

SECTION III STREET GRADING AND PAVING

A. Scope

The work covered by this specification consists of furnishing all plant, labor, equipment, appliances and materials, and in performing all operations in connection with clearing and grubbing, rough grading and street paving, complete, in accordance with the specifications, applicable drawings and contract documents.

B. Pennsylvania Department of Transportation Specifications Form 408, Latest Revision

All equipment, materials and construction methods employed on this work shall conform to the Pennsylvania Department of Transportation Specifications, (hereinafter referred to as Form 408) latest revision, unless specifically modified herein.

For the purpose of emphasis and simplicity, a brief summary of the most applicable section of Form 408 are presented herein. However, the absence of any provisions of Form 408 from these specifications shall in no way release this Contractor from full compliance therewith. In the event of specific contradiction between these Specifications and Form 408, the provisions of these Specifications shall be binding.

C. Materials

1. All cement, reinforcement, ready-mix concrete, and all miscellaneous materials employed on this work shall conform to the applicable provisions of Penn DOT Form 408, latest revision.
2. Bituminous paving materials shall be Penn DOT approved mixes from certified batching plants.
3. Stone shall be Penn DOT approved sizes and grades from certified quarries.

D. Earthwork

1. Clearing and Grubbing.

All objectionable materials including trees, stumps, brush, rubbish, and all organic or inorganic material not suitable for fill shall be removed from the project area. All root mats shall be removed to a depth of not less than one foot below subgrade.

2. Rough Grading: Excavation and Fill

- a. Rough grading shall consist of excavation or fill to the established grades, lines, and limits.
- b. Topsoil shall be stripped and stockpiled outside of the proposed street right-of-way.
- c. Rock, if encountered, shall be removed to a depth of not less than four inches below the established subgrade.
- d. Fill shall consist of clean earth; stone or such non-organic material as may be approved by the Township Engineer. Fill shall be placed in layers not exceeding 8 inches loose and compacted until the density per cubic foot is not less than 97% of the dry-weight density. Compaction shall be accomplished by utilizing a tractor and scoop, 10-ton roller, vibrating compactor or other method as approved by the Township Engineer. Compaction tests may be required by the Township Engineer.

3. Fine Grading; Preparation of Sub-base

Final grading shall consist of preparation of the subgrade for construction of street paving. The subgrade shall be carefully shaped using a patrol grader and compacted using a 3-wheel roller weighing not less than 10 tons to not less than 100% of the dry weight density. Compaction tests may be required by the Township Engineer. In case satisfactory subgrade stability cannot be obtained, unsuitable material shall be removed and replaced with suitable material.

E. Base Course

1. A. Crushed Stone Base Course (Standard Street Design)

Where crushed stone base course is required, construction methods and materials shall be in accordance with Penn DOT Form 408, latest revision.

On a properly prepared subgrade, an initial layer of fine material, meeting the requirements for Penn DOT No. 2A Aggregate, shall be spread to a depth of 2 inches. This initial layer of fine material shall not be placed on a wet, frozen or unsuitable subgrade.

Course material shall be spread uniformly on the initial layer of fine material to the required depth. Coarse material shall meet the requirements for Penn DOT No. 4 Aggregate. Particular attention is called to the requirements of Form 408 regarding compaction. If compaction is obtained by the use of rollers only (Method 1), base course more than 8 inches in compacted depth shall be constructed in 2 or more layers. If approved vibratory equipment is used (Method 2), base course up to 10 inches in compacted thickness may be constructed in one course.

After the coarse material has been satisfactorily compacted, fine material shall be spread uniformly over the surface with approved mechanical equipment. Immediately following this operation, fine material shall be broomed and rolled until the voids in the coarse material are completely filled. The spreading and rolling of the fine material shall be carried out in sections of not less than 150 feet nor more than 1000 feet in length. Each section shall be completely bound and compacted before beginning another.

After the completion of the application and rolling of the fine material, the surface shall be sprinkled with water and rolled. This operation shall continue, and additional fine material added, until all voids in the coarse material are filled and a slight wave of grout forms in front the roller wheels. Brooms, attached to the roller and hand brooms, shall be utilized to spread the grout uniformly and unfilled voids. After the wave of grout has been produced over the entire section of base coarse, this section shall be left to dry. The surface shall be sprinkled and re-rolled on succeeding days, as required to bond it thoroughly and to secure a satisfactory surface.

After completion of the fine material, an second layer of fine material, meeting the requirements for Penn DOT No. 2A Aggregate, shall be spread to a depth of 2 inches. This second layer of fine material shall not be placed on a wet, frozen or unsuitable surface.

F. Bituminous Surface Course

1. Bituminous Surface Course Superpave (Standard Street Design)

- a. Where new crushed stone base course is to be covered with Superpave surface course, it shall consist of 3 courses, base course, binder course and wearing course of hot-mixed, hot-laid binder asphaltic concrete, having a total thickness after final compaction of 5-1/2 inches, 2-1/2 inch base course(PG 64-22 19 MM .3 to 3 million ESAL'S, SRL-M), a 1-1/2" binder course(PG 64-22 12.5 MM .3 to 3 million ESAL'S, SRL-M), and an 1-1/2 inch wearing course (PG 64-22 9.5 MM .3 to 3 million ESAL'S, SRL-M) for residential streets and 7 inches, 4 inches base course (PG 64-22 25 MM .3 to 3 million ESAL'S, SRL-M), a 1-1/2" binder course(PG 64-22 12.5 MM .3 to 3 million ESAL'S, SRL-M), and a 1-1/2 inch wearing course (PG 64-22 9.5 MM .3 to 3 million ESAL'S, SRL-M), for industrial streets. It shall be composed of materials and constructed entirely in accordance with Penn DOT Form 408, latest revision. Bituminous pavers shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of bituminous plant mix material in land widths applicable to the specified typical section shown on the drawings. The paver shall be capable of being

operated at forward speeds consistent with satisfactory laying of the mixture. In small areas, where the use of mechanical finishing equipment is not practical, material may be spread and finished by hand, if so directed by the Township Engineer.

Breakdown rolling shall be performed with a 3 wheel or tandem roller. Intermediate rolling shall be performed with a pneumatic tire roller. Finish rolling shall be performing with a tandem roller. Roller weight shall be sufficient to achieve not less than 95% of the density requirement established by the Marshall method at the time of approval of the mixture. Finish rolling shall continue until all roller marks are eliminated. In no case shall vibratory equipment be permitted on bituminous surface course.

Particular attention is directed to Form 408 regarding weather limitations for placing bituminous material. Bituminous materials shall not be placed on wet surfaces, nor when the air temperature is less than 40° F, nor when the temperature of the sub-base is less than 40° F.

G. Manhole Frame and Cover Grades

Adjusting Rings – The use of brick adjustments shall not be permitted. All manholes shall be adjusted to finished grades utilizing no more than two (2) two (2") inch thick concrete adjusting rings (4" maximum thickness). Concrete adjusting rings shall be one piece, no split rings will be allowed. Joints between cone section, adjustment rings and frame shall be sealed with RAM-NEK or Rub'R-Nek material to provide a watertight seal. 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. The elevation of the manhole frame and cover in new Township streets shall be set 1/8" to 1/4" below the binder course until the wearing course is constructed. At the time of wearing course construction the frame and cover shall be adjusted to finished grade by the use of concrete adjusting rings.

H. Conduit for Underground Utilities

1. General

A. Description

1. The work of this section includes installation of conduits for:
 - a. Underground electrical power transmission.
 - b. Underground telephone and cable TV.
 - c. Natural gas transmission.

B. Quality Assurance

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

D1785 Specifications for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 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 Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

D2855 Recommended Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

D2729 Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

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

2. Products

A. Poly (Vinyl Chloride) (PVC) Utility Conduit

1. Natural Gas:

- a. Main line conduits – 3" diameter and larger shall meet the requirements of ASTM D2729. Joints shall be solvent cement.
- b. Service line conduits – 2-1/2" diameter and small shall meet the requirements of ASTM D-1785 (Schedule 40). Joints shall be solvent cement.

2. Telephone, Electric and Cable TV:

- a. Main line conduits – 3" diameter and larger shall meet the requirement of ASTM D2729. Joints shall be solvent cement.

3. Excavation

A. Preparation

1. Natural Gas Lines.

- 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 2 feet beyond the curb line where curbs are proposed or a minimum of 5 feet 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 24" deep plus that excavation necessary for placement of bedding material. A minimum of 2 feet beyond the curb line where curbs are proposed or a minimum of 5 feet beyond the paving where no curbs are proposed to be installed.

2. Electric Conduits:

- a. Excavate main line trenches to a minimum depth of 24" 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 2 feet beyond the curb line where curbs are proposed or a minimum to 5 feet 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 24" plus that excavation necessary for placement of pipe bedding material. During street construction, prior to installation of the stone base course, conduits shall be installed at all proposed crossings. Conduit shall extend a minimum of 2 feet beyond the curb line where curbs are proposed or a minimum of 5 feet beyond the paving where no curbs are proposed to be installed.

4. 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 6" for bedding, with PA No. 2RC aggregate.

B. Width of Excavation

1. Excavate main line and service trenches to a maximum width of 24".

- C. 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.

- D. 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.
- E. 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.
- F. Assemble joint in accordance with recommendations of the manufacturer.
 - 1. Solvent cemented joints:
 - a. Camfer and deburr conduit. Clean socket and plain end. Measure and mark the socket depth on the outside of the conduit.
 - b. Apply primer to inside socket surface using a scrubbing motion to ensure penetration. Repeated application may be necessary. Soften surface of male end of conduit to depth of fitting socket
 - c. 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.
 - d. 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 1/4 turn during assembly to distribute the cement evenly. Assembly should be completed within 20 seconds after the last application of cement. Insert conduit with a steady, even motion. Do not use hammer blows.
 - e. Hold joint in place until cement has set. Wipe excess cement from the conduit.
- G. Place sufficient compacted bedding and backfill on each section of conduit, as it is laid, to hold firmly in place.
- H. Keep trenches and excavations free from water during construction.
- I. 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. Conduit Bedding Backfill

- A. All conduits must be surrounded with a minimum of 6" of stone dust on top, bottom and each side.

4. Detectable Warning Tape For Electric And Natural Gas Conduits

- A. The Contractor shall furnish and install a metallic warning tape in all electric and natural gas conduit trenches to assist in locating these underground facilities in the future. This detectable identifying tape shall be a color that is easily detected, 2" wide minimum, and be imprinted as follows: "CAUTION BURIED UTILITY LINE BELOW" of similar wording. The warning tape shall be installed twelve (12") inches below the finished ground or street surface. Warning tape shall be Terra Tape "D" as manufactured by the Griffolyn Company, Inc., of Houston Texas or Seton Detention Tape as manufactured by Seton Name Plate Corporation, New Haven, CT 06506 or an approved equal. Materials shall meet ASTM D-2564 standards.

I. Paving Joints

1. Notch

Where specified, the edge of the overlay shall be saw cut to a depth of 1-1/2" for the entire length of the joint and the detached material removed to a minimum notch width of 12 inches. 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 401.2(J)).

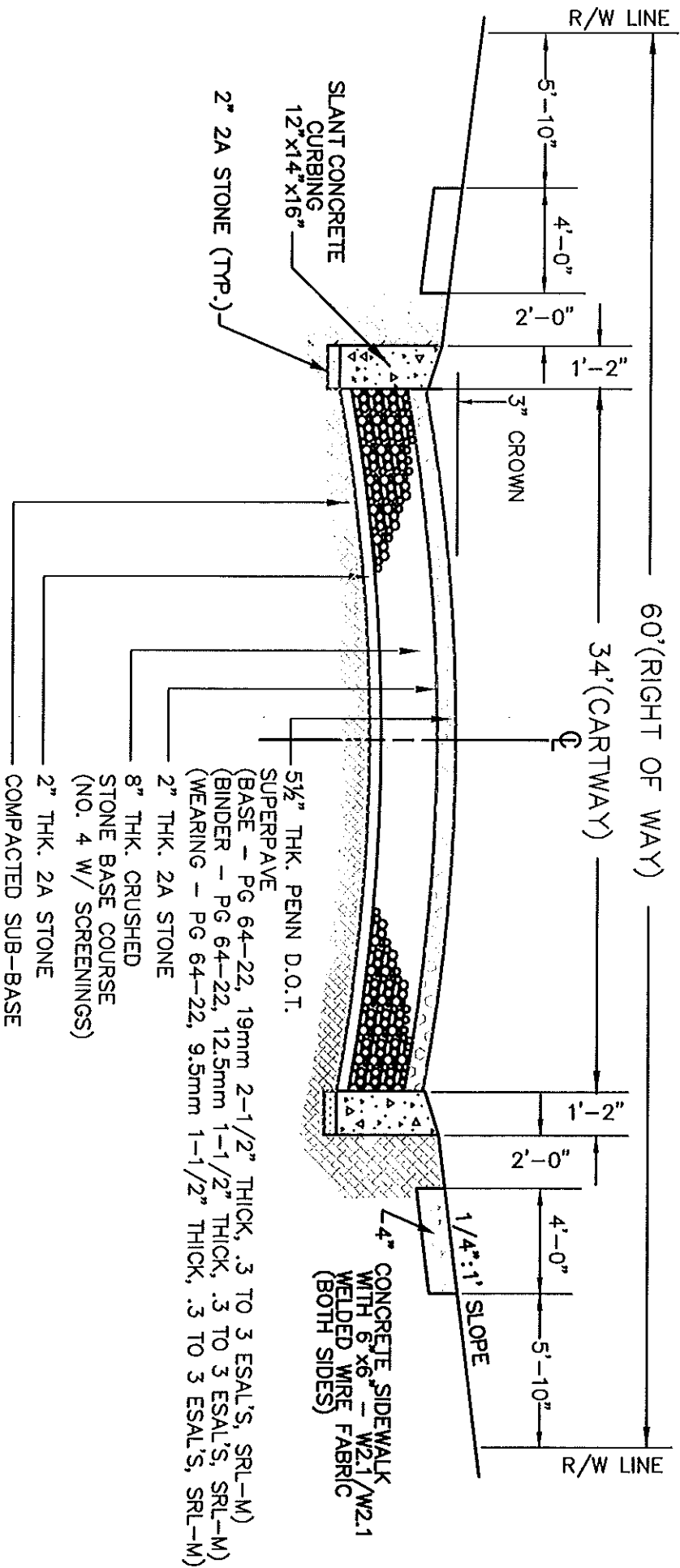
2. Sealing

All joints to be sealed with hot bituminous material using PG 64-22. 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 8 inches from the curb, applied evenly. The use of Class E-6 or E-8 may be permitted in place of hot bituminous material (Publication 408, Section 401.3(G), (J)). Streets that are to be in place for more than one year with the binder course only, shall be sealed immediately following the installation of the binder course as discussed above prior to the placement of the wearing course or prior to street adoption.

J. Geotextile

1. Fabric

Where specified, the developer may install a geotextile fabric in addition to the base course and Bituminous surface course to increase stability of the subgrade. The fabric should be a polypropylene nonwoven fabric with a tensile strength of 200 pounds for local roads and 400 pounds for collector and industrial roads. All geotextile fabrics must be approved by the Township Engineer prior to installation.

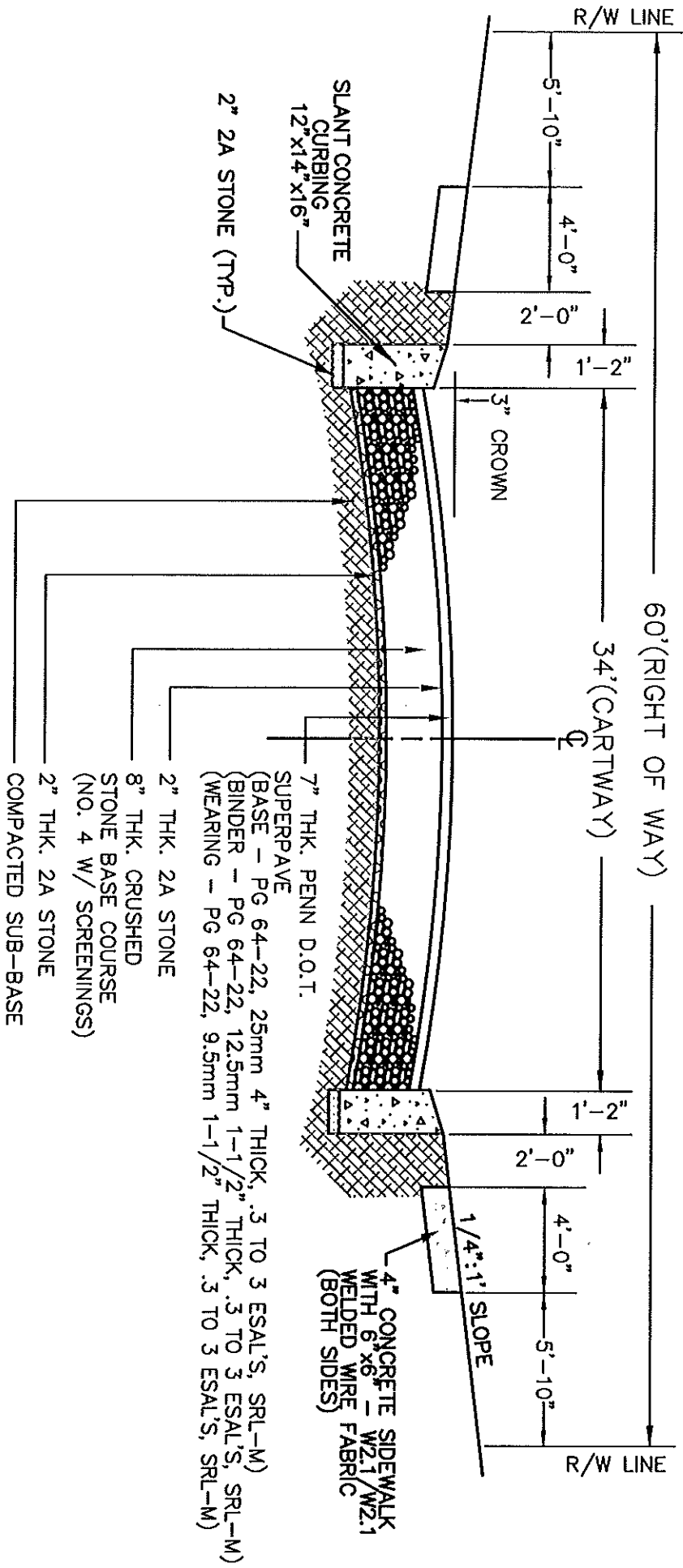


COLLECTOR STREET (RESIDENTIAL)

-CROSS SECTION-

Gordon L. Brown & Associates, Inc.
 Civil Engineers & Surveyors
 717-741-4621
 2238 South Queen Street
 York, Pa. 17402-4631

NOT TO SCALE
 DATE: 1/9/07



7" THK. PENN D.O.T. SUPERPAVE
 (BASE - PG 64-22, 25mm 4" THICK, .3 TO 3 ESAL'S, SRL-M)
 (BINDER - PG 64-22, 12.5mm 1-1/2" THICK, .3 TO 3 ESAL'S, SRL-M)
 (WEARING - PG 64-22, 9.5mm 1-1/2" THICK, .3 TO 3 ESAL'S, SRL-M)

2" THK. 2A STONE

8" THK. CRUSHED STONE BASE COURSE (NO. 4 W/ SCREENINGS)

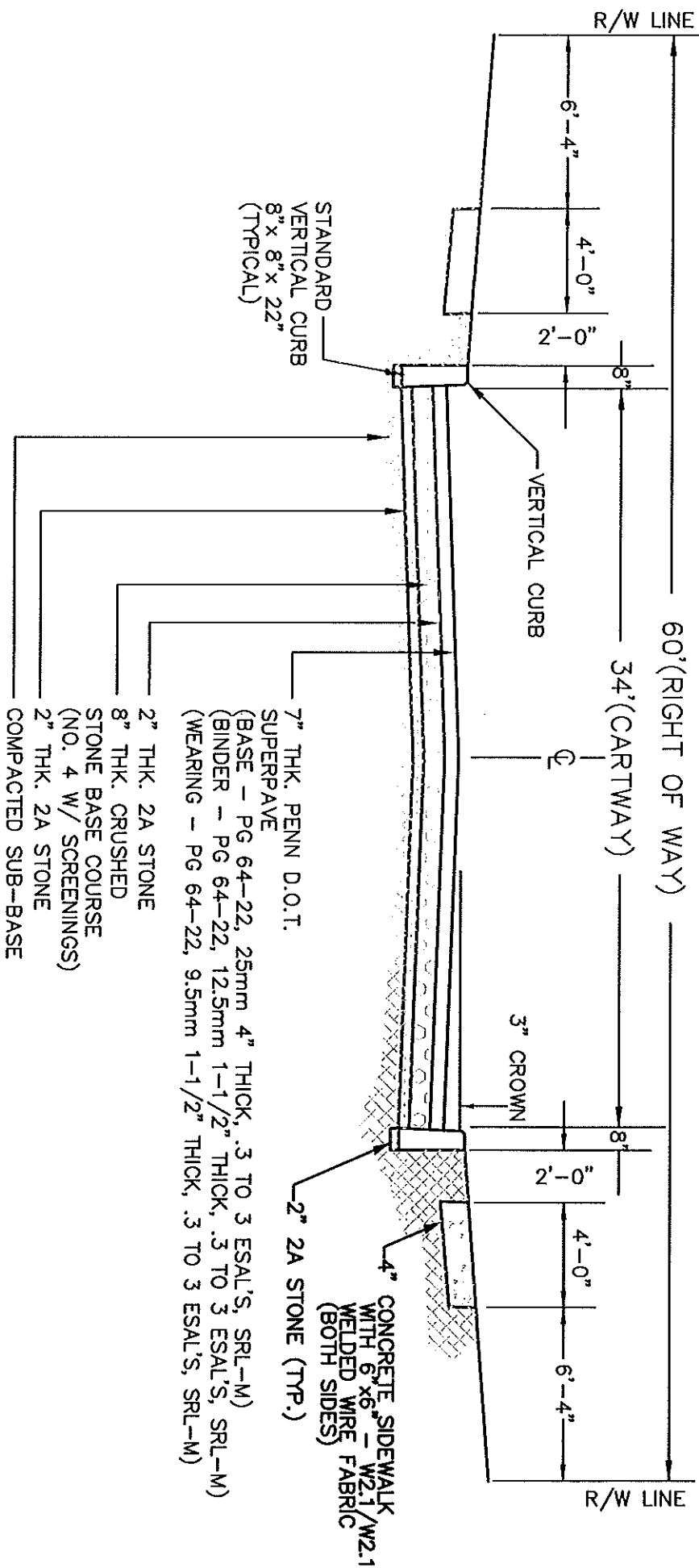
2" THK. 2A STONE

COMPACTED SUB-BASE

INDUSTRIAL STREET DETAIL (SLANT CURB)

-CROSS SECTION-

NOT TO SCALE
 DATE: 1/9/07



- 7" THK. PENN D.O.T. SUPERPAVE
- (BASE - PG 64-22, 25mm 4" THICK, .3 TO 3 ESAL'S, SRL-M)
- (BINDER - PG 64-22, 12.5mm 1-1/2" THICK, .3 TO 3 ESAL'S, SRL-M)
- (WEARING - PG 64-22, 9.5mm 1-1/2" THICK, .3 TO 3 ESAL'S, SRL-M)
- 2" THK. 2A STONE
- 8" THK. CRUSHED STONE BASE COURSE (NO. 4 W/ SCREENINGS)
- 2" THK. 2A STONE
- COMPACTED SUB-BASE

4" CONCRETE SIDEWALK WITH 6 X 6 W2.1/W2.1 WELDED WIRE FABRIC (BOTH SIDES)

2" 2A STONE (TYP.)

INDUSTRIAL STREET (VERTICAL CURB)
 -CROSS SECTION-

LOCAL STREET (RESIDENTIAL)
 -CROSS SECTION-

NOT TO SCALE
 DATE: 1/9/07

