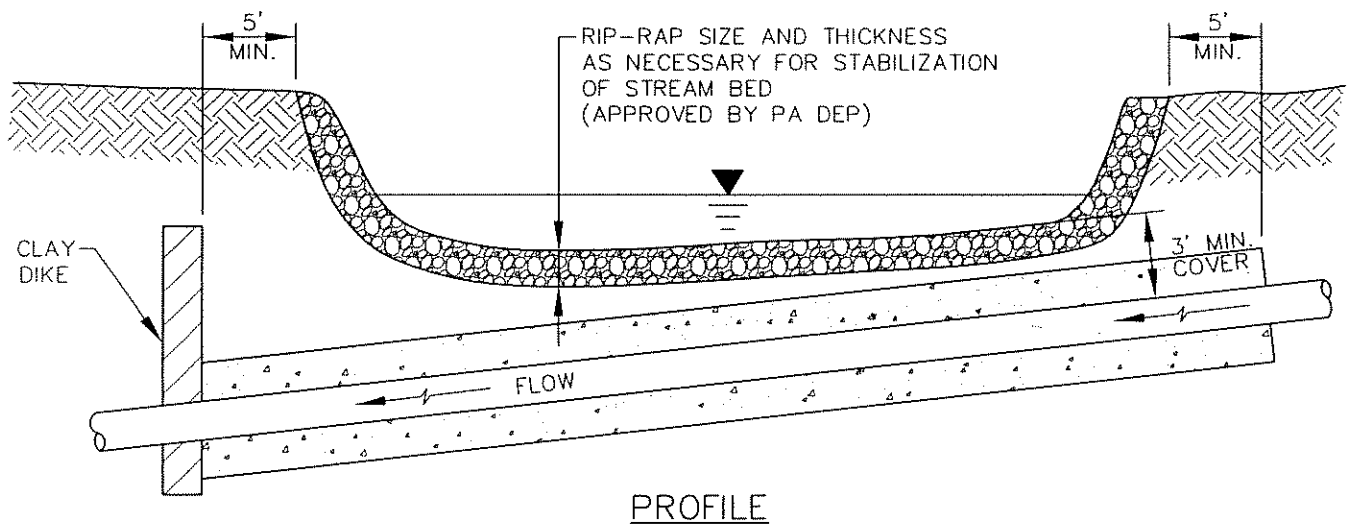
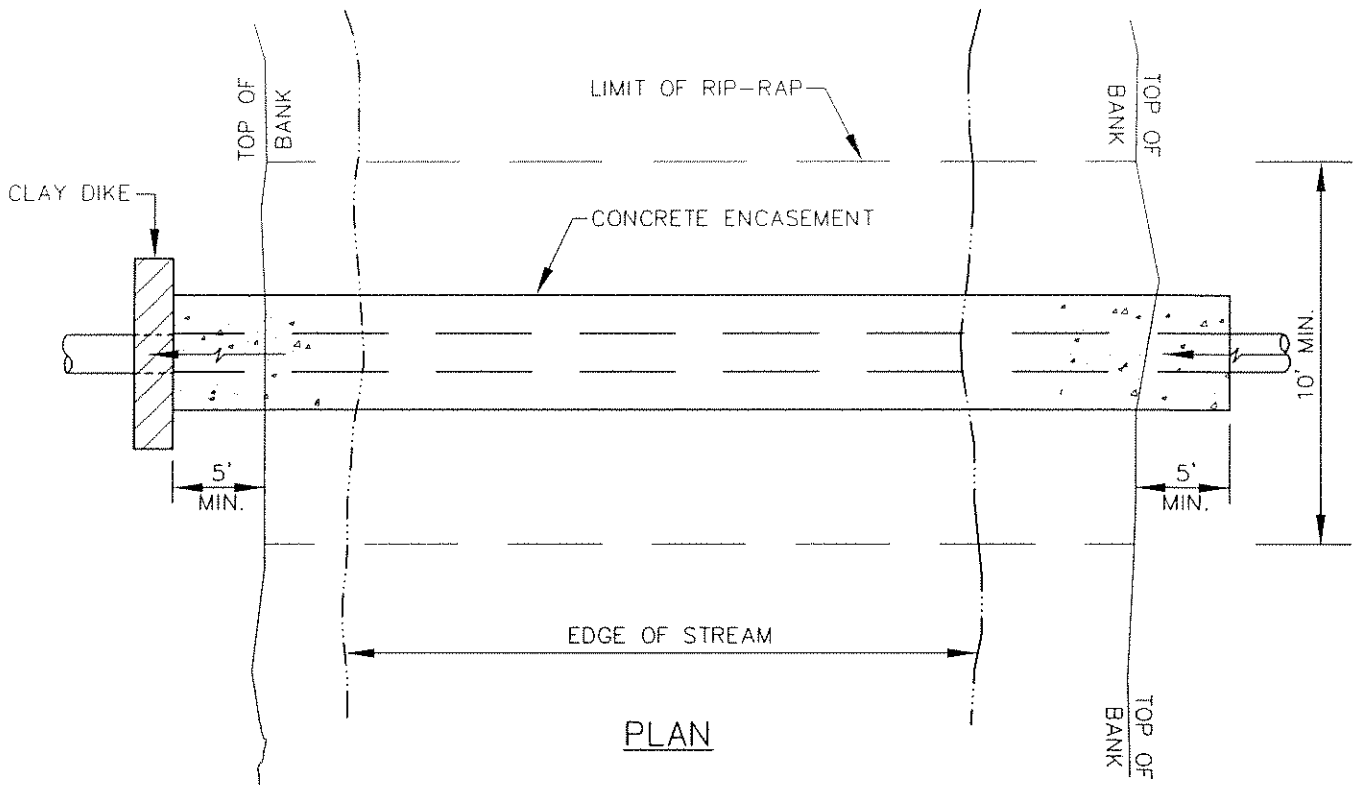
DATE: 3/31/03

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CHK. BY:

NO. CT 02221-1

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STREAM CROSSING
 DETAIL

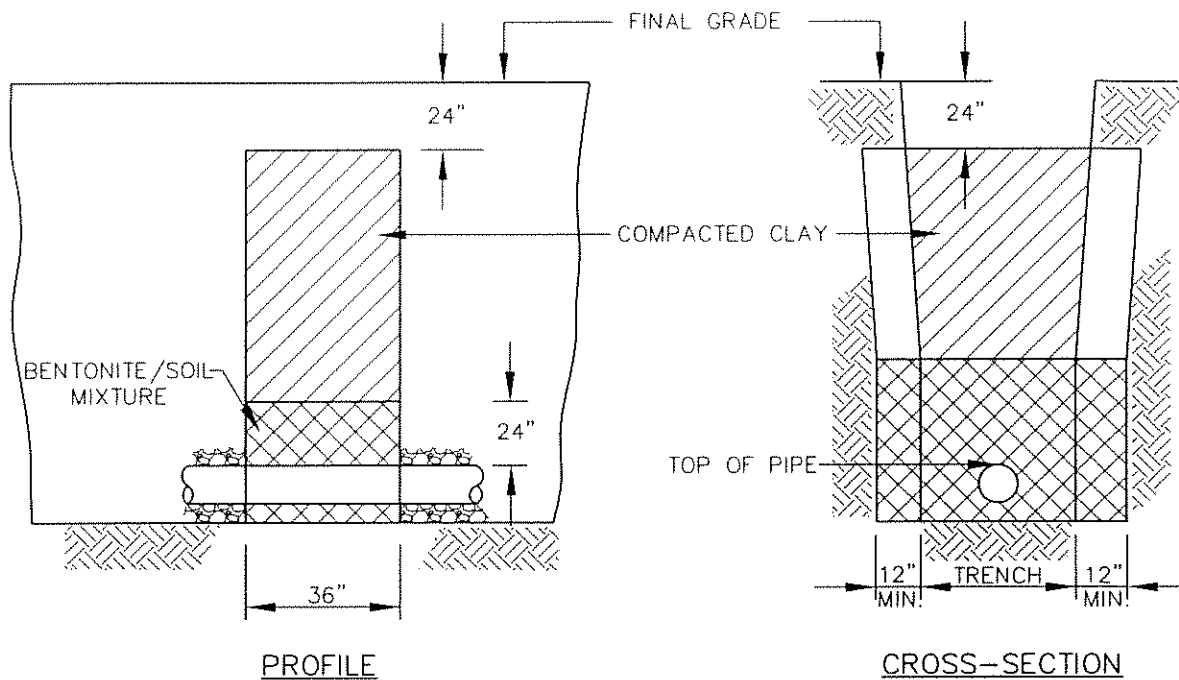
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NO. CT 02221-2

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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.

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CLAY DIKE DETAIL

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02221-3

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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. Finish grading, seeding and sodding: | Section 02485 |
| 4. Bituminous paving and surfacing: | Section 02500 |
| 5. Soil erosion and sediment pollution control: | Section 02270 |

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:

- CT 02500-1 Local Street Cross-Section (Standard)
- CT 02500-2 Local Street Cross-Section (Alternate)
- CT 02500-3 Street Widening Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - T99 Moisture-Density Relations of Soils, Using a 5.5-lb. Rammer and a 12-in. Drop
 - T191 Standard Method of Test for Density of Soil In-Place by the Sand Cone Method.

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

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

D2922 Test Method 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 Municipality 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 aggregate suppliers attesting that materials conform to specifications herein. Certification shall be provided with each load of crushed aggregate delivered to the job site.

- B. One copy of the approved SESPC plan, including approval letter.

1.04 JOB CONDITIONS

- A. As specified in Section 02210.

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.

PART 3 EXECUTION

3.01 SUBGRADE

- A. Perform soil erosion control work in accordance with the approved soil erosion plan.

- 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 Municipality.
 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.
- 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%. Proof roll roadway fill to the satisfaction of the Municipality.
- 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%. Proof roll embankments to the satisfaction of the Municipality.
 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%. Perform finish rolling on roadway subgrade just prior to installation of aggregate subbase or base course.
2. When indicated on the drawings, construct subbase in accordance with Publication 408 Specifications, Section 350.

B. Crushed Aggregate Base Course - Standard

1. Compaction shall be achieved by means of approved static or vibratory equipment as specified in Publication 408, Section 108.05(c)3. 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.
2. On prepared subgrade (or subbase if required), spread limestone screenings (AASHTO No. 10) to a depth of one inch and compact.
3. Construct stone base of AASHTO No. 1 aggregate to the compacted depth specified in the standard details.
4. 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.

5. 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.
6. 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.
7. 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.
8. 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 Municipality.

C. Crushed Aggregate Base Course - Alternate

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

D. Crushed Aggregate Base Course for Street Widening

1. 3A Modified aggregate - gradation as follows:

Sieve	2½"	1"	¾"	No. 4	No. 10	No. 40	No. 100
% passing	100	50-100	25-90	20-65	10-50	8-30	0-20

2. Placement same as paragraph 3.02.C.

E. Crushed Aggregate Shoulders

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

F. Pavement Base Drain - See Section 02618.

3.03 FIELD QUALITY CONTROL

A. Surface Tolerance.

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 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.
2. 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.
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 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 Municipality and unsatisfactory work shall be repaired, corrected, or replaced. The Municipality will not be liable for payment for any excess depth of base course. 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 1500 square yards, or less, of completed base course. Any section in which the depth is ½ inch or more deficient in specified depth, shall be satisfactorily corrected at no expense to the Municipality.
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 Municipality 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

SECTION 02270

SOIL EROSION AND SEDIMENT POLLUTION 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 sediment pollution control (SESPC) measures as per approved plan.
2. Maintenance of SESPC measures.
3. Restoration of area and removal of any interim SESPC 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:

- CT 02270-1 Rock Barrier Detail
- CT 02270-2 Rock Basin Detail
- CT 02270-3 Rock Lining Detail
- CT 02270-4 Soil Erosion Control for Structures
- CT 02270-5 Silt Barrier Fence Detail
- CT 02270-6 Temporary Diversion Swale Detail
- CT 02270-7 Storm Inlet Protection Detail
- CT 02270-8 Straw Bale Barrier Detail
- CT 02270-9 Stabilized Construction Entrance Detail

In the event of a conflict between these details and PA DEP/York County Conservation District details, current PA DEP and York County Conservation District Standard Details shall govern work.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:
 - Publication 408, Specifications
 - Publication 72M, Roadway Construction Standards

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

Soil Erosion and Sedimentation Control Manual

3. Asphalt Institute Specifications

1.03 SUBMITTALS

A. A Soil Erosion and Sediment Pollution Control plan for this project must be approved by the York County Conservation District. This plan may not be adjusted by the Contractor without prior approval of the County Conservation District and other regulatory agencies as applicable.

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 the 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 SEDIMENT CONTROL DEVICE

- A. Nonwoven geotextile fabric bag that collects silt from pumped water, such as Dirtbag manufactured by ACF Environmental, Inc., Richmond, VA, or approved equal.
- B. Bag must be sized to accommodate flow rates and maintained as recommended by the manufacturer.

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 Notify County Conservation District a minimum of 7 days prior to initiating earthmoving.

3.02 A copy of the SESPC Plan must be available at the site of earthmoving activity during construction and until the site is stabilized.

3.03 SESPC measures shall be implemented by the Contractor before earthmoving activities are started. The plan shall be strictly adhered to, and the Contractor shall maintain all SESPC measures until permanent soil cover has been established.

3.04 The following minimum control measures shall be employed by the Contractor:

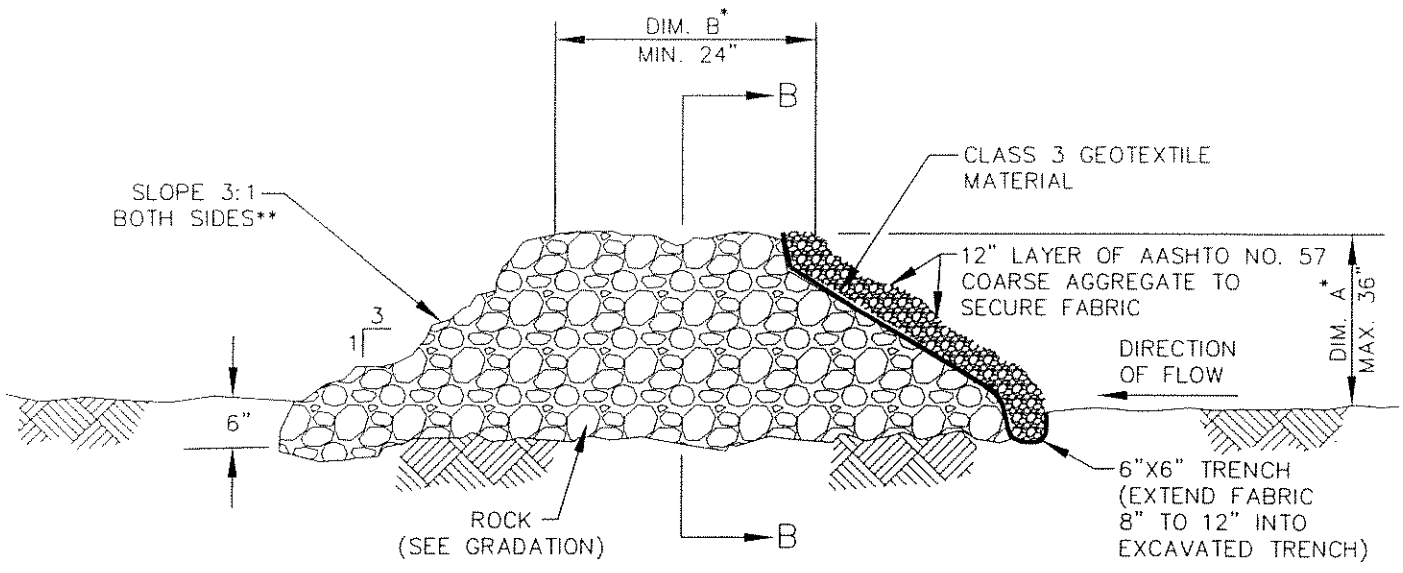
- A. Reduce by the greatest extent practicable the area and duration of exposure of readily erodible soils;
- B. Protect soils by use of temporary vegetation, or by seeding and mulching, or by accelerating the establishment of permanent vegetation and completing disturbed areas of work as rapidly as is consistent with construction schedules;
- C. Retard the rate of runoff from the construction site and control the disposal thereof;
- D. Trap sediment from the construction site in silt basins, including pump discharges from dewatering operations;
- E. Sprinkle or apply dust suppressors to keep dust within tolerable air quality limits on haul roads and at the construction site;
- F. Utilize temporary measures to control soil erosion on construction operations suspended for more than 20 calendar days;
- G. Provide protection against discharge of pollutants such as chemicals, fuel, lubricants, sewage, etc. into streams or storm water facilities;
- H. Keep all construction debris, excavated material, rocks, and refuse incidental to the work out of any stream channel, gutter lines and drainage channels.

3.05 Do not permit mud or silt-laden water to leave the construction site, and is responsible for any and all damages to downstream properties as a result of his failure to prevent such damages.

3.06 At such time permanent soil cover has been established, remove all temporary SESPC measures.

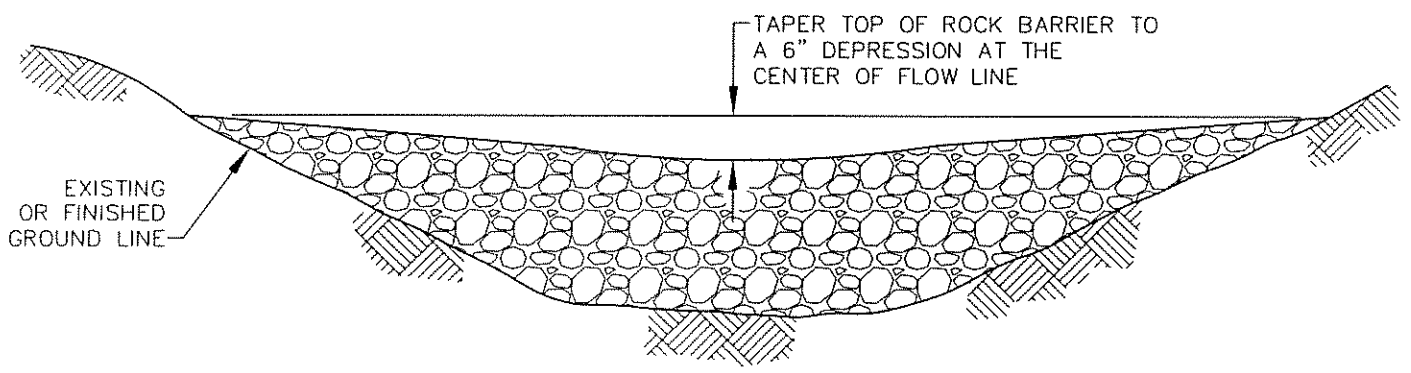
3.07 Temporary control measures must be maintained, including disposal and replacement of damaged or filled devices.

END OF SECTION



TYPICAL SECTION

* REFER TO CONTRACT DRAWINGS FOR INDIVIDUAL BARRIER DIMENSIONS AND LOCATIONS.
 ** SLOPE SHALL BE 1:1 WHEN USED AS ROCK FILTER OUTLET
 DIM. A = 5/6 HEIGHT OF SILT BARRIER FENCE WHEN USED AS ROCK FILTER OUTLET.
 NOTE: SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 HEIGHT OF ROCK BARRIER.



SECTION B-B

HEIGHT (DIM. A)	ROCK
3' OR LESS	R-4
2'-3'	R-3
1'-2'	R-2

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



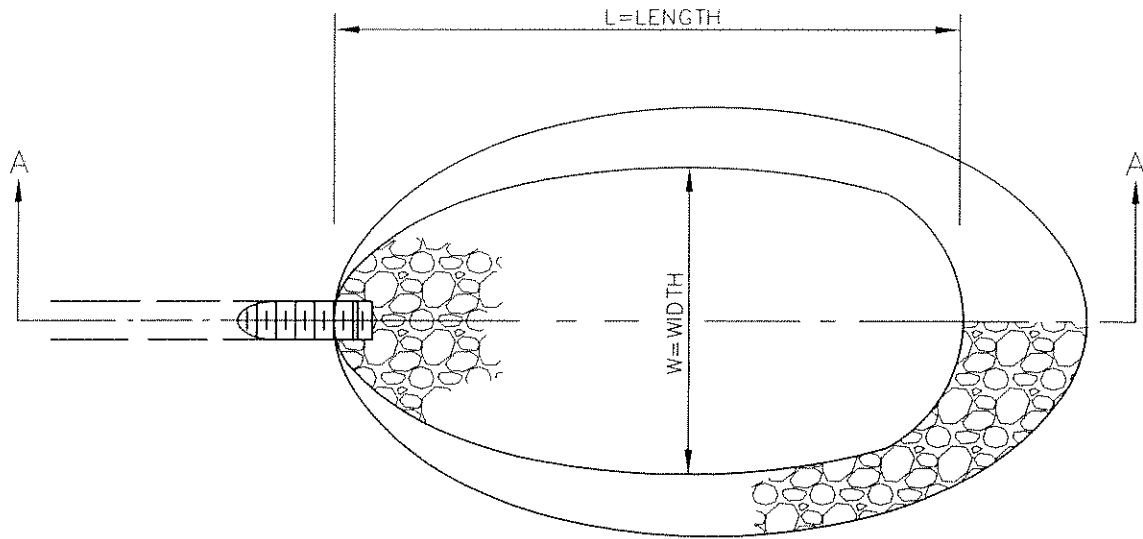
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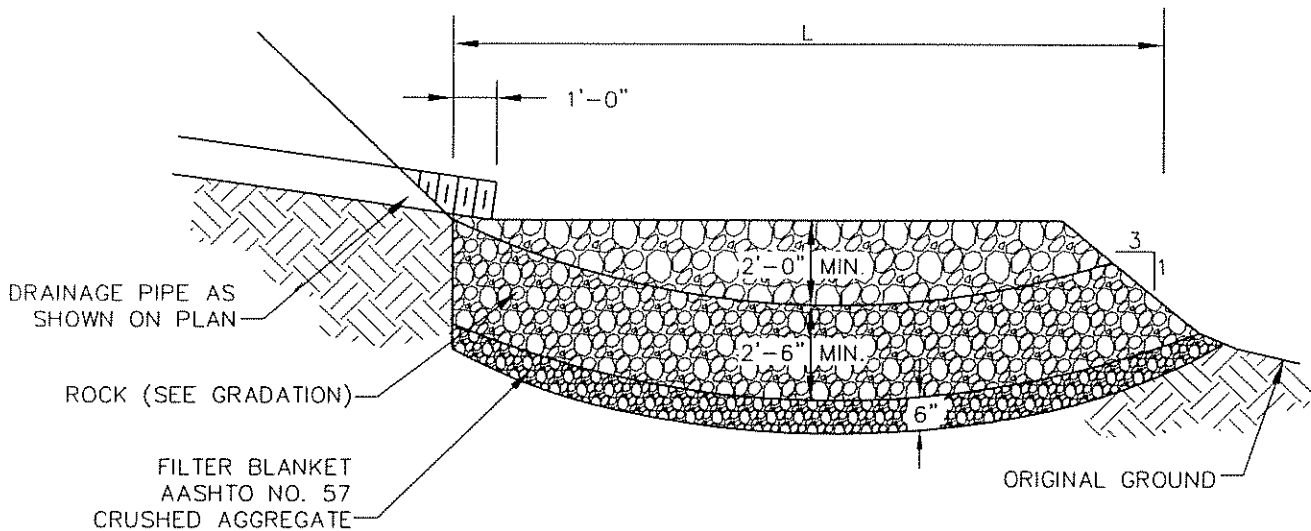
**ROCK BARRIER
DETAIL**

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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

NOTE: NOT TO SCALE

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ROCK BASIN DETAIL

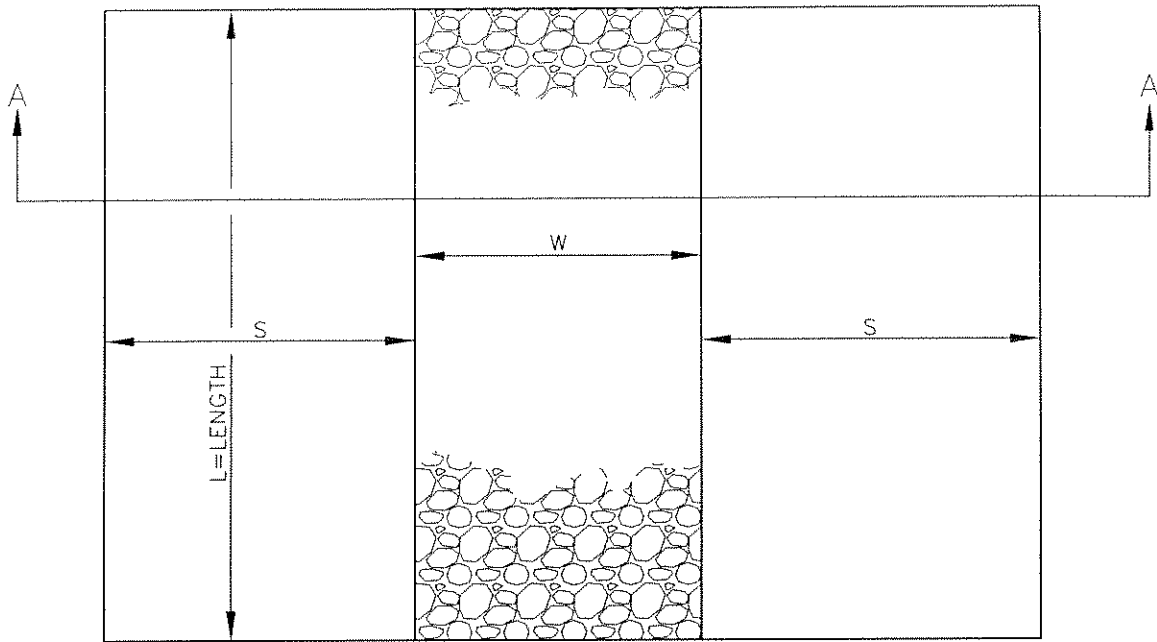
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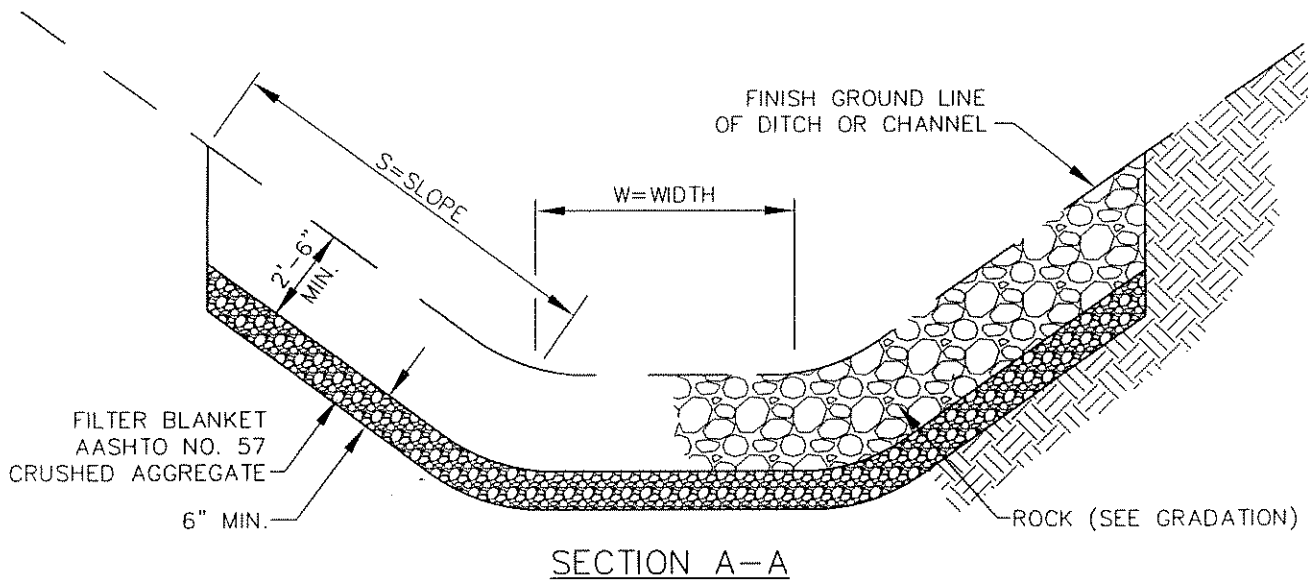
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PLAN



SECTION A-A

ROCK GRADATION

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

"S", "L" AND "W" AS SHOWN
ON DRAWINGS

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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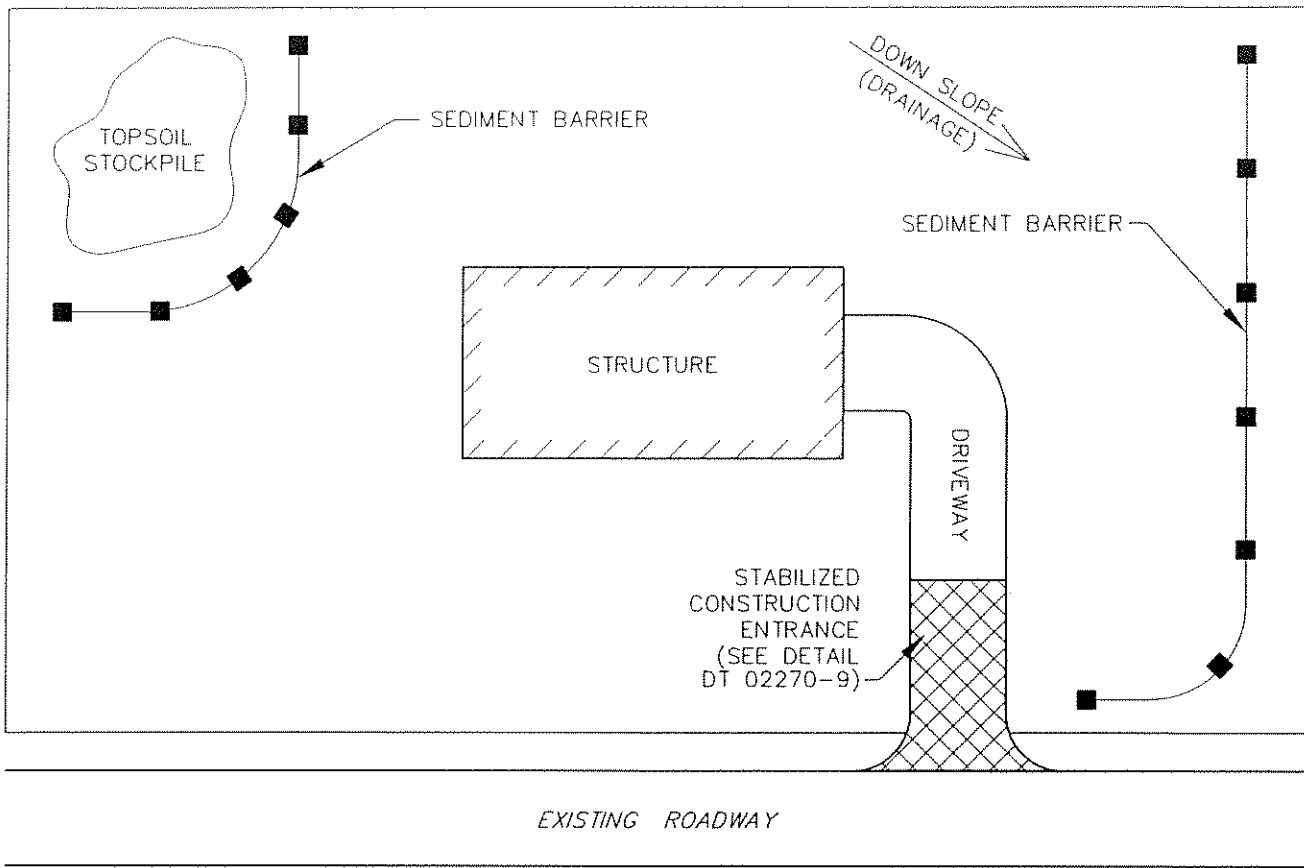
ROCK LINING DETAIL

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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.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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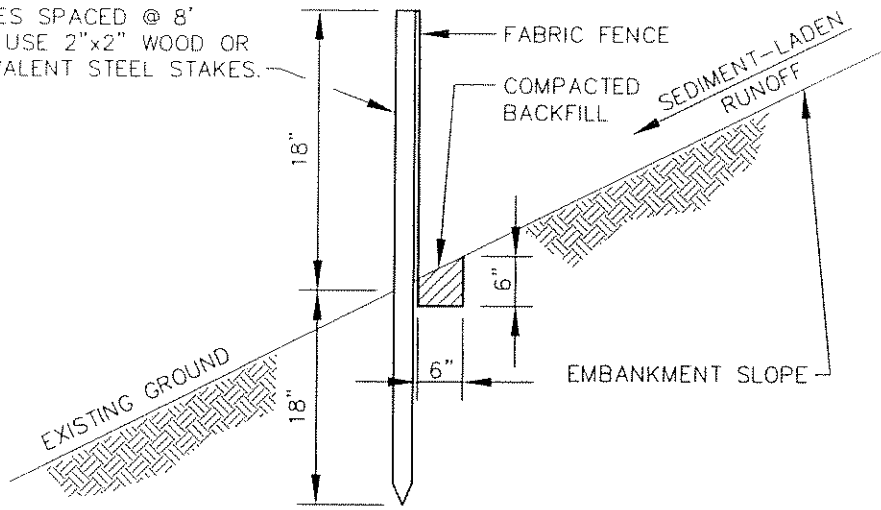
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**SOIL EROSION
CONTROL FOR STRUCTURES**

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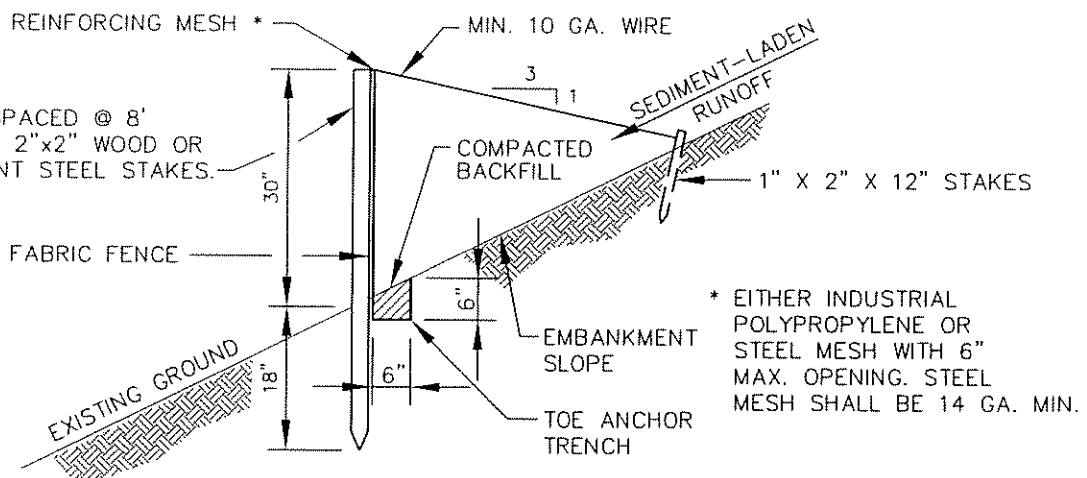
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STAKES SPACED @ 8'
MAX. USE 2"x2" WOOD OR
EQUIVALENT STEEL STAKES.



18" SILT FENCE DETAIL

STAKES SPACED @ 8'
MAX. USE 2"x2" WOOD OR
EQUIVALENT STEEL STAKES.



* EITHER INDUSTRIAL
POLYPROPYLENE OR
STEEL MESH WITH 6"
MAX. OPENING. STEEL
MESH SHALL BE 14 GA. MIN.

FILTER FABRIC FENCE MUST BE INSTALLED AT LEVEL GRADE. BOTH ENDS OF EACH FENCE SECTION MUST BE EXTENDED AT LEAST 8' UPSLOPE AT 45° TO THE MAIN FENCE ALIGNMENT.

SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.

ANY FENCE SECTION WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET. SEE DETAIL, DT 02270-1.

30" SILT FENCE DETAIL

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

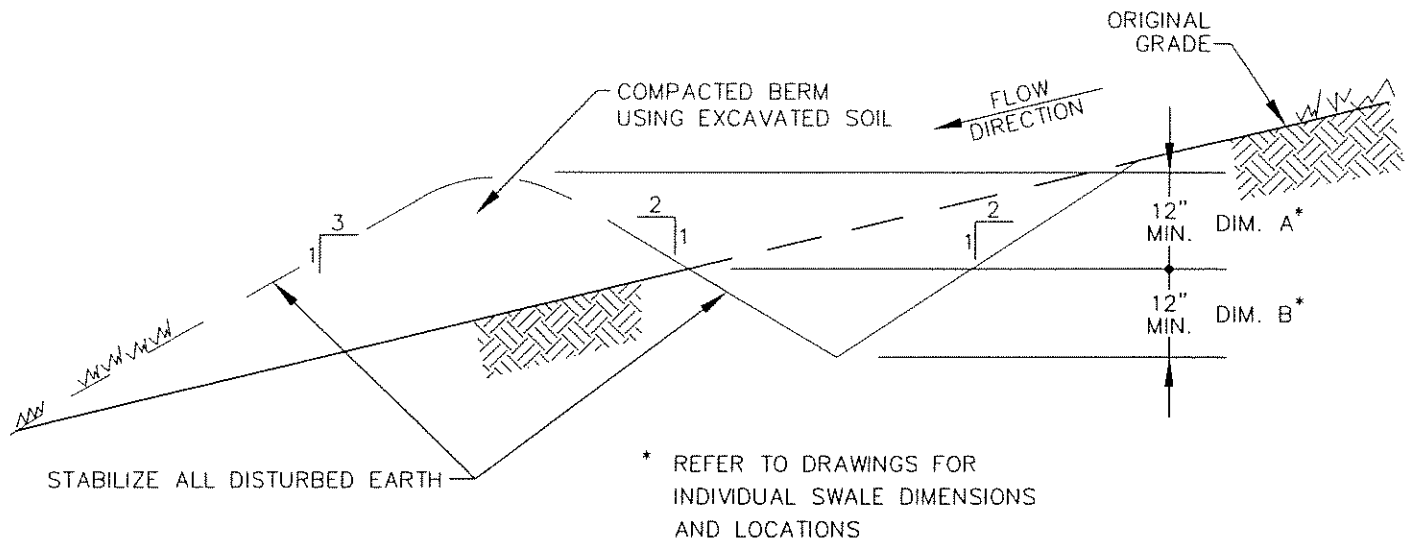


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SILT BARRIER FENCE
DETAIL

DATE:	3/31/03
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NO.	CT 02270-5

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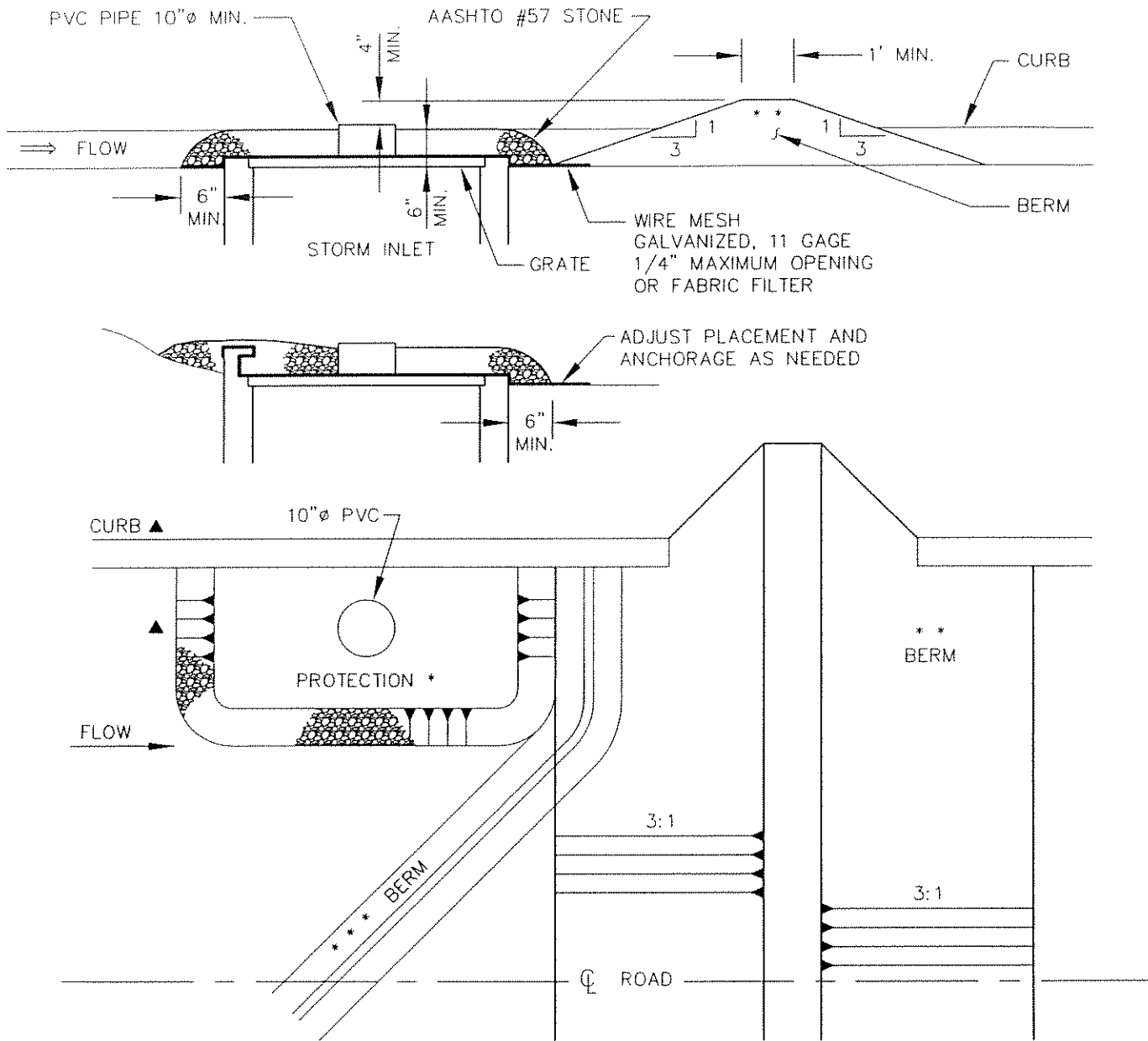


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TEMPORARY DIVERSION
 SWALE DETAIL

DATE:	3/31/03
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NO.	CT 02270-6

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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.
- NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

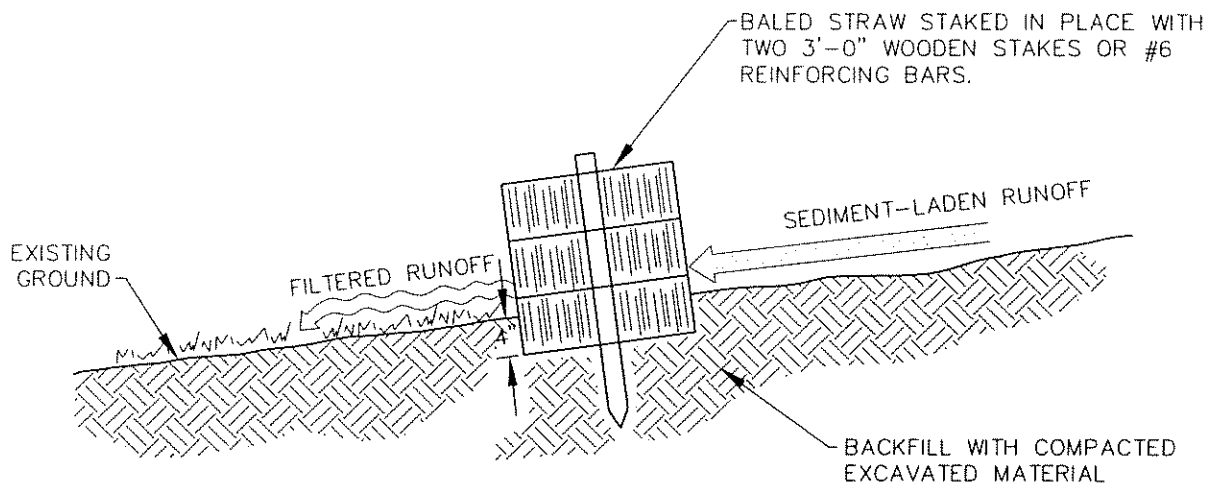


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STORM INLET PROTECTION DETAIL

DATE:	3/31/03
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CHK. BY:	
NO.	CT 02270-7



**CROSS-SECTION OF PROPERLY
INSTALLED STRAW BALE**

NOTES:

STRAW BALE BARRIERS SHOULD NOT BE USED FOR MORE THAN 3 MONTHS.

STRAW BALE BARRIERS MUST BE PLACED AT LEVEL GRADES. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO MAIN BARRIER ALIGNMENT.

SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/3 THE ABOVE GROUND HEIGHT OF THE BARRIER.

ANY SECTION OF STRAW BALE BARRIER WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET. SEE ROCK FILTER OUTLET DETAIL.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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**STRAW BALE BARRIER
DETAIL**

DATE: 3/31/03

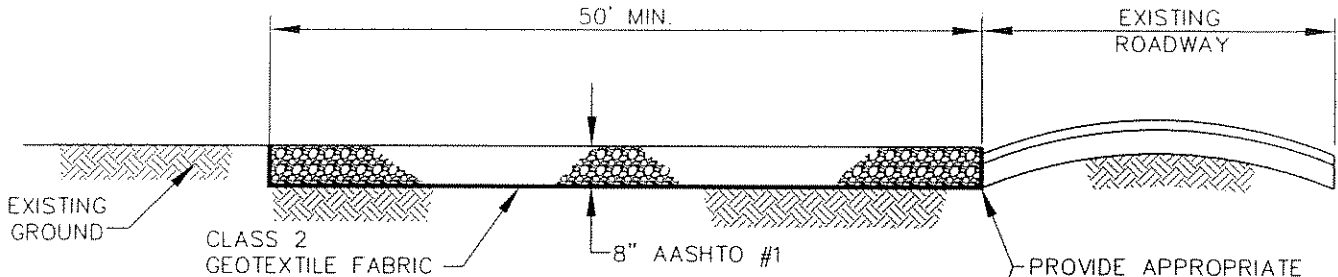
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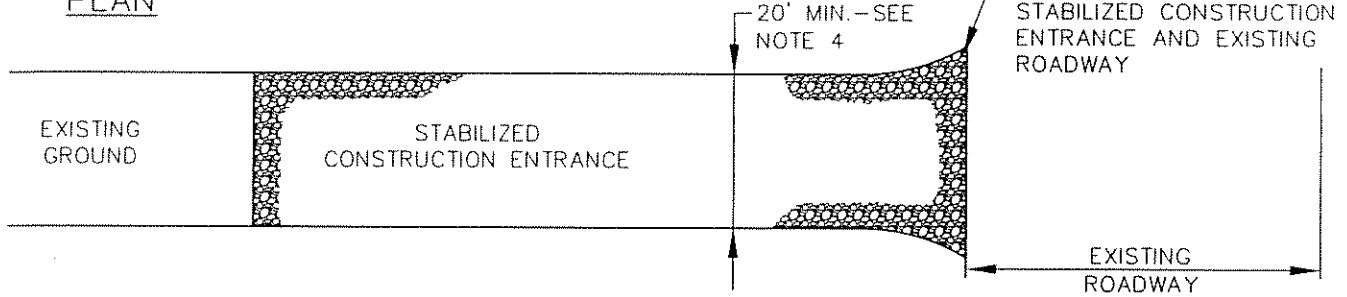
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SECTION



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.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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STABILIZED CONSTRUCTION
ENTRANCE DETAIL

DATE:	9/17/01
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NO.	CT 02270-9

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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. Trenching, backfilling and compacting: Section 02221

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
2. American Association of State Highway Transportation Officials (AASHTO):
T194 Determination of Organic Matter in Soils by Wet Combustion
3. Pennsylvania Department of Agriculture
4. Others:

Agricultural Liming Materials Act of 1978, P.L.15
Pennsylvania Seed Act of 1965, Act 187, as amended
Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1,
1977, P.L. 258 No. 86 (3P.S. 68.2) as amended
Rules for Testing Seeds of the Association of Official Seed Analysts
Federal and State pesticide acts and registration requirements

- B. Sod Producer - Company specializing in sod production and harvesting with a minimum of 5 years experience.
- C. Sod Installer - Company specializing in performing this work with a minimum of 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 place. The samples shall be representative of the sod and workmanship to be provided. Include sod source location.

B. Certificates:

- 1. Unless directed otherwise, prior to use or placement of material, submit certifications of material composition of the following for approval:
 - a. Topsoil analysis
 - b. Fertilizer
 - c. Lime
 - d. Seed mixtures
 - e. Inoculant
 - f. Sod

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. 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.
- B. 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.

TABLE 1 - GRASS AND AGRICULTURAL SEEDS

<u>Species</u>	<u>Minimum Guaranteed Purity (Percent)</u>	<u>Maximum Weed Seed (Percent)</u>	<u>Minimum Guaranteed Germination (Percent)</u>
Kentucky Bluegrass (<i>Poa pratensis</i>)	98	0.20	80
Perennial Ryegrass (<i>Lolium perenne</i> , var. Pennfine)	98	0.15	90
Tall Fescue (<i>Festuca arundinacea</i>), var. Kentucky 31)	98	0.15	85
Crownvetch (<i>Coronilla varia</i>)	99	0.10	65
Creeping Red Fescue (<i>Festuca rubra</i> , var. Pennlawn)	98	0.15	85
Annual Rye Grass (<i>Lolium multiflorum</i>)	98	0.15	90
Timothy (<i>Phleum pratense</i>)	98	0.25	85
Birdsfoot Trefoil mixture (<i>Lotus corniculatus</i>)	98	0.10	80*
Redtop (<i>Agrostis alba</i>)	92	0.15	80

* Minimum 20% hardseed and 60% normal sprouts

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:

- c. Cured to less than 20% moisture content by weight.
- d. Contain no stems of tobacco, soybeans, or other coarse or woody material.
- e. 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.

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. Hand rake 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 starter fertilizer and rake.

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 raking or approved mechanical methods.
- E. Mulch immediately after seeding, using one of the following methods:

2. 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 received 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

<u>RESTORATION CONDITION</u>	<u>TOPSOIL</u>	<u>LIME*</u>	<u>BASIC FERTILIZER</u>	<u>STARTER FERTILIZER</u>	<u>SEED MIX & SOWING RATE (% BY WEIGHT)</u>
Temporary Cover (PennDOT E)	N/A	1 Ton/Acre	5-5-5 @ 1000# /Acre	N/A	100% Annual Ryegrass Sow 10# per 1,000 Sq. Yds. March 15 thru October 15
Roadside; Non-mowed (PennDOT 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% Creeping Red Fescue Sow 21# per 1000 Sq. Yds. Mar. 15 thru May/Aug. thru Oct. 15
Roadside; Mowed (PennDOT 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% Creeping Red Fescue 20% Perennial Ryegrass Sow 21# per 1000 Sq. Yds. Mar. 15 thru May/Aug. thru Oct. 15
Bank Areas (PennDOT 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.
Bank Areas (PennDOT W)	Yes	No	No	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	70% Tall Fescue 20% Birdsfoot Trefoil Mixture 10% Redtop Sow 10.5# per 1000 Sq. Yds.
Lawns (PennDOT 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 Sow 21# per 1000 Sq. Yds. Mar. 15 thru May/Aug. thru Oct. 15
Open Fields; Non-Cultivated, Pasture	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. thru May/Aug. thru Sept.

*Unless lesser rate indicated by soils tests

SEEDING RESTORATION TABLE

<u>RESTORATION CONDITION</u>	<u>TOPSOIL</u>	<u>LIME*</u>	<u>BASIC FERTILIZER</u>	<u>START FERTILIZER</u>	<u>SEED MIX & SOWING RATE (% BY WEIGHT)</u>
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 thru Oct. 15
Woods; Sparse	No	No	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.	100% Red Fescue Sow 36# per 1000 Sq. Yds. Mar. 15 thru May/Aug. thru Oct. 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 1000 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% Redtop

*Unless lesser rate 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. Superpave base course construction.
2. Placement and compaction of bituminous binder and wearing surface.
3. Placement of bituminous seal coat and surface treatment.
4. Surface preparation.
5. 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. Pavement markings | Section 02760 |

C. Definitions: NONE

D. Applicable Standard Details:

- CT 02500-1 Local Street Cross Section (Standard)
- CT 02500-2 Local Street Cross Section (Alternate)
- CT 02500-3 Collector and Arterial Street Cross Section (Standard)
- CT 02500-4 Collector and Arterial Street Cross Section (Alternate)
- CT 02500-5 Industrial Street Cross Section (Standard)
- CT 02500-6 Industrial Street Cross Section (Alternate)
- CT 02500-7 Street Widening Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

- Publication 408, Specifications
- Publication 213, Work Zone Traffic Control Guidelines
- Publication 27, Specification for Bituminous Mixtures (Bulletin 27)
- Publication 37, Specification for Bituminous Materials (Bulletin 25)
- Publication RR-459, Occupancy of Highway by Utilities
- Publication 68, Regulations - Traffic Signs, Signals and Markings
- Publication 236M, Handbook of Approved Signs

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

D2950 Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

B. Inspections:

1. Inspection by the Municipality 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. Qualifications:

1. Pavement marking contractor shall have at least five years documented experience specializing in installing pavement markings.

1.03 SUBMITTALS

A. Certification:

1. Job Mix Formula - Submit job mix formula to the owners engineer five (5) days prior to start of work.
2. Provide PennDOT Certification of Compliance (CS-4171) with the first load delivered to the job site each day. Certification must be signed by the plant technician and cross referenced with the job mix formula number which must appear on the delivery ticket.
3. Delivery Tickets/Weight Slips - Must be provided with each load delivered to the job site. Weight slips must include, at a minimum, the following:
 - a. Job Mix Formula Number
 - b. Date and Time
 - c. Material Type
 - d. Design ESALS
 - e. For Wearing Course - SRL Designation
4. Provide compact testing results.

1.04 JOB CONDITIONS

A. Control 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.
3. Notify all appropriate emergency services (police, fire and ambulance) a minimum of 36 hours in advance of any temporary lane closures.

B. Protect existing utilities as described in Section 02210.

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 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:

<u>ADT</u>	<u>SRL</u>	<u>ALTERNATIVES</u>
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 and Below	L	Any

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

B. All Superpave (HMA) 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. All mixtures will be petroleum grade PG 64-22 and 1.0 million ESAL's unless specified otherwise by the Municipality. Aggregate size is shown on Standard Details.

2.02 SIGNS

A. Post mounted signs shall be on breakaway 2" square steel posts with CAPS as per PennDOT Publication 408, Sections 931 and 1103.

B. Signs shall conform to PennDOT Publication 236M. Street name signs shall be signal sided. Street signs shall be located on the opposite side of the intersection from the stop signs. Street signs shall be mounted on a post (conforming with Section 2.02.A above) without any other signage.

PART 3 EXECUTION

3.01 BASE COURSES

- A. Superpave Asphalt HMA Base Course - Where indicated on the drawings, construct HMA base course to compacted depth in accordance with Publication 408, Section 309. Proof roll base course to satisfaction of the Municipality. Municipality shall approve crushed aggregate base course prior to placement of base course.

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.
- B. Scarify areas shown on the drawings. Where the existing base is judged inadequate by the Municipality, construct new base of the required type shown on Standard Detail 02500-3.
- C. Patch holes and depressions greater than one inch and less than four inches with Superpave (19mm) binder material, compacted in layers not exceeding two inches after compaction.
- D. 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 (19mm) binder material.
- E. Apply tack coat prior to overlaying existing pavement in accordance with Publication 408 Specifications, Section 460.
- F. Milling of existing bituminous pavement shall be performed in accordance with Publication 408, Section 491 to the 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. Millings must be disposed of properly. Remove all loose material left behind the milling machine.
 - 3. Supply all water as needed.

3.03 SURFACE COURSES

- A. 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 required by the Municipality.
 - 2. The roller pattern and speed shall be monitored by the Municipality to avoid roller marks, pattern segregation and displacement of hot mixtures.
- B. Bituminous Seal Coat (single application)

1. Construct bituminous seal coat in accordance with Publication 408 Specifications, Section 470.
- C. Bituminous Surface Treatment (double application)
1. Construct bituminous surface treatment in accordance with Publication 408 Specifications, Section 480.
- D. Superpave Asphalt
1. HMA Binder Course - Construct HMA binder course to the compacted depth shown on the drawings and standard details and Publication 408, Section 409.
 2. HMA Wearing Course - Construct HMA wearing course to the compacted depth shown on the drawings and standard details and Publication 408, Section 409. Apply tack coat on existing paved surfaces in accordance with Publication 408, Section 401.
 3. HMA Base Course - Where required, construct in accordance with Publication 408, Section 309.

3.04 JOINTS

A. Notch

The edge of an 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 a minimum 6:1 unless otherwise noted. A cold planer may be used. The vertical face must be painted with E-6, E-8 or the same asphalt material used in mix design (Publication 408, Section 401.3(j)).

B. Sealing

All joints shall be sealed rubberized joint sealing material. 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 6 inches from the curb, applied evenly.

3.05 SIGNS

- A. Install signs at locations shown on drawings or otherwise specified by Municipality.
- B. Posts shall be installed in undisturbed earth with anchor top 4" above ground on lower slope side.
- 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 FIELD QUALITY CONTROL

A. 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 least 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 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.

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 Municipality and unsatisfactory work shall be repaired, corrected, or replaced. The Municipality will not be liable for payment for any excess depth of base course.

1. The depth will be determined by cutting or coring holes to the full depth of the completed base course. One depth measurement may be required for each 1500 square yards, or less, of completed base course. Any section in which the depth is $\frac{1}{2}$ inch or more deficient in specified depth, shall be satisfactorily corrected at no expense to the Municipality.
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 Municipality who will check the depth for record purposes.

C. 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 furnished and used for testing longitudinal irregularities in the surface of the wearing course.

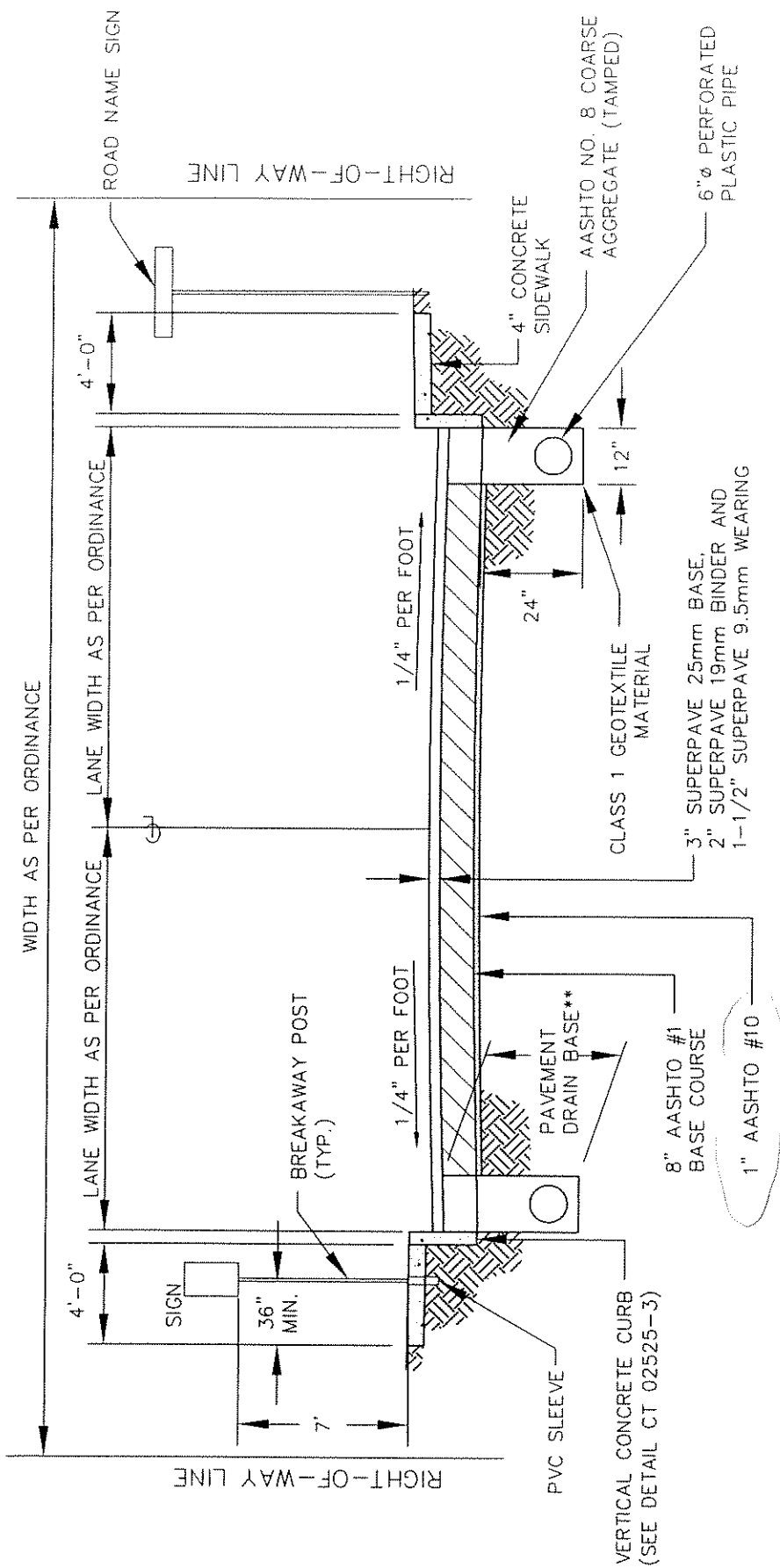
Any surface irregularities that exceed 3/16 inch shall be remedied by removing or adding wearing material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

D. Tests for Depth of Finished Wearing Course.

During the progress of the work, the depth of the wearing course may be measured by the Municipality and unsatisfactory work shall be repaired, corrected, or replaced. The Municipality will not be liable for payment for any excess depth of wearing course.

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 at no expense to the Municipality. One depth measurement may be required for each 1500 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 at no expense to the Municipality.
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 Municipality who will check the depth for record purposes.

END OF SECTION



NOTES:

1. MINIMUM ESAL = 0 TO 0.3 MILLION
2. MINIMUM SRL = L
3. MINIMUM CBR = 6.0
4. ALL PETROLEUM GRADE TO BE 64-22
5. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES.
6. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB.

** PROVIDE PAVEMENT BASE DRAIN FOR 50 FEET ON EACH SIDE OF VERTICAL SAG CURVES. WHERE STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN. SEE PennDOT RC-30M.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

LOCAL STREET

CROSS SECTION (STANDARD)

DATE: 3/29/2006

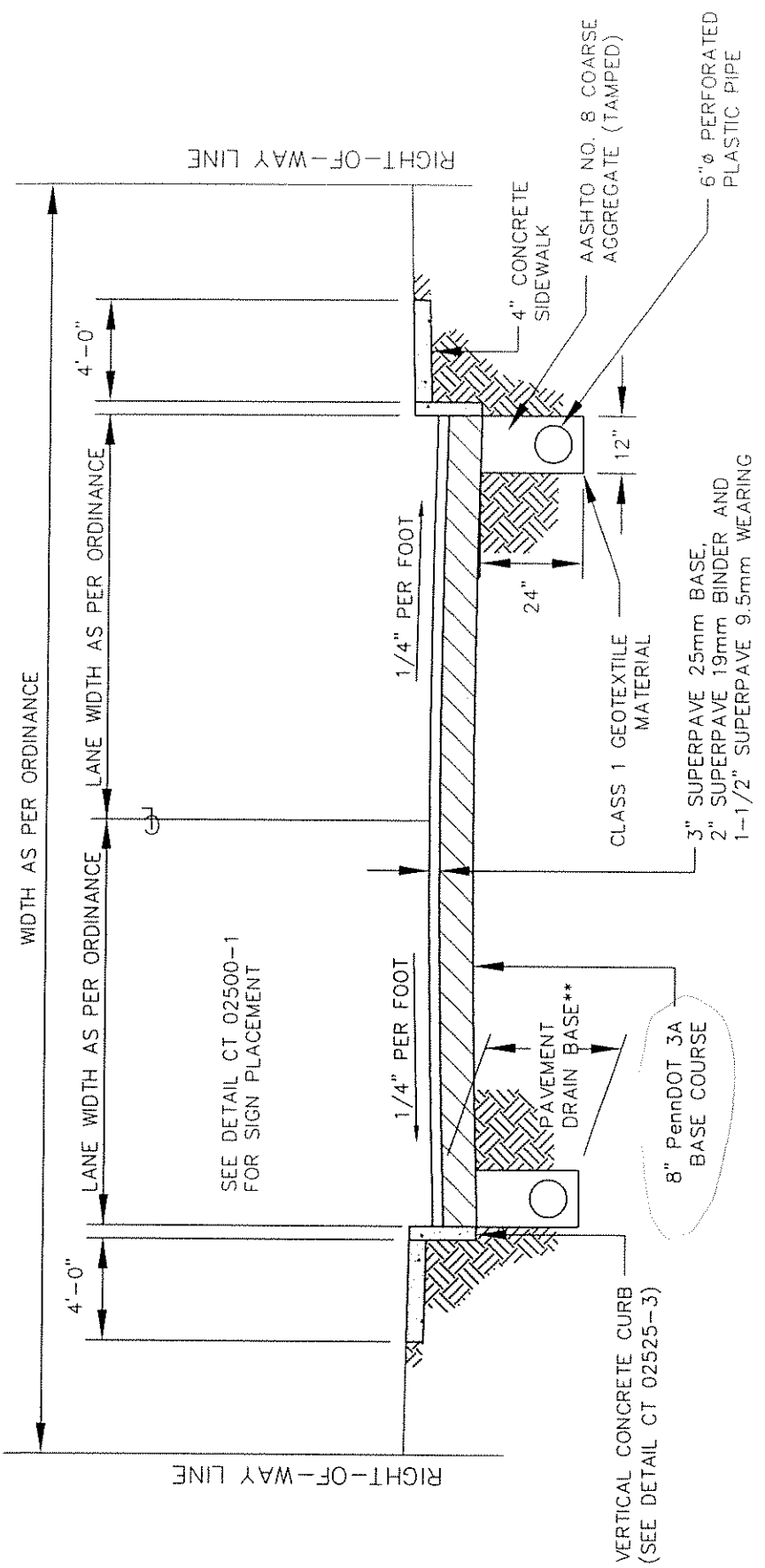
DRAWN BY: APS

CHK. BY:

NO. CT 02500-1



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 50 WEST MIDDLE STREET, GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782



SEE DETAIL CT 02500-1 FOR SIGN PLACEMENT

NOTES:

1. MINIMUM ESAL = 0 TO 0.3 MILLION
2. MINIMUM SRL = L
3. MINIMUM CBR = 6.0
4. ALL PETROLEUM GRADE TO BE 64-22
5. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES.
6. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB.

** PROVIDE PAVEMENT BASE DRAIN FOR 50 FEET ON EACH SIDE OF VERTICAL SAG CURVES. WHERE STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN. SEE PennDOT RC-30M.

NOTE: NOT TO SCALE

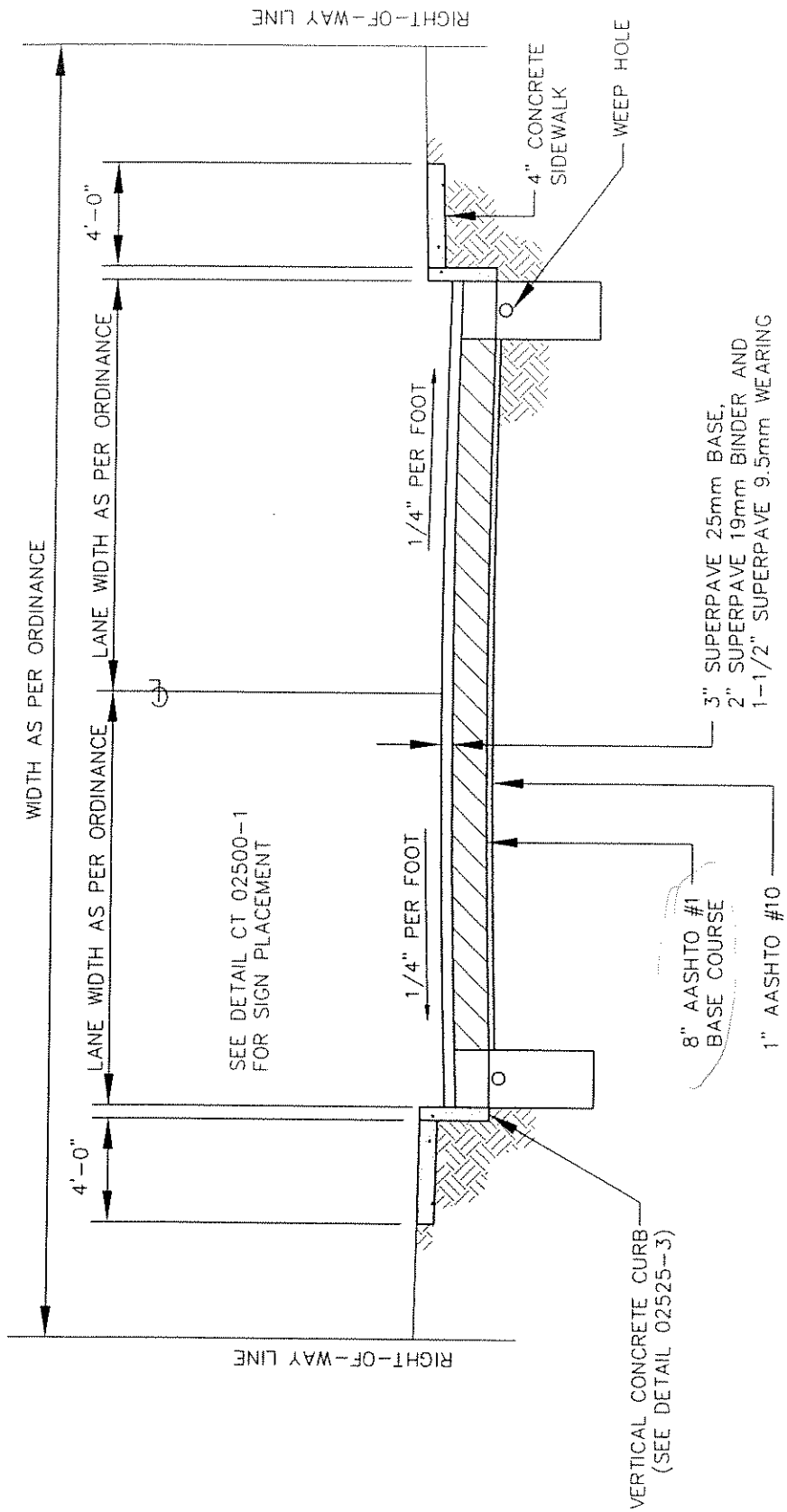
CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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**LOCAL STREET
 CROSS SECTION (ALTERNATE)**

DATE:	3/29/2006
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02500-2



SEE DETAIL CT 02500-1 FOR SIGN PLACEMENT

VERTICAL CONCRETE CURB (SEE DETAIL 02525-3)

8" AASHTO #1 BASE COURSE
1" AASHTO #10

3" SUPERPAVE 25mm BASE,
2" SUPERPAVE 19mm BINDER AND
1-1/2" SUPERPAVE 9.5mm WEARING

NOTES:

1. MINIMUM ESAL = 0.3 TO 3.0 MILLION
2. MINIMUM SRL = M
3. MINIMUM CBR = 6.0
4. ALL PETROLEUM GRADE TO BE 64-22
5. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES.
6. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB.

NOTE: NOT TO SCALE

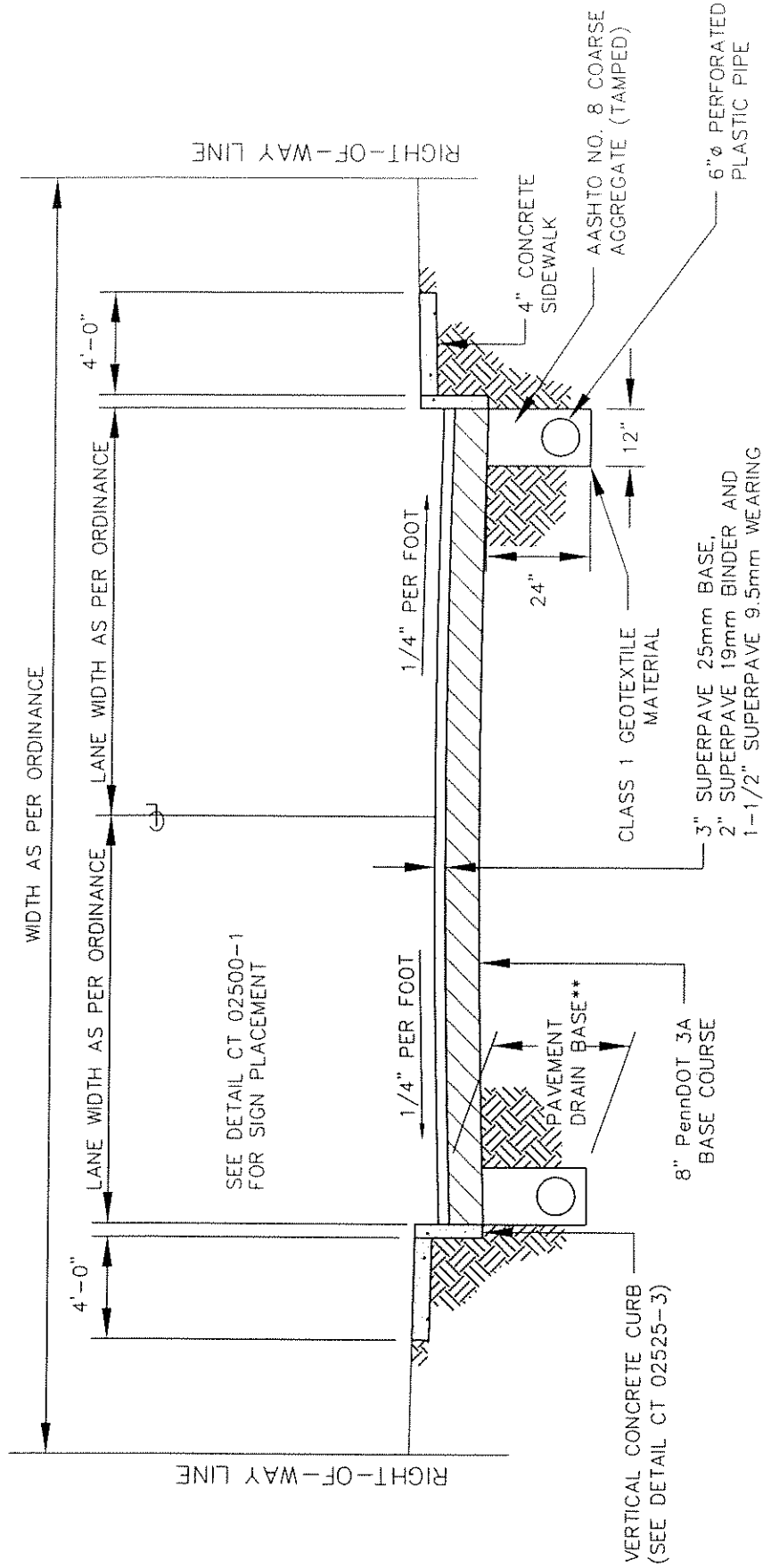
CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

COLLECTOR AND ARTERIAL STREET CROSS SECTION (STANDARD)



18 NORTH DUKE STREET, YORK, PA • PHONE (717) 846-9855 • FAX (717) 846-5811
50 WEST MIDDLE STREET, GETTYSBURG, PA • PHONE (717) 337-2921 • FAX (717) 337-0282
315 W. JAMES STREET, LANCASTER, PA • PHONE (717) 481-2391 • FAX (717) 481-8890

DATE:	6/15/2006
DRAWN BY:	BAM
CHK. BY:	
NO.	CT 02500-3



NOTES:

1. MINIMUM ESAL = 0 TO 0.3 MILLION
2. MINIMUM SRL = L
3. MINIMUM CBR = 6.0
4. ALL PETROLEUM GRADE TO BE 64-22
5. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES.
6. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB.

** PROVIDE PAVEMENT BASE DRAIN FOR 50 FEET ON EACH SIDE OF VERTICAL SAG CURVES. WHERE STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN. SEE PennDOT RC-30M.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

**COLLECTOR AND ARTERIAL STREET
CROSS SECTION (ALTERNATE)**

DATE: 3/29/2006

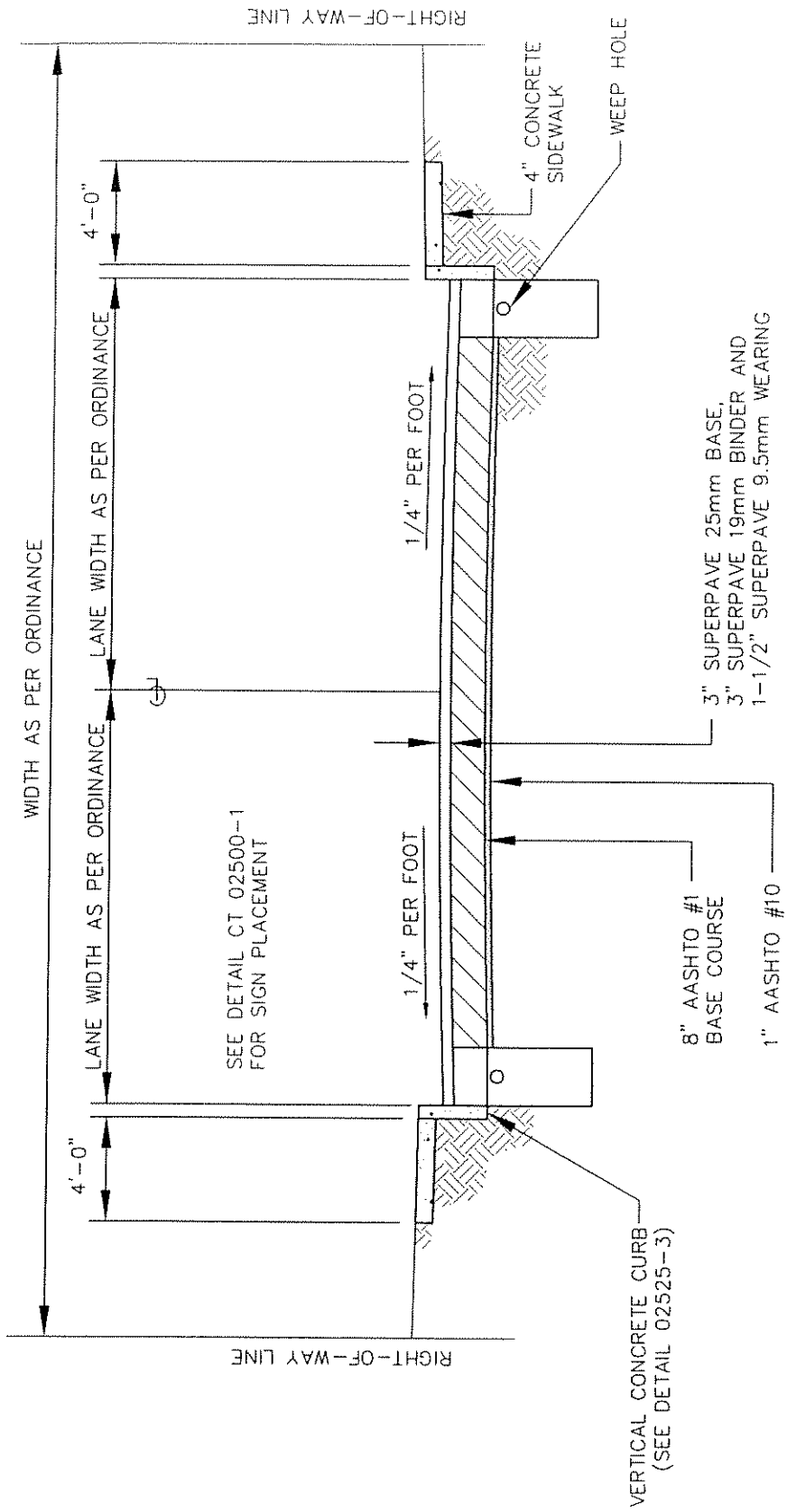
DRAWN BY: APS

CHK. BY:

NO. CT 02500-4



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50 WEST MIDDLE STREET, GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782



NOTES:

1. MINIMUM ESAL = 0.3 TO 3.0 MILLION
2. MINIMUM SRL = M
3. MINIMUM CBR = 6.0
4. ALL PETROLEUM GRADE TO BE 64-22
5. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES.
6. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS
INDUSTRIAL STREET
CROSS SECTION (STANDARD)



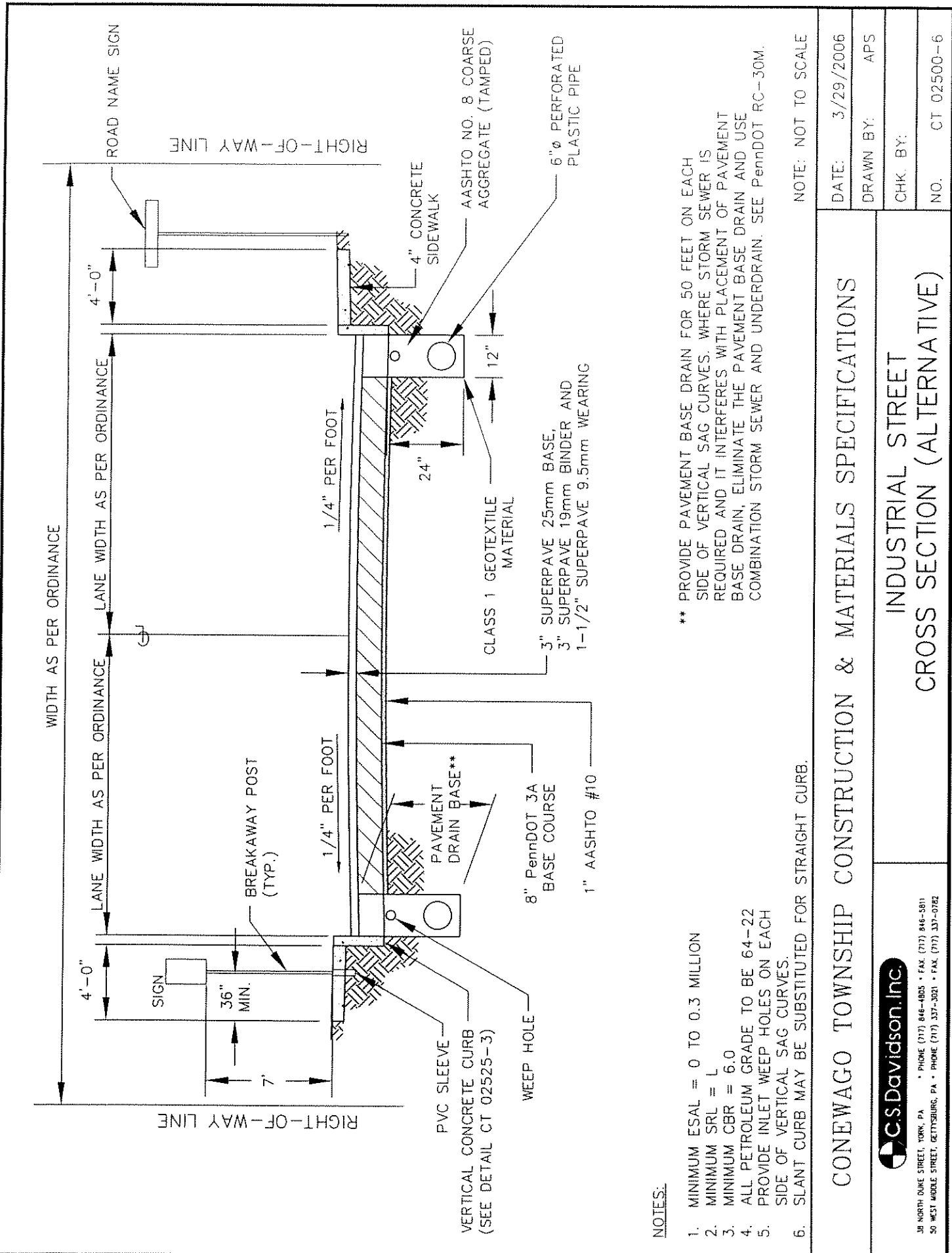
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50 S. JACOB STREET, GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-9782
315 W. JAMES STREET, LANCASTER, PA • PHONE (717) 461-2951 • FAX (717) 461-9690

DATE: 6/15/2006

DRAWN BY: BAM

CHK. BY:

NO. CT-02500-5



NOTES:

1. MINIMUM ESAL = 0 TO 0.3 MILLION
2. MINIMUM SRL = L
3. MINIMUM CBR = 6.0
4. ALL PETROLEUM GRADE TO BE 64-22
5. PROVIDE INLET WEEP HOLES ON EACH SIDE OF VERTICAL SAG CURVES.
6. SLANT CURB MAY BE SUBSTITUTED FOR STRAIGHT CURB.

** PROVIDE PAVEMENT BASE DRAIN FOR 50 FEET ON EACH SIDE OF VERTICAL SAG CURVES. WHERE STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN. SEE PennDOT RC-30M.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

**INDUSTRIAL STREET
CROSS SECTION (ALTERNATIVE)**

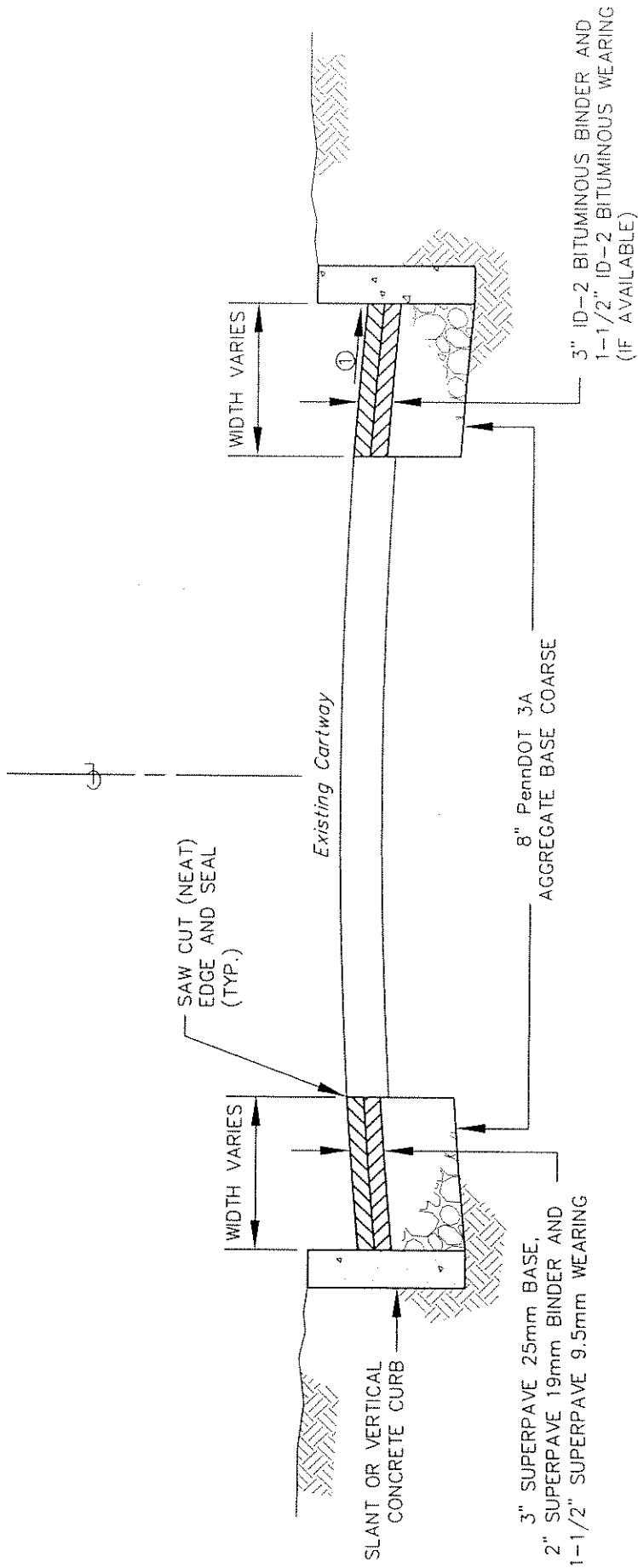


C.S. Davidson, Inc.
 100 NORTH DUKE STREET, YORK, PA • PHONE (717) 846-4805 • FAX (717) 846-5811
 50 WEST MIDDLE STREET, GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782

DATE:	3/29/2006
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02500-6

HMA ASPHALT MATERIALS

ID-2 BITUMINOUS MATERIALS



SEE DETAIL 02500-1 FOR PAVEMENT BASE DRAIN PLACEMENT REQUIREMENTS

① 2% MINIMUM, MATCH EXISTING CROSS-SLOPE IF GREATER THAN 2%

NOTE: NOT TO SCALE
REVISED: 6/15/2006

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

DATE: 10/24/2005

DRAWN BY: JLD

CHK. BY:

NO. CT 02500-7



38 NORTH DUKE STREET, YORK, PA • PHONE (717) 846-4805 • FAX (717) 846-5801
50 WEST MIDDLE STREET, GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
315 W. JAMES STREET, LANCASTER, PA • PHONE (717) 481-2991 • FAX (717) 481-8690

STREET WIDENING DETAIL

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. Applicable Standard Details:

- CT 02525-1 Concrete Sidewalk Detail
- CT 02525-2 Slant Concrete Curb Detail
- CT 02525-3 Standard Concrete Curb Detail
- CT 02525-4 Handicap Ramp Detail
- CT 02525-5 Handicap Ramp Detail (Radius)
- CT 02525-6 Roof Leader Under Sidewalk Detail
- CT 02525-7 Stamped Sidewalk Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

- Publication 408, Specifications
- Publication 213, Work Zone Traffic Control Guidelines

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

- A185 Standard Specification for Welded Steel Wire Fabric 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 Municipality will at a minimum be made of the subgrade, formwork, and any steel prior to placement of the concrete.

1.03 JOB CONDITIONS

A. Control of traffic:

1. Take measures to control traffic during all operations. Do not allow traffic on newly placed concrete until adequate strength has been attained.
2. Employ Traffic Control Guidelines measures in accordance with Publication 213, Work Zone Traffic Control Guidelines.

B. 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 cement concrete shall be air-entrained and have a minimum 28 day compressive strength shall be 3,300 psi.

B. Cement Concrete criteria for curbs and sidewalks:

Slump:	1" minimum, 4" maximum
Air Content:	4.5% minimum, 7.5% maximum
Temperature:	60°F minimum, 100°F maximum

C. For slip formed curb, same as above except with a maximum 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 (vertical 6" x 8" x 22" or rolled 24" x 10¾").

E. Machine-placed curbing:

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

2.03 REINFORCEMENT

- A. Welded Wire Fabric - ASTM A185. Size and spacing as shown on Standard Details.
- B. Reinforcing Bars - ASTM A615, Grade 60 billet steel. Size and spacing as shown on 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. 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.

2.06 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.

2.07 STAMPED COLORED CONCRETE

- A. Concrete, reinforcement, joint material and forms - see above paragraphs
- B. Template Pattern - "old brick runningboard" 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

PART 3 EXECUTION

3.01 CURB CONSTRUCTION

- A. Excavate to required depth, remove and dispose of material, including existing curbs, 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). Forms shall be securely braced to limit deflection during placement of concrete.
- D. Provide openings through curb for drainage pipes. Install one, 2'-0" long, #4 reinforcing bar in the middle of curb centered above the pipe as per Standard Detail.
- E. 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.
- F. 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 ¾" thick expansion joint material shall be provided at storm inlets.
- G. The last three feet of curb shall be tapered to a 1-1/2" reveal with expansion joint at the beginning of taper.
- H. Finish top surface with wood floats. Provide depressions for drainage, driveways, and ramps for the handicapped as directed by the Municipality. Tool all exposed edges to the specified radius.
- I. Do not remove forms until concrete has set. Begin proper curing immediately after placement.
- J. 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.

3.02 SIDEWALK CONSTRUCTION

- A. Excavate to required depth and width, remove and dispose of material, including any existing sidewalks, 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 handicapped persons at all street crossings (as required by ADA regulations) as directed by the Municipality. Handicap ramps shall be 6" thick concrete. All handicap ramps shall have detectible warning domes as shown on drawing CT-02525-4.

- D. Sidewalks across sanitary sewer or storm sewer easements shall be 8" thick.
- E. Spread AASHTO No. 57 aggregate and compact to the thickness shown on the Standard Details.
- F. 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 Municipality. Also score sidewalks over each drainage pipe placed underneath.
- G. Provide 1/4" expansion joint at 30-foot intervals and at the end of each pour. Place 1/2" expansion joint material at adjacent curb, poles, hydrants, walls, and other permanent structures.
- H. Apply light broom finish immediately after float finish.
- I. Provide depressions for driveways, downspouts, and drainage as directed by the Municipality or shown on the drawings. Wherever possible roof leaders shall be placed under the sidewalks in lieu of depressions.
- J. Begin proper curing immediately following placement.
- K. Monolithic sidewalk and curb will not be allowed at a radius handicap ramp.

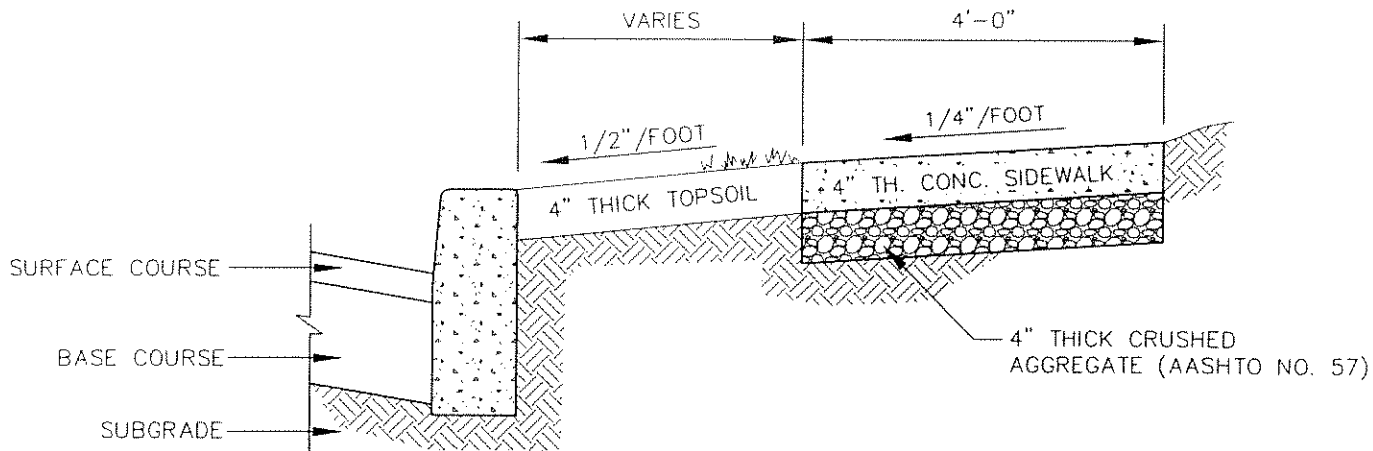
3.03 STAMPED AND COLORED CONCRETE SIDEWALKS

- 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 ratios consistent with manufacturer's recommendations. 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 the 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.

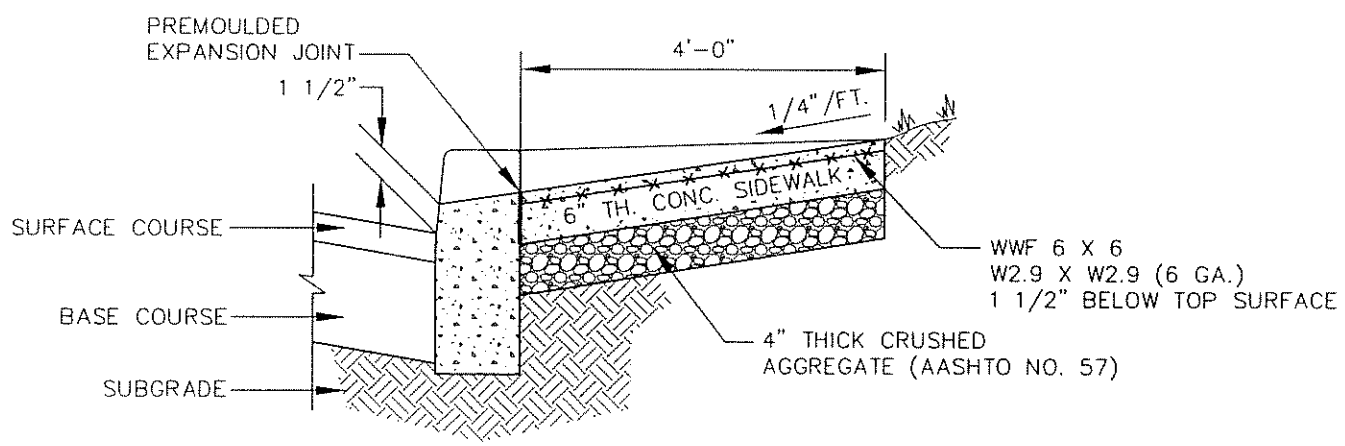
3.04 BACKFILLING AND RESTORATION

- A. Temporary backfill at curbs shall consist of select granular material front and back, to within 8" of top of curb.
- B. Restore adjacent areas in kind.

END OF SECTION



TYPICAL SECTION THROUGH CONCRETE CURB & SIDEWALK



TYPICAL SECTION THROUGH CONCRETE CURB & SIDEWALK AT DRIVEWAY DEPRESSION

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

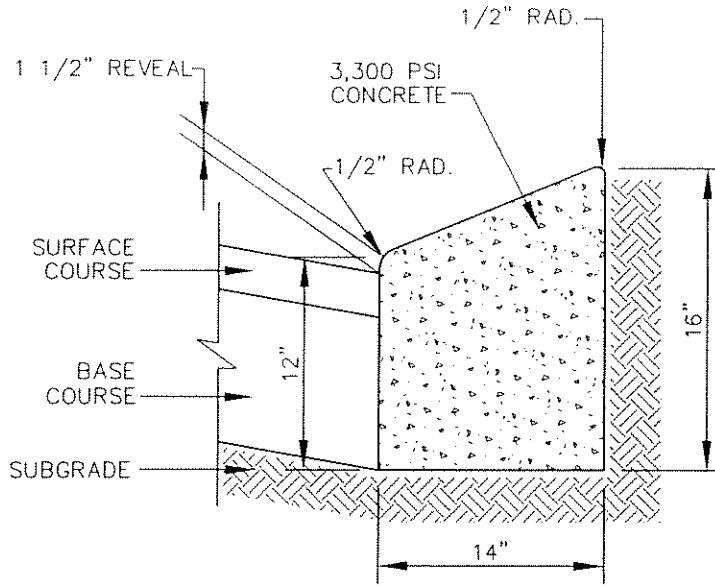


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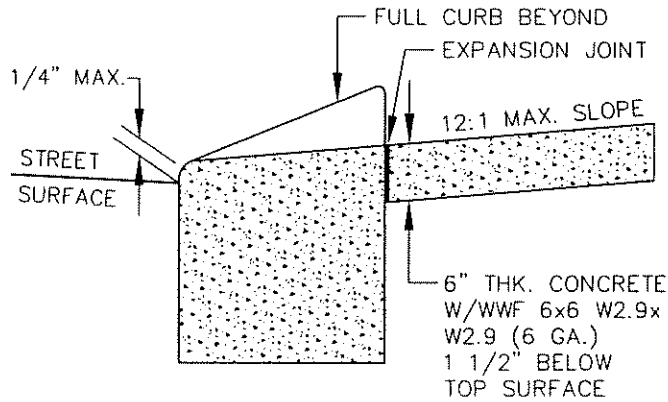
CONCRETE SIDEWALK DETAIL

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CHK. BY:	
NO.	CT 02525-1

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TYPICAL CROSS SECTION



CROSS SECTION AT HANDICAP RAMPS

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



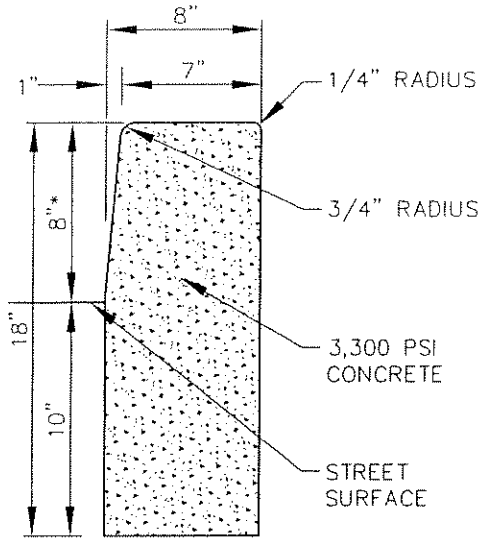
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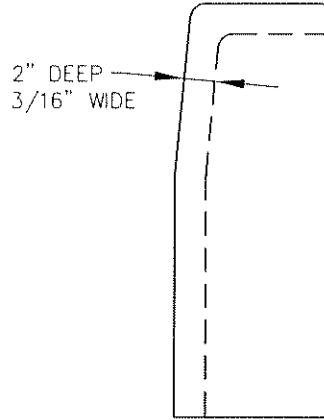
SLANT
 CONCRETE CURB
 DETAILS

DATE:	3/31/03
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NO.	CT 02525-2

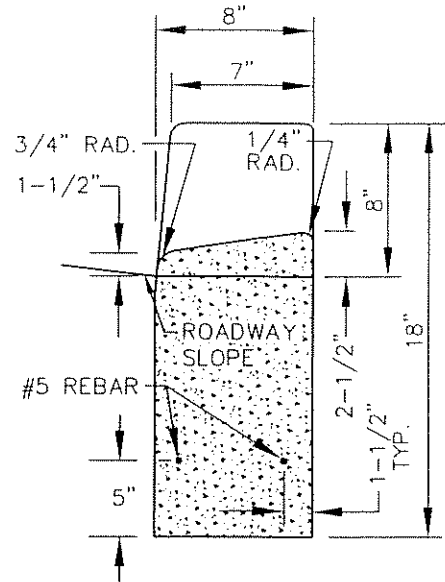
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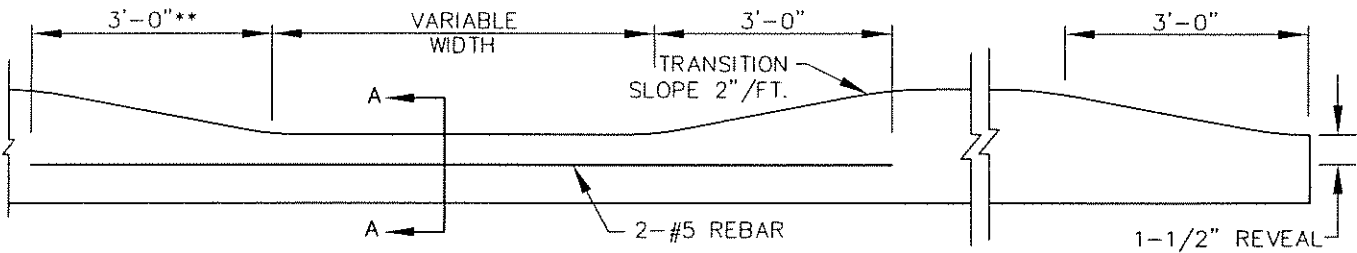
TYPICAL CROSS SECTION
(RC-64 STD.)



CONTRACTION JOINT



SECTION A-A



DEPRESSED CURBS FOR DRIVES

TERMINAL SECTION

NOTES:

- * 6" REVEAL MAY BE CONSTRUCTED IF APPROVED BY BOROUGH.
- ** 2'-0" FOR CURB WITH 6" REVEAL.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

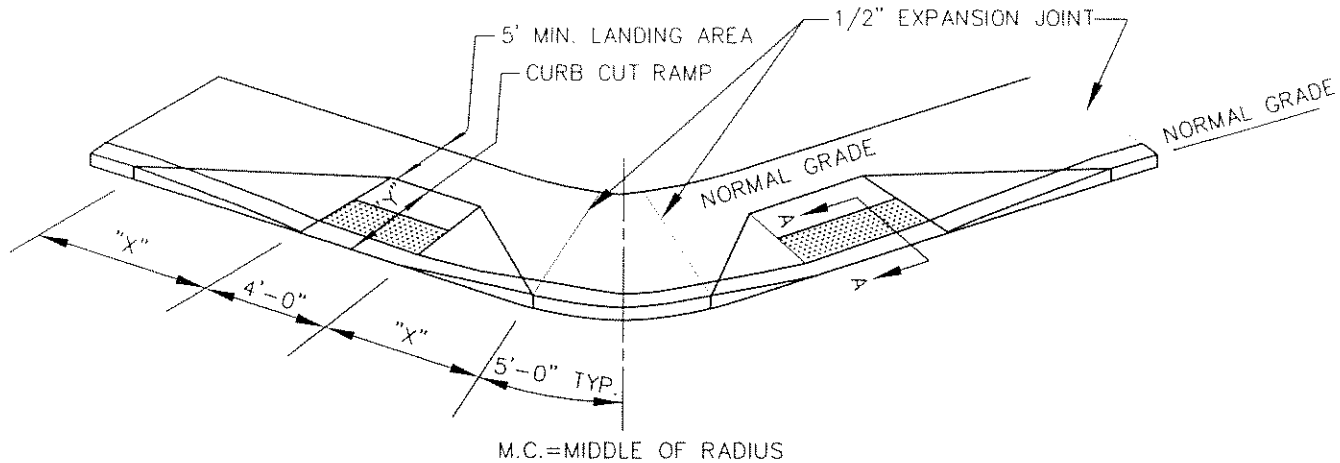


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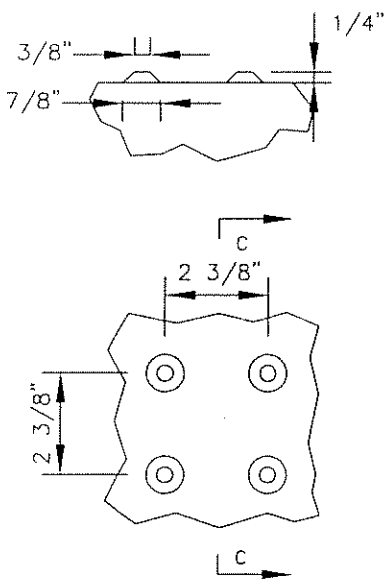
STANDARD CONCRETE
CURB DETAIL

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NO.	CT 02525-3

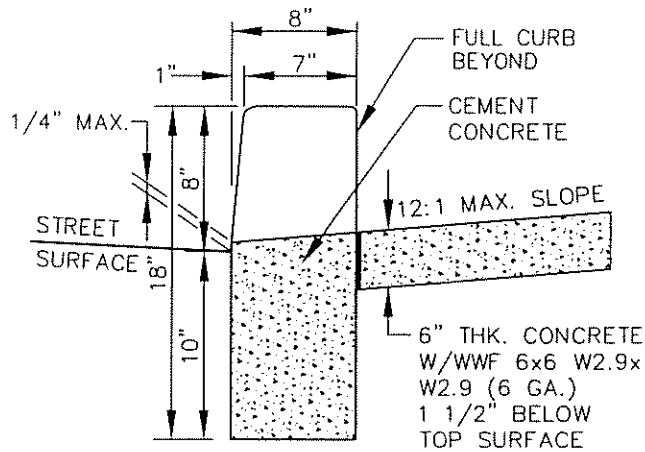


"X" - LENGTH NEEDED TO MAINTAIN A MAXIMUM 12:1 SLOPE ALONG THE FACE OF THE CURB.

"Y" - LENGTH NEEDED TO MAINTAIN A MAXIMUM 12:1 SLOPE FROM THE CURB LINE TO THE TOP OF THE RAMP.



DETECTABLE WARNING TRUNCATED DOME DETAIL



VERTICAL CONCRETE CURB SECTION A-A

NOTE: SEE DETAIL DT 02525-2 FOR SLANT CONCRETE CURB DETAILS

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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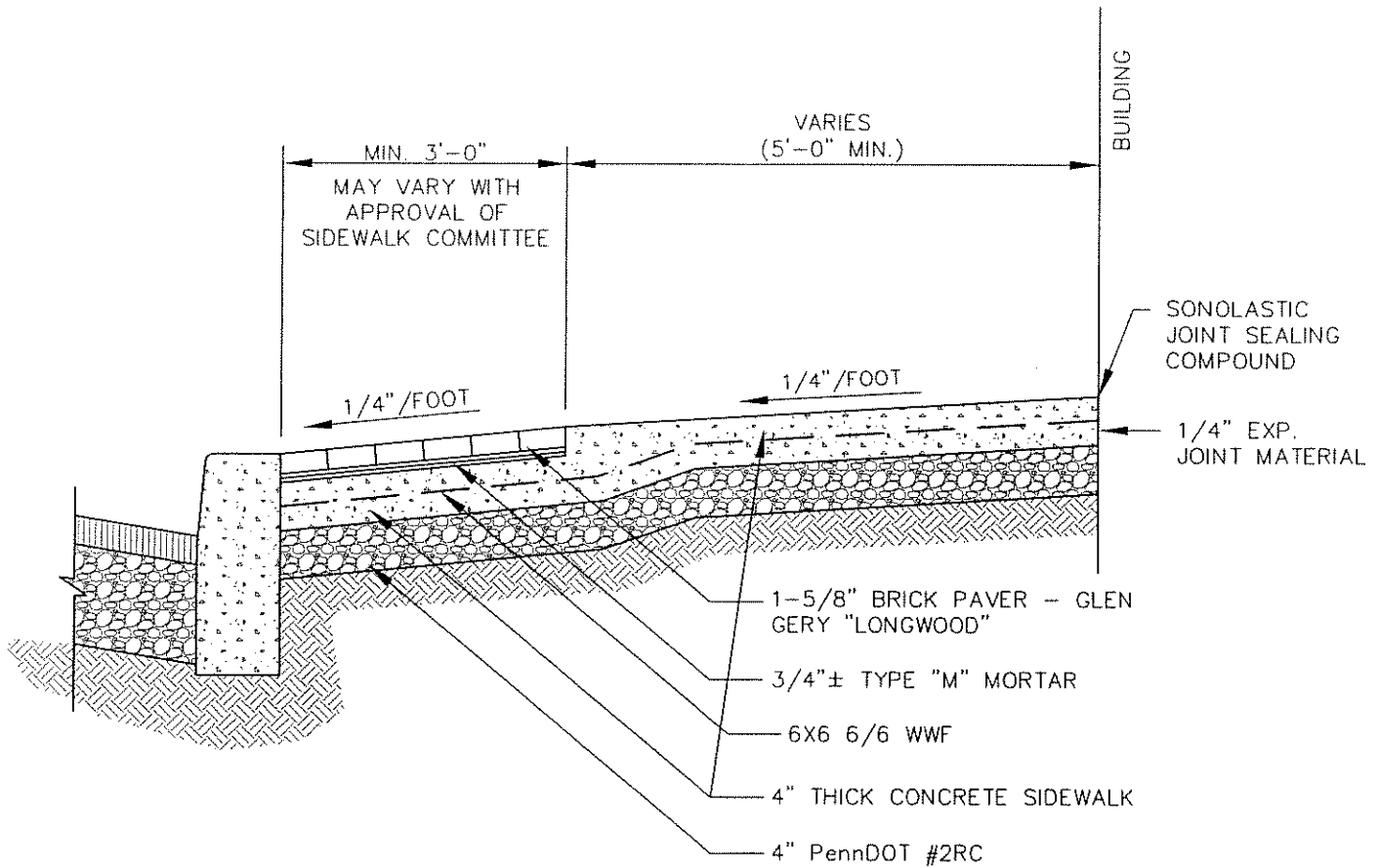
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HANDICAP RAMP DETAIL

DATE:	3/29/2006
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CHK. BY:	
NO.	CT 02525-4

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CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

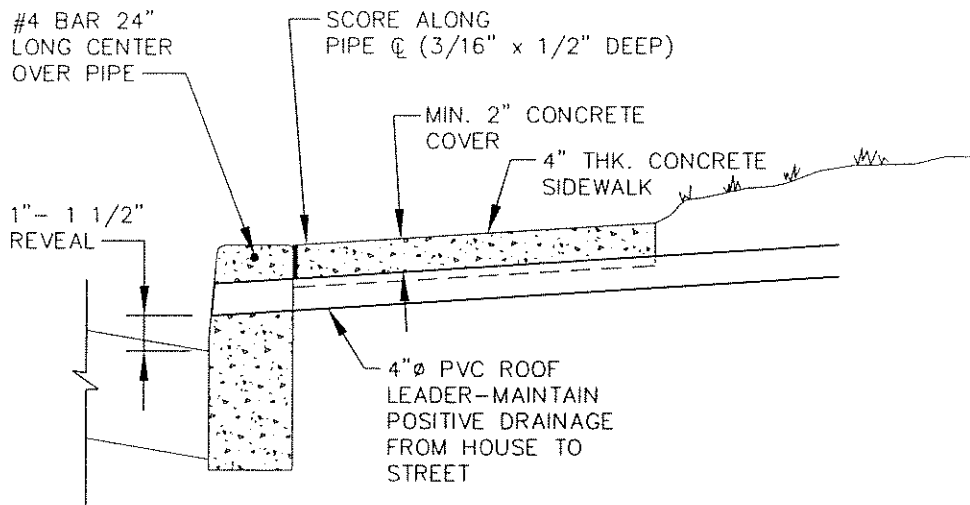


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BRICK WALKWAY
DETAIL

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02525-5



NOTE: USE ROOF LEADER WITH STANDARD VERTICAL CURBS ONLY

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



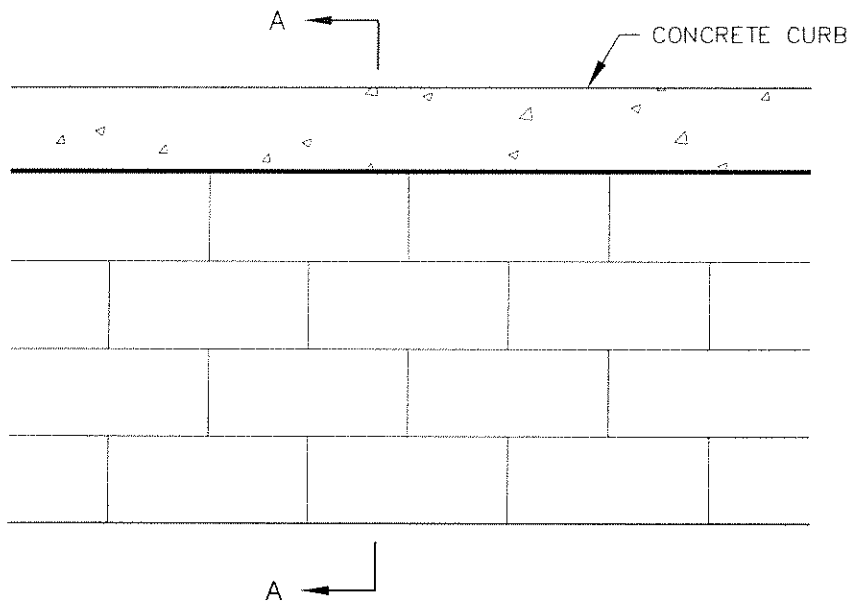
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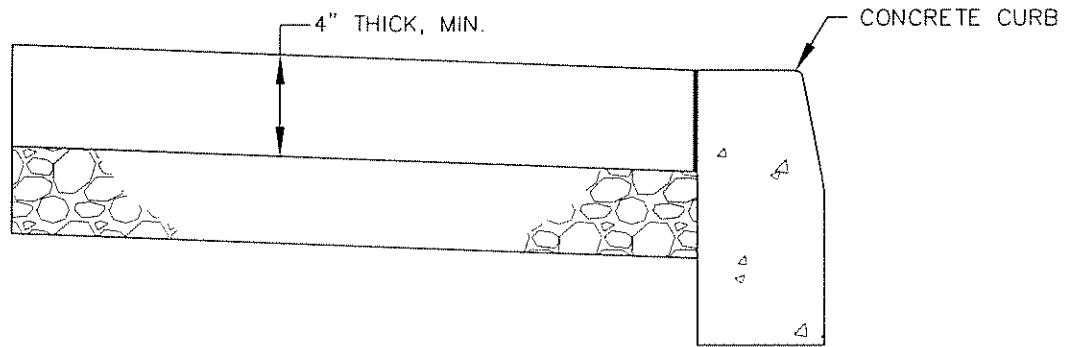
ROOF LEADER
 UNDER SIDEWALK
 DETAIL

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"OLD BRICK RUNNINGBOND" PATTERN



SECTION A-A

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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STAMPED SIDEWALK
DETAIL

DATE:	3/31/03
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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

B. Related work specified elsewhere:

- | | |
|--|---------------|
| 1. Trenching, backfilling, and compacting: | Section 02221 |
| 2. Bituminous paving and surfacing: | Section 02500 |
| 3. 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 (PennDOT), latest revision:

Publication 408, Specifications
Publication 213, Work Zone Traffic Control Guidelines
Publication 27, Specification for Bituminous Mixtures (Bulletin 27)
Publication 37, Specification for Bituminous Materials (Bulletin 25)
Publication RR-459, Occupancy of Highways by Utilities

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

D2950 Test Method for Density of Bituminous Concrete in Place by Nuclear Method

B. Inspections:

1. Inspection by the Municipality 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. Submit bituminous concrete mix design for approval. Provide PennDOT certifications 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° F or less.
2. Employ Traffic Control Guidelines measures in accordance with Publication 213.

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.

C. Concrete Testing: Section 03000.

PART 2 PRODUCTS

2.01 CONCRETE

A. As specified in Section 03000.

- #### B. For driveway restoration, use air-entrained, PennDOT Class HES (High Early Strength) with 3-day compressive strength of 3,300 psi. (28-day compressive strength of 3,750 psi, as per Section 704 of Pub. 408).

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. See descriptions in Sections 02230 and 02500.

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.

- B. Shape and compact subgrade material, then place and compact base course to the required thickness.
- C. Place temporary paving material. Compact to required minimum thickness with trench roller having a minimum 300 pounds pressure per inch-width of compaction.
- D. Continuously maintain temporary paving.

3.02 PERMANENT TRENCH PAVING

- A. For Bituminous Surface Course (Trench) saw cut existing paving in accordance with Publication RR-459. Remove temporary paving material.
- B. Construct permanent base and surface courses to the required compacted thicknesses shown in the Backfill and Surface Restoration Requirements Table, and in accordance with Publication 408 Specifications. In State Highways, construct permanent paving in accordance with Highway Occupancy Permit requirements.
- C. Maintain permanent paving throughout the contract maintenance period.

3.03 BITUMINOUS OVERLAY

- A. See Section 02500.

3.04 SHOULDER RESTORATION

- A. Restore shoulders as directed by the Municipality. In State Highways, restore in accordance with Highway Occupancy Permit requirements.

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.
- 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 (No. 3A stone).
- D. Restore earth driveways with a 6" layer of select granular material (No. 3A stone).
- E. Restore stone or gravel driveways in kind; minimum 6" layer of select granular material (2RC stone).
- 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

Surface Class	Type Backfill	Percent ⁽¹⁾ Compaction	Temp. ⁽³⁾ Base	Temp. ⁽³⁾ Surface	Final Base	Final Surface
Vegetative	S.02221	90%	-----	(2)	-----	(2)
Stone	S.02221	95%	-----	-----	-----	6" Thick PennDOT 2A S.02230
Bituminous Surface Course (Trench)	S.02221	95%	8" thick ⁽⁴⁾ PennDOT 3A ⁽⁶⁾ S.02230	2" thick HMA Binder (19mm) S.02500	8" thick PennDOT 2A	5" thick, HMA Base Course ⁽⁹⁾ , 1½" thick HMA Wearing Surface (9.5mm) S.02500 ⁽⁸⁾
Concrete	S.02230	95%	8" thick ⁽⁴⁾ PennDOT 3A ⁽⁶⁾ S.02230	2" thick HMA 2 Binder (19mm) S.02500	8" thick PennDOT 2A	Min. 6" thick Class AA concrete ⁽⁷⁾

NOTE: Materials and construction requirements shall be in accordance with PennDOT Publication 408 Specifications.

1. Minimum, as % of maximum dry weight density at optimum moisture content plus or minus 2%.
2. See Seeding Restoration Table, Section 02485.
3. Temporary restoration shall remain in place for 90 days. Temporary restoration shall be removed prior to construction of final base and final surface.
4. To remain as final base.
5. All thicknesses shown are minimum compacted thickness.
6. PennDOT 2A modified or 3A modified as approved by Engineer.
7. PennDOT Pub. 408, Section 704. Use High Early Strength concrete for driveways.
8. See Standard Details for HMA asphalt surface if required.
9. Use Superpave Base Course, 37.5mm with a seal coat if wearing course will not immediately be placed.

END OF SECTION

SECTION 02581

CONDUIT FOR UNDERGROUND UTILITIES

PART 1 GENERAL

1.01 DESCRIPTION

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

1. Natural gas transmission
2. Underground electrical power transmission
3. Underground telephone and cable TV

B. Related Work Specified Elsewhere:

1. Trenching, backfilling and compacting: Section 02221

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

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

- D1785 Specifications for Poly (Vinyl Chloride)(PVC) Plastic Pipe, Schedule 40, 80, and 120
- D2241 Specifications for Poly (Vinyl Chloride)(PVC) Plastic Pipe (SDR-PR)
- D2321 Recommended Practice for Underground Installation of Flexible Thermoplastic 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) Plastic Pipe and Fittings
- D2729 Specifications for Poly (Vinyl Chloride)(PVC) Sewer Pipe and Fittings

B. Materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvents, paint thinner, or acid solder will be rejected.

1.03 SUBMITTALS: Section not utilized

1.04 JOB CONDITIONS: See Section 02221.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling:

1. During loading, transporting and unloading, exercise care to prevent damage to materials.
2. Do not drop pipe or fittings. Avoid shock or damage at all times.
3. 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 fittings in a cool, dry location out of direct sunlight and not in contact with petroleum products.

PART 2 - PRODUCTS

2.01 POLY (VINYL CHLORIDE) (PVC) UTILITY CONDUIT

A. Natural Gas:

1. Main line conduits - three inch (3") diameter and larger shall meet the requirements of ASTM D2729. Joints shall be solvent cement.
2. Service line conduits - two and one-half inch (2½") diameter and smaller shall meet the requirements of ASTM D1785 (Schedule 40). Joints shall be solvent cement.

B. Telephone, Electric and Cable TV:

1. Main line conduits - three inch (3") diameter and larger shall meet the requirements of ASTM D2729. Joints shall be solvent cement.

2.02 WARNING TAPE

- A. Metallic warning tape, six inch (6") minimum width, printed with "CAUTION BURIED UTILITY LINE BELOW" or similar. Tape may be provided by utility company or furnished by the installing contractor and approved by utility. Materials shall meet requirements of U.S. DOT, office of Public Safety.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Depth of Excavation

1. Natural Gas Line:

- a. Excavate main line trenches to a minimum depth of 36". Grade for the invert of the conduit plus that excavation necessary for placement of bedding material. During Street construction, prior to installation of the stone base course, conduits shall be installed at all proposed crossings. Conduits shall extend a minimum of two feet (2') beyond the curb line where curbs are proposed or a minimum of five feet (5') beyond the paving where no curbs are proposed to be installed.
 - b. Excavation for service lines shall be as nearly perpendicular to the street centerline as possible and shall be a minimum of twenty-four inches (24") deep plus that excavation necessary for placement of bedding material. A minimum of two (2) service line conduits shall be placed for each lot which will require a street crossing, prior to installation of the stone base course. Location of the service line conduits shall be coordinated with the local gas supplier. With written authorization from the gas supplier, the number of conduits may be reduced to one (1). In any event, no open cut trenching for installation of gas services will be allowed after installation of the stone base course.
2. Electric Conduits:
- a. Excavate main line trenches to a minimum depth of twenty-four inches (24") plus that excavation necessary for placement of bedding material. During street construction and prior to installation of the stone base course, conduits shall be installed at all proposed crossings. Conduits shall extend a minimum of two feet (2') beyond the curb line where curbs are proposed or a minimum of five feet (5') beyond the paving where no curbs are proposed to be installed.
3. Telephone and Cable TV:
- a. Excavate main line trenches to a minimum depth of twenty-four inches (24") plus that excavation necessary for placement of pipe bedding material. During street construction and prior to installation of the stone base course, conduits shall be installed at all proposed crossings. Conduit shall extend a minimum of two feet (2') beyond the curb line where curbs are proposed or a minimum of five feet (5') beyond the paving where no curbs are proposed to be installed.
- B. 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 bottom to required conduit grade, minus six inches (6") for bedding, with Penn DOT 2RC aggregate.
- C. Width of Excavation:
1. Excavate main line and service trenches to a maximum width of twenty-four inches (24").
- D. Lay conduit to a true uniform line with a barrel of the conduit resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints. Do not subject the conduit to a blow or shock to achieve solid bearing or grade.

- E. Lay section of conduit in such a manner as to form a closed concentric joint with the adjoining section and to avoid offsets in the conduit.
- F. Clean and inspect each section of the conduit before joining. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. If unusual joining resistance is encountered or if the conduit cannot be fully inserted into the bell, disassemble joint, inspect for damage, reclean joint components, and reassemble joint.
- G. Assemble joints in accordance with recommendations of the manufacturer.
 - 1. Solvent cemented joints:
 - 2. Camfer and deburr conduit. Clean socket and plain end. Measure and mark the socket depth on the outside of the conduit.
 - 3. Apply primer to inside socket surface using a scrubbing motion to ensure penetration. Repeated applications may be necessary. Soften surface of male end of conduit to depth of fitting socket by applying a liberal brush coat of primer. Do not pour primer on. Assure entire surface is well softened.
 - 4. Repeat application of primer to inside socket surface, then apply cement to conduit while surfaces are still wet with primer. Apply cement uniformly taking care to keep excess cement out of socket.
 - 5. Immediately after applying the last coat of cement to the conduit, and while both the inside socket surface and outside conduit surface are soft and wet, forcefully seat the conduit into the socket. Turn the conduit $\frac{1}{4}$ turn during assembly to distribute the cement evenly. Assembly should be completed within twenty (20) seconds after the last application of cement. Insert conduit with a steady, even motion. Do not use hammer blows.
 - 6. Hold joint in place until cement has set. Wipe excess cement from the conduit.
- H. Place sufficient compacted bedding and backfill on each section of conduit, as it is laid, to hold firmly in place.
- I. Keep trenches and excavations free from water during construction.
- J. When work is not in progress, at the end of each day, and at the end of each conduit run, securely plug open ends of conduit to prevent trench water, earth, and other substances from entering the conduit.

3.02 CONDUIT BEDDING AND BACKFILL

- A. All conduits must be surrounded with a minimum of six inches (6") of stone dust (AASHTO#10) on top, bottom and each side.
- B. For specific higher voltage lines, place 6" concrete encasement as directed by the utility company.

3.03 DETECTABLE WARNING TAPE FOR ELECTRIC AND NATURAL GAS CONDUITS

- A. The warning tape shall be installed twelve inches (12") below the finished ground or street surface. Materials shall meet the requirements of U. S. Department of Transportation, Office of Pipeline Safety, Code for pressure piping.

END OF SECTION

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 frames and covers and adjusting rings

B. Related Work Specified Elsewhere:

- | | |
|---|---------------|
| 1. Trenching, backfilling and compacting: | Section 02221 |
| 2. Soil erosion and sediment pollution control: | Section 02270 |
| 3. Finish grading, seeding and sodding: | Section 02485 |
| 4. Bituminous paving and surfacing: | Section 02500 |
| 5. Sanitary sewer pipe: | Section 02610 |
| 6. Storm drain 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 5'.
2. Shallow Manhole - manhole with vertical height from top of base to top of rim less than 5'.

D. Applicable Standard Details:

- CT 02601-1 Cast-in-Place Manhole Base Detail
- CT 02601-2 Precast Manhole Base Detail
- CT 02601-3 Standard Manhole Detail
- CT 02601-4 Shallow Manhole Detail
- CT 02601-5 Drop Connection Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

Publication 408, Specifications

Publication 213, Work Zone Traffic Control Guidelines

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

A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

B221 Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

C139 Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes

C270 Specification for Mortar for Unit Masonry

C443 Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

C478 Specification for Precast Reinforced Concrete Manhole Sections

C923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals

D1248 Specification for Polyethylene Plastics Molding and Extrusion Materials

3. Federal Specifications (FS):

SS-S-00210 Sealing compound, preformed plastic, for expansion joints and pipe joints.

B. Inspections:

1. Inspections of the manholes by the Municipality 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 Municipality 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 wall.

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

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.
3. Submit details of adjusting rings.
4. Submit details of manhole steps.
5. Submit manufacturer's descriptive literature for the pipe to manhole flexible connections.
6. Submit manufacturer's descriptive literature for joint sealant compounds.

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, Type C 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 ChemRex, Shakopee, MN, or approved equal.

2.09 PRECAST CONCRETE MANHOLE BASES AND SECTIONS: ASTM C478

- A. 5.5% \pm 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 Municipality's 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.

2.10 GLASS FIBER-REINFORCED POLYESTER MANHOLES: Not Permitted

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

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. Frames and covers shall be capable of withstanding an AASHTO HS-25 loading and shall have a minimum 21" 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. Cover shall be lettered or marked "Sanitary Sewer" or "Storm Sewer" as appropriate.
- E. Standard frames and covers shall be similar to Model No. 1835 manufactured by East Jordan Iron Works, Inc., or Model 1255B manufactured by Bridgestate Foundry Corp., or approved equal. Manhole cover shall be 3" thick. Covers shall be self-sealing, have two (2) concealed watertight pick holes, and shall have two (2) lifting rings or bars, and no openings to permit surface water entry.
- F. Watertight frames and covers shall have suitable clamp, employing a rubber gasket seal, similar to Model No. 1120Z1 manufactured by East Jordan Iron Works, Inc., or Model 1032 manufactured by Bridgestate Foundry, or approved equal.

2.14 REINFORCING STEEL: Section 03000

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. Circumferential reinforcement shall be in conformance with ASTM C478. Split concrete rings are not permitted.

- B. Plastic adjusting rings shall be injection molded High Density Polyethylene (HDPE) conforming to ASTM D1248 as manufactured by Ladtech, Inc., Lino Lakes, MN. Maximum ring thickness shall be 2". Plastic rings must be approved by the Municipality prior to use.
- C. Metal adjusting rings are not permitted without prior approval of the Engineer.

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.

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: 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 manhole plus that excavation necessary for placement of base material.

3.05 STANDARD MANHOLE CONSTRUCTION

- A. All manholes greater than 5' in vertical height from top of base to top of rim.
- B. Install a minimum of 4" thick compacted crushed stone base. Provide cast-in-place concrete or precast concrete bases.
 - 1. Construct cast-in-place bases as shown on Standard Detail CT 02601-1.
 - 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 CT 02601-2.
 - 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 CT 02601-5. Encase drop connection in concrete.
- 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 2" 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. Distance from top of rim to top step shall not be greater than 22". Distance from floor of manhole to bottom step shall not be greater than 24".
 - 2. Manhole steps shall be placed perpendicular to the mainline channel. Do not locate steps over channels.
- J. Install manhole frames and covers.
 - 1. In all streets and private roadways the top rim elevation of all manhole frames and covers shall be depressed 1/4" below the elevation of the adjacent street surface.
 - 2. Seal joint between manhole frame and manhole with joint sealant compound.
 - 3. All manholes shall be adjusted to finished street grade utilizing no more than two (2) two (2") thick concrete adjusting rings (4" maximum adjustment).
 - 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.
 - 5. All concrete adjusting rings shall be parged and plastered on the inside and outside with cement mortar one-half (1/2") inch in thickness, carefully spread and thoroughly troweled to a smooth surface on the inside only.
 - 6. Install HDPE 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 prior approval is obtained from the Engineer.
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 Municipality.

L. Concrete wall penetration shall be cored at the sizes and locations indicated on the drawings or as recommended by the seal manufacturer. Place wall sleeves in the concrete walls in accordance with manufacturer's requirements.

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 CT 02601-4.

3.10 BACKFILLING

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

B. Perform backfilling as specified in Section 02221

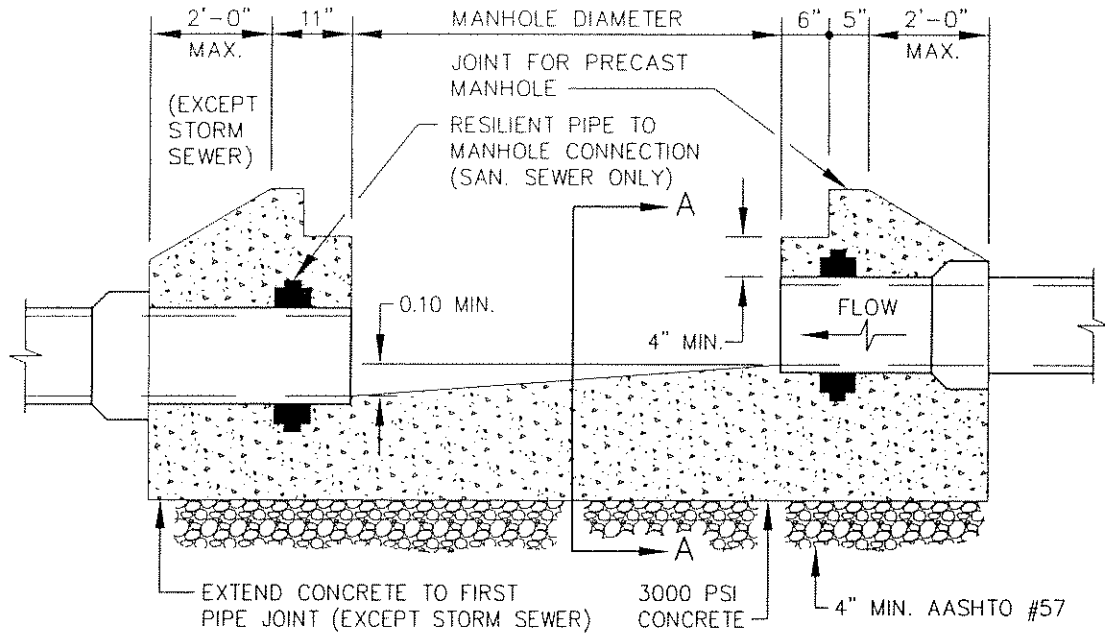
3.11 DISPOSAL OF EXCAVATED MATERIAL: Section 02221

3.12 RESTORATION OF SURFACE AREAS

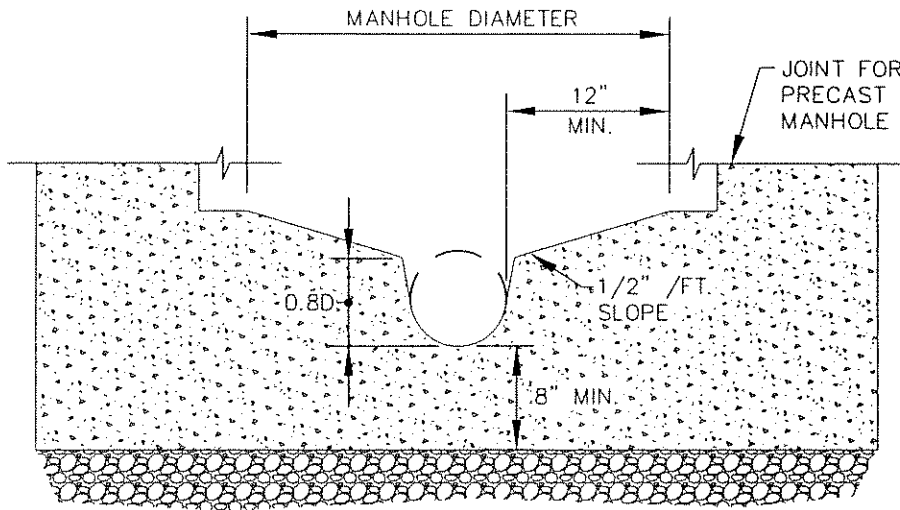
A. Restore paved areas as specified in Section 02575.

B. Restore unpaved surfaces as specified in Section 02221.

END OF SECTION



ELEVATION



SECTION A-A

D = PIPE INSIDE DIAMETER

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



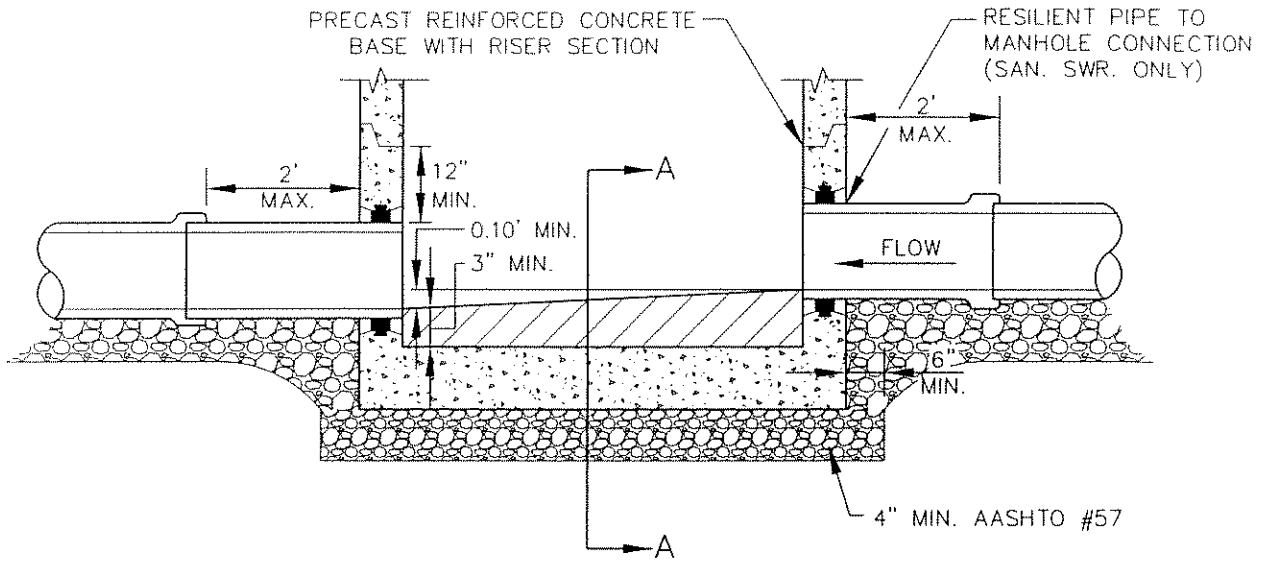
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 50 WEST MOORE ST. CGETYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
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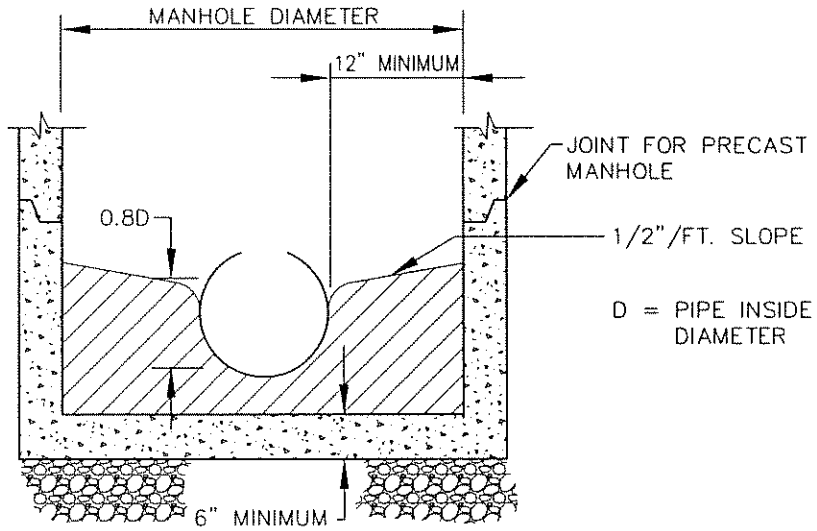
CAST-IN-PLACE
 MANHOLE BASE DETAILS

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ELEVATION



SECTION A-A

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS

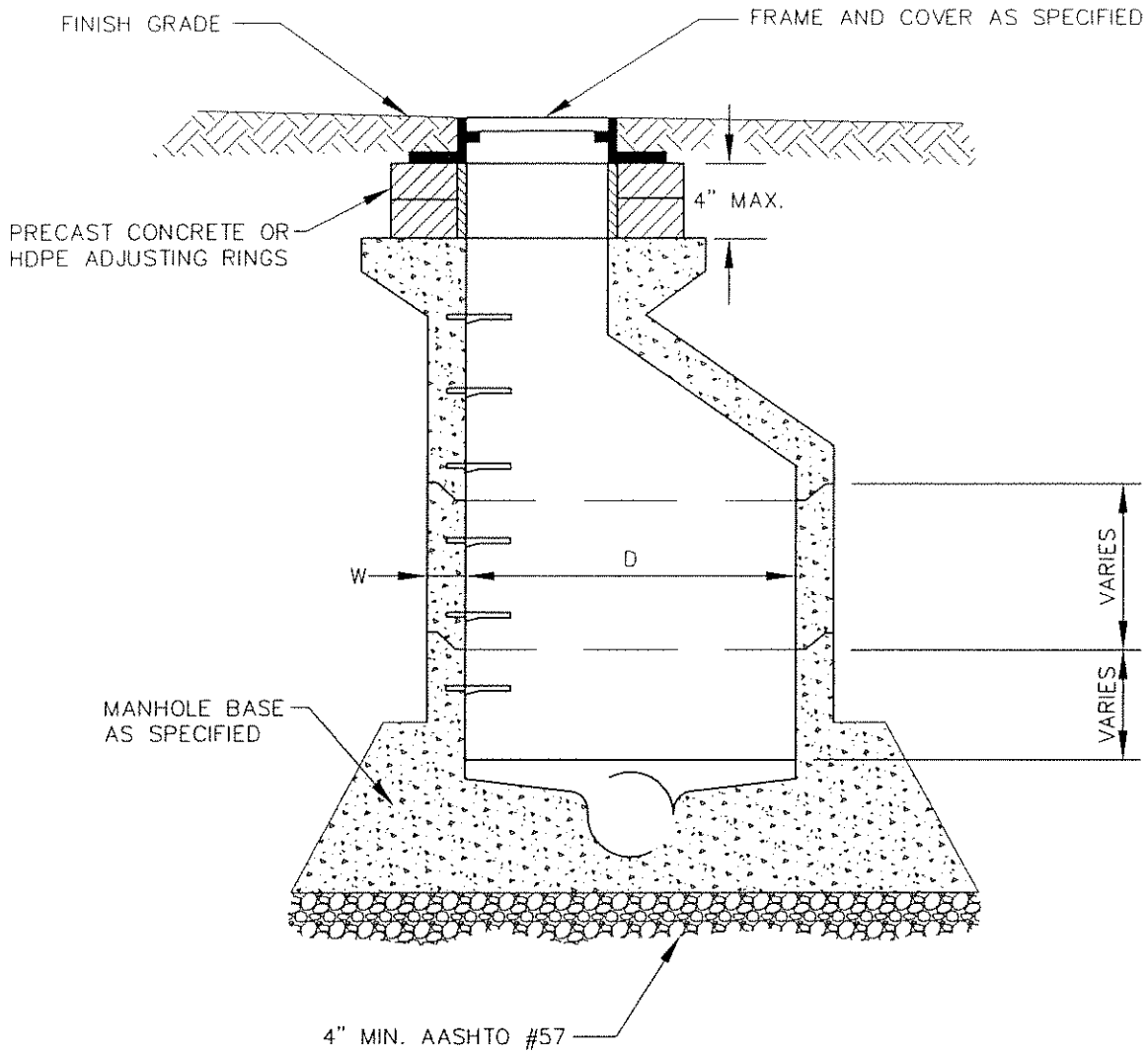


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PRECAST MANHOLE
 BASE DETAIL

DATE:	3/31/03
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CHK. BY:	
NO.	CT 02601-2

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D	W
4'-0"	5"
5'-0"	6"
6'-0"	7"

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



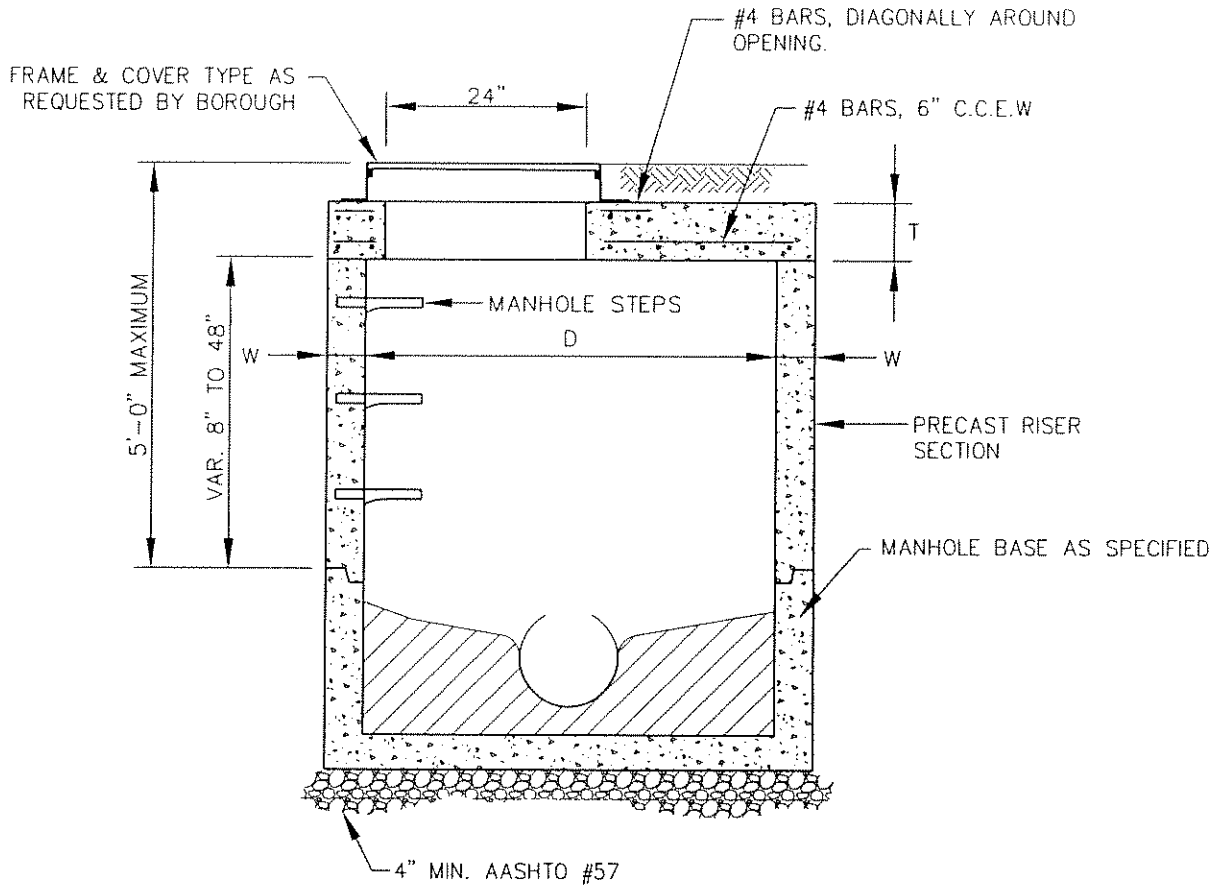
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STANDARD
MANHOLE DETAIL

DATE:	3/31/03
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NO.	CT 02601-3

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

NOTE: NOT TO SCALE

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STANDARD SHALLOW
MANHOLE DETAIL

DATE: 3/31/03

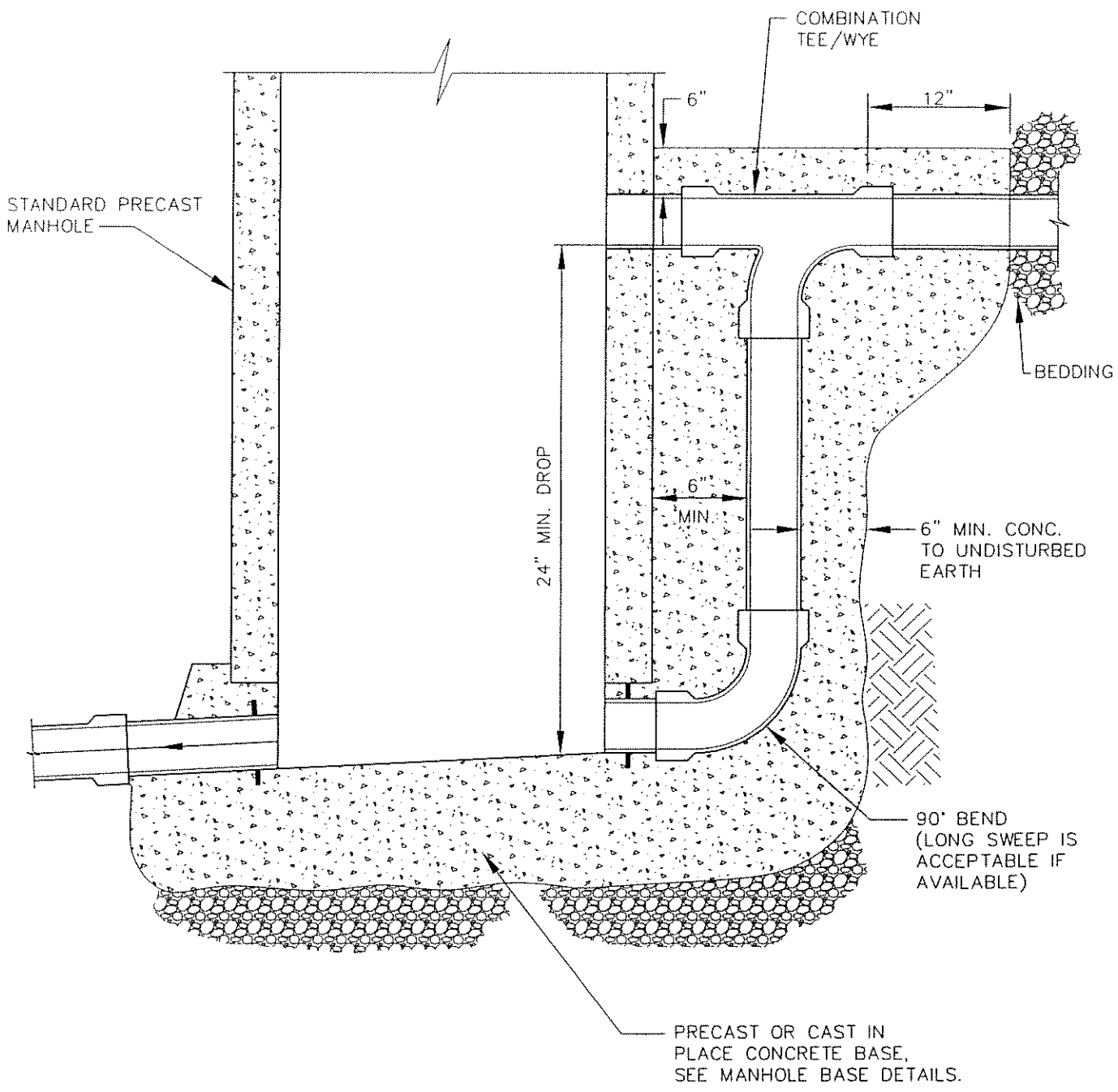
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NO. CT 02601-4

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DROP CONNECTION
 DETAIL

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02601-5

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 sediment pollution 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 cement concrete: | Section 03000 |
| 8. Cement concrete for utility construction: | Section 03050 |

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 72M, Standards for Roadway Construction

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

A36	Specification for Carbon Structural Steel
A47	Specification for Ferritic Malleable Iron Castings
A48	Specification for Gray Iron Castings
A185	Specification for Steel Welded Wire Fabric for Concrete Reinforcement
A536	Specification for Ductile Iron Castings
A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C32	Specification for Sewer and Manhole Brick (made from clay or shale)
C270	Specification for Mortar for Unit Masonry

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 compressive strength tests, certified field tests and copies of batch slips for all cast-in-place inlets, catch basins or 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 Municipality 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.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone Subbase:

1. AASHTO No. 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-Place 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' 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, Publication 72M, RC-33.
2. Polyethylene end sections shall have smooth interior and be anchored at the flared end.

C. Inlet Grates:

1. Comply with the requirements of Publication 72M, RC-34 PennDOT approved diagonal or bicycle safe grates only.
2. 6' 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. Precast Cement Concrete Grade Adjustment Risers: Risers shall be cast from 4000 psi concrete (28-day compressive strength), shall be a maximum of 2" thick, and shall be reinforced in accordance with ASTM A478.
- E. Outlet Structures
 1. Precast concrete or cast-in-place concrete in accordance with Article 2.02.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 12" compacted crushed stone base.
 2. Construct cast-in-place units on undisturbed earth.
 3. Shape bottom of 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 brick to adjust to grade. Mortar in place.
 5. 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 2" 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. Construct basin outlet structures with inverts, grates and openings at the required elevations shown on the drawings. Connect to new or existing outlet pipes, relaying or adding pipe as needed to meet the structure.
- 3.03 BACKFILLING
- A. Backfill structures only after inspection by the Municipality.
 - 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

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 and valves
3. Laterals/service connections
4. Pump stations

B. Related work specified elsewhere:

- | | |
|---|---------------|
| 1. Boring and jacking: | Section 02150 |
| 2. Trenching, backfilling and compaction: | Section 02221 |
| 3. Soil erosion and sediment pollution 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: None

D. Applicable Standard Details:

- CT 02610-1 Lateral Detail with Cleanout
- CT 02610-2 Subbase Drain Detail
- CT 02610-3 Pump Station Site Plan
- CT 02610-4 Pump Station Generator Enclosure

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American National Standards Institute (ANSI):

- 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

- C425 Specification for Compression Joints for Vitrified Clay Pipe and Fittings
- C564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- C700 Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated
- D2241 Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR series)
- D2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
- D3034 Specification for Type PSM 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):

- 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 Distribution

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, valves, joints, joint gaskets and lubricants and detectable warning tape meet or exceed specification 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.

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.

PART 2 PRODUCTS

2.01 VITRIFIED CLAY GRAVITY SEWER PIPE

A. Pipe and Pipe Fittings: ASTM C700, Extra Strength.

B. Joints: Compression Type, ASTM C425.

2.02 DUCTILE IRON PIPE

A. Pipe:

1. ANSI A21.51, minimum Class 50.
2. Standard bituminous coating, interior and exterior.
3. Cement mortar lining is not permitted.

B. Fittings:

1. Ductile-iron or gray-iron, ANSI A21.10.
2. Provide with standard lining and coating as for ductile iron pipe, but not cement mortar lining.

C. Joints:

1. Pipe joints may be either mechanical joint or push-on joint.
2. Fitting joints shall be mechanical joint, unless Municipality specifies otherwise.

D. Rubber gaskets, lubricants, gland, bolts and nuts: ANSI A21.11

2.03 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

B. Pressure Sewer Pipe and Fittings:

1. SDR-18 minimum, meeting ASTM D-2241, 125 psi minimum unless Municipality specifies otherwise.
2. Flexible Elastomeric Seals: ASTM D3139
Seal Material: ASTM F477

2.04 CAST IRON SOIL PIPE (PLUMBING)

A. Pipe and Fittings:

1. Hub and spigot type, medium weight with preformed gasket compression joints.
2. Extra heavy weight under traffic areas.
3. 150 psi working pressure.
4. ANSI A21.10 and A21.11.

2.05 STEEL CASING PIPE: Section 02150

2.06 FLEXIBLE COUPLINGS:

- A. Gravity - Leakproof, PVC compound with stainless steel clamps suitable for the pipe materials as manufactured by Fernco, Inc., Davison, MI, or approved equal.
- B. Pressure Pipe - Ductile iron, as manufactured by Dresser.

2.07 CLEANOUTS

- A. Cleanout riser pipe and fitting shall be PVC SDR 35.

B. Cleanout caps:

1. Brass - Style A as manufactured by the General Engineering Company (GENECO), Frederick, MD, or approved equal.
2. PVC- Schedule 40

2.08 DETECTABLE WARNING TAPE

- A. 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 of 2 inches and have the words "Caution Buried Sewer Line Below", or similar imprinted. Tape shall be approved by the Engineer prior to installation.

2.09 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, and AWWA C507. 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. 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 shall be provided to the Municipality.

2.10 PUMP STATIONS

- A. New wet wells will be lined with extruded PVC or HDPE liner cast integral with inside wall of manhole. Acceptable lining systems are Ameron T-Lok PVC or AGRU Sure Grip HDPE. Engineer shall review shop drawings for lined wet wells.
- B. Wet well manhole shall meet the requirements of ASTM C478, 6' minimum inside diameter.
- C. Pumps, enclosure, valving, fittings, fencing, landscaping and electric service shall be in accordance with Standard Details CT 02610-3 and CT 02610-4 and approved by the Engineer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Perform trench excavation as specified in Section 02221.
- B. Unless otherwise required by the Municipality, 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. For PVC and cast iron pipe, use AASHTO No. 57 crushed aggregate pipe bedding.
 1. Use select excavated material for ductile iron pipe bedding.
- D. Provide AASHTO No. 10 crushed aggregate bedding for 2" dia. and smaller pressure sewers.

3.02 LAYING PIPE IN TRENCHES

- A. Give ample notice to the Municipality in advance of pipe laying operations, minimum twenty-four hours.

- B. Maintain no less than three batter boards 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.
- 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. 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 cannot 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. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.
 - 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.

<u>Bolt Size, In.</u>	<u>Torque, Ft.-Lbs.</u>
5/8	45 - 60
3/4	75 - 90
1	100 - 120

3. 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. Deflection:
 1. When it is necessary 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° maximum deflection per joint
>12" diameter - 3° maximum deflection per joint
 - b. PVC Pipe: 4 degree maximum deflection per joint.
- P. Make connections in accordance with the drawings, and perform any adjustments and ensure a watertight installation. Connections to the existing sewers shall be made under the direct observation of the Municipality or his authorized representative. Do not 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 plumber's stopper in the existing manhole 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 written authorization to do so is given by the Municipality. Routinely remove any accumulated ground and surface water from the line upstream and shall be totally responsible for any damages to existing facilities.

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 taps into an existing pipeline, install a wye or tee with stainless steel clamps and watertight resilient boot.

- C. Where specifically approved by the Municipality, for taps into an existing pipeline, use a saddle wye or tee with stainless steel clamps or core drill pipe and install watertight resilient boot. Mount saddles with gasket and secure with metal bands. Lay out 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 CT 02610-1 as specified. Lateral risers are not permitted.
- 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. Laterals shall be installed at a slope of 1/4"/ft. (4" diameter) or 1/8"/ft. (6" diameter) from the main to the cleanout or plug. The minimum depth under streets shall be 5'. Any deviations must be approved by the Municipality prior to installation.

3.05 CAST-IN-PLACE CONCRETE CONSTRUCTION

- A. Conform to the applicable requirements of Section 03050.

3.06 CRADLES AND ENCASEMENT

- A. Provide concrete cradles and encasement for pipeline where indicated on the drawings, or as directed by the Municipality, and in accordance with Standard Detail CT 03050-1.

3.07 THRUST RESTRAINT FOR PRESSURE PIPELINES

- A. Provide all valves, tees, bends, caps, and plugs with concrete thrust blocks in accordance with Standard Detail CT 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 Municipality. Protect metal restrained joint components against corrosion by applying a bituminous coating.

3.08 CARRIER PIPE IN CASINGS: Section 02150

3.09 STREAM CROSSINGS

- A. Construct sanitary sewer pipeline stream crossings in accordance with Standard Detail No. CT 02221-2.
- 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.

3.10 BACKFILLING TRENCHES

- A. Backfill pipeline trenches only after examination of pipe by the Municipality.
- B. Backfill trenches as specified in Section 02221.
- C. Install the detectable warning tape 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.

3.11 SURFACE RESTORATION

- A. Restore unpaved areas in accordance with Section 02221.
- B. Restore other areas in accordance with Section 02575.

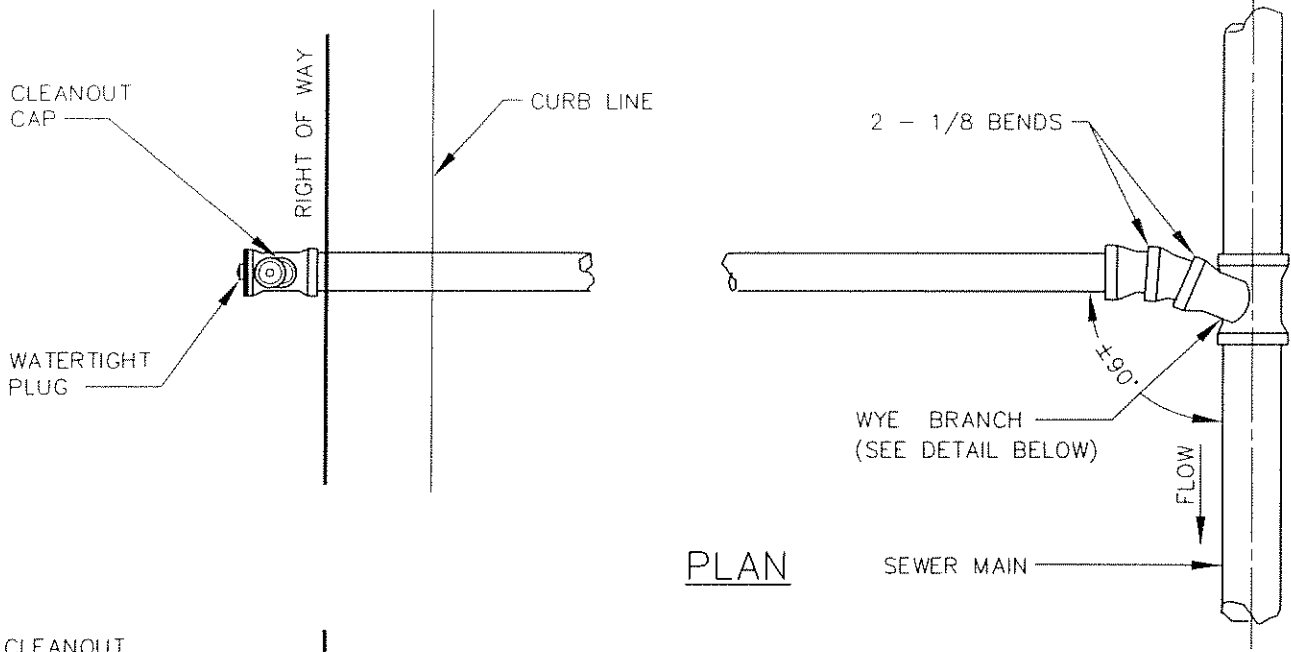
3.12 BYPASS PUMPING

- 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.

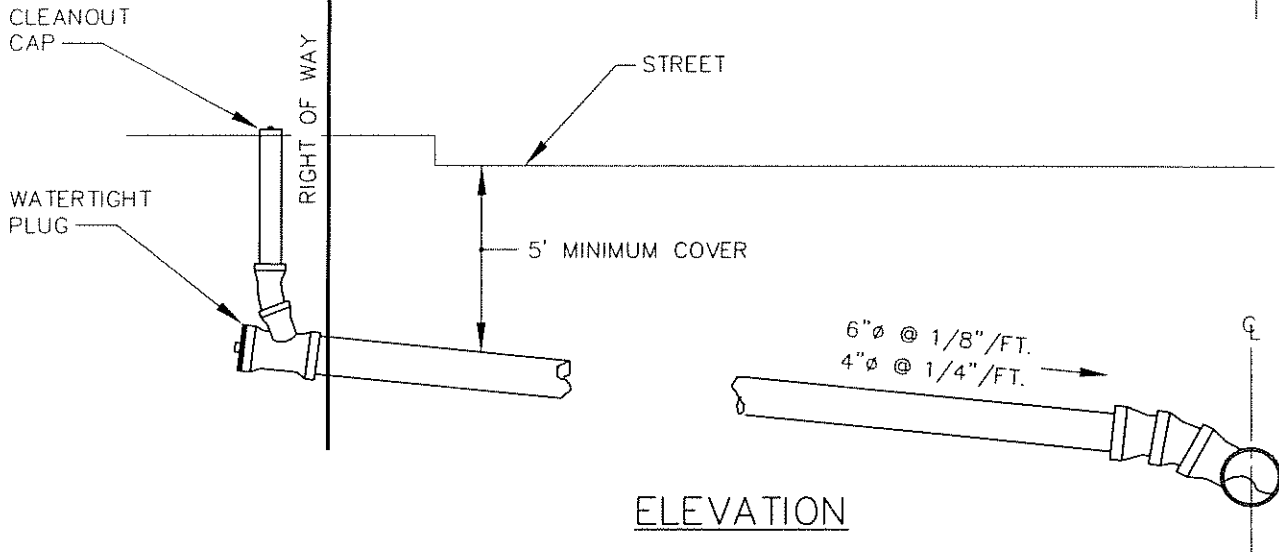
3.13 PUMP STATIONS

- A. Construct sewage pump station in accordance with approved drawings and the manufacturer's requirements.
- B. Startup, test and calibrate all equipment as per manufacturer's instructions. Provide 2 sets of Operation and Maintenance Manuals to the Municipality.

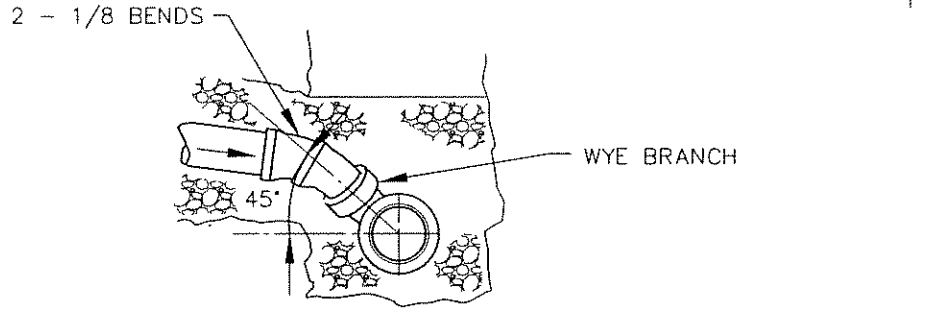
END OF SECTION



PLAN



ELEVATION



DETAIL

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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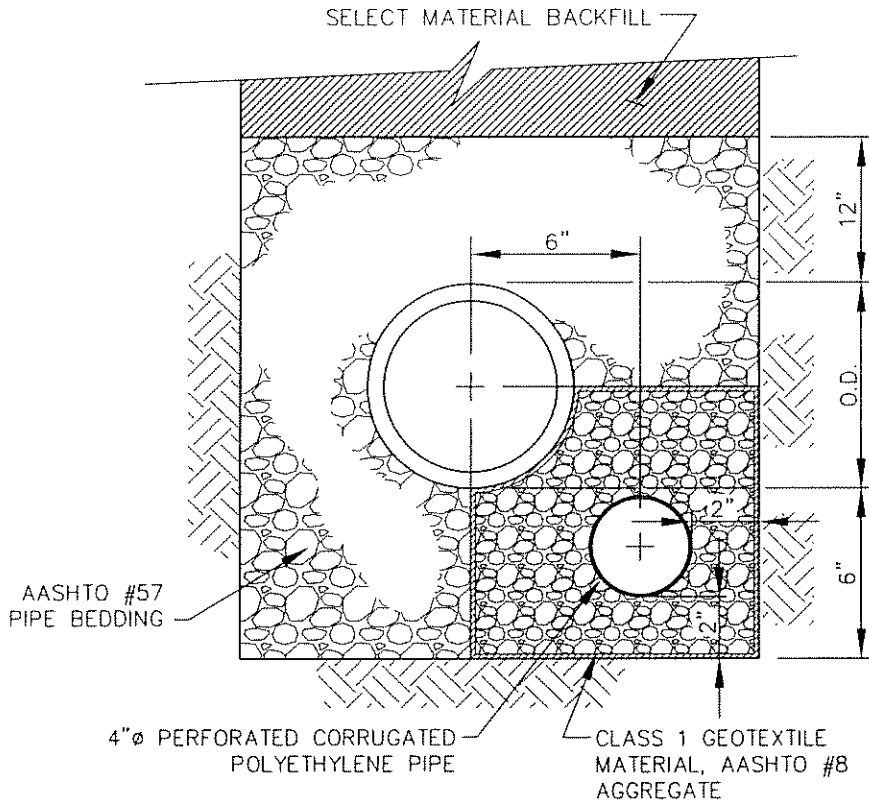
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 50 WEST MIDDLE ST. GETTYSBURG, PA • PHONE (717) 337-3021 • FAX (717) 337-0782
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LATERAL DETAIL WITH CLEANOUT

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02610-1

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NOTE:

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.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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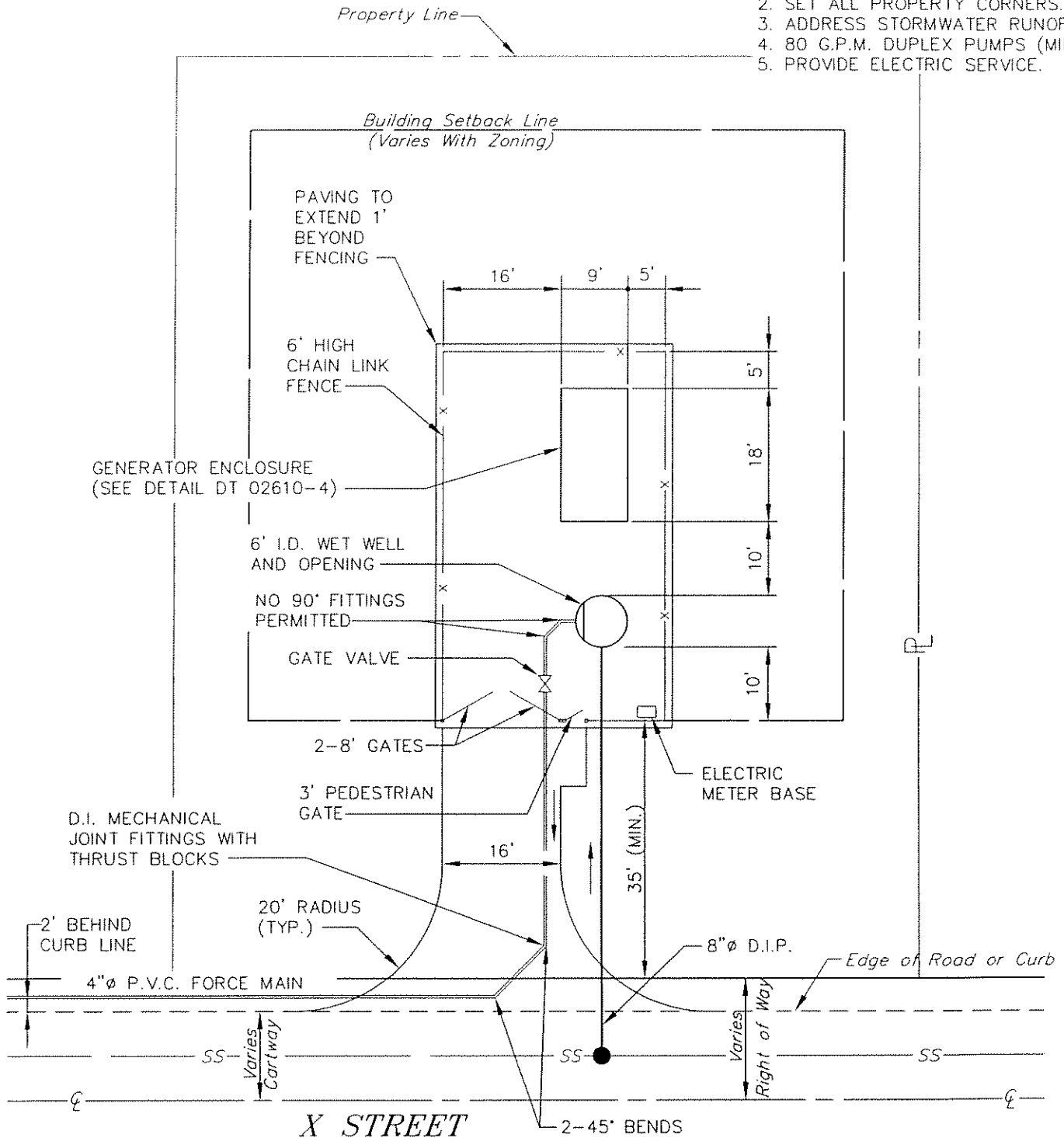
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SUBBASE DRAIN DETAIL

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02610-2

NOTES:

1. PROVIDE LANDSCAPE BUFFER ON THREE SIDES.
2. SET ALL PROPERTY CORNERS.
3. ADDRESS STORMWATER RUNOFF.
4. 80 G.P.M. DUPLEX PUMPS (MIN.)
5. PROVIDE ELECTRIC SERVICE.



NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



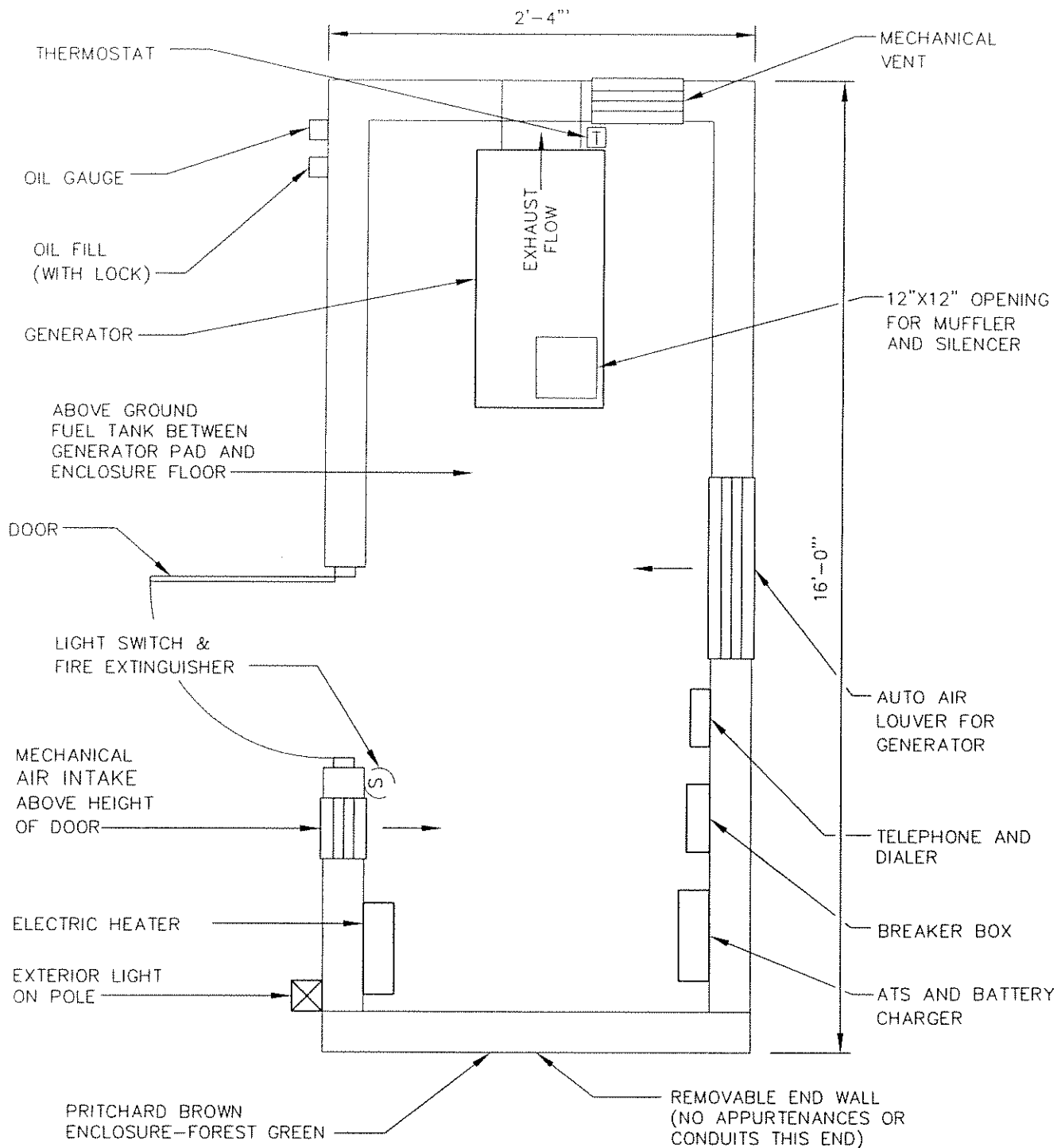
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PUMP STATION
SITE PLAN

DATE:	7/18/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02610-3

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PLAN VIEW

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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PUMP STATION
 GENERATOR
 ENCLOSURE

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 02610-4

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SECTION 02615

WATER MAINS

PART 1 GENERAL

- 1.01 The work of this section includes the installing, repairing and testing of water mains.
- 1.02 All public water mains in the Municipality are owned and maintained by the York Water Company.

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
2. Pavement base drains and subdrains

B. Related work specified elsewhere:

- | | |
|---|---------------|
| 1. Boring and jacking: | Section 02150 |
| 2. Trenching, backfilling and compacting: | Section 02221 |
| 3. Soil erosion and sediment pollution 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) Pressure Rated Pipe (SDR series)

- 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 Specification for 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 36" 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. Tubing and Fittings - 3" to 6"

1. AASHTO M252
2. ASTM F405

B. Pipe and Fittings - 12" to 48"

1. Integrally formed smooth interior.
2. AASHTO M294 and MP6-95
3. ASTM F667

C. Pavement Base Drains - 4", 6"

- (1) 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.

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 I or AASHTO M274, Type II.
3. Minimum 14 gage; 2²/₃" x 1/2" corrugations unless otherwise approved by Municipality.

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 so that the pipe can be laid to the required tolerances.

3.02 LAYING PIPE IN TRENCHES

- A. Give ample notice to the Municipality in advance of pipe laying operations, minimum twenty-four 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 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.
- 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 Municipality.
- B. Backfill and compact trenches as specified in Section 02221.

3.04 PAVEMENT BASE DRAINS AND PIPE UNDERDRAINS

- A. Construct drains of the size and type indicated on the drawings in accordance with the requirements set forth in Section 610, Publication 408 Specifications and as shown on Standard Drawing RC-30, Publication 72M.

3.05 SURFACE RESTORATION

- A. Restore unpaved areas in accordance with Section 02221.
- B. Restore other areas in accordance with Section 02575.

END OF SECTION

SECTION 02640

VALVES AND FIRE HYDRANTS

PART 1 GENERAL

- 1.01 The work of this section includes the installing and repairing of water valves and fire hydrants.
- 1.02 All public water mains in the Municipality are owned and maintained by the York Water Company.

PART 2 PRODUCTS

- 2.01 All materials shall be in accordance with the requirements of the York Water Company. All threaded connections on hydrants shall be NST (National Standard Thread).

PART 3 EXECUTION

- 3.01 All work shall be performed in accordance with the requirements of the York Water Company.
- 3.02 Water mains supplying flow to a hydrant shall be a minimum 8" diameter on looped systems and 10" on non-looped systems.
- 3.03 All hydrants shall be delineated in the field with (2) type GM-2 ground mounted posts (manufactured by PIBH (717-236-3610)) located 30"-48" in either direction of the hydrant along the edge of roadway. The posts shall be red in color with red type V retro reflective sheeting 3" wide by 12" long at the top of the post, both sides.

END OF SECTION

SECTION 02642

WATER SERVICE CONNECTIONS

PART 1 GENERAL

- 1.01 The work of this section includes tapping mains for water services and installing service piping to the curb stops or meter boxes.
- 1.02 All public water mains in the Municipality are owned and maintained by the York Water Company.

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
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. Testing procedures
- B. List of test equipment
- C. Testing sequence schedule

D. Provisions for disposal of flushing and test water

E. 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 Municipality (or Red Lion Municipal Authority)
Pull/retrieval ropes

2.04 VACUUM TEST EQUIPMENT

Vacuum pump
Pipe plugs
Vacuum hose
Test connections
Vacuum gauge
Vacuum relief valve

2.05 NON-SHRINK GROUT

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 water to remove debris. Collect and dispose of flushing water and debris in accordance with Federal, State and local regulations.
- 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 conjunction with the Municipality.
- 2. Assist the Municipality in the lamping operation by shining a light at one end of each pipeline section between manholes. The Municipality 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 4.0 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:

<i>AIR TEST TABLE</i>					
MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 PSIG TO 2.5 PSIG					
	PIPE DIAMETER				
Length Ft.	4"	6"	8"	10"	12"
25	4	10	18	29	40
50	9	20	35	35	79
75	13	30	53	83	119
100	18	40	70	110	158
125	22	50	88	138	198
150	26	59	106	165	236
175	31	69	123	193	277
200	35	79	141	220	317
225	40	89	158	248	340
250	44	99	176	275	340
275	48	109	194	283	340
300	53	119	211	283	340
350	62	139	227	283	340
400	70	158	227	283	340
450	79	170	227	283	340
500	88	170	227	283	340
550	97	170	227	283	340
600	106	170	227	283	340
650	113	170	227	283	340

- 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. Regardless of pipe length, the minimum test times for 4" dia., 6" dia., and 8" dia. pipes are 2 ½, 4 and 5 minutes, respectively.

C. Testing Pipe Over 36" Diameter:

1. Pipe over 36" diameter shall be subjected to a visual interior inspection.

D. Infiltration Test:

1. Leakage into the sewer shall not exceed 200 gallons per inch pipe diameter per mile of pipe per 24 hours.
2. Tests shall be conducted at the discretion of the Municipality.

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 Municipality, 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 provided by the Municipality.
4. Pipe exceeding the allowable deflection shall be located, excavated, replaced, and retested at the sole expense of the Contractor, including surface restoration.
5. 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 Municipality, including preparation in accordance with Article 3.01.

3.03 TESTING PRESSURE PIPELINES

- A. Ductile iron force mains shall be subjected to a hydrostatic test of 50 psi in excess of what the maximum static pressure will be when force main is in operation. Test shall continue until Municipality inspector has approved all joints at this pressure.

3.04 TESTING MANHOLES

- A. Test all new manholes for exfiltration utilizing the vacuum test method and equipment developed by NPC Systems, Inc., Milford, NH, or approved equal.
- B. Provide the necessary labor, equipment or materials to conduct the vacuum test.
- C. The testing shall be done after complete assembly of the manhole.
- D. Plug the pipe openings, taking care to securely brace the plugs and the pipe.
- E. With the vacuum tester set in place:
1. Inflate the compression band to effect a seal between the vacuum base and the structure.
 2. Connect the vacuum pump to the outlet port with the valve open.
 3. Draw a vacuum to 10" of Hg. and close the valve.

- F. A vacuum of 9 in. 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:

<u>Depth of Manhole (ft.)</u>	<u>TIME (sec.)</u>		
	<u>Diameter of Manhole (in.)</u>		
	<u>48"</u>	<u>60"</u>	<u>72"</u>
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

- G. 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 approved non-shrink grout.

END OF SECTION

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. Removal of any conflicting pavement markings.
- B. Related Work Specified Elsewhere:
 - 1. Bituminous Paving and surfacing Section 02500
- C. Applicable Standard Details: None

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Pennsylvania Department of Transportation (PennDOT), latest edition of the following:
 - Publication 408, Specifications
 - Publication 68M, Subchapter K - markings
 - Publication 213, Work Zone Traffic Control Guidelines
 - 2. American Society for Testing and Materials (ASTM):
 - D868 Standard Method of Evaluating Degree of Bleeding of Traffic Paint
 - D1309 Standard Test Method for Settling Properties of Traffic Paint During Storage
 - 3. American Association of State Highway and Transportation Officials (AASHTO):
 - M249 White and Yellow Reflective Thermoplastic Striping Materials (Solid Form)
 - 4. Manual on Uniform Traffic Control Guidelines Devised for Streets and Highways, latest edition (MUTCD).
- B. Qualifications: Installer shall specialize in application of traffic lines and pavement markings and shall have 5 years documented experience in Pennsylvania.

1.03 SUBMITTALS

A. Certification

1. Submit letter of certification from the thermoplastic installation manufacturer stating that the product supplied meets previously referenced PennDOT's specification. This letter shall accompany the delivery of the material and be given to the Municipality prior to the installation of pavement markings.

B. Application method material and manufacturer's required surface preparation.

C. Schedule of operations.

1.04 JOB CONDITIONS

B. Control of Traffic:

1. Take measures to control traffic during installation operations. Pavement marking installation shall not appreciably impede traffic flow in adjacent lanes while installing centerline and one lane shall be left completely open to traffic when installing edgelines.
2. Employ Traffic Control Guidelines measures in accordance with Publication 213, Work Zone Traffic Control Guidelines.

C. Temperature and Weather Restrictions:

1. Pavement markings shall not be placed when the ambient temperature is less than 50 degrees Fahrenheit or more than 90 degrees Fahrenheit.
2. Pavement markings shall not be place when the wind speed exceeds 20 miles per hour.

D. Protection of Pavement Markings:

1. Crosswalks, stop bars, symbols, legends, centerlines, and lane lines shall require coning until the pavement markings are sufficiently cool and solidified.

E. 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.

PART 2 - PRODUCTS

2.01 HEAT APPLIED THERMOPLASTIC PAVEMENT MARKINGS

- A. A durable, retro-reflective pavement marking material suitable for use as roadway, intersection, commercial or private delineation markings.
- 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. 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 Manual on Uniform Traffic Control Guidelines Devices for Streets and Highways. The thermoplastic material conforms to AASHTO M249, with the exception of the relevant differences due to the material supplied in a preformed state.
- F. Graded Glass Beads: The material must contain a minimum of thirty percent (30%) graded glass beads by weight. The beads are clear and transparent. Not more than twenty percent (20%) consist of irregular fused spheroids, or silica. The index of refraction shall not be less than 1.50.
- G. Pigments:
 - White: Sufficient titanium dioxide pigment is used to ensure a color similar to Federal Highway White, Color No. 17886, as per Federal Standard 595.
 - Yellow: Sufficient yellow pigment is used to ensure a color similar to Federal Highway Yellow, Color No. 13655, as per Federal Standard 595. The yellow pigment must be of organic origin only.
- H. Skid Resistance: The surface must provide a minimum resistance value of 55 BPN when tested according to ASTM E 303.
- I. Thickness: The material must be supplied at a minimum thickness of 125 mils (3.15 mm).
- J. Versatility: No glass beads must be applied on the surface of the material before application, as the material shall be able to be placed on the pavement either side up. For instance: Should an arrow, either left or right, be desired, only one arrow needs to be purchased. It is also true of combination arrows and other legends where applicable.
- K. Environmental Resistance: The material must be resistant to deterioration due to exposure to sunlight, water, oil, gasoline, salt or adverse weather conditions.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Apply new pavement markings and "touch-up" existing markings within the limits of work, in accordance with drawings. The finished project shall match the drawings.

3.02 SURFACE PREPARATION FOR PAVEMENT MARKINGS

- A. Clean the surface of the roadway before application of pavement markings to provide a clean, dry roadway surface which is free of loose dirt and other debris, to the satisfaction of the Municipality.

- B. New concrete road surfaces shall be cured at least (7) seven days prior to applying pavement markings. Remove curing compounds prior to pavement marking application.

3.03 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 Municipality, 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 (Pavement Marking Removal) 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. 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.

3.04 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.

3.05 APPLICATION OF HEAT APPLIED THERMOPLASTIC MARKING

- 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 50 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.
- C. The preformed thermoplastic markings shall be placed in protective plastic film with cardboard stiffeners where necessary to prevent damage in transit. Linear material must be cut to a maximum of 3 foot long pieces. The cartons in which packed shall be non-returnable and shall not exceed 40" in length and 25" in width, and be labeled for ease of identification. The weight of the individual carton must not exceed seventy (70) pounds.
- D. Remove and replace any defective pavement markings or any marking installed incorrectly as determined by the Municipality. Any material with insufficient thickness, width or retro-reflectivity shall be deemed defective and shall be replaced by the Contractor at no additional cost to the Municipality.

3.06 WARRANTY

- A. The Contractor shall guarantee to replace, at his expense, that portion of the pavement marking installed which, in the opinion of the Municipality, 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.

END OF SECTION

SECTION 02830
CHAIN LINK FENCING

PART 1 - GENERAL

1.01 DESCRIPTION

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

1. Installation of chain link fencing and gates.

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 Material (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
- F043 - 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.

1.04 JOB CONDITIONS

A. Locate and protect existing utilities as specified in Section 02210.

B. Exact location of fencing will be determined by the Contractor in consultation with the Municipality.

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. 2 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. Wire shall be imprinted with identification of manufacturer or trade name, country of origin, gage and tensile strength at 12" intervals.
- C. 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, SS40.
- B. End, corner, angle or pull posts shall be 3" O.D. tubular steel pipe, SS40.
- C. Gate posts shall be 4" O.D. tubular steel pipe or SS40, for each 7' - 12' gate leaf.
- D. All posts shall be hot-dipped galvanized.

2.03 FRAMING AND BRACING

- A. Top rail and bracing rail shall be 1-5/8" O.D. tubular steel pipe (SS40), hot-dipped galvanized.
- B. Bracing ends (for fastening to posts) shall be formed steel.
- C. Truss rods shall be steel rods with minimum diameter of 3/8".
- D. All framing shall be hot-dipped galvanized.

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.
- D. Double "V" support arms, where specified, shall support 6 strands of barbed wire.

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 SS40. Connections shall be welded to form rigid one-piece unit.
- B. Hinges shall be structurally capable of supporting gate leaf and allow 180° of movement without binding. Non-lift-off type hinge design.
- C. Latch - Forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.
- D. Keeper - Provide keeper for each leaf over 5' wide. Keeper shall secure free end of gate when fully open until manually released.
- E. For double leaf gates, provide drop rod to hold inactive leaf and gate stop pipe to engage center drop rod.
- F. Padlock - Provide one padlock to lock both gate leaves with 3 keys. Lock shall conform to Fed. Spec. FF-P-10 lb Type EPA with chain.
- G. Gate posts shall have heavy ornamental caps.

2.08 SLIDING GATES

- A. Gate posts shall be a minimum of 3" O.D. tubular pipe, SS40. Additional steel bracing as required.
- B. Rollers shall cantilever from posts.
- C. Gate stop, padlock, and operator as required.

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. Install 4' high fence around stormwater basins. 6' high fence with barbed wire shall be installed at pump station sites or as otherwise directed.

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 equidistance spaces minimum 8', 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 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 1"-2" above surrounding grade and sloped to direct water away from posts. Maintain position of post (vertically and horizontally) during placement operations.
- D. If solid rock is encountered during drilling, core drill a hole 1" larger in diameter than post and 12" deep. Grout the post in place.

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 to each post with ties.

3.04 FABRIC

- A. Attach fence fabric so that fabric remains in tension after pulling force is released. Allow 2" clear 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 GATES

- A. Swinging gates - Set posts in concrete and attach fabric. Locate and place gate stops so that drop rod fully engages. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation of gate leaves.
- B. Sliding gates - Set posts, rollers, framing and bracing for smooth operation. Place gate stops. Adjust hardware.

3.07 CLEAN UP

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

END OF SECTION

SECTION 02852

GUIDE RAIL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work of this section includes installation of steel guide rail 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

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Pennsylvania Department of Transportation (latest revisions):
 - a. Publication 408, Specifications
 - b. Publication 72M, Roadway Construction Standards (RC)
- B. Qualifications
 - 1. Guide Rail Installer - shall be a firm that specializes in this work, has minimum 5 years experience 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 Work Zone Traffic Control Guidelines.
- 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 Municipality 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 Penn DOT 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 Contract drawings. Restore ground surface to pre-existing conditions.

3.02 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 and shrubs.
2. Transplanting trees and shrubs.
3. Maintenance.
4. Fertilizing and mulching.
5. Placing topsoil.

B. Related Work Specified Elsewhere:

1. Trenching, backfilling and compacting: Section 02221
2. Finish grading, seeding and sodding: Section 02485

C. Definitions: NONE

D. Applicable Standard Details:

1. PennDOT Publication 72M, Standards for Roadway Construction, latest revision.

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.

1.03 JOB CONDITIONS

A. Protect underground utilities and structures. Comply with local and State requirements to locate facilities to avoid damage.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with local, State or Federal laws relative to plant material shipment.

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. Collected Plants shall be obtained from native standard or established plantings.
 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.
 4. Container-Grown Plants shall have been grown for at 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-branched 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. Material shall be available for inspection in the nursery or collecting field before digging. The Municipality reserves the right to tag selected plants, indicating acceptable form, shape, and cultural 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.

2.02 WRAPPING MATERIAL

- A. Approved wrapping material shall be krinkle-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, 23-10-5 (10 gram tablets) or 16-8-16 and shall be packaged in 4 ounce, individual, heat-sealed, polyethylene envelopes.

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, fibrous-ground, shredded, or chunk aged oak bark, not decomposed, between 1/4" and 2" in any dimension.
- B. Mulch shall be spread in 3" thick (min.) layer over a 2" thick (min.) layer or organic compost material.

2.05 BACKFILL MIX FOR PLANTINGS

- A. Backfill mix shall consist of a homogeneous mixture of 20% peat (either shredded reedsedge peat or sphagnum moss peat, or a combination of both from fresh water sites) and 80% topsoil by volume. One pound of 0-20-2 commercial fertilizer shall be uniformly mixed into each cubic yard of 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. Ground anchors, if specified, shall be either a 4-inch Universal Ground Anchor, as manufactured by Laconia Malleable Iron or a 4-inch Auger Type Earth Anchor, as manufactured by American Steel Products Corp., or approved equal.
- C. Turnbuckles shall be galvanized steel, meeting ASTM A153, and measuring nominally 3/8" x 6".
- D. All wire for bracing and guying trees shall be #12 gage, galvanized, and shall meet ASTM A392, Class II requirements.

2.07 TREE PROTECTORS

- A. 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.

2.08 HOSE GUARD

- A. To protect trees and shrubs from guy wire damage, an acceptable hose guard shall be utilized.

2.09 WEED BARRIER MAT

- A. When indicated, use a nonwoven 100% polyester fiber fabric manufactured for this specific purpose.

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 the 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, healing in or during actual planting operations will be rejected.

3.02 LAYOUT OF PLANTINGS

- A. Delineate the plant pit 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 Municipality.
- B. Should obstructions prevent planting at the indicated locations, alternate locations or deletions will be determined by the Municipality.

3.03 SHRUB BED PREPARATION

- A. For areas indicated for bedding, prepare the area in the following manner to attain the designed finished grade:
 - 1. Remove sod and all undesirable growth, add additional topsoil if required to re-establish grade.
 - 2. Uniformly spread 3 inches of peat, 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.

3.04 PREPARATION OF PLANT PITS

- 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 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 Municipality may direct the Contractor to dig the pit up to three (3) times the root spread or balled diameter.

3.05 PRUNING

- A. Typical top pruning, as directed, shall be performed appropriate for each species, variety, size, or planting location. Typical pruning samples will serve as a guide for subsequent pruning throughout the project.
- B. Broken or badly bruised branches shall be removed with a clean cut. Pruning cuts over 3/4" in diameter shall be painted over with approved tree paint.
- C. 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.

- D. Root pruning shall only be performed to remove damaged or broken main roots. Cut immediately above the damage with a clean oblique cut.

3.06 PLANTING

- 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 Municipality, these dates may be extended:
 - 1. Deciduous Trees and Shrubs: October 15 - May 15
 - 2. Evergreen Trees: March 1 - May 15
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 preformed root protection devices which restrict root development immediately prior to planting. Balled and burlapped material shall be placed in the plant pits intact.
- 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 back fill mix around the ball or roots, 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. Where indicated, install the weed barrier mat to match the diameter of the plant pit or other designated area and staple. Mulch area as required.
- F. Wrap deciduous shade and flowering tree trunks from the ground line to the lowest main branches, overlapping the wrap 1" - 1½". 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 MAINTENANCE OF PLANTING

- A. All plants shall be maintained in a living, healthy conditions until the entire project has been accepted. Plants are required to be growing in place at least 30 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. Furnish measurements and capacities of water tanks to be used in the watering operation along with a watering schedule for approval.
- C. Tighten guys and stakes that may become loosened.

3.08 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 suitable disposed of. The acceptable condition may also require seeding and mulching of disturbed areas within the limits of work.

3.09 REPLACEMENT

- A. Within the 30-day establishment period and prior to acceptance of the project, all plants determined by the Municipality 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. Replacements may be directed to be made at the beginning or the next planting season.

END OF SECTION

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

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 Structural Concrete.

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

- A185 Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
- A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

- C31 Practice for Making and Curing Concrete Test Specimens in the Field
- C33 Specification for Concrete Aggregates
- C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C42 Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- C94 Specification for Ready-Mixed Concrete
- C138 Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
- C143 Test Method for Slump of Hydraulic Cement Concrete
- C150 Specification for Portland Cement
- C171 Specification for Sheet Materials for Curing Concrete
- C172 Practice for Sampling Freshly Mixed Concrete
- C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- C192 Practice for Making and Curing Concrete Test Specimens in the Laboratory
- C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- C260 Specification for Air-Entraining Admixtures for Concrete
- C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- C494 Specification for Chemical Admixtures for Concrete
- D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³)
- D994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
- D1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- D1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- E329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

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 Municipality at the Contractor's expense. 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.

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 Municipality, 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 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.

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 in ACI 301 moderate exposure.

3.02 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.

3.03 EMBEDDED ITEMS

- A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.
- B. 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.
- C. 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.

3.04 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 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.

3.05 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.
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.
 - a. Truck mixers, agitators and nonagitating 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.
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°F. When the temperature of the steel is greater than 120°F, steel forms and reinforcement shall be sprayed with water just prior to placing the concrete.

3.06 FINISHING OF FORMED SURFACES

A. 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 1/4" in heights 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.

3.07 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 load-bearing 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°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. Finishes

1. 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 and the slab shall then be refloated immediately to a uniform sandy texture.
2. 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.
3. Unspecified Finish - When type of finish is not specified on the drawings, use broom finish.

3.08 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 Municipality.
 - 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°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°F, the temperature of the concrete shall be maintained between 50° and 70°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°F in any 1-hr. or 50°F in any 24-hr. period.

- D. Protection from mechanical injury - During the curing period, the concrete shall be protected from damage due to 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.

3.09 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 Municipality 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 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 the specimens in accordance with ASTM C39. Two specimens shall be tested at 28-days for acceptance and two shall be tested at 7-days for information. The acceptance test results shall be the average of the strengths of the two 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.
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 Municipality at the Contractor's expense:
1. Inspect concrete batching, mixing and delivery operations to the extent deemed necessary by the Municipality.
 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 specimens from each sample (in addition to those required above) 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 Municipality. 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 Municipality and the Contractor.
2. The agency shall report all test and inspection results to the Municipality 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 specifications, 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 the Contract Documents.
3. The Contractor shall submit to the Municipality 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.

END OF SECTION

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. 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:

- CT 03050-1 Concrete Encasement Detail
- CT 03050-2 Concrete Anchor Detail
- CT 03050-3 Thrust Blocking Details
- CT 03050-4 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 Municipality 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

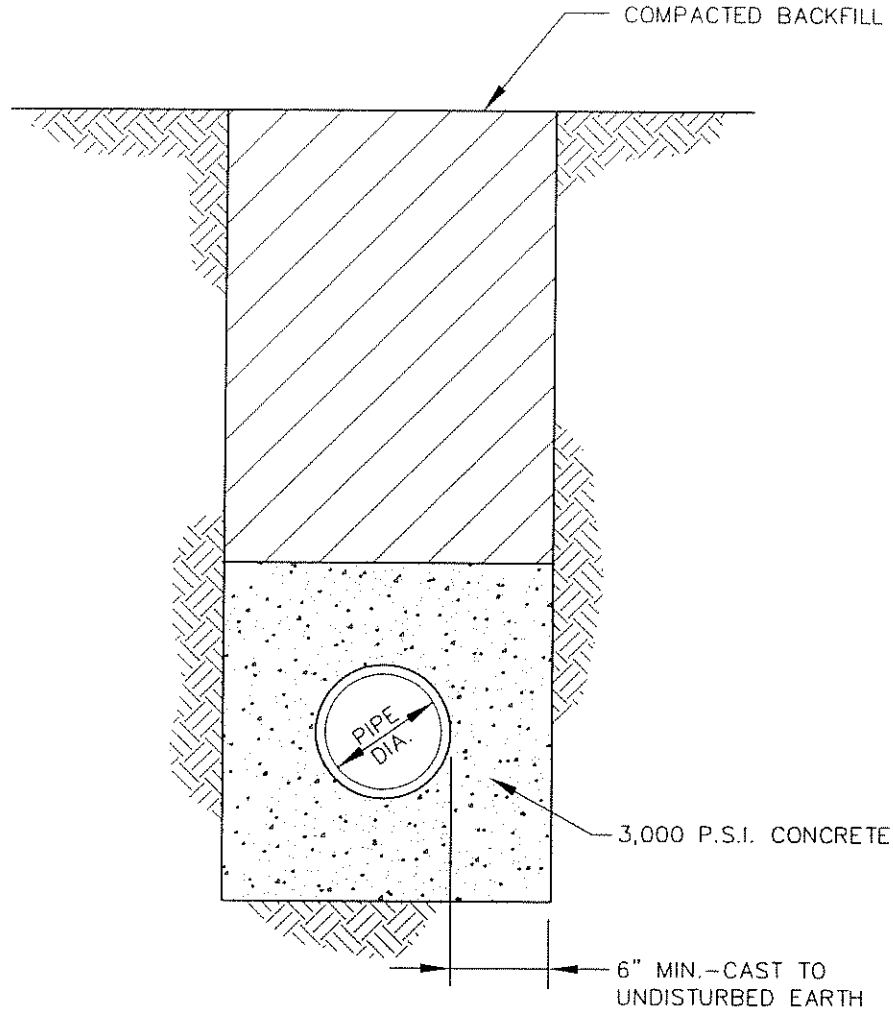
- A. As specified in Section 03000.

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. Comply with Section 03000 for construction requirements including 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



SECTION

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



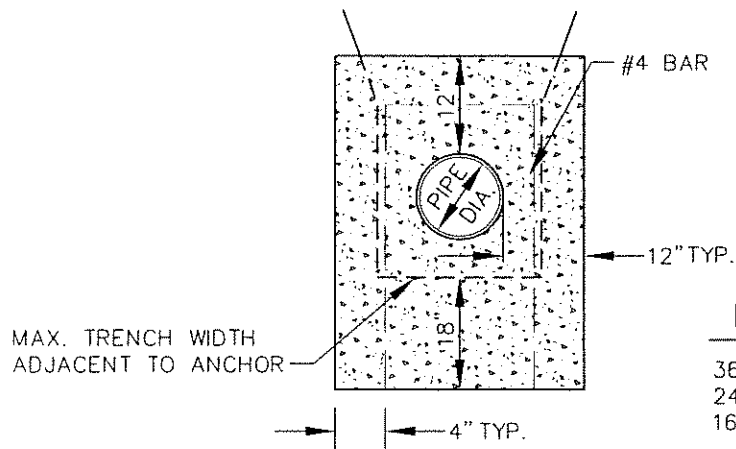
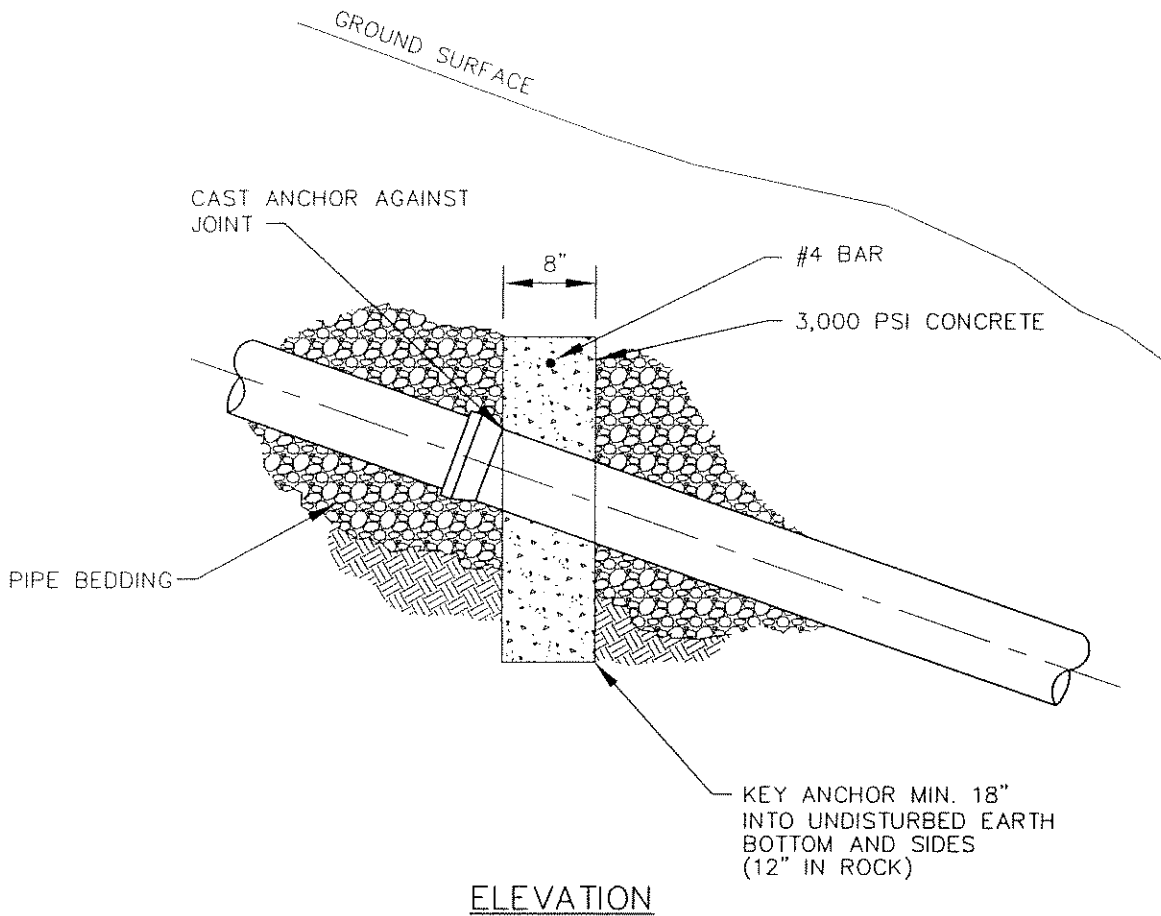
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CONCRETE
 ENCASEMENT
 DETAIL

DATE:	3/31/03
DRAWN BY:	APS
CHK. BY:	
NO.	CT 03050-1

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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

SECTION

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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CONCRETE ANCHOR
 DETAILS

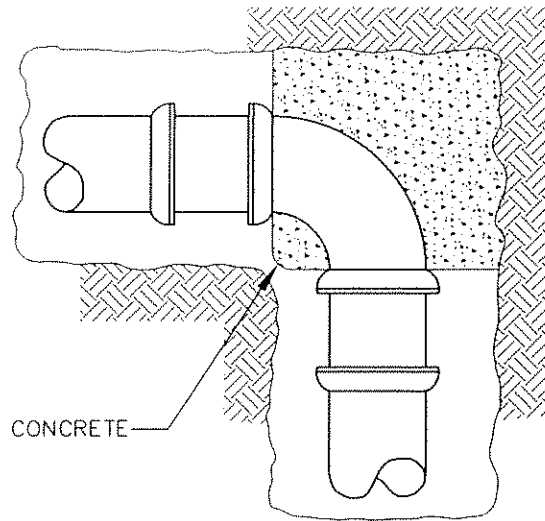
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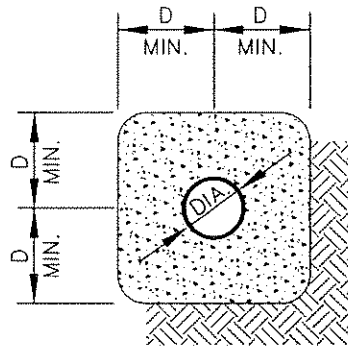
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PLAN - 90° BEND
(LESSER BENDS SIMILAR)



TYPICAL SECTION
D= OUTSIDE DIAMETER OF PIPE

NOTE: NOT TO SCALE

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**THRUST BLOCKING
DETAILS**

DATE: 7/18/03

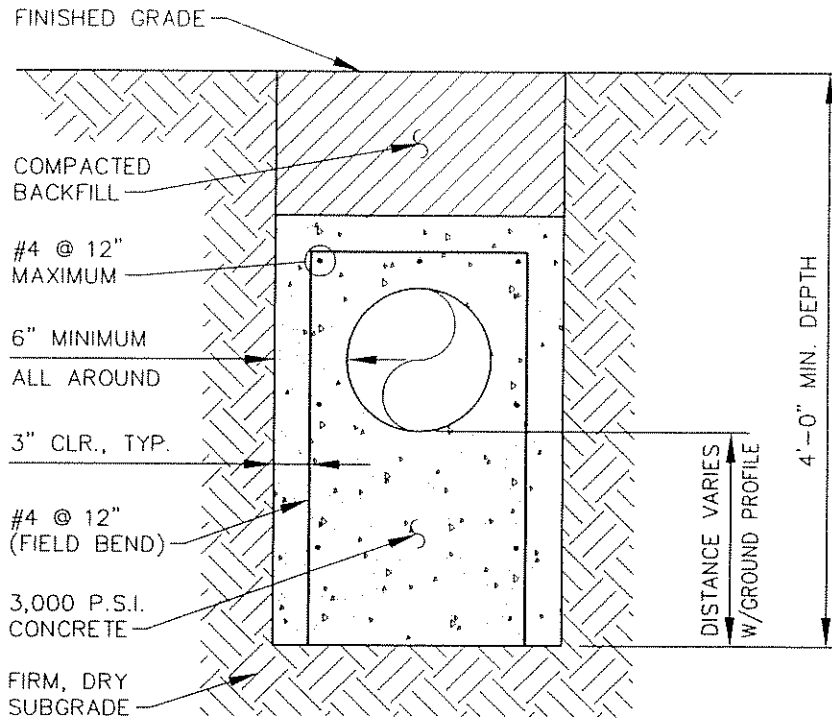
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NOTES:

- STABILIZE PIPE & REINFORCEMENT WITHIN EXCAVATION TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT.

NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



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SPECIAL CONCRETE ENCASEMENT FOR FROST PROTECTION DETAIL

DATE: 3/31/03

DRAWN BY: APS

CHK. BY:

NO. CT 03050-4

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. Trench paving and restoration: | Section 02575 |
| 3. Plain and reinforced cement concrete: | Section 03000 |
| 4. Cement concrete for utility construction: | Section 03050 |

C. Definitions: None

D. Applicable Standard Details:

- CT 16500-1 Street Lighting Installation Details
- CT 16500-2 Light Pole Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

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

B. Inspections:

1. Upon completion of work, customer/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 this 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. This Contractor shall furnish and employ suitable instruments such as ammeters, volt meters, meggars, etc. Preliminary testing with magnetos will be permitted but will not be accepted as a final or conclusive test.
2. Prior to testing or adjusting, this Contractor shall consult with the Municipality to determine the intended function of any equipment, wiring or systems. This 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. Submit (in triplicate) Certificate of Compliance following electrical inspection.
- B. Voltage drop calculations, prepared by a Professional Engineer licensed in Pennsylvania.
- C. 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.
- D. Efficiency and candle power distribution curve for each type lighting fixture.
- E. Catalog cuts and dimensional data for poles and lighting fixtures proposed.
- F. Concrete base design.

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 authorities 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 - DEVELOPMENT STREET LIGHTING

- A. The electric company's street lighting service is only available to the Municipality. The developer shall coordinate street lighting requests with the Township and all street lighting shall conform to the Municipality's and electric company's street lighting specifications.
- B. Customer/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 which lists material requirements.
- D. Customer/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 necessary to conform to the performance criteria. Minor adjustments to spacing may be made to accommodate lot lines, driveways, etc.
 - 2. Customer/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. Customer/developer shall install facilities in accordance with requirements of the electric company, the Municipality, the manufacturer, the National Electric Code, and final plan. The customer/developer is require to provide and/or install:
 - a. All trenching and backfilling, including service cable from source to junction box.
 - b. All cable, conduit, foundations, standards, luminaires, lamps, and photoelectric controls as per developer agreement with municipality.
 - c. Service equipment at each source location designated by the electric company to facilitate street lighting cable connections.
 - 5. Customer/developer shall secure an electrical inspection from the electric company accepted electrical inspection agency before the electric company will energize.
 - 6. Upon receipt of a street lighting agreement from the municipality 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 and 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 Municipality 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 Municipality.

PART 2 - PRODUCTS

2.01 FIXTURE

- A. See Specification Drawing CT-16500-2
- B. Substitution from Section 2.01A will be considered by Township only if unique situations apply. Approvals of substitutions will be at the discretion of the Board of Supervisors.

2.03 POLES

- A. See Specification Drawing CT-16500-2
- B. Substitution from Section 2.01.A will be considered by Township only if unique situations apply. Approvals of substitutions will be at the discretion of the Board of Supervisors.

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 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.

2.06 CONDUIT

- A. Polyvinyl Chloride (PVC) - Schedule 40.
- B. Extruded from virgin polyvinyl chloride compound.
- C. Resistant to water, oil, outdoor aging, exposure to sunlight, underground environments, and corrosive atmospheres.
- D. Flame retardant for use above ground, resistant to low temperatures, and resistant to distortion due to heat under conditions likely to be encountered in intended service.
- E. Sufficient strength to withstand abuse, such as impact and crushing during handling, installation, and service. Ten foot lengths with one coupling furnished for each length.
- F. Minimum Size: 1 inch.
- G. Each length clearly and durably marked with manufacturer's name. Markings shall be permanent for PVC used above ground.
- H. PVC conduit shall be UL listed.
- I. Comply with applicable ASTM testing procedures and specifications.
- J. Fittings:
 - 1. Conform to applicable PVC conduit specifications above.
 - 2. Manufacturer: Same as PVC conduit manufactures.

2.07 WIRE

- A. All wire and cable shall conform to the following:
 - 1. Copper shall not be less than 98 percent conductivity.
 - 2. Single conductor, unless otherwise indicated.
 - 3. Color coded.
 - 4. Marked with classification type, conductor size, and voltage rating, every foot, where applicable.
 - 5. Minimum Size: #12 AWG, unless otherwise specified.
 - 6. Sizes #8 AWG and larger shall be stranded.
 - 7. UL listed.
- B. Wire Specification No. 1
 - 1. Type THW insulation, UL listed.
 - 2. 600 volt insulation.
 - 3. Ampacity based upon maximum conductor temperature of 75 degrees C. in wet or dry locations, continuous operation.
 - 4. Conform to ASTM B3 for solid conductors and ASTM B8 for stranded conductor.
 - 5. Annealed, uncoated copper conductor.
 - 6. Flame retardant, moisture and heat resistant thermoplastic (PVC) insulation.

C. Wire Specification No. 2

1. Type XHHW insulation, UL listed.
2. 600 volt insulation.
3. Ampacity based upon maximum conductor temperature of 90 degrees C. dry locations and 75 degrees C. wet locations, continuous operation.
4. Moisture and heat resistant cross linked polyethylene (XLP) insulation.
5. Conform to applicable NEMA and IPCEA requirements.
6. Conform to ASTM B3 for solid conductors and ASTM B8 for stranded conductors.
7. Soft copper conductor.

D. Wire Specification No. 4

1. Type THHN/THWN insulation, UL listed.
2. 600 volt insulation.
3. Ampacity based upon maximum conductor temperature of 90 degrees C. dry locations (THHN) and 75 degrees C. dry and wet locations (THWN), continuous operation.
4. Flame retardant, moisture and heat resistant thermoplastic (PVC) insulation with nylon jacket.
5. Conform to applicable NEMA and IPCEA requirements.
6. Conform to ASTM B3 for solid conductors and ASTM B8 for stranded conductors.
7. Soft copper conductor.

2.8 CONNECTORS

A. Connector Specification No. 1 - Splice Connectors

1. For insulated wire, 600 volt and under, #8 AWG and smaller.
2. Compression solderless connector.
3. Insulated or non-insulated.
4. UL listed.
5. Manufacturer: Buchanan B-cap.
6. Substitutions: Ideal Wing-nut, 3M Schotchlok.

B. Connector Specification No. 2 - Splice Connectors

1. For insulated wire, 600 volts and under, #6 AWG and larger.
2. Split bolt pressure connector.
3. Bronze.
4. UL listed.
5. Manufacturer: Anderson.
6. Substitutions: Thomas & Betts, Penn-Union, Dossert, Burndy, Reliable Electric, Ideal.

C. Connector Specification No. 3 - Splice Connectors

1. For insulated wire, 600 volts and under, #6 AWG and larger.
2. Compression or crimp connector, short sleeve.
3. Copper.
4. UL listed.
5. Manufacturer: Anderson.

6. Substitutions: Thomas & Betts, Dossert, Burndy, MAC, 3M, Ideal.

D. Connector Specification No. 4 - Lug connector

1. For insulated wire, 600 volt and under, #8 AWG and larger.
2. Compression or crimp connector, short sleeve.
3. Copper.
4. UL listed.
5. Manufacturer: Anderson.
6. Substitutions: Thomas & Betts, Penn-Union, Dossert, Burndy, MAC, 3M, Ideal.

E. Connector Specification No. 5 - Lug connector

1. For insulated wire, 600 volt and under, #8 AWG and larger.
2. Bolted type pressure connection, hex head or hex socket pressure bolts.
3. Copper.
4. UL listed.
5. Manufacturer: Penn-Union.
6. Substitutions: Thomas & Betts, Anderson, Dossert, Burndy, Ideal.

F. Connector Specification No. 6 - Lug Connector.

1. For insulated wire, 600 volt and under, #10 AWG and smaller.
2. Compression or crimp type.
3. Standard barrel, insulated for 600 volts.
4. Ring terminal or flanged or flared block spade terminal.
5. Copper.
6. UL listed.
7. Manufacturer: Penn-Union Penn Crimp.
8. Substitutions: Ideal Crimp Terminal, Thomas & Betts Sta-Kon, Burndy Insulug, MAC MiniDent, 3M Scotchlok Terminals.

G. Connector Application

1. Unless otherwise noted, connectors shall be used for insulated wire, 600 volts and under as follows:

CONNECTOR SCHEDULE	
Application	Connector Spec. No.
Splice Connectors:	
#8 AWG and smaller	1
#6 AWG and larger	2 or 3
Lug Connectors:	
Stranded wire connection under head of binding screw or bolt	4 or 6

CONNECTOR SCHEDULE	
Application	Connector Spec. No.
Connection to equipment bus, or screw or bolt terminals	4, 5, 6, or manufacturer supplied lugs

2.9 TAPE

A. Tape Specification No. 1 - Tape for Insulation 600 Volts or Less

1. Vinyl plastic all weather electrical tape.
2. Manufacturer: 3M Scotch 33+.
3. Substitutions: Tomic, Okonite.

B. Tape Specification No. 2 - Underground Marker Tape

1. Material: Red, plastic, 6 inches wide.
2. Marking: CAUTION - BURIED ELECTRIC LINE BELOW, or similar wording.
3. Manufacturer: Griffolyn, Inc.
4. Substitutions: Allen Company.

2.10 WIRE MARKERS

A. Wire Marker Specification No. 2 - Vinyl plastic or Vinyl Polyester.

1. Temperature Range: to 250 degrees F.
2. Self-sticking adhesive backing.
3. Waterproof, solvent proof.
4. Printing permanently protected.
5. Manufacturer: Thomas & Betts E-Z-Code, Type WSL.
6. Substitutions: W.H. Brady Co. Type CAB.

2.11 GROUND RODS

- A. Type: High strength steel core.
- B. Construction : Copper exterior welded to the steel core.
- C. Chamfered top to prevent mushrooming. Pointed end.
- D. Minimum Diameter
 1. 10 foot rod: 3/4 inch diameter.
 2. Above 10 feet: 1 inch diameter.

E. For lengths over 10 feet, sectional rods with steel driving bolt may be furnished.

F. Manufacturer: Copperweld.

G. Substitutions: Penn-Union, Weaver.

2.12 GROUND CONNECTORS

A. Ground Connector Specification No. 2

1. Type: Ground grid clamps. Compression connection to cable or rod.
2. High conductivity cast copper fittings.
3. Cable, rod, plate or combination connector, as required.
4. Suitable for direct burial or imbedded in concrete.
5. Manufacturer: Thomas & Betts.
6. Substitutions: Burndy.

B. Ground Connector Application

1. Unless noted otherwise, ground connectors shall be installed as follows:
 - a. Connection of ground wire or ground grid cable to ground rod, building steel or another ground grid cable.

PART 3 - EXECUTION

3.01 RACEWAY INSTALLATION

A. PVC conduit shall be installed as follows:

1. Expansion joints shall be installed where expansion and contraction of PVC occurs due to changing temperature conditions.
2. Joints in PVC conduit runs shall be in accordance with manufacturer's recommendations.
3. PVC conduit shall not be used where subject to ambient temperature exceeding those which conduit has been approved.
4. Fittings as specified under Raceway Specification No. 4 shall be used when installing PVC conduit.
5. Install ground wire, sized per NEC in all PVC conduit runs.

6. Underground raceways or duct banks shall have a marker or warning tape installed above raceway, 12 inches below finished grade. Use Tape Specification No. 2. Duct banks with widths over 12 inches shall have 6 inch wide tape runs installed side-by-side on 12 inch (maximum) centers.

3.02 WIRING METHODS

- A. Wiring shall be installed in raceways unless otherwise noted.
- B. Use color coded wire throughout as required by National Electric Code for convenience in testing and maintenance. Neutral conductors shall be color coded neutral gray or white; grounding conductors shall be green.
- C. Pull wire into conduit so that insulation will not be damaged. Approved pulling compound shall be used to assist in pulling of 600 volt wire into conduit. Oil or grease will not be permitted. Pulling compound shall be compatible with wire insulation and conduit.
- D. Conductors shall be installed continuous from outlet to outlet, without splicing except within outlet or junction boxes.
- E. Noninsulated splices in insulated wire, 600 volts and under shall be factory insulated as follows:
 1. Rubber and friction tape coated with Scotchkote or similar coating.
 2. Scotchfil or equivalent electrical putty with Tape Specification No. 1.
 3. Insulation of splices shall provide same insulation qualities as insulation of wire being spliced.
- F. Stranded wire shall not be placed under the head of a binding screw or bolt. Refer to Part 2 - Products, this Section, for connectors to be used in stranded wire connections under head of binding screw or bolt.
- G. Wire shall be identified by use of wire markers at termination points, including outlet boxes, pull boxes, junction boxes, wireways and at locations where wire changes direction within an enclosure. Unless otherwise specified, wire markers shall be as specified under Wire Marker Specification No. 2.

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.
- B. Ground rods shall be driven to a depth so that top of rod is 2 feet below grade.

3.04 GROUNDING

A. Equipment Grounding:

1. Unless otherwise specified, conductive noncurrent carrying electrical materials and equipment shall be grounded. Non-electrical items of equipment shall be grounded as indicated on Drawings. Grounding shall be in accordance with National Electrical Code requirements.
2. Grounding shall be separate insulated grounding conductors pulled with phase conductors. Grounding system shall be electrically, and mechanically continuous from all outlet devices, power utilization equipment, and distribution equipment to system main ground point.
3. Bonds and jumpers shall be furnished and installed where required during construction and where necessary to ensure both operation and safety.
4. Service ground point shall be ground rods near the customer's junction box.
5. Neutral conductors shall be continuous throughout system and shall be grounded only at switchboard neutral.
6. Ground wire shall be installed in all PVC raceway runs. Ground wires shall be insulated.

B. Grounding Tests :

1. Ground resistance of main system grounding point shall be inspected and shall not exceed values required by National Electrical Code. Inspection shall be made using two auxiliary ground rod (three point) method or other approved method. If resistance is found to be higher than that allowed by National Electric Code, additional ground rods shall be driven until a resistance below allowed value is obtained.
2. Outside inspections shall not be performed during unusually wet conditions. Check shall be made during dry weather conditions.
3. Complete inspection record shall be submitted to the Municipality showing resistance values and calculations and shall indicate method of test.

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.

END OF SECTION

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 stranded on disconnect equipment rated greater than 30 amps. Enclosure must prevent access by unauthorized persons and shall be a NEMA Type 3R.

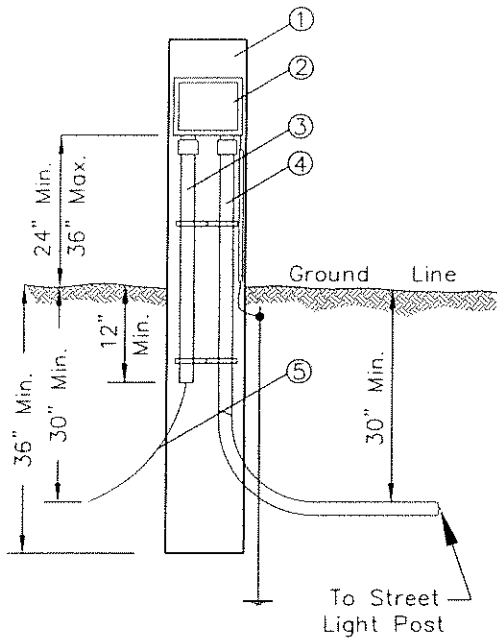
③ SERVICE LATERAL CONDUIT, CONNECTORS AND CLAMPS

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)



NOTE: NOT TO SCALE

CONEWAGO TOWNSHIP CONSTRUCTION & MATERIALS SPECIFICATIONS



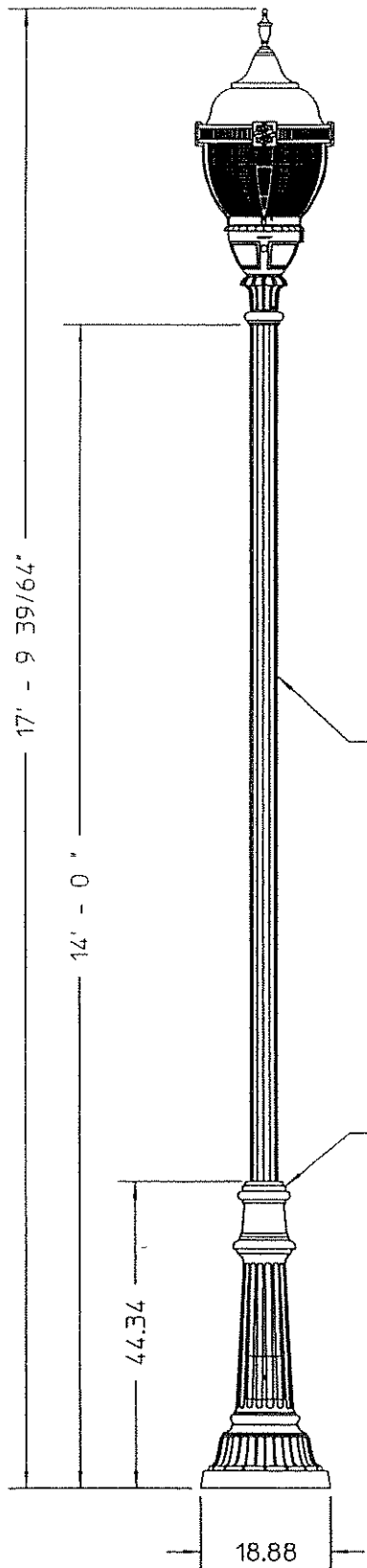
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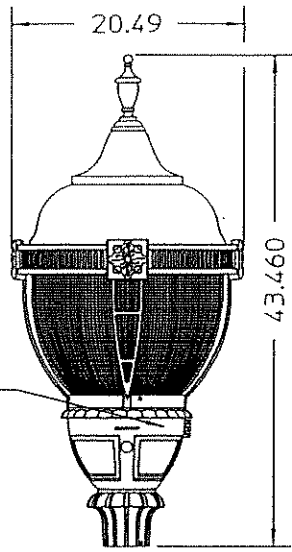
STREET LIGHTING INSTALLATION DETAIL

DATE:	7/18/03
DRAWN BY:	APS
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NO.	CT 16500-1

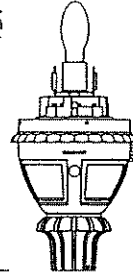
Ordering Guide:
 C2178A: LUMINAIRE
 CP2178A: POLE



Luminaire
 Detail
 Scale 1:16



Lamping
 Detail



Finish:
 Black

POLE: 4" STRAIGHT FLUTED
 W/ 3" TENON
 .125" WALL THICKNESS
 6063-T6 ALUMINUM ALLOY

BASE:
 CAST #356HM
 ALUMINUM ALLOY,
 W/ ACCESS COVER

BASE DETAIL:
 REFERENCE TEMPLATE
 #T01000395

Luminaire
 Matrix

- GLOBE:
 - X ACRYLIC TYPE V
 - ACRYLIC TYPE III
- FASTENERS:
 - X HEX
 - ALLEN
- FINISH:
 - X BLACK
 - WHITE
 - BRONZE
 - GREEN
- REFLECTOR:
 - SM REFLECTOR
 - SM REFLECTOR W/H.S.S.
 - FULL TOP W/H.S.S.
 - H.S.S.
 - FULL TOP
 - X NONE
- PHOTO CONTROL:
 - BUTTON-EYE
 - X TWIST-LOCK RECEPT.
 - NONE
- SOCKET:
 - MEDIUM
 - X HOGUL
 - INDUCTIVE
- WATTAGE:
 - 70W MH
 - 100W MH
 - 150W MH
 - 175W MH
 - 200W MH
 - 250W MH
 - 70W HPS
 - 100W HPS
 - X 150W HPS
 - 200W HPS
 - 250W HPS
 - 165R
 - 150R
 - 100R
 - 85R
 - 55R
- VOLTAGE:
 - X 120V
 - 208V
 - 240V
 - 277V
 - 347V
 - QUAD TAP

PRODUCT APPROVALS

HADCO	
CUST.	

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Full
 Specification
 (Complete Assembly)
 Drawing

HADCO
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 "Over 50 Years of Excellence"

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JOB NAME:
Conewago Township

REP. TERRITORY: **17** DRAWN BY: **SMK**

SCALE: **1:25** DATE: **03/01/08**

DRAWING NUMBER:
C2178-DWG02

REP:
Genlyte Philadelphia

REV: **B** PCN: **08-030**
 BY: **SMK** DATE: **03/08/08**