LIMERICK TOWNSHIP
MONTGOMERY COUNTY, PENNSYLVANIA

IMPROVEMENTS CONSTRUCTION MANUAL

PROCEDURES, MATERIALS AND SPECIFICATIONS

LIMERICK TOWNSHIP
BOARD OF SUPERVISORS
646 WEST RIDGE PIKE
LIMERICK, PA 19468

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MONTGOMERCOUNTY, PENNSYLVANIA

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LIMERICK TOWNSHIP
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THE FOLLOWING SPECIFICATIONS SHALL SUPPLEMENT THE LIMERICK TOWNSHIP ZONING ORDINANCE, SUBDIVISION AND LAN DEVELOPMENT ORDINANCE, AND ALL OTHER ORDINANCES AND REGULATIONS OF LIMERICK
TOWNSHIP WHICH PERTAIN TO THE CONSTRUCTION OF THE TYPES OF IMPROVEMENTS REGULATED BY THESE SPECIFICATIONS

PROCEDURES

General

A General Procedure for subdivision and land development projects, preconstruction and construction phase is included in the exhibits.

Notification

The Limerick Township Board of Supervisors or duly assigned representative shall be notified prior to the start of any construction and/or excavation, including removal of topsoil, grubbing of shrubs, bushes, trees and vegetation of any kind, or the performance of any work in a street, right-of-way, utility easement, storm drainage easement, waterways, and approved subdivision or land development in Limerick Township.

Preconstruction Conference

A preconstruction conference will be required for all Subdivision and Land Developments where an escrow has been developed for improvements cost, and for any other construction or earthmoving activities when deemed necessary by the Township Supervisors or Township Engineer. The developer or his representative and the contractor or contractors who will be performing the work are to attend along with the Township Engineer and Township representatives as well as any other interested reviewing agencies and/or utilities. A preconstruction conference agenda and check list is included in the exhibits.

Permits and Certificates

Proof of all required permits, certifications and approvals shall be provided at the preconstruction meeting as well as compliance With PA One Call System, in accordance with PA ACT 287 of 1974 as amended by PA ACT 187 of 1996 and PA ACT 181 of 2006. Construction may not commence until all permits and approvals are obtained. All permit applications shall be made by the property owner and shall be under his signature.

Any and all applications and/or permit fees shall be paid at the time of application and shall be in the amount as established by resolution of the Board of Supervisors as in effect at the time of application.

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A general list of permits and/or approvals which is not all inclusive or limited is as follows:

Permits or Approvals	Agency
Stream Encroachment	PA D.E.P., Army Corps of Engineers, and Pa. Fish Commission
Wetlands and/or Flood Plain Encroachments	PA D.E.P. Army Corps of Engineers
Water Quality	PA D.E.P. Delaware River Basin Commission
State Highway Access	and/or Occupancy
County Highway	Montgomery County
Township Street Opening	Limerick Township
Township Street Access (Driveways & Roads)	Limerick Township
Grading, Soil Erosion & Sediment Control	County Conservation, Limerick Township
Sanitary Sewer Connections and Installations	Limerick Township Sewer Authority
Water Connections and/or Installations	Local Water Utility Co., and Limerick Township

Traffic Control and Safety

Work being performed on any and all existing public highways, streets, rights-of-ways and easements, shall require Street Occupancy Permit and posting of a performance bond as may be required from the proper authority, and all required safety protection, including flag persons, signing, barricades, flashing warning devices and other required devices. All safety protection methods and devices and procedures shall be in conformance with Pennsylvania Department of Transportation Publication 203, Work Zone Traffic Control current edition, and will be furnished and maintained solely by the applicant.

All work being performed shall be in compliance with Federal, State and local safety regulations and shall provide for public safety and the safety of all personnel involved directly or indirectly in the construction of all improvements, including, but not limited to trench shoring, protective clothing, safety shields and switches on power equipment, and vehicle alarms.

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Inspections

Inspections shall be performed by the Township or his duly representative unless stated otherwise herein, to guarantee the proper procedures and methods of installation of all approved structure and approved materials required to be installed.

Inspections shall be required prior to starting construction, during the installation of materials and structures, and upon the completion of all improvements. All improvements shall be installed in accordance with all required approved regulations and specifications.

Any and all unsatisfactory work, faulty procedures and methods, and defective materials that have been installed shall be rejected an noted for the record on the inspection standards punch list and shall be corrected before final acceptance.

The placement of all required improvements shall be in accordance with the controls set by a surveyor registered by the state of Pennsylvania, to ensure installation of improvements to proper location, elevation, alignment and profile.

The following is intended to describe the format of inspection and notification procedures. Scheduling of required inspections shall be the responsibility of the Owner, and/or his contractor at least 48 hours before commencing any work on any item requiring inspection.

Sanitary Sewer System

Inspection of the sanitary sewer system is the responsibility of the Township Municipal Sewer Authority. The owner and/or his contractor shall make all arrangements with the Authority to adhere to their policies, procedures and standards.

Water Distribution System (Community System)

Inspection of all improvements having been installed complete by section, requiring section by section pressure test and bacteria test to required standards, which shall be in accordance with standards utilized by the water utility company servicing the Township.

Water Distribution System (Municipal or Public)

Inspection of all improvements is the responsibility of the local utility company serving the area. The Owner and/or his contractor shall make all arrangements with the Utility Co. to adhere to their policies, procedures and standards.

Storm Drainage System

Shall require visual inspection, section by section, upon completion of that section, prior to backfilling any section including pipes, inlets, manholes, endwalls, detention and retention basins, culverts and bridges, and all items being installed as part of the storm drainage system. Cast in place concrete structures and bridge structures shall require material samples, in compliance with the latest ASTM standards. Test samples must be taken in the presence of the inspector

Subsoil System

Inspections to determine type of subsoil structure for compaction compatibility for use as a subgrade.

Subgrade Structure and Underdrain Pipe

Inspection and testing of subgrade type and required density and visual inspection of underdrain pipe installation including all connections to the storm drainage system and service laterals as required.

Concrete Curb Structure

Inspection of subgrade, general alignment and any forms to be used. String line shall be set prior to any concrete pour to show line and grade, profile and alignment. Material inspection, including the submittal of all certified material delivery slips.

Subbase Course

Inspection of materials placed as subbase prior to installation of base course, including the submittal of all certified material delivery slips.

Superpave Asphalt Mixture Design shall be inspected in accordance with the following:

HMA Base Course – Mix Design 25mm. Inspection of materials placed as base, including the submittal of all certified material weight slips.

HMA Binder (19 mm) and Wearing Course (9.5 mm).

Re-inspection of previously installed base course.

Inspection of materials placed as wearing surface, including the submittal of all certified material weight slips.

Sidewalk Structures

Inspection of subbase grade, form, and alignment prior to any pour.

Right-of-way Profile

Inspection of required finish grade elevations to limits of street right-of-way.

Seeding, Sodding and Erosion Controls

Inspection as required to assure compliance with approved plans, regulations and general acceptable methods and practice.

LIMERICK TOWNSHIP
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SPECIFICATIONS

I- STREET

a. General Requirements:

1. The construction of streets in Limerick Township shall be done comply with the specifications, regulations and provisions set forth in this manual, together with the detail/ cross section provided under the details section.

2. In the case of new roads within subdivisions and land developments, all roads and streets shall be designed and constructed in accordance with the provisions of the current Limerick Township Subdivision and Zoning Ordinances and the requirements of this manual.

3. All work done pursuant to the provisions of the Limerick Ordinance shall be inspected by the Township Engineer, or Township Representative.

   The Design of all streets constructed shall be in accordance with the guidelines and requirements for Design of Local Road and street contained in PaDot Design Manual, Part 2, Highway Design, latest revision, the Township Zoning and Subdivision Ordinances, and this Manual.

4. Lines and grades shall be constructed as shown on the final approved plans. Any proposed modifications and changes, shall be review and approved by the Township Engineer prior to field implementation.

5. All Superpave asphalt mixture shall be in accordance with PaDot Publication 408, latest edition, Sections 309 and 409.

6. All work shall remain to within the area of disturbance. All disturbed areas shall be properly repaired, restored or replaced to the satisfaction of the Township by the party causing said damage.

7. In the case where the Township Engineer finds that the ground condition and/or rock condition beneath a street provides sufficient stability so that part or all of the subbase condition beneath a street provides sufficient stability so that part or all of the subbase requirements may be waived, modified or changed and still comply with generally recognized, sound engineering principles after appropriate test have been taken, subbase requirements may be so waived, modified or changed as recommended by the Township Engineer.

8. Clearing and grubbing – All trees, roots, stumps, brush, down timber, wood, rubbish and any other objectionable material shall be removed from the site and shall include the removal of any objectionable material shall be removed from the site and shall include

the removal of any obstruction interfering with the proposed road construction for the full legal right-of-way width, or as approved by the Township Engineer.

b. Subgrade:

1. Subgrade shall be prepared to accommodate the placement of the pavement structure and shoulders or gutters in accordance with PaDot specifications and within reasonably close conformity tot the lines, grades and widths shown on the drawings and cross-sections or otherwise directed.

2. Subgrade shall be graded to the elevation and cross-section required with suitable soil or granular material, compacted to the required density.

3. In cases where the required density or stability cannot be obtained, the material in the area shall be excavated to a depth that when replaced and recompacted at a moisture content not exceeding optimum, the Subgrade will have the required stability where the Subgrade cannot be compacted or which moist and flow under the weight of a ten (10) ton roller.

4. The Subgrade shall be properly prepared to receive the subbase.

5. Where the surface of an existing non-skid roadway conforms approximately to the proposed Subgrade elevation, or where an embankment less than nine inches (9") in depth is to be made over such roadway, the surface of the old roadway shall be scarified to a depth of not less than four inches (4"), to permit satisfactory reshaping, binding and compaction of the subgrade.

c. Sub-base:

1. This work shall consist of constructing a layer or layers of aggregate on a prepared are in accordance with Penn DOT Publication 408, Section 350, latest revisions.

2. The aggregate shall be stone or gravel meeting the requirements of Penn DOT Type C or better, No. 2A stone or approval equal.

3. If at the time of construction, local unstable subgrade conditions are encountered, the Township Engineer may require that all areas of unstable subgrade be excavated to sufficient depth, replaced with approved material and compacted to a density and stability equal to or greater than the surrounding subgrade, and/or require the use of a Geotexile.

d. Superpave Asphalt Mixture Design, HMA Base Course:

Description: This work shall consist of installing a certified plant-mixed HMA base course on a prepared surface within reasonably close conformity to the lines, grades and limits shown on the construction documents. The base course shall be constructed to the minimum compacted depth and density and to the distances below the finished grade, as indicated in the construction documents.

Design Standards: Unless otherwise indicated, the following design standards shall be used:

1. Mix Design – 25mm.
2. Equivalent Single Axle Load – 3.0 to 10.0 million.
3. Performance Grade – PG 64-22.
4. Mat Thickness – 150mm (6-inches) State Highways
   200 mm (8-inches) Township Roads.

All standards shall be in accordance with PaDot Publication 408, latest edition, Sections 309 and 409.

Mixture Acceptance:

A. For Township Roads, Certification Acceptance level will be used. Criteria for acceptance shall be as specified in PennDOT Publication 408, Section 409.2(f).

B. Provide PennDOT Form CS-4171 from a plant approved in Bulletin 15. Attach all QC test results to the form. Certify mixture as specified in Section 106.03 and the requirements of Section 409.

C. Provide all forms and supporting certifications to the Engineer a minimum of 10-days prior to the commencement of work.

D. For State Highways, mixture acceptance may be by other methods, as specified in PaDot Publication 408, Section 409. It is incumbent upon the contractor to contact the PaDot representative to determine which criteria for acceptance will be used for the specific project.

Material: All material shall be in accordance with Section 409.2 of PaDot Publication 408, latest edition.

Equipment:

- Hauling Equipment

1. Haul the mixtures in tightly sealed vehicles that do not contain petroleum oils, solvents, or other materials that adversely affect the mix.
2. Provide covers of sufficient size and quality to protect the entire load under all conditions.
3. Maintain the proper and uniform temperature specified in Section 409.3(h)1 of PaDot Publication 408, latest edition.
4. Provide insulation on all sides of the truck body, a double-walled body, or a heated body when the air temperature is below 50°F.

- Bituminous Pavers

1. Use self-contained, power-propelled units with activated screeds or activated strike-off assemblies and with automatic screed controls capable of producing a finished surface of the specified evenness and texture.
2. Provide heated units capable of spreading and finishing the mixture to the widths and depths indicated.
3. Provide units capable of being operated at forward speeds consistent with the satisfactory laying of the mixture and equipped with receiving hoppers having sufficient capacity for uniform spreading and equipped with distribution systems that place the mixture uniformly in front of the screeds.
4. Do not use any equipment that tears, shoves, or gouges the mixture or that causes tracks, indented areas, flushing segregation or other permanent blemishes. Do not use blade graders or other earthmoving equipment.

- Rollers

1. Use steel-wheel, pneumatic-tire or vibratory rollers as specified in Section 108.05(c)3 of PaDot Publication 408, latest edition. Operate rollers according to manufacturer's recommendations.

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Construction Methods:

- Time Restrictions

1. Do not place paving mixtures from November 1 to March 31 unless written permission is obtained from Township or State Officials.

- Weather Limitations

1. Do not place base course when the air or prepared surface temperature is 35°F or lower.
2. If work is halted because of weather conditions, the Contractor may be permitted to place limited quantities of the base course that is en route to the project provided the placement is approved by the Project Representative on site.
3. Should the conditions not permit the material to be placed, the Contractor shall have no recourse for payment of any unused material.

- Preparation of Existing Surface.

1. Thoroughly roll all subgrade with a minimum 10-ton vibratory roller such that the finished product is properly compacted, stable at a uniform elevation and all aggregate is firmly embedded. For areas inaccessible to a roller, use a vibratory plate tamper or jumping jack to achieve the same criteria.
2. Compact subgrade to a minimum percentage specified of the materials maximum dry density as determined by ASTM D-698-70.

   For State Highways: minimum 100%
   For Township Roads: minimum 95%

3. If soft areas are encountered, the Engineer may direct the Contractor to allow sufficient time for the subgrade to dry out. If the area cannot be suitably compacted, the Engineer can order it removed and backfilled with suitable material. If soft areas are caused by the Contractor, those areas will be removed and backfilled at the Contractor's expense.
4. Do not allow equipment on the prepared subbase after final rolling and conditioning.

5. Paint all vertical surfaces of curbs, structures, gutter and pavements that will be in contact with bituminous mixtures with a uniform coating of bituminous material, Class E6 or E8.

- Spreading and Finishing.

1. Unless otherwise directed, deliver, place and compact pawns, mixtures during daylight hours.
2. Ensure that mixtures are delivered and placed at the following laying temperatures. Ensure mixture does not contain lumps of cold material

	Temperature of Mixture	
Class of Material	Min (°F)	Max (°F)
PG 64-22	265	320

For other classes of material, refer to PaDot Publication 408, Section 409.2 for temperature ranges.

3. Spread and strike off the mixture for the entire lane width or as much lane width as practical. Adjust screed assemblies to provide the required cross section and depth. After spreading, do not add any mixture to the mat that is segregated, below the minimum temperature, contains either a deficiency or excess of asphalt, or is otherwise unsuitable.
4. In areas where mechanical spreaders cannot be used, place and screed the mixture with suitable hand tools. Do not use rakes.
5. If the base course is more than 150 mm (6-inches), place the course in two or more layers of approximately equal depth, with no layer less than 80 mm (3-inches) or more than 150 mm (6-inches). If the compacted depth of the base course is more than 200 mm (8-inches), please the course in two or more layers of approximately equal depth with no layer less than 100 mm (4-inches) or more than 200 mm (8-inches).
6. Install the base course to within 6 mm (1/4-inch) of final elevations. Remove and replace any irregularities more than 6 mm (1/4-inch).

Joints:

a. Longitudinal.

1. Plan joint locations to ensure that the joint in the top layer is at the approximate pavement centerline for two-lane roadways and within 300 mm (12-inches) of the lane lines for roadways with more than two lanes. Offset joints in a layer from the joint in the layer immediately below by approximately 150 mm (6-inches).
2. If traffic or other causes distort the lane edge, restore it to its original shape using either a vertical or notched wedged joint per Section 409.3 of PaDot Publication 408, latest edition.

b. Transverse.

1. Construct joints perpendicular to the pavement centerline.
2. Provide a true vertical surface and cross section throughout the entire joint.
3. Paint the joint face with a thin coating of bituminous material before placing fresh mixture against the joint face.

Compaction:

1. Compact the mixture to achieve the density acceptance requirements and to eliminate all roller marks.
2. Compact the mixture while it is in the proper condition. Adjust roller speed, amplitude, frequency pattern and roller size to eliminate displacement, shoving, cracking and aggregate breakage. Satisfactorily correct all displacement.
3. Maintain wheels of the steel-wheel rollers moist and clean to prevent the mixture from adhering to the wheels.
4. For areas inaccessible to rollers, compact with mechanical vibrating hand tampers.

Mat Density Acceptance:

1. Density acceptance level will be either by Non-Movement or Optimum – Rolling Pattern as outlined in PaDot Publication 408, Section 409.3.

2. Density limits shall comply with Table E of Section 409.3, Publication 408, latest edition.

Field Technician:

1. Provide a certified HMA field technician in accordance with the qualifications outlined in Publication 351 to control placement of the bituminous mixtures. The certified HMA field technician must be onsite and carry a valid certification card during placement of all HMA mixtures.

Protection of Courses:

1. Do not allow vehicular traffic or loading on newly compacted courses until adequate stability and adhesion is obtained and the material has cooled to 140°F or less.

Defective Work.

1. Remove and replace all work determined to be defective by the Engineer. Defective work will be as defined in PaDot Publication 408, latest edition, Sections 105, 309 and 409.
2. Defective work will not be measured for payment until it is satisfactorily corrected.

e- Superpave Asphalt Mixture Design, HMA Binder and Wearing Course:

Description:. This work shall consist of installing a certified plant-mixed HMA Binder or Wearing course on a prepared surface within reasonably close conformity to the lines, grades and limits shown on the construction documents. The base course shall be constructed to the minimum compacted depth and density and to the distances below the finished grade, as indicated in the construction documents.

Design Standards: Unless otherwise indicated, the following design standards shall be used:

- Mix Design – 19mm. - Binder
  9.5mm - Wearing
- Equivalent Single Axle Load – 3.0 to 10.0 million.
- Performance Grade – PG 64-22.
- Mat Thickness – (2") 50mm Binder Course
  40mm Wearing Course
- Skid Resistance Level (SRL) – Level H

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All standards shall be in accordance with PaDot Publication 408, latest edition, Sections 309 and 409.

Mixture Acceptance:

A. For Township Roads, Certification Acceptance level will be used. Criteria for acceptance shall be as specified in PaDot Publication 408, Section 409.2(f).

B. Provide PaDot Form CS-4171 from a plant approved in Bulletin 15. Attach all QC test results to the form. Certify mixture as specified in Section 106.03 and the requirements of Section 409.

C. Provide all forms and supporting certifications to the Engineer a minimum of 10-days prior to the commencement of work.

D. For State Highways, mixture acceptance may be by other methods, as specified in PaDot Publication 408, Section 409. It is incumbent upon the contractor to contact the PaDot representative to determine which criteria for acceptance will be used for the specific project.

Material: All material shall be in accordance with Section 409.2 of PaDot Publication 408, latest edition.

Equipment:

- Hauling Equipment.

  1. Haul the mixtures in tightly sealed vehicles that do not contain petroleum oils, solvents, or other materials that adversely affect the mix.
  2. Provide covers of sufficient size and quality to protect the entire load under all conditions.
  3. Maintain the proper and uniform temperature specified in Section 409.3(h)1 of PaDot Publication 408, latest edition.
  4. Provide insulation on all sides of the truck body, a double-walled body, or a heated body when the air temperature is below 50°F.

- Bituminous Pavers

  1. Use self-contained, power-propelled units with activated screeds or activated strike-off assemblies and with automatic screed controls capable of producing a finished surface of the specified evenness and texture.
  2. Provide heated units capable of spreading and finishing the mixture to the widths and depths indicated.

3. Provide units capable of being operated at forward speeds consistent with the satisfactory laying of the mixture and equipped with receiving hoppers having sufficient capacity for uniform spreading and equipped with distribution systems that place the mixture uniformly in front of the screeds.
4. Do not use any equipment that tears, shoves, or gouges the mixture or that causes tracks, indented areas, flushing segregation or other permanent blemishes. Do not use blade graders or other earthmoving equipment.

- Rollers

1. Use steel-wheel, pneumatic-tire or vibratory rollers weighing not less than ten (10) tons, as specified in Section 108.05(c)3 of PaDot Publication 408, latest edition. Operate rollers according to manufacturer's recommendations.

Construction Methods:

- Time Restrictions

1. Do not place paving mixtures from November 1 to March 31 unless written permission is obtained from Township or State Officials.

- Weather Limitations

1. Do not place base course when the air or prepared surface temperature is 40°F or lower.
2. If work is halted because of weather conditions, the Contractor may be permitted to place limited quantities of material that is en route to the project provided the placement is approved by the Project Representative on site.
3. Should the conditions not permit the material to be placed, the Contractor shall have no recourse for payment of any unused material.

- Preparation of Existing Surface.

1. Remove and dispose of all loose and foreign material including, dirt, dust, mud, excess joint and crack sealer and all other foreign material. Employ a power or portable truck broom for large areas.
2. Should excessive amounts of dirt and/or dust be embedded within the base course, the Engineer may order the surface to be blown off with compressed air to remove this material.
3. Fill cracks where directed by the Engineer prior to paving. Any broken or faulty road surface, holes, or depressions are to be excavated to a firm

foundation, dried, tack or prime coated and leveled with suitable bituminous patching material prior to overlay.

4. All surfaces to receive either binder or wearing course must be dry.
5. Before overlaying any surfaces, apply specified tack coat at an average rate of 0.05 gal/sq.yd. in accordance with Section 460 or as directed by the Engineer. Tack coat shall be applied no more than three (3) hours before the street is paved. Dripping or pouring the tack coat even from a distributor truck will be cause for suspension of work until proper equipment is brought to the job.
6. Paint all vertical surfaces of curbs, structures, gutter and pavements that will be in contact with bituminous mixtures with a uniform coating of bituminous material, Class E6 or E8.
7. All necessary start and stop cuts and cuts around inlets and at the end of paving for each limit of paving are to be made by the Contractor.

- Spreading and Finishing.

1. Unless otherwise directed, deliver, place and compact pawns, mixtures during daylight hours.
2. Ensure that mixtures are delivered and placed at the following laying temperatures. Ensure mixture does not contain lumps of cold material

	Temperature of Mixture	
Class of Material	Min (°F)	Max (°F)
PG 64-22 .	265	320

For other classes of material, refer to PaDot Publication 408, Section 409.2 for temperature ranges.

3. Spread and strike off the mixture for the entire lane width or as much lane width as practical. Adjust screed assemblies to provide the required cross section and depth. After spreading, do not add any mixture to the mat that is segregated, below the minimum temperature, contains either a deficiency or excess of asphalt, or is otherwise unsuitable.
4. In areas where mechanical spreaders cannot be used, place and screed the mixture with suitable hand tools. Do not use rakes.
5. Install the binder or wearing course to within 6 mm (1/4-inch) of final elevations. Remove and replace any irregularities more than 6 mm (1/4-inch).
6. Sealing of each overlaid road shall be performed within fourteen (14) days of paving.
7. All curbs, edges, inlets, manholes, water boxes, driveways, etc. Must be sealed with AC-20 or equal (not tack coat) after resurfacing. All driveways shall have screenings placed over the AC-20 while it is still hot.

Joints:

a. Longitudinal.

1. Plan joint locations to ensure that the joint in the top layer is at the approximate pavement centerline for two-lane roadways and within 300 mm (12-inches) of the lane lines for roadways with more than two lanes. Offset joints in a layer from the joint in the layer immediately below by approximately 150 mm (6-inches).
2. If traffic or other causes distort the lane edge, restore it to its original shape using either a vertical or notched wedged joint per Section 409.3 of PaDot Publication 408, latest edition.

b. Transverse.

1. Construct joints perpendicular to the pavement centerline.
2. Provide a true vertical surface and cross section throughout the entire joint. All joints within the wearing course shall be saw joints.
3. Paint the joint face with a thin coating of bituminous material before placing fresh mixture against the joint face.

Compaction:

1. Compact the mixture to achieve the density acceptance requirements and to eliminate all roller marks.
2. Compact the mixture while it is in the proper condition. Adjust roller speed, amplitude, frequency pattern and roller size to eliminate displacement, shoving, cracking and aggregate breakage. Satisfactorily correct all displacement.
3. Maintain wheels of the steel-wheel rollers moist and clean to prevent the mixture from adhering to the wheels.
4. For areas inaccessible to rollers, compact with mechanical vibrating hand tampers.

Mat Density Acceptance:

1. Density acceptance level will be either by Non-Movement or Optimum – Rolling Pattern as outlined in PaDot Publication 408, Section 409.3.
2. Density limits shall comply with Table E of Section 409.3, Publication 408, latest edition.

Field Technician:

1. Provide a certified HMA field technician in accordance with the qualifications outlined in Publication 351 to control placement of the bituminous mixtures. The certified HMA field technician must be onsite and carry a valid certification card during placement of all HMA mixtures.

Protection of Courses:

1. Do not allow vehicular traffic or loading on newly compacted courses for a minimum of three (3) hours and until adequate stability and adhesion is obtained and the material has cooled to 140°F or less.

Surface Tolerance:

1. Extreme care shall be exercised by the contractor to insure that a continuous grade exists along the new paving and that no pockets exist for water to collect and remain dormant. If any such pockets do occur, the contractor at his expense shall be required to correct the problem to the satisfaction of the Township Engineer.
2. Surface tolerance shall be as defined by Section 409.3(L). The pavement will be considered defective if irregularities are more than 3/16-inch over a 10-foot length.

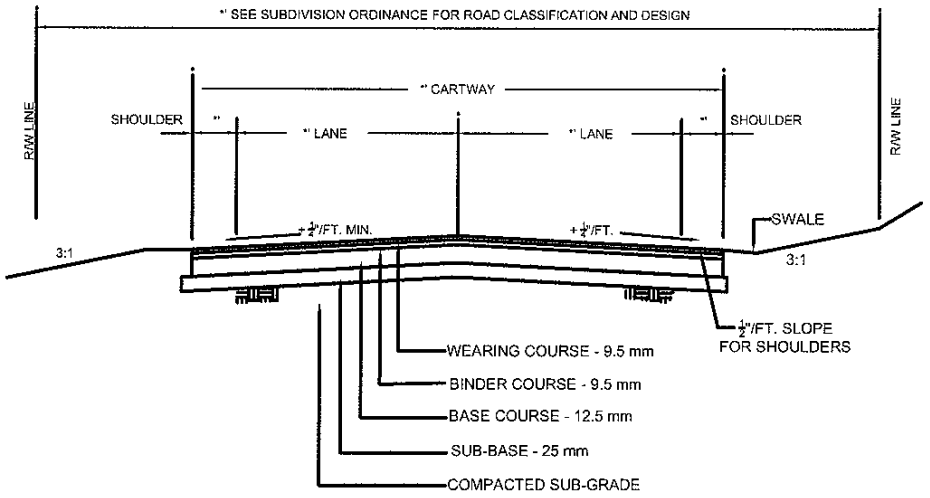
Defective Work:

1. Remove and replace all work determined to be defective by the Engineer. Defective work will be as defined in PaDot Publication 408, latest edition, Sections 105, 309 and 409.
2. Defective work will not be measured for payment until it is satisfactorily corrected.
3. All cutting of test holes, checking of depth, refilling, and compacting shall be done by the contractor at his expense and as directed by the Engineer.

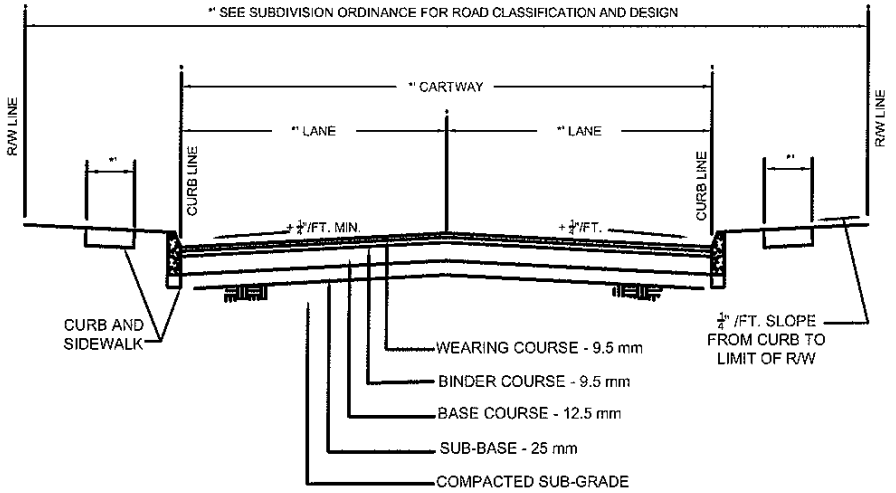
f. Shoulders:

1. Supporting shoulders shall be constructed on the sides of all roads and streets within the Township where curbing shall not otherwise be required.

2. Shoulders shall be constructed as required and shall be Penn DOT Type 1-I paved shoulders as in Publication 408, Section 651, latest revision. Additional shoulder designs may be approved by the Township and Township Engineer where deemed necessary.



+ INCREAS SLOPE FOR ¼"/FT. WHEN DEEMED NECESSARY .

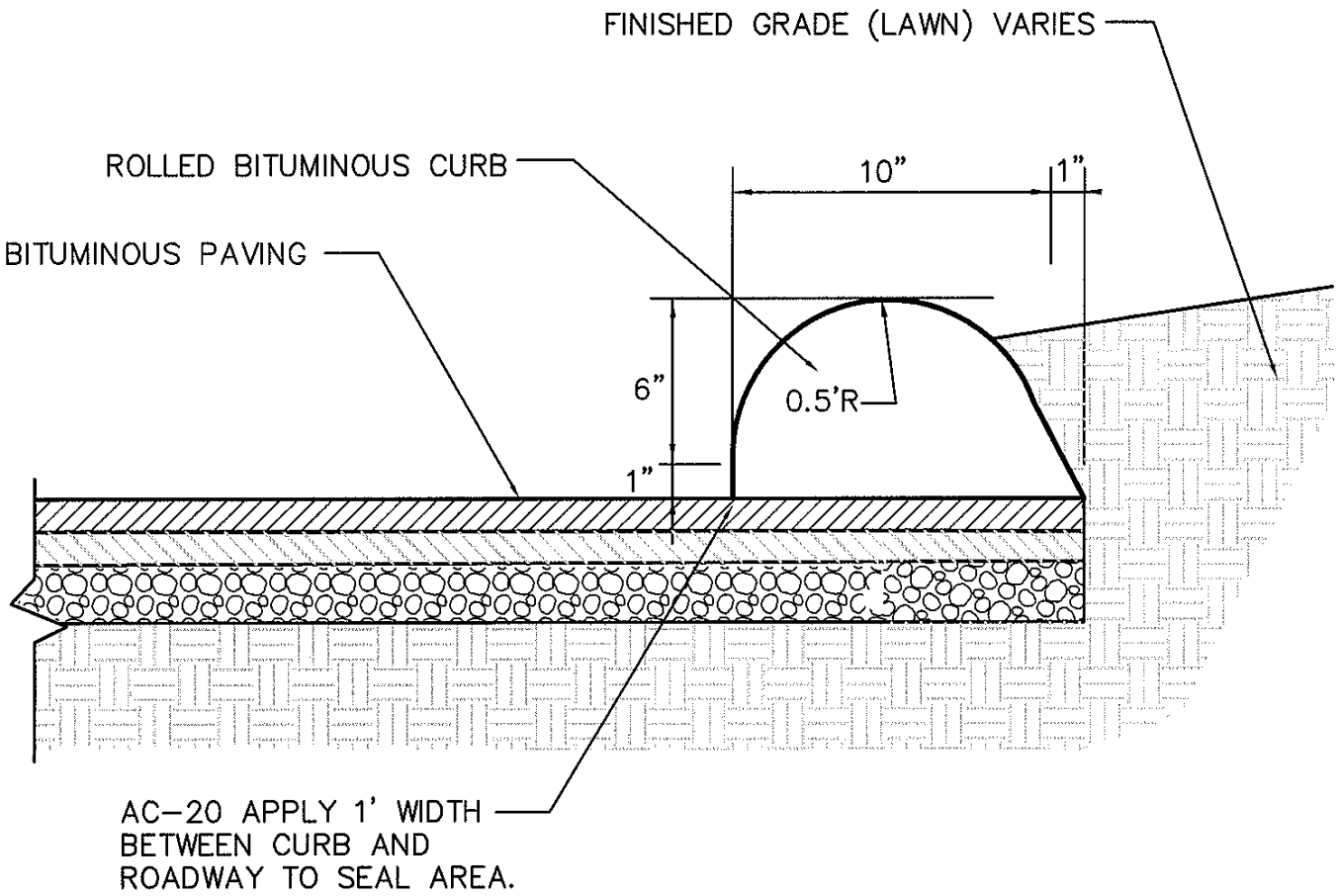


LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

ROADWAY CROSS SECTION

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

BITUMINOUS ROLLED CURB

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

LIMERICK TOWNSHIP
IMPROVEMENT CONSTRUCTION PROCEDURES,
MATERIALS AND SPECIFICATIONS

SPECIFICATIONS

Curb and Sidewalk

Curb:

1. Standard straight curb (machine slip form) shall be minimum 18" structure height, installed on a minimum 4-inch layer of AASHTO 57. Expansion joints shall be every 60 feet, at structures, and at the end of a day's work. Contraction joints shall be saw cut every 10 feet a minimum of 2 inches in depth. Minimum 4,000 psi compressive strength.

2. Standard straight curb (type hand form) shall be minimum 18" structure height and installed on a minimum 4" layer of AASHTO 57. Expansion joints shall be every 30 feet, at structures, and at the end of a day's work. Minimum 4,000 psi compressive strength.

3. Shall be air entrained (6%), 4,000 p.s.i. In accordance with the American Concrete Institute ACI 318-05 or latest edition.

   All work within PENNDOT R.O.W. areas shall comply with PENNDOT 408. All 4,000 PSI air entrained concrete exceeds specifications set forth for PaDot Class AA concrete. (AA concrete = 3,750 PSI after 28 days.)

4. Protection and curing shall be as follows:

   - Curb shall be protected and cured for a period of not less than 72 hours after completion.
   - If polyethylene sheets or burlap are used for curing they shall be properly weighted down and the concrete shall be kept moist through the curing period.
   - Concrete curb shall not be placed when the air temperature is below 40°F unless approved precautions are taken to prevent freezing.
   - Temps below 40 degrees F require proper add mixtures (reducer) as specified in ACI 318-05.
   - All concrete and form work must be insulated and covered prior to, and immediately after placement of fresh concrete. All insulated blankets must be in accordance with ACI 318-05 Sections 19-19.5 specifications.

Sidewalk:

1. Sidewalk shall be 4 foot wide, 4 inch thick placed on a minimum 4 inch layer of 2A crushed aggregate bedding. Expansion joints shall be every 30 feet, with contraction

joints cut every 5 feet a minimum of 1 inch in depth. Additional expansion materials shall be placed between any curb and driveway aprons and in the sidewalk at the driveway limits. All sidewalks shall receive a broom finish unless approved otherwise by the Township. Minimum 4000 psi compressive strength.

2. Shall be air entrained (6%), 4,000 p.s.i. American Concrete Institute ACI 318-05 or latest edition. Maximum water-cement ratio shall not exceed 0.45.

3. Aggregate Subbase: Shall be AASHTO No. 57 material meeting the requirements of Section 703.2, PaDot Specifications, Publication 408, latest edition.

4. Subgrade Preparation:

   - The sidewalk area shall be excavated to the proposed subgrade line. The excavation shall include the removal of existing paving or sidewalk, if necessary and the disposal of all excess material.

   - The subgrade line shall be 8-inches below and parallel to the finished grade. When directed, remove and replace unsuitable material with acceptable material, as approved by the Engineer.

   - The subgrade shall be compacted to a firm, even surface and moistened as necessary to prevent absorption of water from the concrete.

   - All sewer vent boxes, gas, and water service valve boxes shall be reset to be flush with finished grade.

4. Protection and Curing:

   - Traffic shall be excluded and the sidewalk shall be protected and cured for a period of not less than 72 hours after completion.

   - If polyethylene sheets or burlap are used for curing they shall be properly weighted down and the concrete shall be kept moist through the curing period.

   - Concrete sidewalk shall not be placed when the air temperature is below 40°F unless approved precautions are taken to prevent freezing.

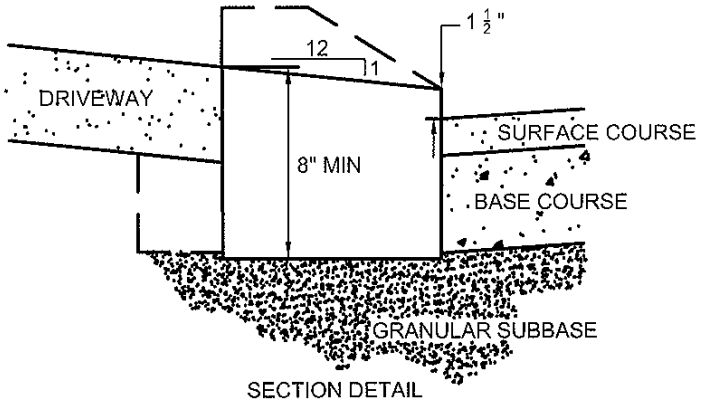
Driveway Apron:

1. Driveways over sidewalks shall be at least 6 inches thick or as a minimum, welded wire fabric, 6" x 6" by 10 gauge, shall be installed in all driveway apron/sidewalk areas. Minimum 4,000 psi compression strength.

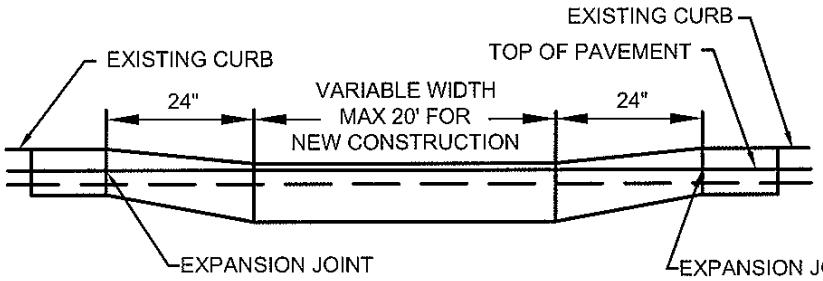
2. All depressed curb for driveway entrances is permitted rather than a horizontal radius. The curb shall be depressed by rounding the edge from the top of the curb to the gutter line. The bottom line of the curb shall be maintained. The sloped portion of the driveway on all new construction shall terminate at the closest edge of sidewalk and at the gutter line. A lip of two (2) inches in height shall be constructed at the gutter line.

Sealer:

1. All areas adjacent to straight curbs, inlets, utility covers, and trench repair areas shall be sealed with AC-20.

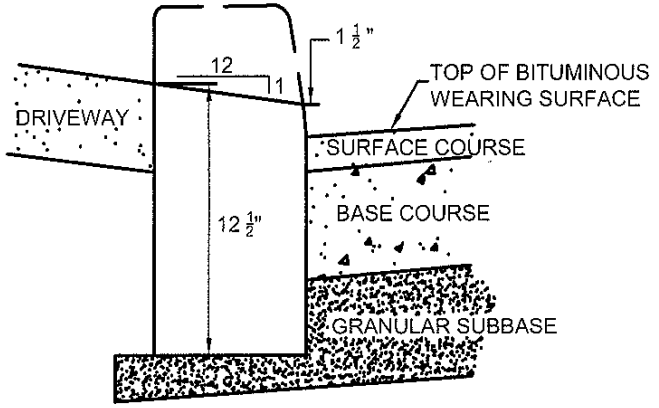


SECTION DETAIL

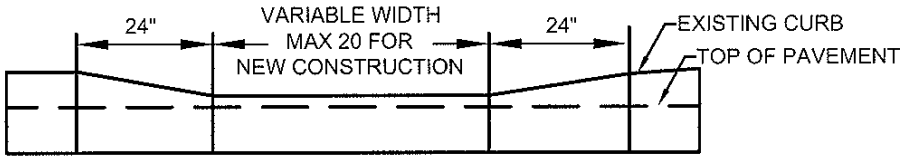


ELEVATION VIEW

DRIVEWAY CURB CUT DETAIL FOR
EXTRUDED CURBS



SECTION DETAIL



ELEVATION VIEW

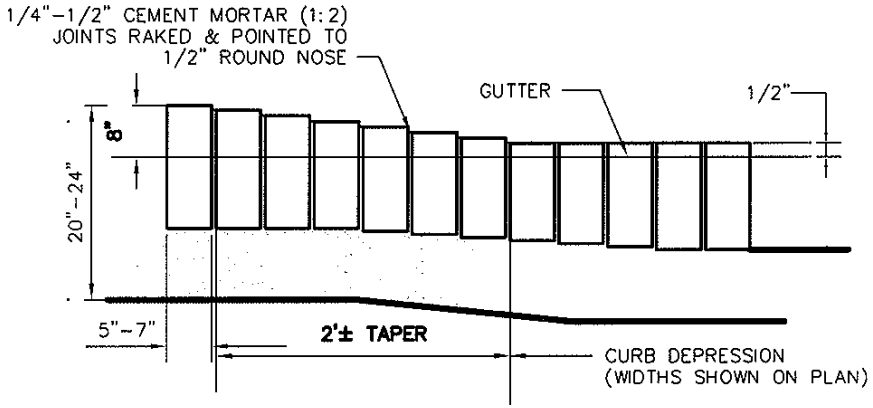
DRIVEWAY CURB CUT DETAIL FOR FULL
DEPTH VERTICAL FREE CURB

LIMERICK TOWNSHIP

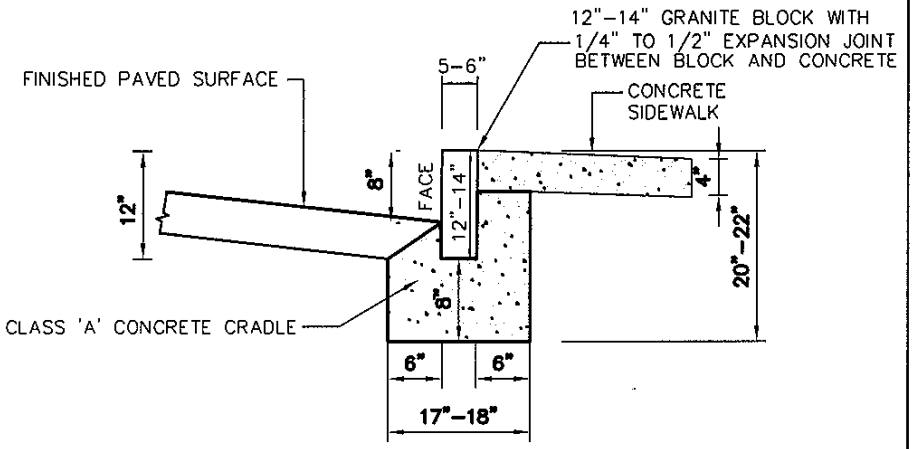
646 WEST RIDGE PIKE
LIMERICK, PA 19468

DRIVEWAY CURB–CUT

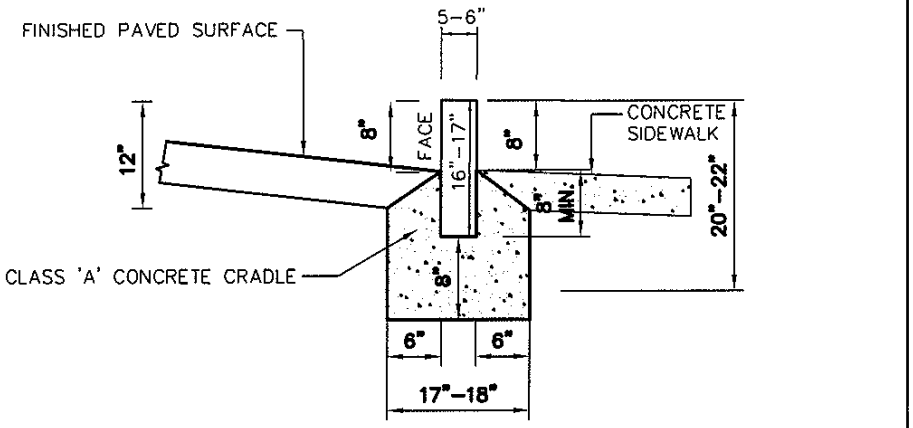
SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



TYPICAL ELEVATION AT CROSSWALK



TYPICAL SECTION AT SIDEWALK



TYPICAL SECTION AT CIRCLE PLAZA

NOTES:

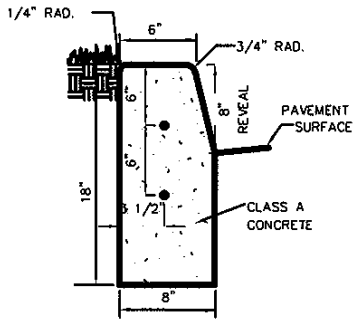
1. GRANITE CURBS TO HAVE 8" REVEAL UNLESS OTHERWISE NOTED.
2. PROVIDE 1/2" PREFORMED BITUMINOUS FIBER EXPANSION JOINTS, TRIMMED TO CONFORM TO CURB AND CRADLE SECTIONS, AT P.C. AND P.T. OF CURB RETURNS AT 50' INTERVALS ELSEWHERE.
3. USE ONLY 12" TO 14" LONG BLOCKS FOR ALL 8" CURBS.
4. TRANSITION BETWEEN DEPRESSED GRANITE CURB AND ASPHALT TO BE FLUSH (1/4" TOLERANCE, MAX.).
5. 6" 2B STONE SUBBASE REQUIRED BENEATH ALL GRANITE BLOCK CURB

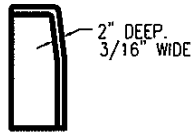
LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

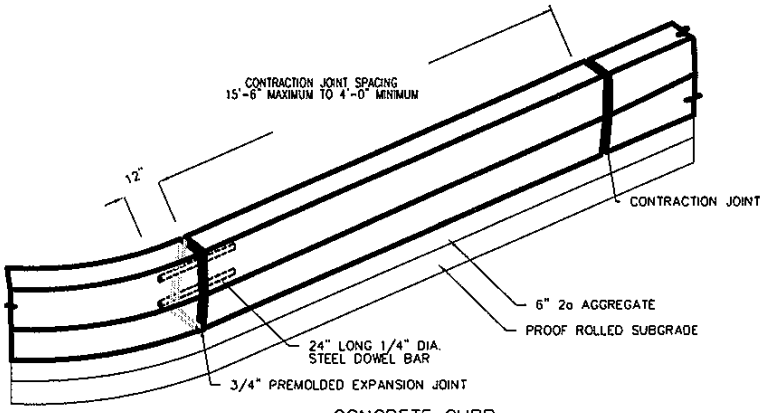
GRANITE CURB

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

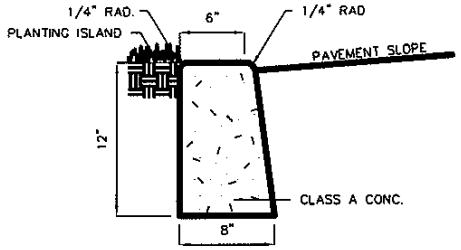




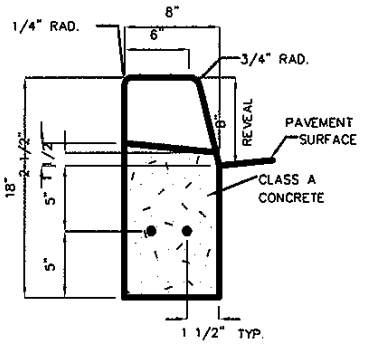
CONTRACTION JOINT



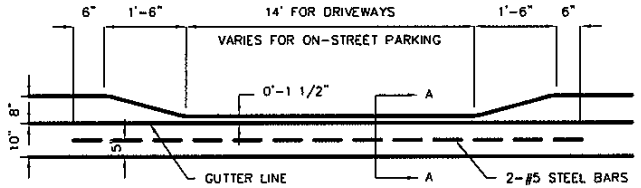
CONCRETE CURB
N.T.S.



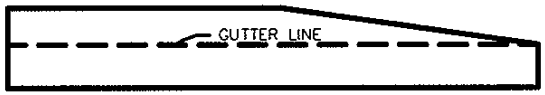
FLUSH VERTICAL CURB/PLANTING ISLAND INTERFACE
N.T.S.



SECTION A-A



DEPRESSED CURB
N.T.S.



END CURB TREATMENT DETAIL
N.T.S.

NOTE:

1. CURBS SHALL BE PROVIDED ON BOTH SIDES OF THE STREET AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH PENNDOT'S FORM 408, SECTION 630 AND THE FOLLOWING LIMERICK TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE.
2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS.
3. PLACE 3/4" PREMOLDED EXPANSION JOINTS AT ENDS OF SECTIONS OF CURVED CURBS AND STRUCTURES AT INTERVALS OF NOT MORE THAN FORTY-FIVE (45) FEET OF STRAIGHT CURB, AND AT THE END OF THE WORK DAY. CUT PREMOLDED EXPANSION MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
4. INSTALL STEEL DOWEL BARS WHEN CURVED CURB JOINS WITH TANGENT CURBS AT CURB RETURNS AND ON SHARP CURVES WHERE DIRECTED BY THE TOWNSHIP ENGINEER. THE PORTION OF THE BAR EXTENDING INTO THE TANGENT CURB SHALL BE RENDERED BONDLESS BY A COATING OF APPROVED MATERIAL, AND ENCLOSED IN PART IN APPROVED TUBES OR CAPS.
5. 4,000 PSI, A/E CONCRETE (AIR - ENTRAINED)
5. ASPHALT / TAR EXPANSION JOINT TO BE SEALED WITH EMULSION MIXTURE.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

CURB DETAILS

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
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REV BY:	KRH
DWG #:	
JOB #:	
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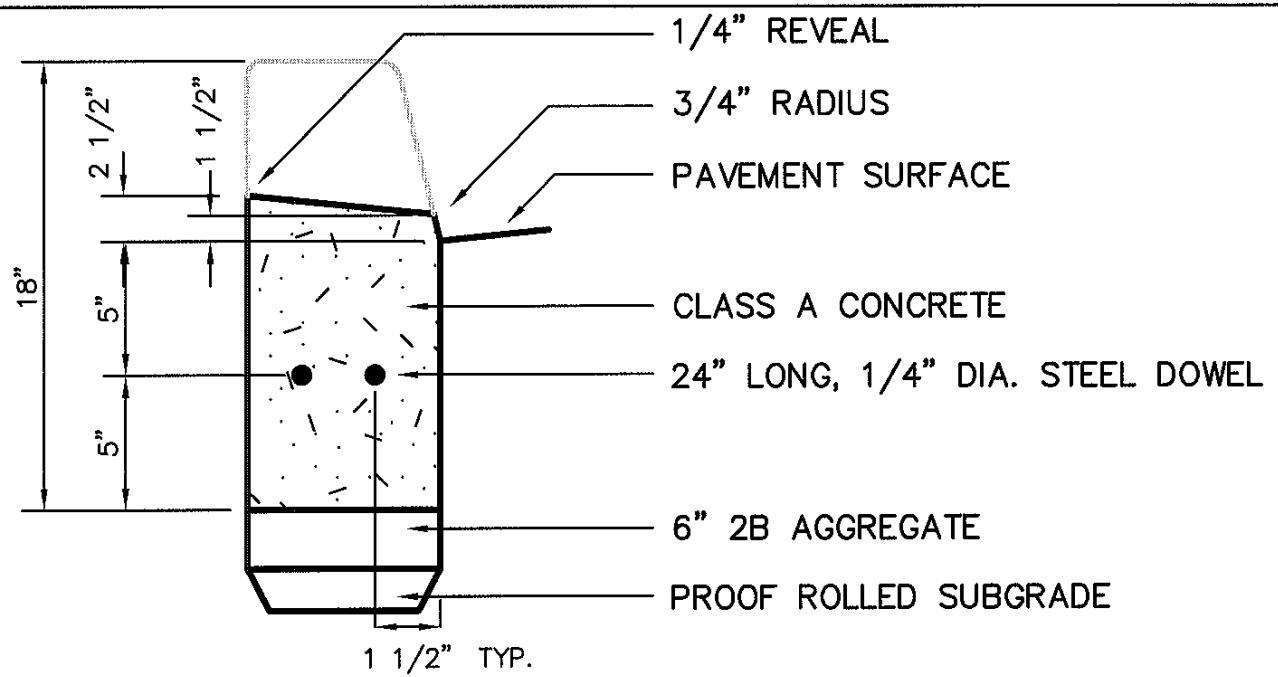

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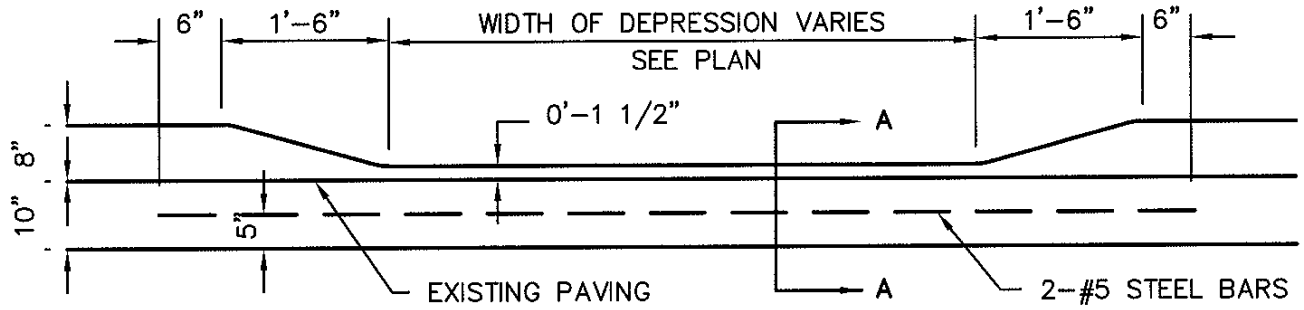

NOTE: MUST COMPLY WITH ADA STANDARDS ANSI 117.1 – 2003 OR LATEST EDITION.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

DEPRESSED CURB

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
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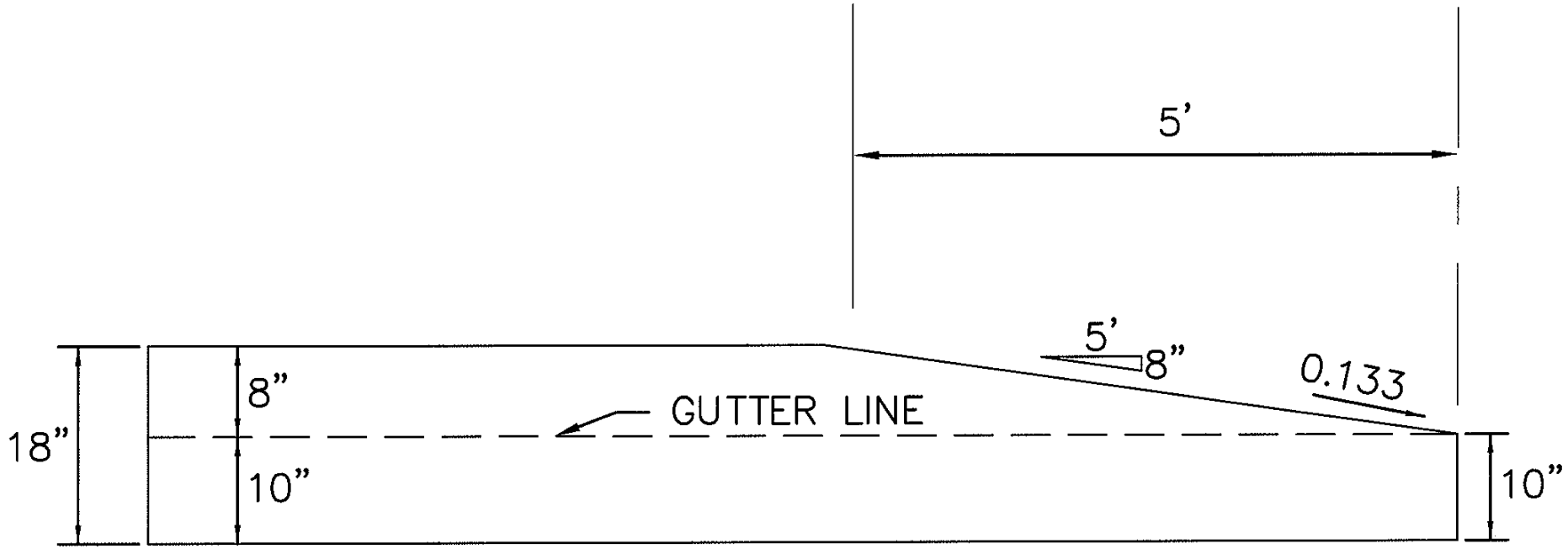

LIMERICK TOWNSHIP

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LIMERICK, PA 19468

END CURB TREATMENT

SCALE:	NTS
DATE:	2/18/08
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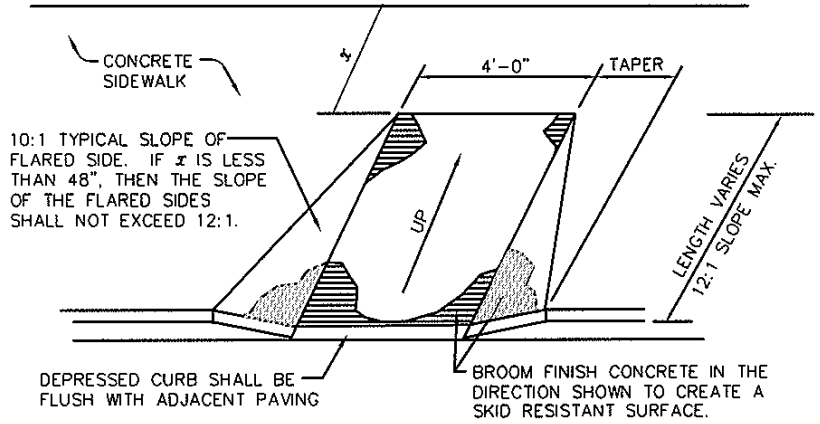
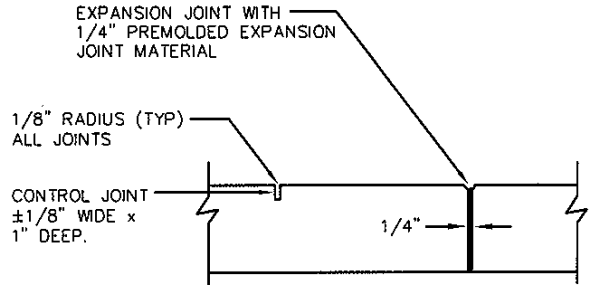
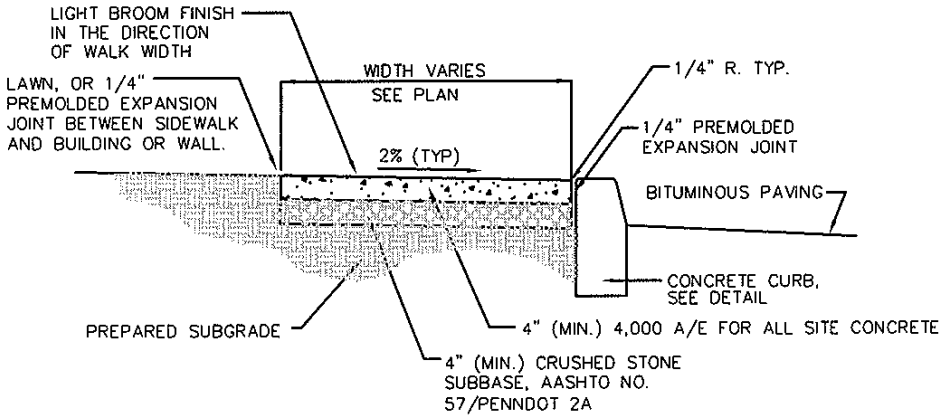


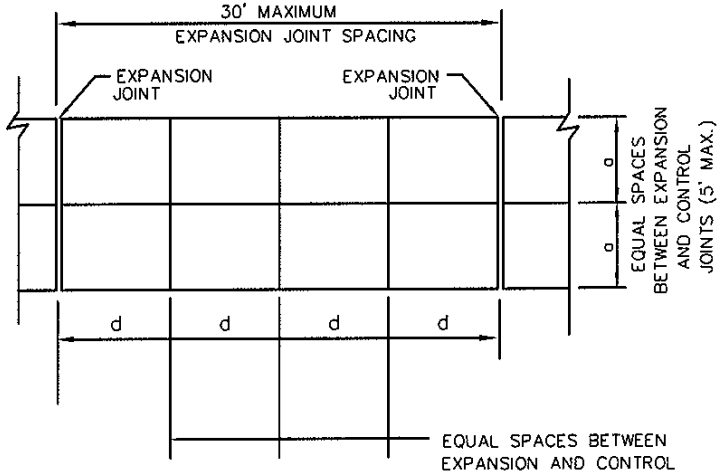
CURB RAMP



JOINTS



SECTION



JOINT SPACING

SIDEWALK CONSTRUCTION NOTES:

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PADOT PUB. 408.
2. COORDINATE JOINT LOCATIONS WITH ENGINEERING DRAWINGS.
3. FINAL LOCATIONS OF CURB RAMPS TO BE APPROVED IN FIELD BY ENGINEER.
4. MUST COMPLY WITH ADA STANDARDS ANSI 117.1 – 2003 OR LATEST EDITION.

LIMERICK TOWNSHIP

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CONCRETE SIDEWALK AND CURB RAMP

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
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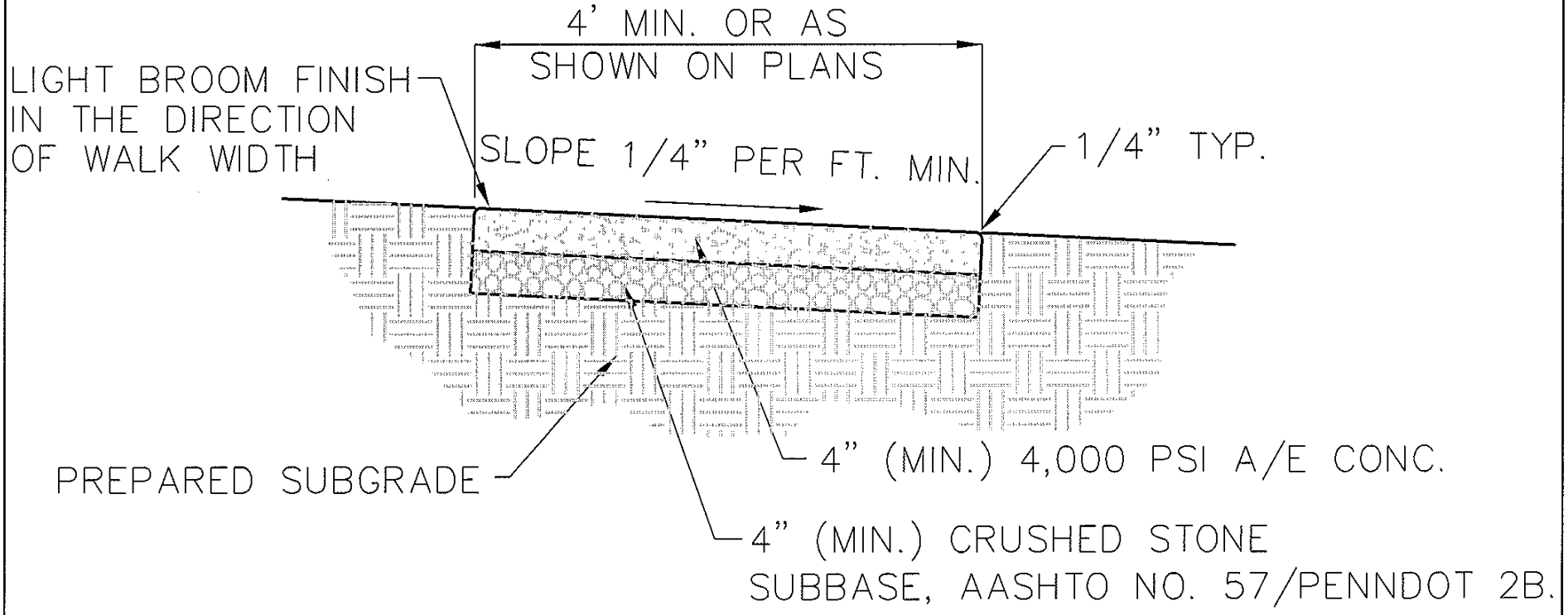

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
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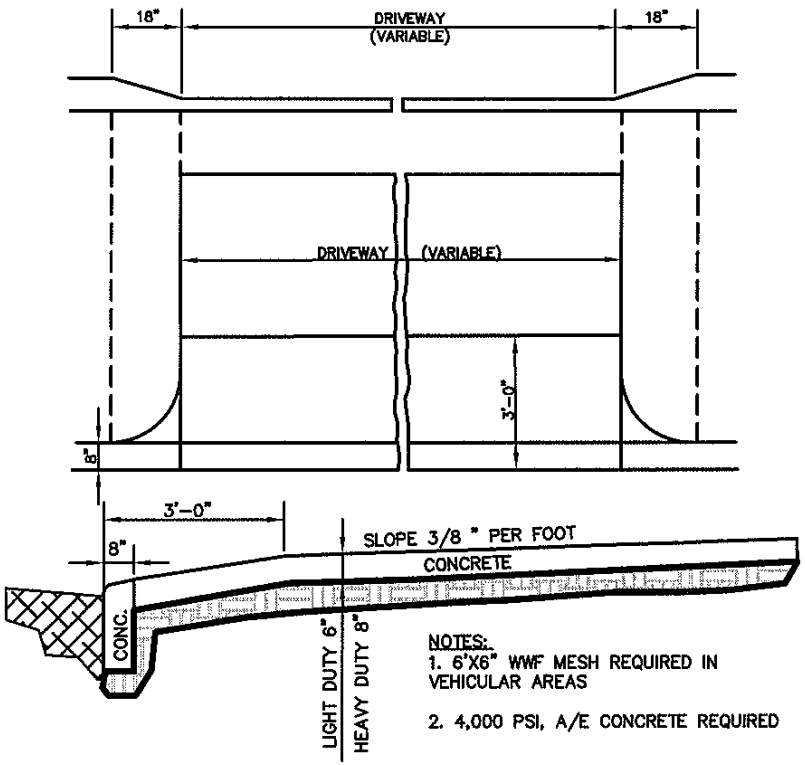
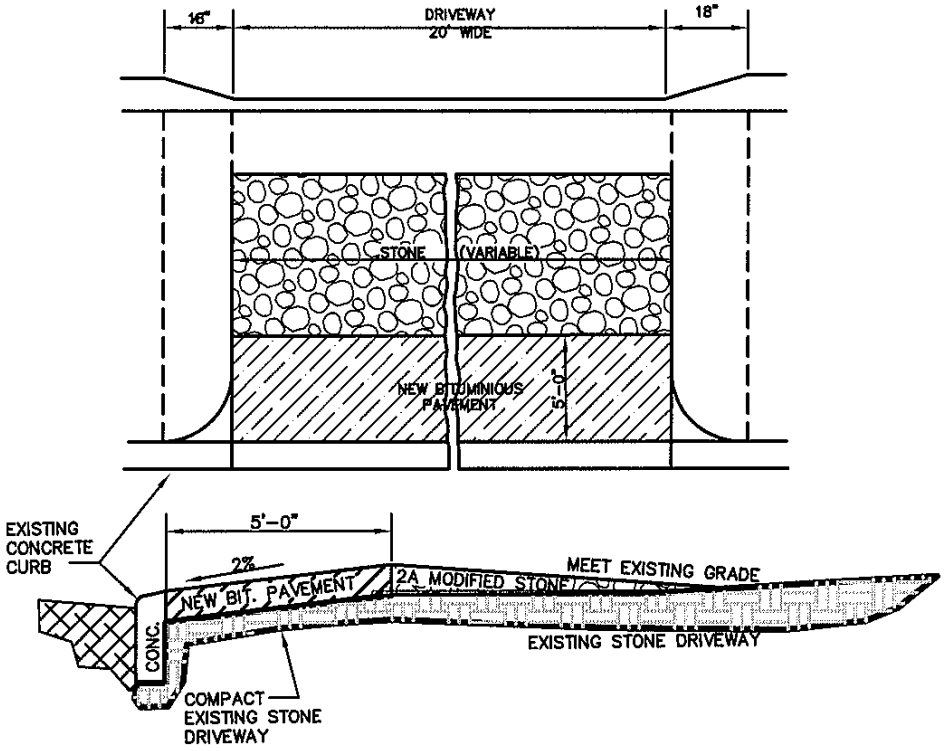
SIDEWALK SECTION (TYP.)

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



DRIVEWAY APRON



CURB CUT "A"

LIMERICK TOWNSHIP

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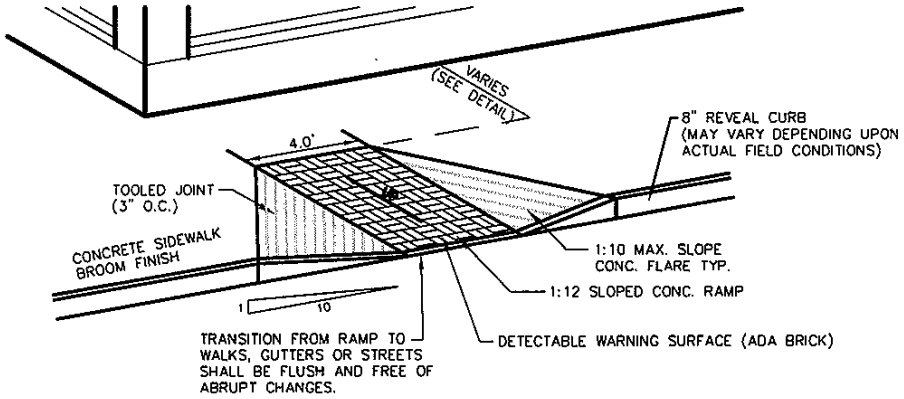
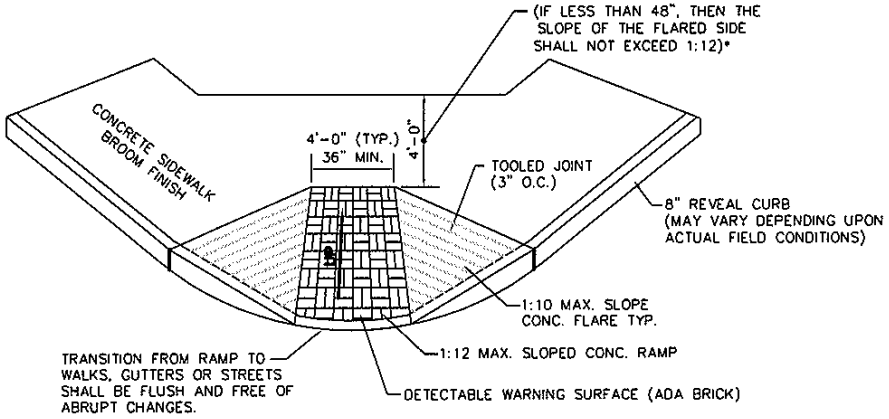
LIMERICK, PA 19468

DRIVEWAY APRON

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	





NOTES:

1. ACTUAL LOCATION TO BE DETERMINED IN THE FIELD.
2. THE LEAST POSSIBLE SLOPE SHALL BE USED FOR ANY RAMP.
3. THE MAXIMUM SLOPE OF A RAMP IN NEW CONSTRUCTION SHALL BE 1:12.
4. THE MAXIMUM RISE FOR ANY RUN SHALL BE 30 INCHES.
- * 5. IF SPACE LIMITATIONS PROHIBIT THE USE OF A 1:12 SLOPE OR LESS:
   (a.) A SLOPE BETWEEN 1:10 AND 1:12 IS ALLOWED FOR A MAXIMUM RISE OF 6 INCHES.
   (b.) A SLOPE BETWEEN 1:8 AND 1:10 IS ALLOWED FOR A MAXIMUM RISE OF 3 INCHES. A SLOPE STEEPER THAN 1:8 IS NOT ALLOWED.

MUST COMPLY WITH ANSI 117.1 - 2003 OR LATEST EDITION.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
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HANDICAPPED CURB RAMP & DIAGONAL HANDICAPPED CURB RAMP

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

LIMERICK TOWNSHIP
IMPROVEMENT CONSTRUCTION PROCEDURES,
MATERIALS AND SPECIFICATIONS

SPECIFICATIONS

Storm Drainage Pipe Materials

A) All storm drainage pipes up to, but not including, 42 inches in equivalent diameter shall be constructed of either of the following materials:

1. Reinforced concrete, rubber gasketed conforming to AASHTO M170, M198 and M207

2. Reinforced, tongue and groove conforming to AASHTO M170 and M207.

3. Corrugated polyethylene (PE) smooth bore interior only conforming to ASTM D 1248, ASTM D 2412, AASHTO M 252 and 294. All PE pipe shall be placed on a minimum of six inches (6") of AASHTO #57 stone and backfilled with same to a foot above the crown of the pipe.

4. Corrugated polyethylene (PE) perforated underdrain shall conform to AASHTO M252.

B) All storm drainage pipe and/or culverts 42 inches in equivalent diameter and above shall be constructed of either of the following material:

1. Reinforced concrete tongue and grove conforming to AASHTO M170 and M207

2. Reinforced concrete piping, rubber gasketed, shall conform to AASHTO M170, M198, and M207.

3. Precast reinforced concrete box sections in accordance with AASHTO M259.

4. Cement concrete cast in place, mix design strength 4,000 psi

C) General:

1. All pipe and/or culverts (cross drains) discharge and inlet ends shall have reinforced concrete precast or cast in place full flow inverts to limits of required endwall section, with invert base end cutoff walls extending three feet (3') below channel flow line, or to rock, whichever occurs first.

2. All culverts with continuous or intermittent water flow other than rainfall events shall have type "DW" headwalls/endwalls installed.

3. Installation having a maximum five feet (5') vertical rise from flow channel invert to crown of street, with the required maximum 3 to 1 embankment slope from limit of right-of-way to elevation of flow channel invert, shall not require protective parapets.

All other installations shall require protective concrete parapets and approach guide rail in accordance with PaDot Standards.

4. All culvert structures shall require submission of complete design drawings and shop drawings, for review by Limerick Township, to assure compliance to H-25 loading, flow design capacity and calculated life cycle of proposed structures.

D) Bridge:

1. An enclosed water carrying structure of one or more barrels having a combined span of 8 feet or greater.

2. All bridge designs shall be in accordance with PaDot Design Manual, Part IV (latest revisions) and shall be submitted to Limerick Township for approval of materials, structural design, compliance to H-25 loading, flow design capacity and calculated life cycle of proposed structures. All bridges shall have approach guide rail in accordance with Pa Dot.

Storm Drainage Appurtenances

1. Headwalls, endwalls, inlets, manholes and energy flow dissipaters shall be in accordance with Penn DOT Publication 405, Latest Edition. All manhole covers shall have the words "Storm Sewer" cast in them. Channels shall be poured in inlets and manholes using 3,330 psi compressive strength concrete. (See sketches)

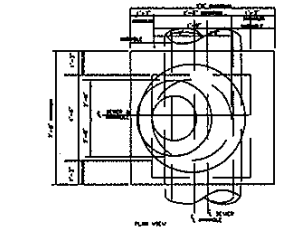
Suitable Materials for Trench Backfill

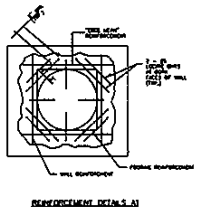
1. General: Suitable material, when used as backfill shall be capable of being compacted to at least ninety-five percent (95%) of maximum density at optimum moisture content.

2. Type 1 Material: Excavated material from the trench or materials from other sources which are free from large clods, roots, or stones larger than two inches may be used from top of bedding material to one foot above crown of pipe in lawn areas where polyethylene (PE) pipe is not used.

3. Type 2 Material: Excavated material from the trench or materials from other sources which are free from large clods, roots, or stones larger than eight inches may be used from one foot above top of pipe to subgrade in lawn areas or where 2A coarse aggregate is not required.

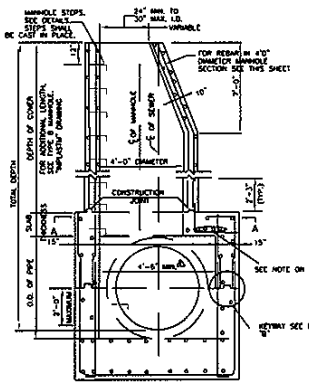
4. Select Backfill: Select backfill shall be "Selected Granular Material" in accordance with section 703.3 of the Pennsylvania Department of Transportation Standard Specifications, Form 408 (latest edition), excepting the use of slag





REINFORCEMENT DETAILS AT VERTICAL OPENINGS

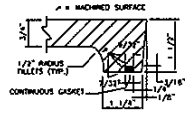
NOTE: ONLY BOX WITH 9mm REINFORCEMENT SHOWN FOR CLARITY



MODIFIED MANHOLE

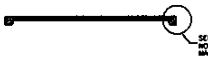
FOR PIPES GREATER THAN 30 INCHES TO 84 INCHES INSIDE DIAMETER.

SECTION B-B



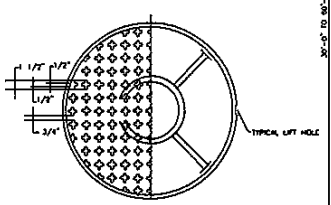
DETAIL A

GASKET SEALING SYSTEM



ELEVATION VIEW

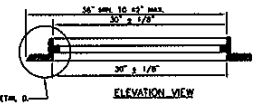
ELEVATION VIEW



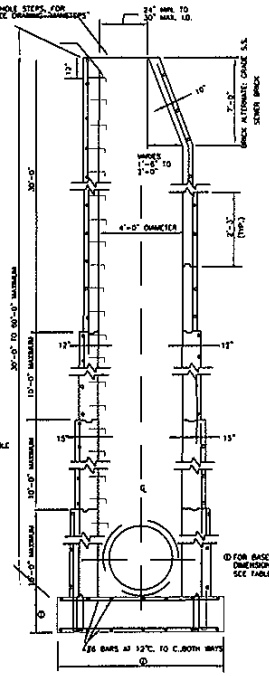
PLAN VIEW

CAST IRON MANHOLE COVER

(STANDARD COVER)

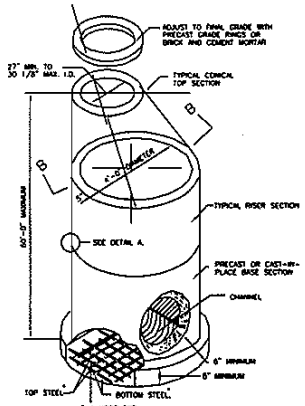


ELEVATION VIEW

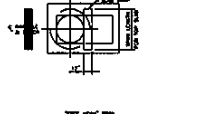


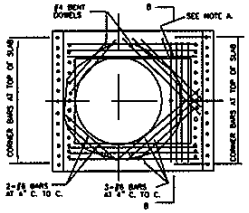
TYPE B MANHOLE

(IN PLACE CONSTRUCTION)



PRECAST MANHOLE

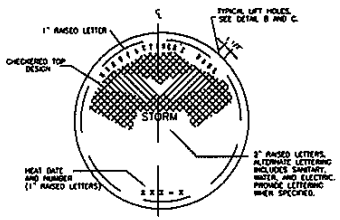




SECTION A-A

NOTE A: BARS REQUIRED TO SPAN FROM WALL TO WALL.

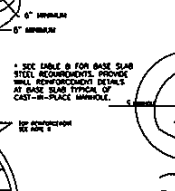
NOTE B: PROVIDE ADDITIONAL BARS AS REQUIRED BY DESIGN WHEN OPENING IN WALL IS PRESENT (TYP.)



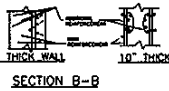
PLAN VIEW

CAST IRON MANHOLE COVER

(PLATEN COVER)



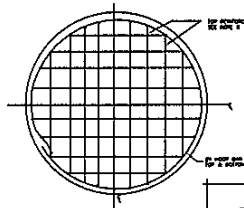
PLAN VIEW



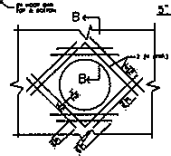
5" THICK WALL

10" THICK WALL

SECTION B-B



SECTION A-A



REINFORCEMENT DETAILS AT OPENINGS

1. CONSTRUCTION REQUIREMENTS.
   A. CONSTRUCT IN ACCORDANCE WITH PENNDOT PUBLICATION 408, SPECIFICATIONS, SECTIONS 603, 605, 716, AND ASTM C-478-90, STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, AS MODIFIED HEREIN.
   B. MINIMUM CONCRETE CLASS:
      CAST-IN-PLACE CLASS A
      PRECAST CLASS AA
   C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A185, STEEL WELDED WIRE FABRIC ASTM A883 & A615, PLAIN BILLET STEEL BARS OR ASTM A615 DEFORMED BILLET STEEL BARS PROVIDE MINIMUM YIELD STRENGTH OF 60,000 PSI.
   D. CLEAR COVER FOR STEEL:
      WALLS: CAST-IN-PLACE 2"
      PRECAST 1 1/2"
      FOOTINGS: CAST-IN-PLACE 2 1/2" (TOP BARS)
      3" (BOTTOM BARS)
      2" (SIDE COVER)
      PRECAST 2" (TOP BARS)
      1 1/2" (BOTTOM BARS)
      1 1/2" (SIDE COVER)
      SLABS: CAST-IN-PLACE 2" (TOP & BOTTOM BARS)
2. FOR PIPE WITH INSIDE DIAMETERS GREATER THAN 30" SEE DRAWING "PRECASTN".
3. PROVIDE 12" MINIMUM HORIZONTAL CLEARANCE BETWEENOPENINGS
   PROVIDE 12" MINIMUM HORIZONTAL CLEARANCE BETWEEN OPENINGS LOCATED AT THE SAME DEPTH. PIPE NOT LOCATED AT THE SAME DEPTH MUST BE LOCATED VERTICALLY AT LEAST ONE TRACE MAXIMUM OPENING DIAMETER APART.
4. FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE CONFORMING TO THE SHAPE OF THE LOWER HALF OF THE INCOMING AND/OR OUTGOING PIPES. A FULL DEPTH U-SHAPED CHANNEL SHOULD BE PROVIDED WHEN NECESSARY TO REDUCE ENERGY LOSSES.
5. USE 5" THICK WALLS WITH ONE MAT OF REINFORCING, OR USE 10" THICK OR GREATER WALLS WITH TWO MATS OF REINFORCING.
6. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. JOINTS AND KEYS ARE TO BE THOROUGHLY CLEANED BEFORE PLACING NEXT CONCRETE SECTION.
7. A SAFE BEARING CAPACITY OF 1.5 TONS PER SQUARE FOOT UNDER THE ENTIRE BASE SLAB IS ASSUMED TO DETERMINE THE BASE SIZE. WHEN THE SUBSOIL IS EXTREMELY POOR, PROCEED WITH CONSTRUCTION ONLY AFTER THE ENGINEER SPECIFIES AN ADEQUATE BASE DESIGN.
8. FOR FOOTING TOP REINFORCEMENT, BOTH DIRECTIONS, USE #6 BARS AT 12" FOR DEPTHS TO 60 FT. OR 0.30 IN.2/FT. MIN. FOR DEPTHS TO 30' AND 0.32 IN2/FT. MIN. FOR DEPTHS GREATER THAN 30 - 0" (6" MAXIMUM SPACING).
9. FOR FOOTING BOTTOM REINFORCEMENT, BOTH DIRECTIONS, USE #6 BARS AT 12" FOR DEPTHS TO 60 FT. OR 0.13 IN/FT. MIN. FOR DEPTHS TO 30 FT. AND 0.10 IN/FT MIN. FOR DEPTHS GREATER THAN 30 FT. (6" MAXIMUM SPACING).

TABLE A

BASE SLAB DIMENSIONS

MAXIMUM DIAMETER OF PIPE	TYPE OF MANHOLE	DEPTH FROM TOP OF MANHOLE TO INVERT OF PIPE	AS DESIGNED** TONS PER SQUARE FOOT	AS DESIGNED** MINIMUM WIDTH OF BASE	MINIMUM THICKNESS OF BASE BELOW BOTTOM OF PIPE
30"	A	MAX. 10'-0"	0.5	5'-0"	1'-0"
30"	A	MAX. 20'-0"	0.5	6'-0"	1'-0"
30"	A	MAX. 30'-0"	0.5	7'-0"	1'-0"
30"	A	MAX. 40'-0"	1.0	7'-0"	1'-0"
30"	A	MAX. 50'-0"	1.0	8'-0"	1'-0"
30"	A	MAX. 60'-0"	1.0	9'-0"	1'-0"
30"	A	MAX. 70'-0"	1.0	10'-0"	1'-0"
30"	A	MAX. 80'-0"	1.0	11'-0"	1'-0"
30"	A	MAX. 90'-0"	1.0	12'-0"	1'-0"
30"	A	MAX. 100'-0"	1.0	13'-0"	1'-0"

* FOR MODIFIED MANHOLE DETAILS, SEE DRAWING "PRECASTN"

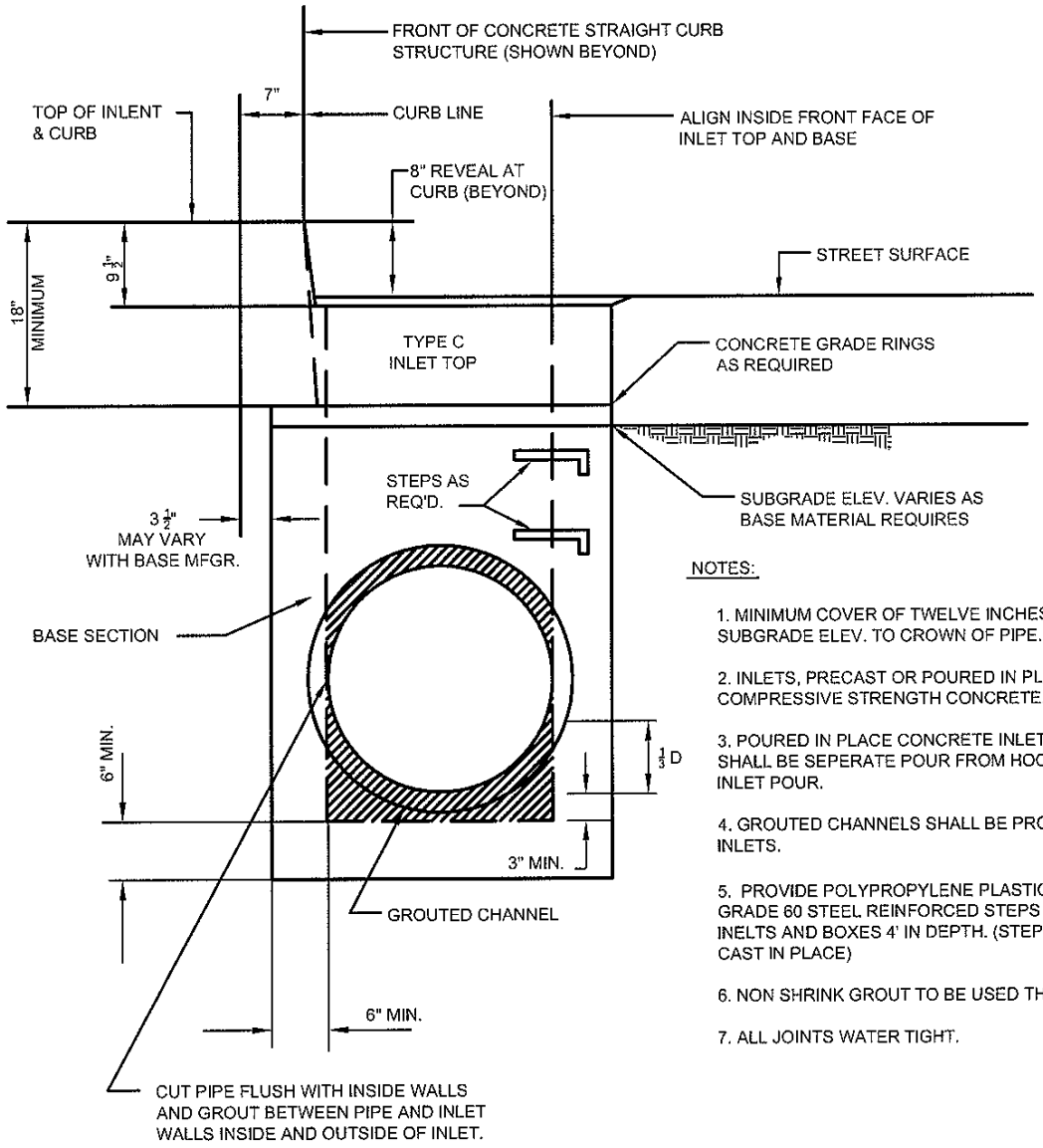
** A SAFE BEARING CAPACITY OF 1.50 TONS PER SQUARE FOOT IS ASSUMED TO DETERMINE THE BASE SIZE. WHEN THE SUBSOIL IS EXTREMELY POOR, PROCEED WITH CONSTRUCTION ONLY AFTER THE ENGINEER SPECIFIES AN ADEQUATE BASE DESIGN.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

IN PLACE STANDARD MANHOLE
RC-39M

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



NOTES:

1. MINIMUM COVER OF TWELVE INCHES (12") FROM SUBGRADE ELEV. TO CROWN OF PIPE.

2. INLETS, PRECAST OR POURED IN PLACE, 4000 PSI COMPRESSIVE STRENGTH CONCRETE.

3. POURED IN PLACE CONCRETE INLET BASE SECTION SHALL BE SEPERATE POUR FROM HOOD SECTION INLET POUR.

4. GROUTED CHANNELS SHALL BE PROVIDED IN ALL INLETS.

5. PROVIDE POLYPROPYLENE PLASTIC COATED ½" DIA. GRADE 60 STEEL REINFORCED STEPS AT 12" c.c. IN ALL INELTS AND BOXES 4' IN DEPTH. (STEPS SHALL BE CAST IN PLACE)

6. NON SHRINK GROUT TO BE USED THROUGHOUT.

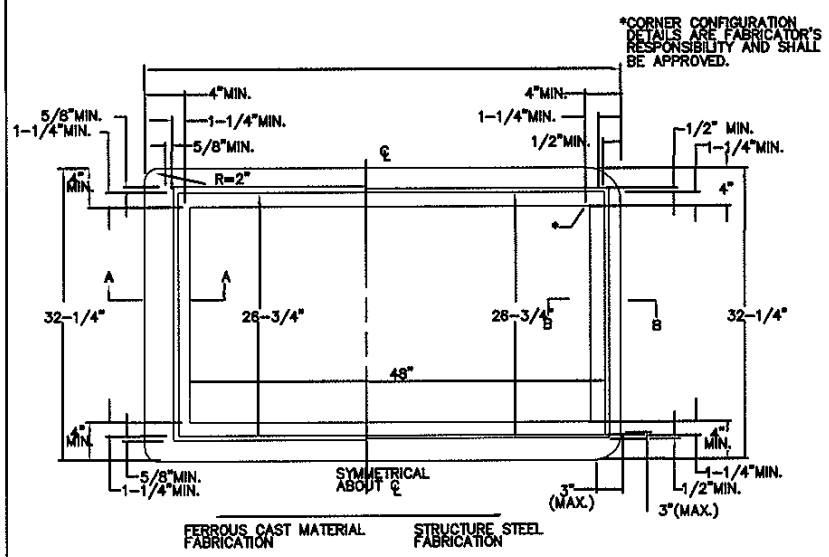
7. ALL JOINTS WATER TIGHT.

LIMERICK TOWNSHIP

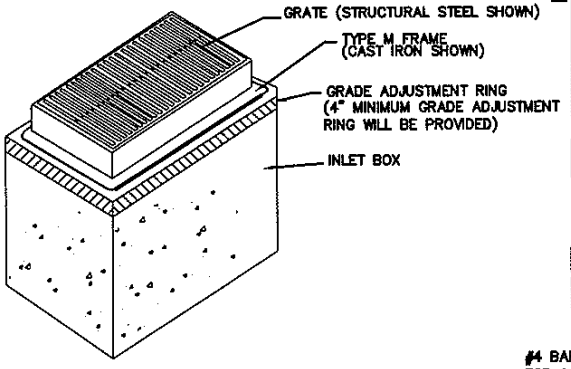
646 WEST RIDGE PIKE
LIMERICK, PA 19468

INLET CONSTRUCTION ALONG STREETS WITH STRAIGHT CURB

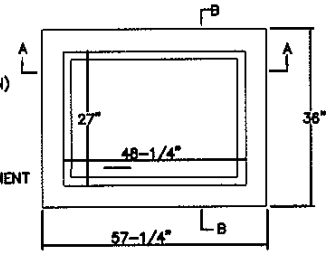
SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



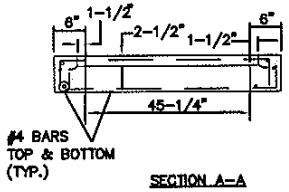
TYPE M FRAME



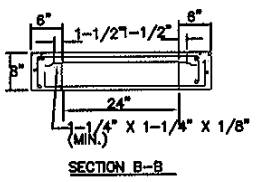
TYPE M INLET



PLAN VIEW

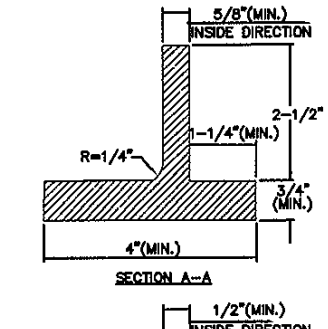


SECTION A-A

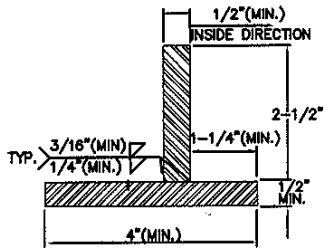


SECTION B-B

TYPE M TOP UNIT



SECTION A-A



SECTION B-B

3

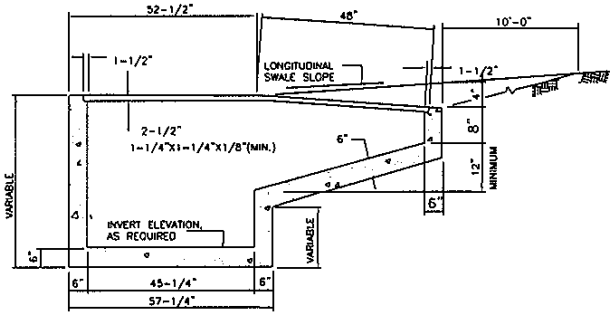
* NOTE: INLETS OVER 4 FEET DEEP WILL BE CONSTRUCTED WITH INLET STEPS. STEPS TO BE CAST IN PLACE.

LIMERICK TOWNSHIP

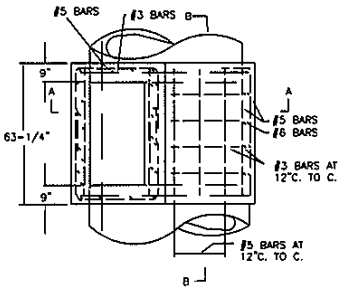
646 WEST RIDGE PIKE
LIMERICK, PA 19468

TYPE M INLET (RC-34M)

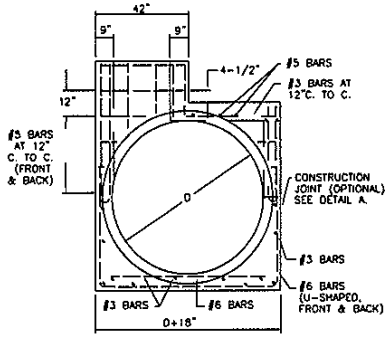
SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



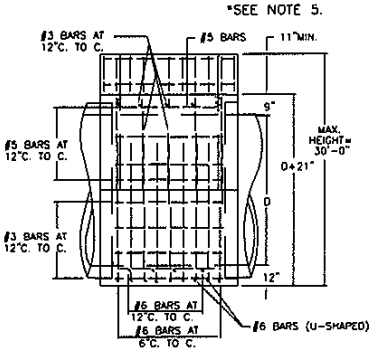
SECTION A-A



PLAN VIEW

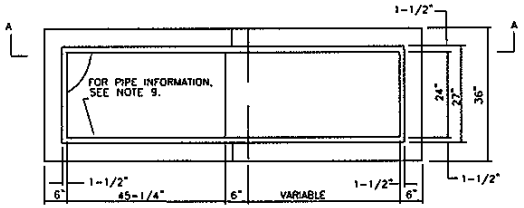


SECTION A-A

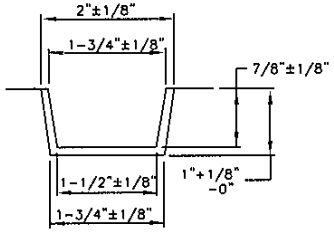


SECTION B-B

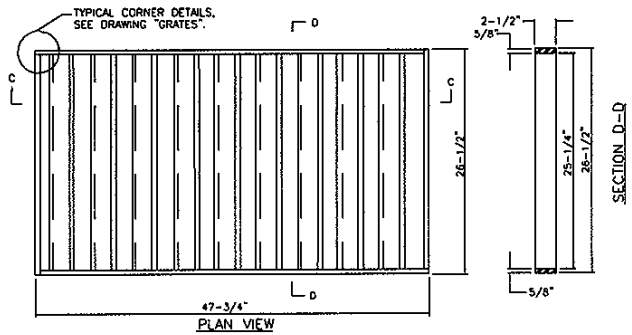
INLET BOX
MODIFIED TYPE I



PLAN VIEW



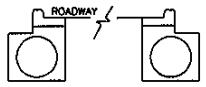
DETAIL A
ALTERNATE JOINT



SECTION C-C
BAR GRATE

NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605, FOR CAST-IN-PLACE UNITS AND SECTION 713.2(d) FOR PRECAST CEMENT CONCRETE UNITS.
2. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE A SPECIAL DETAIL AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLE, SEE DWG. STORM MANHOLES.
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, SPECIAL DETAILS AND DESIGN SHALL BE PROVIDED.
4. FOR ORIENTATION OF THE TYPE C INLET WITH MODIFIED TYPE I INLET BOX, THE TYPICAL INSTALLATION DETAILS ARE SHOWN BELOW. ANY VARIATION SHALL BE SHOWN ON THE CONSTRUCTION DRAWINGS BY SPECIAL DETAILS.



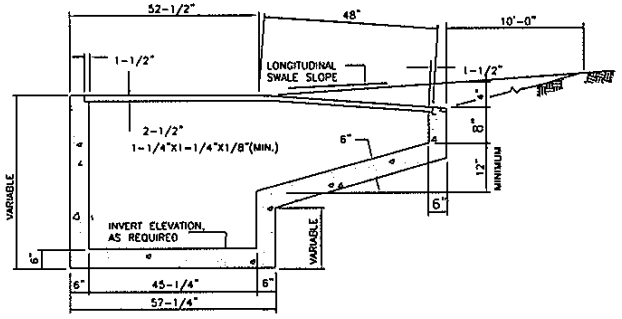
5. PROVIDE A MINIMUM HEIGHT OF 20 INCHES MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE R INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY GRATES AND PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN LISTING, SUBMIT A 22"X36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS. MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.
7. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R). WELDING SHOPS ARE NOT REQUIRED TO BE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) CERTIFIED.
8. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATES FOR TYPE D-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.
9. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE DRAWING STANDBOX

LIMERICK TOWNSHIP

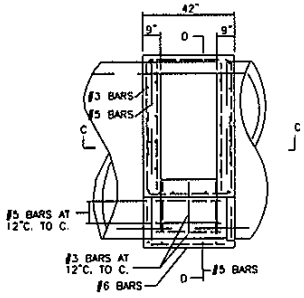
646 WEST RIDGE PIKE
LIMERICK, PA 19468

MODIFIED INLET TYPE 1

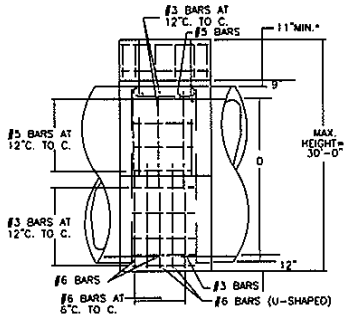
SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



SECTION A-A

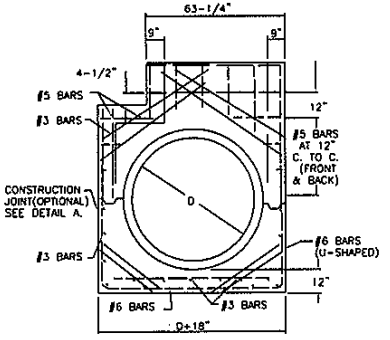


PLAN VIEW

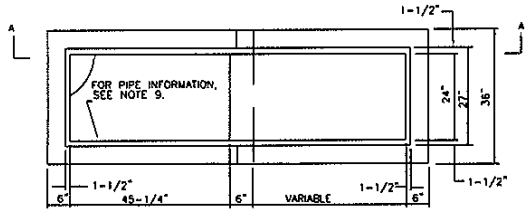


SECTION C-C

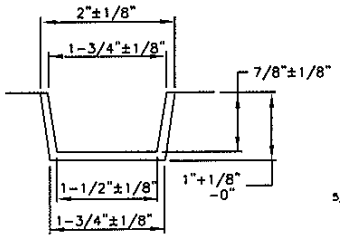
INLET BOX
MODIFIED TYPE II



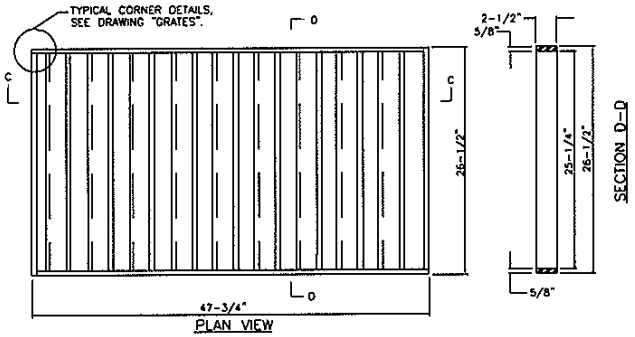
SECTION D-D



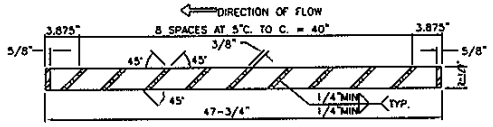
PLAN VIEW



DETAIL A
ALTERNATE JOINT



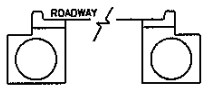
PLAN VIEW



SECTION C-C
BAR GRATE

NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605, FOR CAST-IN-PLACE UNITS AND SECTION 713.2(d) FOR PRECAST CEMENT CONCRETE UNITS.
2. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE A SPECIAL DETAIL AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLE, SEE DWG. STORM MANHOLES.
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, SPECIAL DETAILS AND DESIGN SHALL BE PROVIDED.
4. FOR ORIENTATION OF THE TYPE C INLET WITH MODIFIED TYPE I INLET BOX, THE TYPICAL INSTALLATION DETAILS ARE SHOWN BELOW. ANY VARIATION SHALL BE SHOWN ON THE CONSTRUCTION DRAWINGS BY SPECIAL DETAILS.



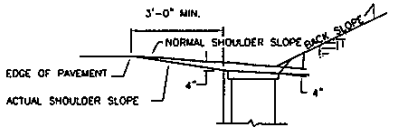
5. PROVIDE A MINIMUM HEIGHT OF 20 INCHES MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE II INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY GRATES AND PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN LISTING, SUBMIT A 22"X36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.
7. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R). WELDING SHOPS ARE NOT REQUIRED TO BE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) CERTIFIED.
8. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATES FOR TYPE O-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.
9. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE DRAWING STANDBOX

LIMERICK TOWNSHIP

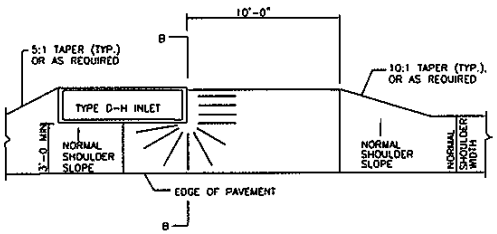
646 WEST RIDGE PIKE
LIMERICK, PA 19468

MODIFIED INLET TYPE 2

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

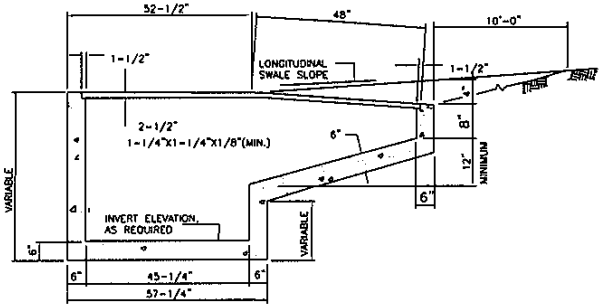


SECTION B-B

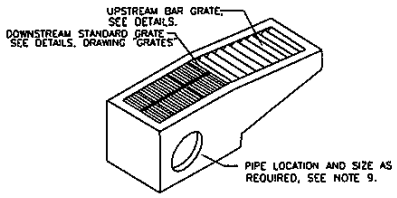


PLAN VIEW

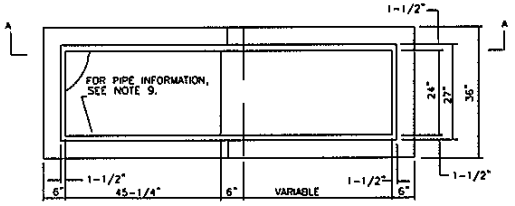
TYPICAL D-H INLET LOCATION



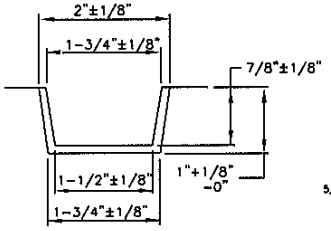
SECTION A-A



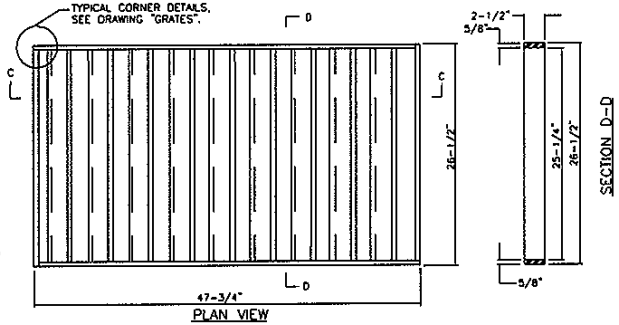
TYPE D-H INLET



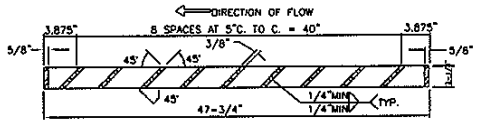
PLAN VIEW



DETAIL A
ALTERNATE JOINT



PLAN VIEW



SECTION C-C
BAR GRATE

NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 805, FOR CAST-IN-PLACE UNITS AND SECTION 713.2(a) FOR PRECAST CEMENT CONCRETE UNITS.
2. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE A SPECIAL DETAIL AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLE, SEE DWG. STORM MANHOLES.
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, SPECIAL DETAILS AND DESIGN SHALL BE PROVIDED.
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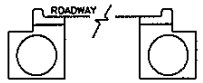

5. PROVIDE A MINIMUM HEIGHT OF 20 INCHES MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE II INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY GRATES AND PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN LISTING, SUBMIT A 22"X36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.
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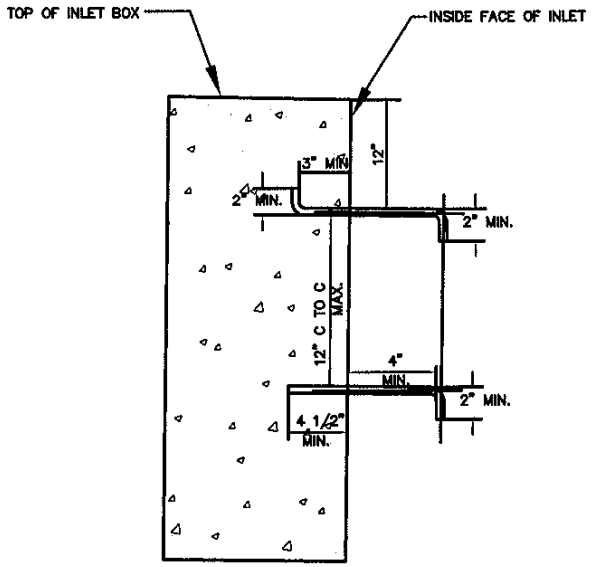
8. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATES FOR TYPE D-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.
9. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE DRAWING STANDBOX

LIMERICK TOWNSHIP

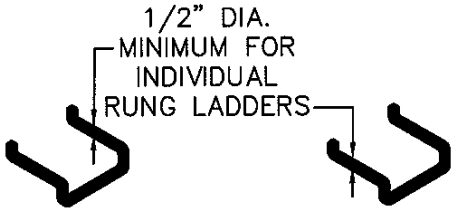
646 WEST RIDGE PIKE
LIMERICK, PA 19468

MODIFIED D-H INLET

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



SIDE VIEW



TYPICAL STEP CONFIGURATIONS

NOTES:
1. STEPS TO BE CAST IN ALL INLET BOXES WITH A DEPTH GREATER THAN 4'.
2. STEPS SHALL BE POLYPROPYLENE PLASTIC COATED $\frac{1}{2}$" DIAMETER GRADE 60 STEEL REINFORCED.

LIMERICK TOWNSHIP
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LIMERICK, PA 19468

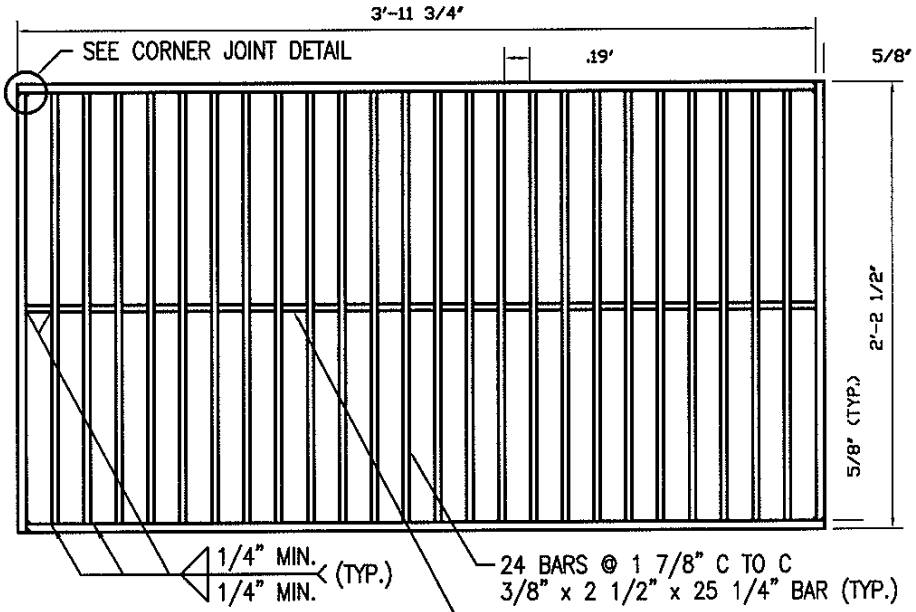
IINLET STEP

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

CORNER JOINT

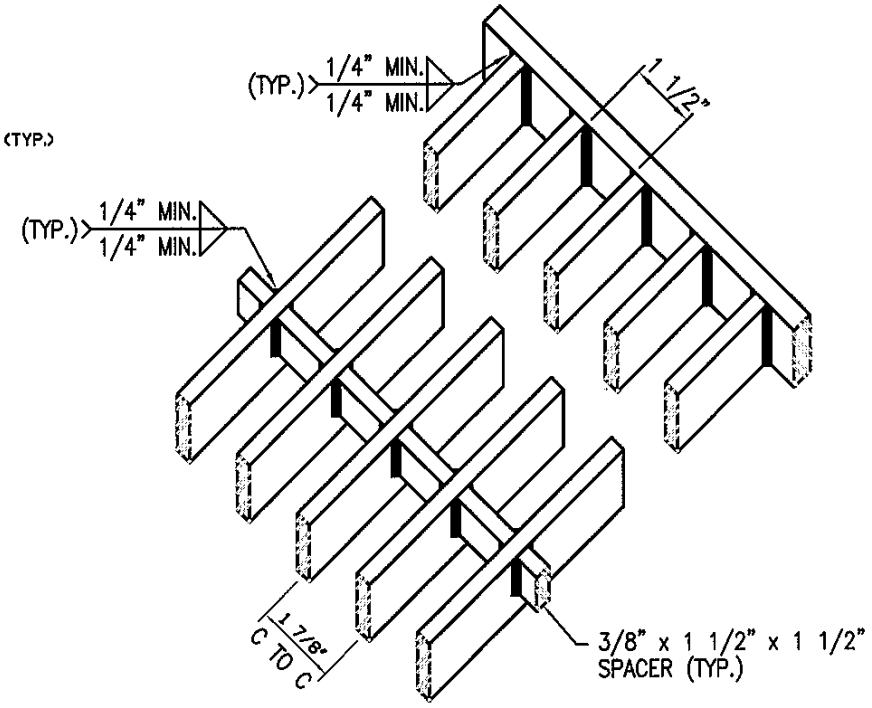
3" = 1'-0"

NOTE: MUST BE BICYCLE SAFE THROUGHOUT.



PLAN

1 1/2" = 1'- 0"



GRATE SPACER

N.T.S.

LIMERICK TOWNSHIP

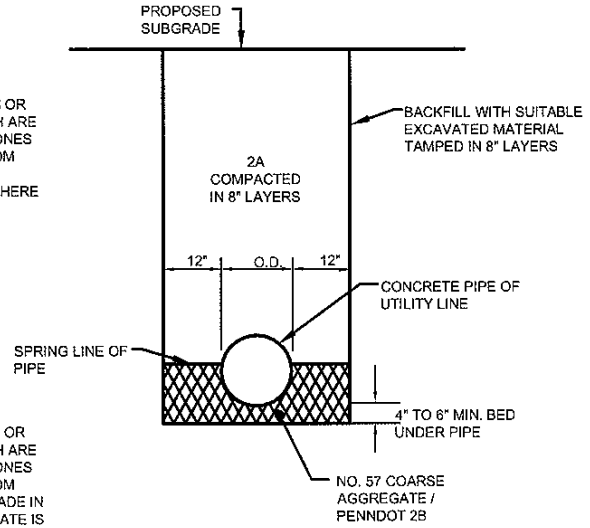
646 WEST RIDGE PIKE
LIMERICK, PA 19468

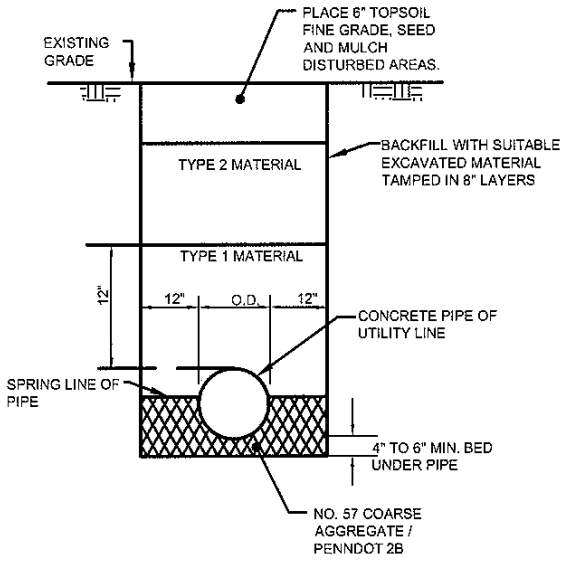
STRUCTURAL STEEL GRATE

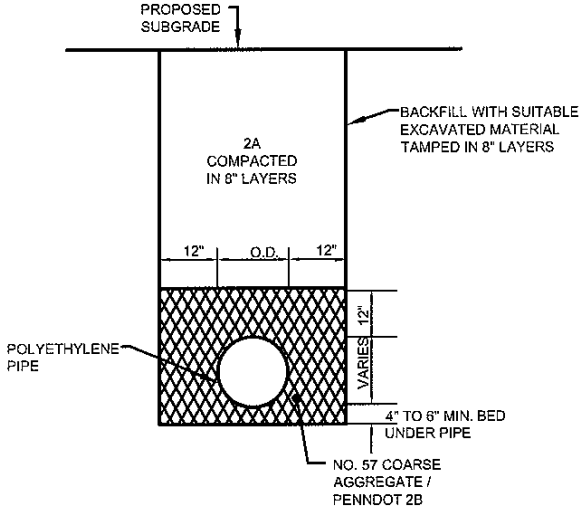
SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

TYPE 1 MATERIAL:
RXCAVATED MATERIAL FROM THE TRENCH OR MATERIALS FROM OTHER SOURCES WHICH ARE FREE FROM LARGE CLODS ROOTS, OR STONES LARGER THAN 2 INCHES MAY BE USED FROM TOP OF BEDDING MATERIAL TO ONE FOOT ABOVE CROWN OF PIPE IN LAWN AREAS WHERE POLYETHYLENE (PE) PIPE IS NOT USED.

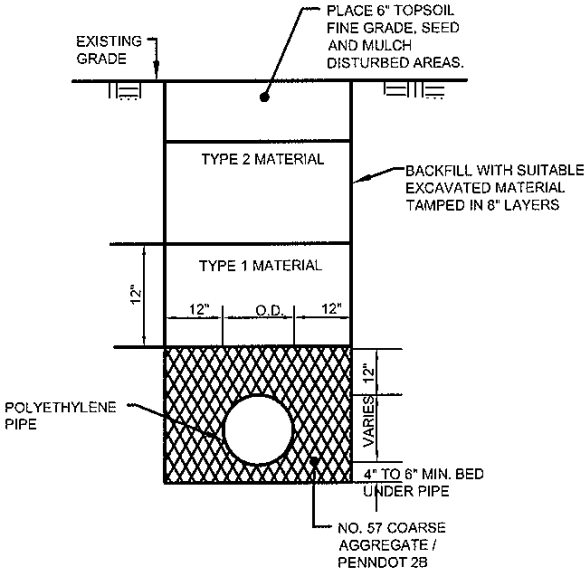
TYPE 2 MATERIAL:
EXCAVATED MATERIAL FROM THE TRENCH OR MATERIALS FROM OTHER SOURCES WHICH ARE FREE FROM LARGE CLODS ROOTS, OR STONES LARGER THAN 8 INCHES MAY BE USED FROM ONE FOOT ABOVE TOP OF PIPE TO SUBGRADE IN LAWN AREAS WHERE 2A COARSE AGGREGATE IS NOT REQUIRED.







PROPOSED STREETS



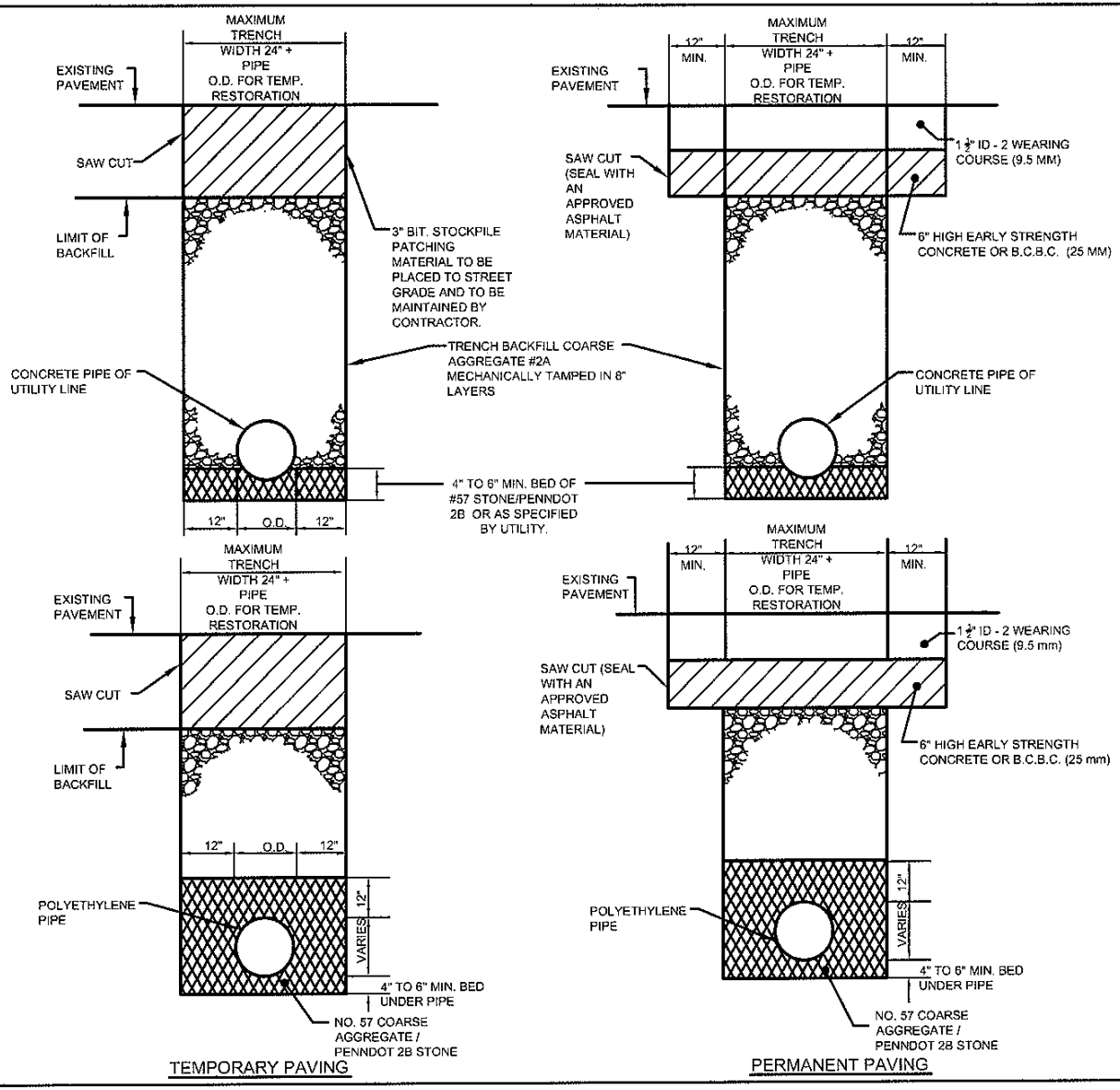
LAWN AREAS

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

TRENCH RESTORATION FOR PROPOSED STREETS AND LAWN AREAS

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

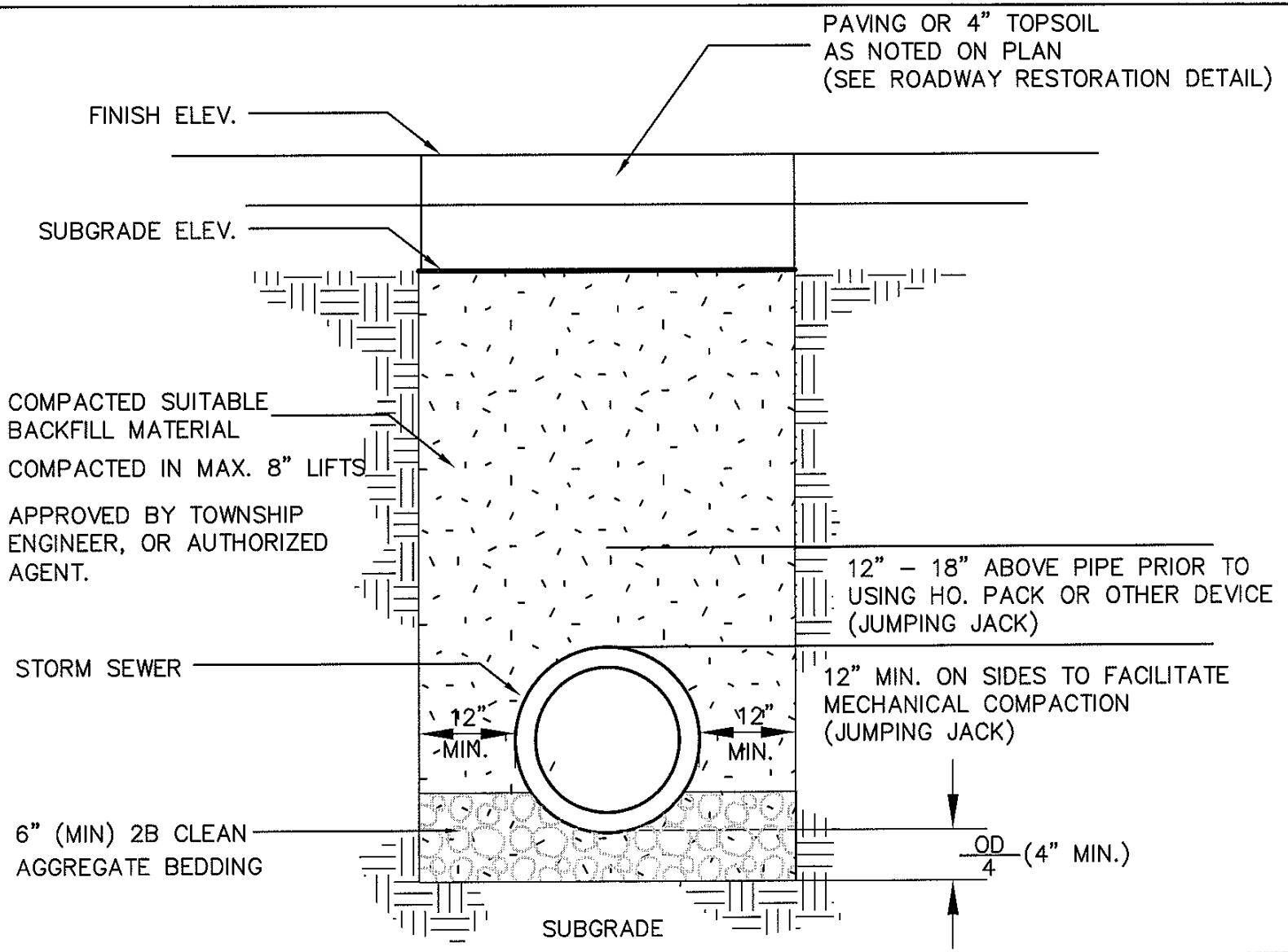


LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

TRENCH RESTORATION FOR EXISTING STREETS

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

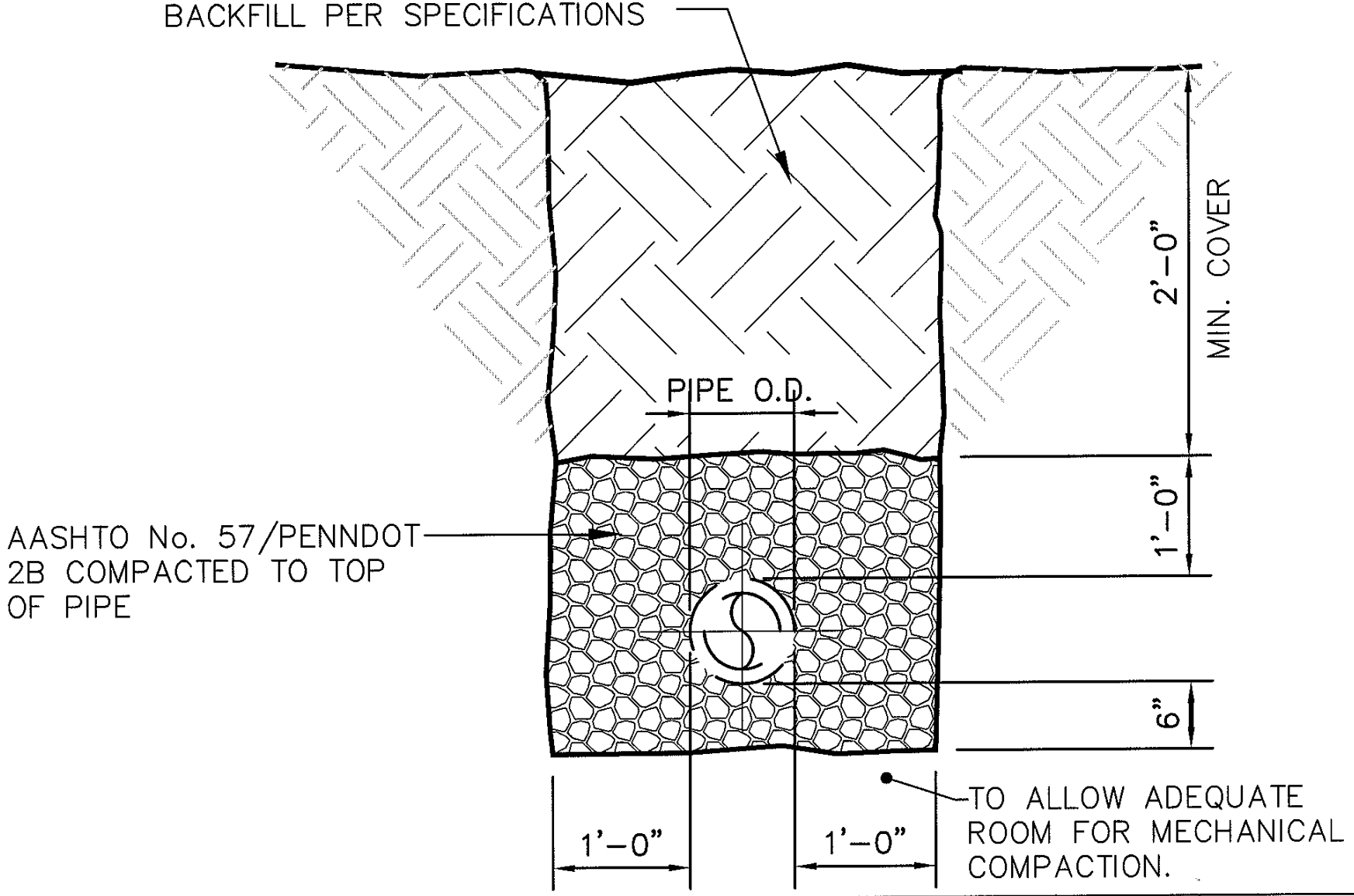


LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

STORM SEWER TRENCH BACKFILL

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



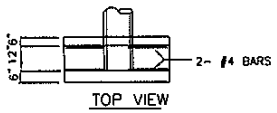
LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

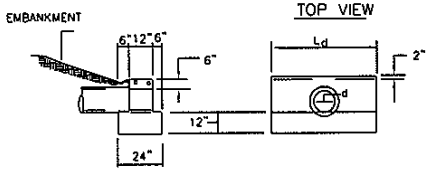
P.V.C. PIPE TRENCH

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

PIPE DIAMETER	L
18" & 21"	5'
24" & 27"	7'
30" & 33"	9'



TOP VIEW

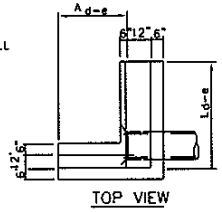


END VIEW SIDE VIEW

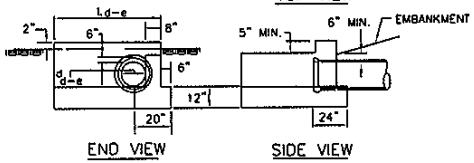
TYPE D ENDWALL

LOCAL CONDITIONS WILL GOVERN DIMENSION A.

$L_{d-e} = 2.5_{d-e} + 12"$

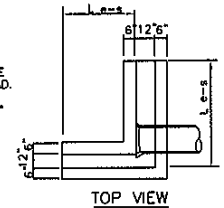


TOP VIEW



END VIEW SIDE VIEW

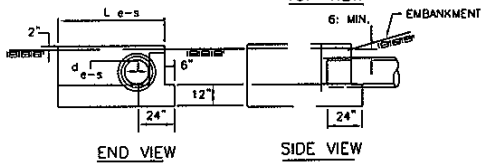
TYPE D-E ENDWALL



SIDE ROAD WALL TO BE PARALLEL TO SIDE ROAD.

$L_{e-s} = 2.50_{e-s} + 12"$

TOP VIEW



END VIEW SIDE VIEW

TYPE E-S ENDWALL

TABLE A

2:1 EMBANKMENT SLOPES

PIPE DIAMETER	SKEW Δ = 90° TO 60° θ = 30°			SKEW Δ = 55° θ = 35°			SKEW Δ = 50° θ = 40°			SKEW Δ = 45° θ = 45°			SKEW Δ = 40° θ = 50°			SKEW Δ = 30° θ = 60°			SKEW Δ = 20° θ = 60°			SKEW Δ = 10° θ = 80°				
d	L	R	W_1	L	R	W_1	L	R	W_1	L	R	W_1	L	R	W_1	L	R	W_1	L	R	W_1	L	R	W_1	W_2	A
(in.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(in.)
36	5.8	0	4.6	6.0	.33	4.9	6.2	.5	5.2	6.5	.67	5.7	7.0	.75	6.2	8.3	1.33	8.0	11.1	1.75	11.7	19.6	5.0	23.0	4.6	12
42	6.3	0	5.8	6.6	.33	6.1	6.9	.5	6.5	7.3	.67	7.1	7.8	.75	7.8	9.3	1.33	10.0	12.5	1.75	14.6	22.5	5.0	28.8	5.8	12
48	6.9	0	6.9	7.2	.33	7.3	7.5	.5	7.8	8.0	.67	8.5	8.5	.75	9.4	10.3	1.33	12.0	14.0	1.75	17.5	25.3	5.0	34.6	6.9	12
54	7.5	0	8.0	7.8	.33	8.5	8.2	.5	9.1	8.7	.67	9.9	9.3	.75	10.9	11.3	1.33	14.0	15.5	1.75	20.5	28.2	5.0	40.3	8.0	12
60	8.1	0	9.2	8.4	.33	9.8	8.8	.5	10.4	9.4	.67	11.3	10.1	.75	12.5	12.3	1.33	16.0	16.9	1.75	23.4	31.1	5.0	46.0	9.2	15
72	9.2	0	11.5	9.6	.33	12.2	10.1	.5	13.0	10.8	.67	14.1	11.7	.75	15.6	14.3	1.33	20.0	19.8	1.75	29.2	36.9	5.0	57.6	11.5	15

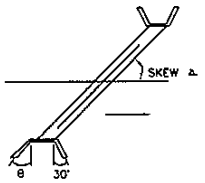
$SD = \frac{d_{D-W}}{\cos\theta} = \frac{d_{D-W}}{\sin Skew}$

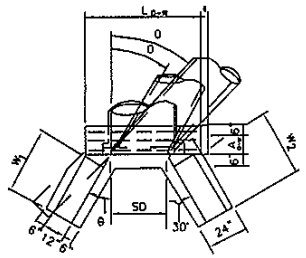
$L_{D-W} = SD + 2.3'$

$W_1 = \frac{2d_{D-W}}{\cos\theta} - 2'$ (FOR 2:1 SLOPE)

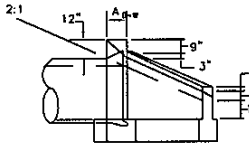
$W_1 = \frac{X}{\cos\theta}(d_{D-W} - 0.5 - \frac{1.0}{X})$ (FOR VARIABLE)

SLOPE WHEN X EQUALS HORIZONTAL DIMENSION OF THE SLOPE DESIGNATION

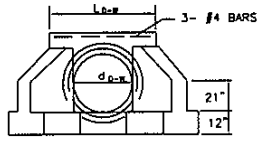




PLAN VIEW



SECTION A-A



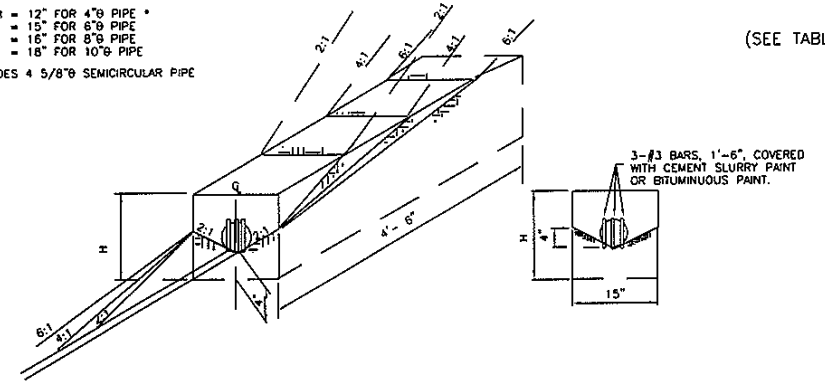
FRONT ELEVATION VIEW

TYPE D-W ENDWALL

(SEE TABLE A FOR DIMENSIONS NOT INDICATED)

H = 12" FOR 4"Ø PIPE *
= 15" FOR 6"Ø PIPE
= 18" FOR 8"Ø PIPE
= 18" FOR 10"Ø PIPE

* INCLUDES 4 5/8"Ø SEMICIRCULAR PIPE



SUBSURFACE DRAIN OUTLET ENDWALL

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN PUBLICATION 408, SECTION 605.
2. USE CLASS A CEMENT CONCRETE OR BETTER.
3. CHAMFER EXPOSED EDGES ONE INCH.
4. PROVIDE REINFORCEMENT (.12 IN/LN FT.) IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

ENDWALLS (RC-31M)

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

LIMERICK TOWNSHIP
IMPROVEMENT CONSTRUCTION PROCEDURES,
MATERIALS AND SPECIFICATIONS

SPECIFICATIONS

Storm Drainage Detention/Retention Basin

General:

Detention or retention basins for the control of storm water peak discharge shall meet the following requirements:

1. Basins Shall be installed prior to any earthmoving or land disturbances which they will serve. The phasing of their construction shall be noted in the narrative and on the plan.

2. Whenever a basin will be located in an area underlain by limestone, a geological evaluation of the proposed location will be conducted to determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent groundwater contamination and, where necessary, sinkhole formation. Soils used for the construction of basin shall have low-erodibility factors ("K" factors). Basin shall be kept as shallow and wide as possible. It shall be located four (4) feet above carbonated geology and the bed lined to limit the outfall of water.

3. Energy dissipaters and/or level spreaders shall be installed at points where pipes or drainage ways discharge to or from basins. Generally, outlet pipes designed to carry the predevelopment two (2) year storm flow will be permitted to discharge to a stream with only an energy dissipater. Storms of ten (10) year or greater intensity shall be spread across flood plains by level spreaders; rock material found on the site is suggested for their construction.

Primary Outlet Structures:

1. Pipe – reinforced concrete, rubber gasketed, shall conform to AASHTO M170, M198 and M207.

2. Poured-in-Place Outlet Structure – Reinforced concrete, minimum 4,000 psi compressive strength in accordance with Penn DOT Publication 408, Latest Edition.

3. Precast Outlet Structure – Reinforced concrete, minimum 4,000 psi compressive strength in accordance with Penn DOT Publication 408, Latest Edition. Submit design for Township review and approval.

4. Precast Reinforced Concrete Box Sections in accordance with AASHTO M259

5. Orifice Plates – Stainless steel, type 204, with stainless steel mounting hardware. Use ¼ inch thick up to 24 inch span and 3/8 inch thick over 24 inch spans.

6. Headwalls/Endwalls – Reinforced concrete, minimum 4,000 psi. Compressive strength in accordance with Penn DOT Publication 408, Latest Edition.

7. Cutoff (Anti-Seep) Collars – Reinforced concrete, minimum 4,000 psi compressive strength.

8. Concrete Pipe End Sections – Reinforced concrete in accordance with Penn DOT Publication 408.

9. Steel Grates – In accordance with Penn DOT Publication 408, Latest Edition.

Emergency Spillway Structure:

1. On Fill – Gabion mattresses minimum 9 inches thick with grouted weir are all placed on geotextile Class 4. Gabion materials including aggregate and grout shall be in accordance with Penn DOT Publication 408. Installation shall be in accordance with manufacturer's recommendation. Other types acceptable as approved by Township Engineer. The construction material of the spillway shall extend along the upstream and downstream berm embankment slopes. The upstream edge of the emergency spillway shall be a minimum of three (3) feet below the spillway crest elevation. The downstream slope of the spillway shall as a minimum extend to the toe of the berm embankment. The emergency spillway shall not discharge over the earthen fill or other easily erodible material.

2. On Natural Ground – Methods to be approved by the Township Engineer.

Embankment:

1. Embankment Structure - Materials suitable, including an impervious core and cutoff trench if required, to limit the seepage through the embankment so that no internal erosion takes place.

2. Exterior slopes of compacted soil shall not exceed one foot (1') vertical for three feet (3') horizontal if crown vetch or similar material not requiring mowing is utilized, and shall be 1 foot (1') vertical for four feet (4') horizontal when vegetation requiring mowing is utilized. The slopes shall be further reduced if the soil has unstable characteristics.

3. Embankment shall be installed in 8-inch lifts (max) and shall meet 95%.

4. Interior slopes of the basin shall not exceed one foot (1') vertical in three feet (3') horizontal except with approval of the Township:

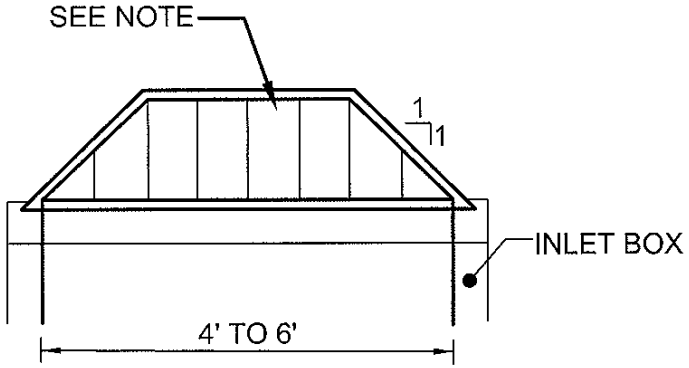
   (a) Where maximum water depth will not exceed three feet (3'); or

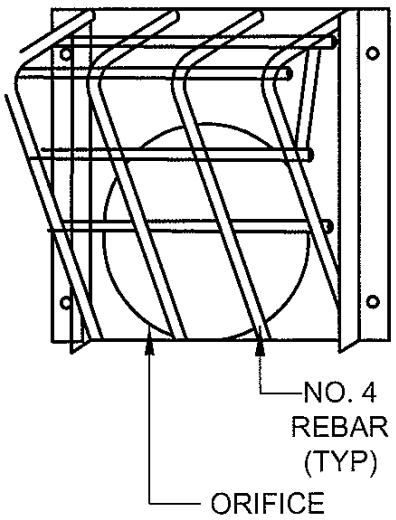
(b) When a two inch (2") rainfall in one (1) hour will not fill the basin in one (1) hour; or

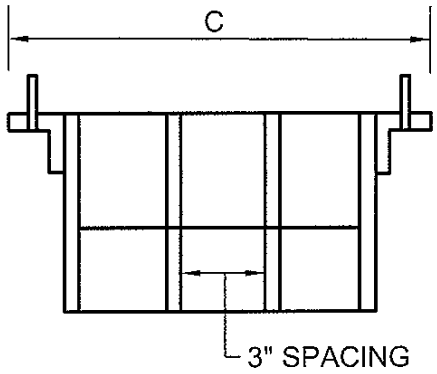
(c) Where concrete, stone or brick walls are used with side slopes proposed to be steeper than one foot (1') vertical in three feet (3') horizontal, in which case the basin shall be fenced with a permanent non corrosive chain link wire fence or other material as approved by the Township. The fence shall be forty two inches (42") in height and a ramp of durable, non-slip materials for maintenance vehicles shall be provided for access into the basin.

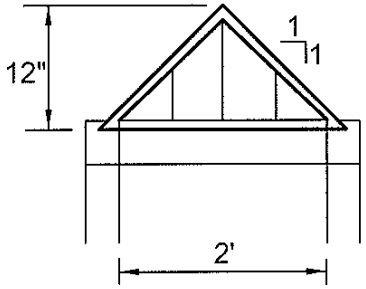
Underground Detention:

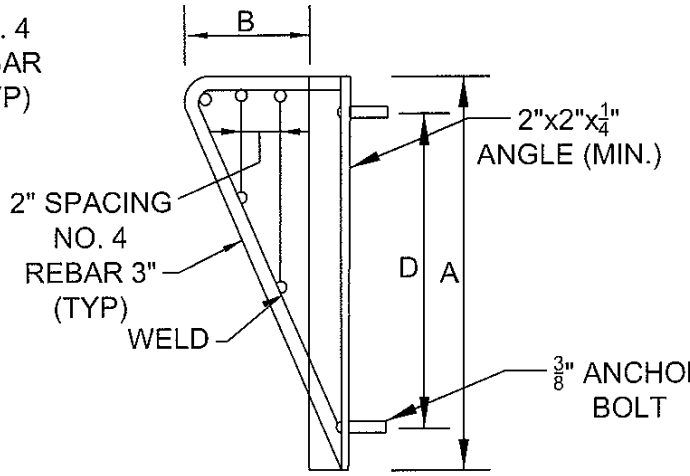
1. Structure – Materials as approved under pipes. Submit design for Township review and approval.











BASIN ID.	A	B	C	D
A (12" Ø ORF.)	16"	5"	16"	14"
B (3" Ø ORF.)	7"	3"	7"	5"
C (4" Ø ORF.)	8"	3"	8"	6"

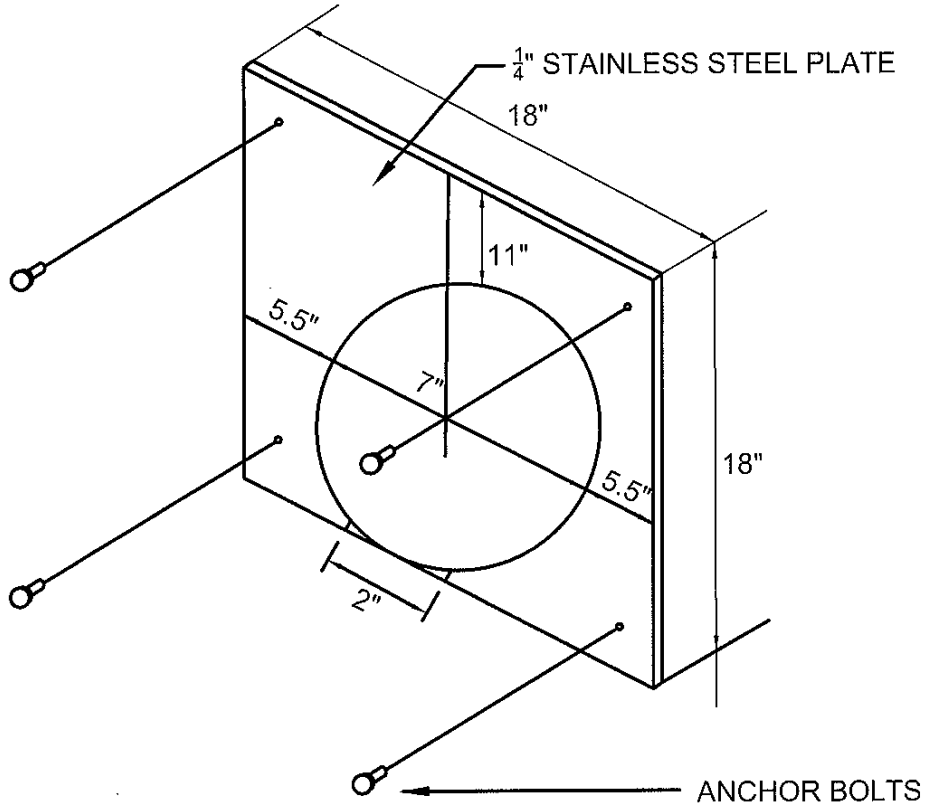
NOTE:
TEMPORARY TRASH GATE - $\frac{3}{8}$ " X 2"
STEEL FRAME WITH $\frac{3}{4}$" DIA. GRATE
BARS 8" O/C. USE ANTI-RUST COMPOUNDS.
TEMPORARY TRASH RACK TO BE
REPLACED WITH PERMANANT GRATE
WHEN BASIN IS CONVERTED FROM
SEDIMENT BASIN TO 4'x6' INLET BOX.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

TRASH RACK

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



NOTES:

1. TO BE ATTACHED TO ENDWALL WITH (4) ⅜" STAINLESS STEEL ANCHOR BOLTS.
2. PLATE TO BE COMPOSED OF ¼" STAINLESS STEEL.
3. DIMENSIONS & SIZE OF ORIFICE PLATE WILL VARY BETWEEN PROJECTS.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

ORIFICE PLATE

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

LIMERICK TOWNSHIP
IMPROVEMENT CONSTRUCTION PROCEDURES,
MATERIALS AND SPECIFICATIONS

SPECIFICATIONS

Geotextiles

Geotexile Materials shall be used for but not limited to the following uses:

1. Class 1 – Subsurface drainage.

2. Class 2 – Erosion Control.

3. Class 3 – Sedimentation Contol.

4. Class 4 – Layer separation.

During any project review phase, construction phase, and inspection phase the Township of Limerick and/or the Township Engineer can require the use of Geotextile fabrics for any of the above noted Classes.

Geotextile fabric placement, securing pin spacing and Geotextile physical property requirements shall meet the standards of PaDot 408, latest revision. See Section 212 and 735 – GEOTEXTILES of the Exhibits.

SPECIFICATIONS

LIMERICK TOWNSHIP
ENGINEERING AND CONSTRUCTION STANDARDS
AND IMPROVEMENTS PROCEDURES

STANDARDS

Signs and Markings:

1. Street Signs:

   (a) Street sign post — green steel channel post. (10') one piece section mm. 2.5 lb

   (b) All sign post must be erected on a breakaway made of steel green channel post a minimum of 2.5 lb/ft 3 feet in length. Breakaway shall be placed in ground except for the top 6 inches. Mount breakaway to post. An eze-erect breakaway strip must be used.

   (c) All fittings shall be aluminum or stainless steel and anti-theft.

   (d) All street signs shall be extruded aluminum minimum 0.08 gauge thickness at 9" height blade. Sign facing shall be H.I. color green

   (e) Letters shall be 3M Series 605-B, HA color white reflective (6") with 4" suffix.

2. End of Street Permanent Barricade:

   Barriers shall be pressure treated lumber, full depth to 60 p.s.i., type equal to wolmanized process.

   Barrier structure shall be post and beam type construction, 6" x 8" posts installed 36" below finish grade, by mechanical driving or setting in concrete; posts maximum 10' centers, three (3) 2" x 10" cross members fit into framing structure as self supporting.

   Barrier length shall be full width of cartway, Barrier height shall be 60", as measured from adjacent street surface.

   Barrier shall have Penn DOT Class I or Class 1-A or Class II reflective sheeting applied aluminum blank and fastened to wood planks on barrier facing direction of traffic approach.

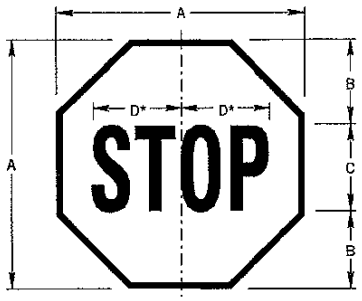
R1–1

STOP SIGN

(a) Justification. The Stop Sign (R1–1) is authorized for use on those streets or highways which intersect with a through highway or at a stop intersection so designated by the Department with reference to State–designated highways or local authorities with reference to highways under their jurisdiction. The R1–1 sign is also authorized for use in work zones involving one–lane, two–way roadways. At intersections where all approaches are controlled by an R1–1 sign, a supplemental plaque (R1–3 or R1–4) shall be mounted below each R1–1 sign.

(b) Authorization. Before local authorities designate any highway as a through highway or stop intersection which will intersect or affect a State–designated highway, approval of such designation shall first be obtained from the Department. Approval to install R1–1 signs in work areas shall not require the approval of the Department or local authorities when the conditions stipulated in Publication 203M (relating to work zone traffic control) are satisfied.

(c) Size. The standard size R1–1 sign shall be 750 mm by 750 mm (30" x 30"); however, on low–speed minor roads and secondary streets, a 600 mm by 600 mm (24" x 24") sign may be used.



DIMENSIONS – mm (IN)					
SIGN SIZE A x A	B	C	D	BOR-DER	BLANK STD.
600 x 600 (24" x 24")	200 (8)	200C (8C)	254 (10)	15 (0.6)	B1–600 (B1–24)
750 x 750 (30" x 30")	250 (10)	250C (10C)	318 (12.6)	20 (0.8)	B1–750 (B1–30)
900 x 900 (36" x 36")	300 (12)	300C (12C)	381 (15)	20 (0.8)	B1–900 (B1–36)
1200 x 1200 (48" x 48")	400 (16)	400C (16C)	508 (20)	30 (1.2)	B1–1200 (B1–48)

* REDUCE SPACING 40%

COLOR:

LEGEND AND BORDER:
WHITE (REFLECTORIZED)

BACKGROUND:
RED (REFLECTORIZED)

APPROVED FOR THE SECRETARY OF TRANSPORTATION

By : Allen C Rowe Date : 01–03–06

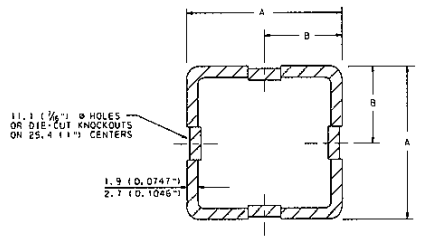
Chief, Traffic Engineering and Operations Division
Bureau of Highway Safety and Traffic Engineering

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

STOP SIGN

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



METRIC UNITS (mm)

SIGN POST SIZE	SIGN POST DIMENSION A	SIGN POST DIMENSION B	SIGN POST THICK.	ANCHOR POST SIZE	ANCHOR POST DIMENSION A	ANCHOR POST DIMENSION B	ANCHOR POST THICK.	ANCHOR SLEEVE * SIZE	ANCHOR SLEEVE * DIMENSION A	ANCHOR SLEEVE * DIMENSION B	ANCHOR SLEEVE * THICK.	SPLICE SLEEVE SIZE	SPLICE SLEEVE DIMENSION A	SPLICE SLEEVE DIMENSION B	SPLICE SLEEVE THICK.
44.5	44.5	22.2	1.9	50.8	50.8	25.4	2.7	57.2	57.2	28.6	2.7	38.1	38.1	19.0	1.9
50.8	50.8	25.4	1.9	57.2	57.2	28.6	2.7	63.5	63.5	31.8	2.7	44.5	44.5	22.2	1.9
57.2	57.2	28.6	1.9	63.5	63.5	31.8	2.7	76.2	76.2	38.1	4.8	50.8	50.8	25.4	1.9

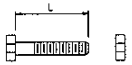
ENGLISH UNITS (INCHES)

SIGN POST SIZE	SIGN POST DIMENSION A	SIGN POST DIMENSION B	SIGN POST THICK.	ANCHOR POST SIZE	ANCHOR POST DIMENSION A	ANCHOR POST DIMENSION B	ANCHOR POST THICK.	ANCHOR SLEEVE * SIZE	ANCHOR SLEEVE * DIMENSION A	ANCHOR SLEEVE * DIMENSION B	ANCHOR SLEEVE * THICK.	SPLICE SLEEVE SIZE	SPLICE SLEEVE DIMENSION A	SPLICE SLEEVE DIMENSION B	SPLICE SLEEVE THICK.
1.75"	1.75"	0.875"	0.0747"	2.00"	2.00"	1.000"	0.1046"	2.25"	2.25"	1.125"	0.1046"	1.50"	1.50"	0.750"	0.0747"
2.00"	2.00"	1.000"	0.0747"	2.25"	2.25"	1.125"	0.1046"	2.50"	2.50"	1.250"	0.1046"	1.75"	1.75"	0.875"	0.0747"
2.25"	2.25"	1.125"	0.0747"	2.50"	2.50"	1.250"	0.1046"	3.00"	3.00"	1.500"	0.1875"	2.00"	2.00"	1.000"	0.0747"

* ONLY REQUIRED FOR INSTALLATIONS IN CONCRETE.

SQUARE STEEL POSTS SYSTEM A

2.7 mm (0.1046") AND 1.9 mm (0.0747") - 415 MPa (60 KSI)

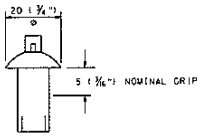


METRIC UNITS SIGN POST SIZE (mm)	METRIC UNITS DIMENSION L (mm)
44.5	75
50.8	
57.2	90

ENGLISH UNITS SIGN POST SIZE (INCHES)	ENGLISH UNITS DIMENSION L (INCHES)
1.75	3.0
2.00	
2.25	3.5

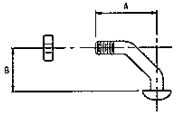
M10 x 1.5 (3/8" - 16 UNC) ANCHOR BOLTS & NUTS

CADMIUM PLATED STEEL, ZINC PLATED STEEL OR ALUMINUM



10 (3/8") DRIVE RIVET

CADMIUM PLATED STEEL, ZINC PLATED STEEL OR ALUMINUM



METRIC UNITS SIGN POST SIZE (mm)	METRIC UNITS DIMENSION (mm) A	METRIC UNITS DIMENSION (mm) B
44.5	34.13	24.61
50.8		
57.2	39.69	30.16

ENGLISH UNITS SIGN POST SIZE (INCHES)	ENGLISH UNITS DIMENSION (INCHES) A	ENGLISH UNITS DIMENSION (INCHES) B
1.75	1.343	0.969
2.00		
2.25	1.562	1.188

M8 x 1.25 (5/16" - 18 UNC) CORNER BOLTS & NUTS

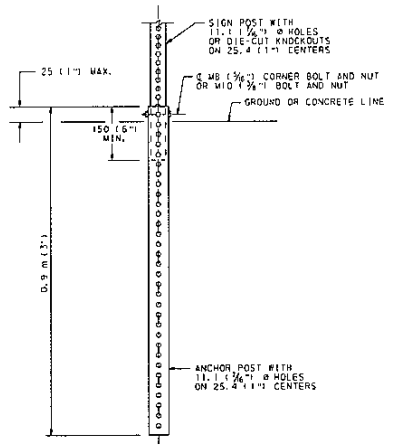
CADMIUM PLATED STEEL, ZINC PLATED STEEL OR ALUMINUM

INSTALLATION INSTRUCTIONS:

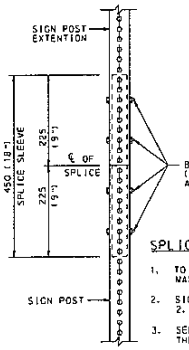
1. DETERMINE THE PROPER SIZE AND NUMBER OF SIGN POSTS FROM THE APPROPRIATE GRAPH ON SHEET 2 OF 9.
2. PUNCH OUT APPROPRIATE KNOCKOUTS AND ATTACH THE SIGN.
3. DETERMINE THE PROPER SIZE ANCHOR POST FROM THE SQUARE STEEL POSTS TABLE ON THIS SHEET.
4. DRIVE THE ANCHOR POST INTO THE GROUND, USING THE APPROPRIATE SIZE DRIVE CAP, UNTIL ONLY ONE HOLE REMAINS ABOVE THE GROUND OR FINISHED ELEVATION OF THE CONCRETE.
5. PUNCH OUT THE SIXTH KNOCKOUTS FROM THE BOTTOM OF THE SIGN POST.
6. SLIDE A MINIMUM OF 150 mm (6") OF THE SIGN POST INTO THE ANCHOR POST.
7. ATTACH THE SIGN POST TO THE ANCHOR POST WITH ONE M8 (5/16") CORNER BOLT AND NUT (OR ALTERNATELY ONE M10 (3/8") BOLT AND NUT) THROUGH THE TOP HOLE OF THE ANCHOR POST.
8. TIGHTEN THE BOLT AND NUT BY THE TURN-OF-NUT METHOD. BRING NUT TO A SNUG CONDITION TO ENSURE THAT ALL PARTS ARE BROUGHT TOGETHER INTO FULL CONTACT WITH EACH OTHER, THEN TIGHTEN AN ADDITIONAL ½ TURN.

INSTALLATION IN CONCRETE:

INSTALL AS NOTED ABOVE, BUT PLACE A 450 (18") LONG ANCHOR SLEEVE OUTSIDE THE ANCHOR POST SO THAT THE TOPS OF THE ANCHOR POST AND ANCHOR SLEEVE ARE EVEN. SELECT THE PROPER SIZE ANCHOR SLEEVE FROM THE SQUARE STEEL POSTS TABLE ON THIS SHEET.



INSTALLATION DETAIL



SPLICE NOTES:

1. TO EXTEND THE HEIGHT OF A SIGN POST, A MAXIMUM OF ONE SPLICE MAY BE MADE.
2. SIGN POST SPLICES MUST BE A MINIMUM OF 2.7 m (9') ABOVE GROUND.
3. SELECT THE PROPER SIZE SPLICE SLEEVE FROM THE SQUARE STEEL POSTS TABLE ON THIS SHEET.

SPLICE DETAIL

NOTES:

1. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH PUB. 408.
2. SIGN POSTS AND SPLICE SLEEVES SHALL HAVE 11.1 mm (7/16") DIAMETER HOLES OR DIE-CUT KNOCKOUTS ON 25.4 mm (1") CENTERS ON ALL FOUR SIDES. ANCHOR POSTS AND ANCHOR SLEEVES SHALL HAVE 11.1 mm (7/16") DIAMETER HOLES ON 25.4 mm (1") CENTERS ON ALL FOUR SIDES.
3. BOLTS AND NUTS SHALL BE ASTM A 307, GRADE B.
4. DRIVE RIVETS MAY BE USED TO FASTEN SIGN BLANKS TO THE SIGN POST.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS (").
6. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

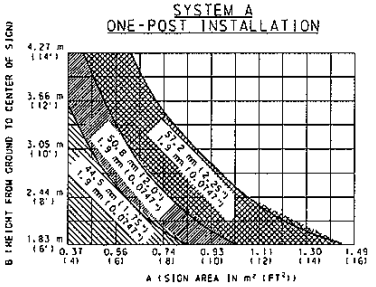
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

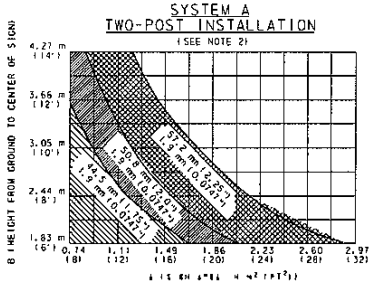
STEEL SQUARE POSTS (SYSTEM A) ERECTION DETAILS

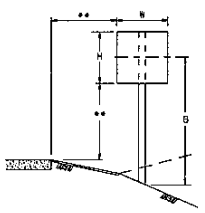
RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 1 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B

SYSTEM A
ONE-POST INSTALLATION



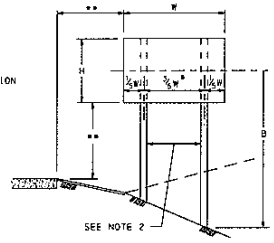
SYSTEM A
TWO-POST INSTALLATION
(SEE NOTE 2)





* WHEN ERECTING STANDARD WARNING OR REGULATORY SIGNS THAT ARE PREPUNCHED, THIS DISTANCE IS THE DISTANCE BETWEEN THE HORIZONTAL HOLES.

** SEE SHEET 9 OF 9 FOR SIGN LOCATION/INSTALLATION DETAILS.



A = SIGN AREA (SEE TABLE).
A = W x H FOR SQUARE OR RECTANGULAR SIGNS.
WHERE: W = WIDTH OF SIGN
H = HEIGHT OF SIGN

METRIC UNITS

SIGN AREA TABLE

SQUARE OR RECTANGULAR SIGNS						IRREGULAR SHAPED SIGNS	
SIZE (mm x mm)	AREA (m²)	SIZE (mm x mm)	AREA (m²)	SIZE (mm x mm)	AREA (m²)	SIGN (mm x mm)	AREA (m²)
200x1200	0.24	750x375	0.28	1800x300	0.54	YIELD (R1-2) 900 x 900	0.35
300x450	0.14	750x600	0.45	1800x600	1.08	YIELD (R1-2) 1200 x 1200	0.62
300x600	0.18	750x750	0.56	1800x900	1.62	YIELD (R1-2) 1500 x 1500	0.97
300x750	0.22	750x900	0.68	1800x1200	2.16	NO PASSING PENNANT (W14-3) 1200 x 900	0.50
300x900	0.27	750x1200	0.90	1800x1500	2.70	RAILROAD WARNING (W10-1) 900 DIA.	0.64
300x1200	0.36	750x1500	1.12	2400x600	1.44	SCHOOL (S1-1) 750 x 750	0.42
450x375	0.17	900x900	0.81	2400x1200	2.88	SCHOOL (S1-1) 900 x 900	0.61
450x450	0.20	900x1200	1.08	3000x300	0.90	STOP (R1-1)600 x 600	0.30
450x600	0.27	900x1350	1.22	3000x375	1.12	STOP (R1-1)750 x 750	0.47
450x900	0.40	1200x1200	1.44	3000x600	1.80	STOP (R1-1)900 x 900	0.67
450x1200	0.54	1200x1500	1.80	3000x750	2.25	STOP (R1-1)1200 x 1200	1.19
525x375	0.20	1500x300	0.45	3600x300	1.08	INTERSTATE ROUTE MARKER (MI-1) 600 x 600	0.29
600x600	0.36	1500x600	0.90	3600x450	1.62	INTERSTATE ROUTE MARKER (MI-1) 750 x 600	0.36
600x900	0.54	1500x1050	1.58	3600x600	2.16	INTERSTATE ROUTE MARKER (MI-1) 900 x 900	0.69
600x1200	0.72	1500x1500	2.25	3600x750	2.70	INTERSTATE ROUTE MARKER (MI-1) 1125 x 900	0.80

ENGLISH UNITS

SIGN AREA TABLE

SQUARE OR RECTANGULAR SIGNS						IRREGULAR SHAPED SIGNS	
SIZE (in. x in.)	AREA (FT²)	SIZE (in. x in.)	AREA (FT²)	SIZE (in. x in.)	AREA (FT²)	SIGN (in. x in.)	AREA (FT²)
8"x48"	2.7	30"x15"	3.1	72"x12"	6.0	YIELD (R1-2) 36"x36"	3.9
12"x18"	1.5	30"x24"	5.0	72"x24"	12.0	YIELD (R1-2) 48"x48"	6.9
12"x24"	2.0	30"x30"	6.3	72"x36"	18.0	YIELD (R1-2) 60"x60"	10.8
12"x30"	2.9	30"x36"	7.5	72"x48"	24.0	NO PASSING PENNANT (W14-3) 48"x36"	5.6
12"x36"	3.0	30"x48"	10.0	72"x60"	30.0	RAILROAD WARNING (W10-1) 36" DIA.	7.1
12"x48"	4.0	30"x60"	12.5	96"x24"	16.0	SCHOOL (S1-1) 30"x30"	4.7
18"x15"	1.9	36"x36"	9.0	96"x48"	32.0	SCHOOL (S1-1) 36"x36"	6.8
18"x18"	2.3	36"x48"	12.0	120"x12"	10.0	STOP (R1-1) 24"x24"	3.3
18"x24"	3.0	36"x54"	13.5	120"x15"	12.5	STOP (R1-1) 30"x30"	5.2
18"x36"	4.5	48"x48"	16.0	120"x24"	20.0	STOP (R1-1) 36"x36"	7.4
18"x48"	6.0	48"x60"	20.0	120"x30"	25.0	STOP (R1-1) 48"x48"	13.2
21"x15"	2.2	60"x12"	5.0	144"x12"	12.0	INTERSTATE ROUTE MARKER (MI-1) 24"x24"	3.2
24"x24"	4.0	60"x24"	10.0	144"x18"	18.0	INTERSTATE ROUTE MARKER (MI-1) 30"x24"	4.0
24"x36"	6.0	60"x42"	17.5	144"x24"	24.0	INTERSTATE ROUTE MARKER (MI-1) 36"x36"	7.2
24"x48"	8.0	60"x60"	25.0	144"x30"	30.0	INTERSTATE ROUTE MARKER (MI-1) 45"x36"	9.0

NOTES:

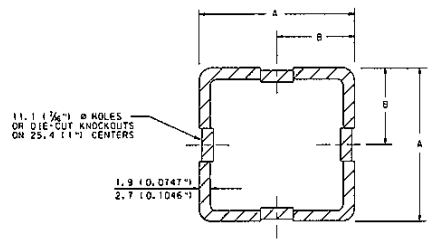
1. TO DETERMINE THE POST SIZE, ENTER THE GRAPH WITH THE VALUES OF A AND B. THE SHADED AREA INDICATES THE APPROPRIATE POST SIZE REQUIRED.
2. 57.2 mm (2.25") POSTS SHALL HAVE 2.1 m (7') CLEARANCE BETWEEN EACH OTHER, MEASURED FROM INSIDE POST EDGE TO INSIDE POST EDGE, WHEN USED IN TWO-POST INSTALLATIONS. 50.8 mm (2") AND 44.5 mm (1.75") POSTS MAY HAVE LESS THAN 2.1 m (7') CLEARANCE BETWEEN EACH OTHER WHEN USED IN TWO-POST INSTALLATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).
4. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

STEEL SQUARE POSTS (SYSTEM A) SELECTION TABLES

RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 2 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B



METRIC UNITS (mm)

SIGN POST				ANCHOR POST				ANCHOR SLEEVE *				SPLICE SLEEVE			
SIZE	DIMENSION A	DIMENSION B	THICK.	SIZE	DIMENSION A	DIMENSION B	THICK.	SIZE	DIMENSION A	DIMENSION B	THICK.	SIZE	DIMENSION A	DIMENSION B	THICK.
44.5	44.5	22.2	1.9	50.8	50.8	25.4	2.7	57.2	57.2	28.6	2.7	38.1	38.1	19.0	1.9
50.8	50.8	25.4	1.9	57.2	57.2	28.6	2.7	63.5	63.5	31.8	2.7	44.5	44.5	22.2	1.9

ENGLISH UNITS (INCHES)

SIGN POST				ANCHOR POST				ANCHOR SLEEVE *				SPLICE SLEEVE			
SIZE	DIMENSION A	DIMENSION B	THICK.	SIZE	DIMENSION A	DIMENSION B	THICK.	SIZE	DIMENSION A	DIMENSION B	THICK.	SIZE	DIMENSION A	DIMENSION B	THICK.
1.75"	1.75"	0.875"	0.0747"	2.00"	2.00"	1.000"	0.1046"	2.25"	2.25"	1.125"	0.1046"	1.50"	1.50"	0.750"	0.0747"
2.00"	2.00"	1.000"	0.0747"	2.25"	2.25"	1.125"	0.1046"	2.50"	2.50"	1.250"	0.1046"	1.75"	1.75"	0.875"	0.0747"

* REQUIRED FOR ALL POST INSTALLATIONS

SQUARE STEEL POSTS SYSTEM C

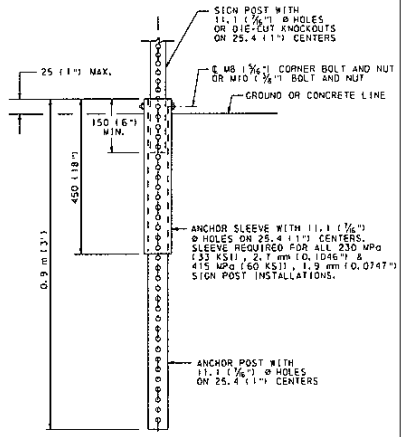
1.9 mm (0.0747") - 415 MPa (60 KSI)
2.7 mm (0.1046") - 230 MPa (33 KSI)

INSTALLATION INSTRUCTIONS:

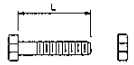
1. DETERMINE THE PROPER SIZE AND NUMBER OF SIGN POSTS FROM THE APPROPRIATE GRAPH ON SHEET 4 OF 9.
2. DETERMINE THE PROPER SIZE ANCHOR POST AND ANCHOR SLEEVE FROM THE SQUARE STEEL POSTS TABLE ON THIS SHEET.
3. DRIVE THE ANCHOR POST AND ANCHOR SLEEVE INTO THE GROUND SIMULTANEOUSLY, USING THE APPROPRIATE SIZE DRIVE CAP, UNTIL ONLY ONE HOLE REMAINS ABOVE THE GROUND OR FINISHED ELEVATION OF THE CONCRETE.
4. SLIDE A MINIMUM OF 150 mm (6") OF THE SIGN POST INTO THE ANCHOR POST.
5. ATTACH THE SIGN POST TO THE ANCHOR POST AND SLEEVE WITH ONE M8 (5/16") CORNER BOLT AND NUT (OR ALTERNATELY ONE M10 (3/8") BOLT AND NUT) THROUGH THE TOP HOLE OF THE ANCHOR POST AND SLEEVE.
6. TIGHTEN THE BOLT AND NUT BY THE TURN-OF-NUT METHOD. BRING NUT TO A SNUG CONDITION TO ENSURE THAT ALL PARTS ARE BROUGHT TOGETHER INTO FULL CONTACT WITH EACH OTHER, THEN TIGHTEN AN ADDITIONAL ½ TURN.

INSTALLATION IN CONCRETE:

INSTALL AS NOTED ABOVE.



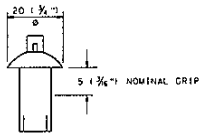
INSTALLATION DETAIL



METRIC UNITS		ENGLISH UNITS	
SIGN POST SIZE (mm)	DIMENSION L (mm)	SIGN POST SIZE (INCHES)	DIMENSION L (INCHES)
44.5	75	1.75	3.0
50.8		2.00	
57.2	90	2.25	3.5
63.5		2.50	

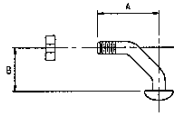
M10 x 1.5 (3/8" - 16 UNC) ANCHOR BOLTS & NUTS

CADMIUM PLATED STEEL, ZINC PLATED STEEL OR ALUMINUM



10 (3/8") DRIVE RIVET

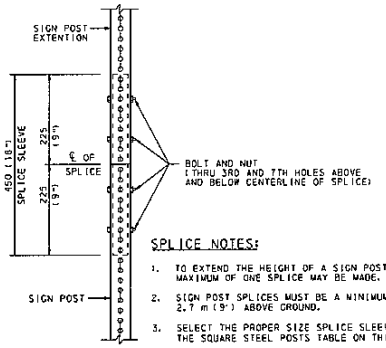
CADMIUM PLATED STEEL, ZINC PLATED STEEL OR ALUMINUM



METRIC UNITS			ENGLISH UNITS		
SIGN POST SIZE (mm)	DIMENSION (mm) A	DIMENSION (mm) B	SIGN POST SIZE (INCHES)	DIMENSION (INCHES) A	DIMENSION (INCHES) B
44.5	34.13	24.61	1.75	1.343	0.969
50.8			2.00		
57.2	39.69	30.16	2.25	1.562	1.188
63.5			2.50		

M8 x 1.25 (5/16" - 18 UNC) CORNER BOLTS & NUTS

CADMIUM PLATED STEEL, ZINC PLATED STEEL OR ALUMINUM



SPLICE NOTES:

1. TO EXTEND THE HEIGHT OF A SIGN POST, A MAXIMUM OF ONE SPLICE MAY BE MADE.
2. SIGN POST SPLICES MUST BE A MINIMUM OF 2.7 m (9') ABOVE GROUND.
3. SELECT THE PROPER SIZE SPLICE SLEEVE FROM THE SQUARE STEEL POSTS TABLE ON THIS SHEET.

SPLICE DETAIL

NOTES:

1. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH PUB. 408.
2. SIGN POSTS AND SPLICE SLEEVES SHALL HAVE 11.1 mm (7/16") DIAMETER HOLES OR DIE-CUT KNOCKOUTS ON 25.4 mm (1") CENTERS ON ALL FOUR SIDES. ANCHOR POSTS AND ANCHOR SLEEVES SHALL HAVE 11.1 mm (7/16") DIAMETER HOLES ON 25.4 mm (1") CENTERS ON ALL FOUR SIDES.
3. BOLTS AND NUTS SHALL BE ASTM A 307, GRADE B.
4. DRIVE RIVETS MAY BE USED TO FASTEN SIGN BLANKS TO THE SIGN POST.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).
6. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

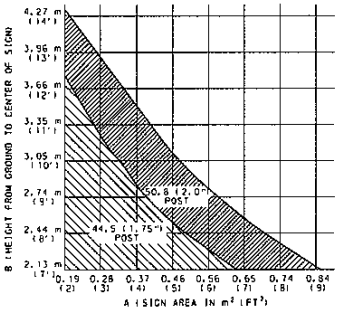
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

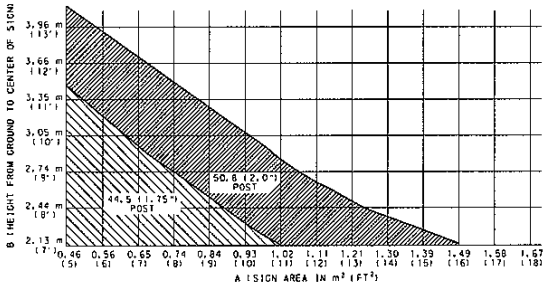
STEEL SQUARE POSTS (SYSTEM C) ERECTION DETAILS

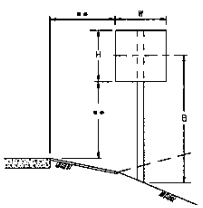
RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 3 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B

SYSTEM C
ONE-POST INSTALLATION



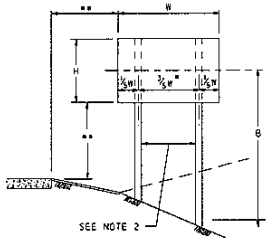
SYSTEM C
TWO-POST INSTALLATION





* WHEN ERECTING STANDARD WARNING OR REGULATORY SIGNS THAT ARE PREPUNCHED, THIS DISTANCE IS THE DISTANCE BETWEEN THE HORIZONTAL HOLES.

** SEE SHEET 9 OF 9 FOR SIGN LOCATION/INSTALLATION DETAILS.



A = SIGN AREA (SEE TABLE).
A = W X H FOR SQUARE OR RECTANGULAR SIGNS,
WHERE: W = WIDTH OF SIGN
H = HEIGHT OF SIGN

METRIC UNITS

SIGN AREA TABLE

SQUARE OR RECTANGULAR SIGNS						IRREGULAR SHAPED SIGNS	
SIZE (mm x mm)	AREA (m²)	SIZE (mm x mm)	AREA (m²)	SIZE (mm x mm)	AREA (m²)	SIGN (mm x mm)	AREA (m²)
200x1200	0.24	750x375	0.28	1800x300	0.54	YIELD (R1-2) 900 x 900	0.35
300x450	0.14	750x600	0.45	1800x600	1.08	YIELD (R1-2) 1200 x 1200	0.62
300x600	0.18	750x750	0.56	1800x900	1.62	YIELD (R1-2) 1500 x 1500	0.97
300x750	0.22	750x900	0.68	1800x1200	2.16	NO PASSING PENNANT (W14-3) 1200 x 900	0.50
300x900	0.27	750x1200	0.90	1800x1500	2.70	RAILROAD WARNING (W10-1) 900 DIA.	0.64
300x1200	0.36	750x1500	1.12	2400x600	1.44	SCHOOL (S1-1) 750 x 750	0.42
450x375	0.17	900x900	0.81	2400x1200	2.88	SCHOOL (S1-1) 900 x 900	0.61
450x450	0.20	900x1200	1.08	3000x300	0.90	STOP (R1-1) 600 x 600	0.30
450x600	0.27	900x1350	1.22	3000x375	1.12	STOP (R1-1) 750 x 750	0.47
450x900	0.40	1200x1200	1.44	3000x600	1.80	STOP (R1-1) 900 x 900	0.67
450x1200	0.54	1200x1500	1.80	3000x750	2.25	STOP (R1-1) 1200 x 1200	1.19
525x375	0.20	1500x300	0.45	3600x300	1.08	INTERSTATE ROUTE MARKER (M1-1) 600 x 600	0.29
600x600	0.36	1500x600	0.90	3600x450	1.62	INTERSTATE ROUTE MARKER (M1-1) 750 x 600	0.36
600x900	0.54	1500x1050	1.58	3600x600	2.16	INTERSTATE ROUTE MARKER (M1-1) 900 x 900	0.69
600x1200	0.72	1500x1500	2.25	3600x750	2.70	INTERSTATE ROUTE MARKER (M1-1) 1125 x 900	0.80

ENGLISH UNITS

SIGN AREA TABLE

SQUARE OR RECTANGULAR SIGNS						IRREGULAR SHAPED SIGNS	
SIZE (in. x in.)	AREA (FT²)	SIZE (in. x in.)	AREA (FT²)	SIZE (in. x in.)	AREA (FT²)	SIGN (in. x in.)	AREA (FT²)
8"x48"	2.7	30"x15"	3.1	72"x12"	6.0	YIELD (R1-2) 36"x36"	3.9
12"x18"	1.5	30"x24"	5.0	72"x24"	12.0	YIELD (R1-2) 48"x48"	6.9
12"x24"	2.0	30"x30"	6.3	72"x36"	18.0	YIELD (R1-2) 60"x60"	10.8
12"x30"	2.5	30"x36"	7.5	72"x48"	24.0	NO PASSING PENNANT (W14-3) 48"x36"	5.6
12"x36"	3.0	30"x48"	10.0	72"x60"	30.0	RAILROAD WARNING (W10-1) 36" DIA.	7.1
12"x48"	4.0	30"x60"	12.5	96"x24"	16.0	SCHOOL (S1-1) 30"x30"	4.7
18"x15"	1.9	36"x36"	9.0	96"x48"	32.0	SCHOOL (S1-1) 36"x36"	6.8
18"x18"	2.3	36"x48"	12.0	120"x12"	10.0	STOP (R1-1) 24"x24"	3.3
18"x24"	3.0	36"x54"	13.5	120"x15"	12.5	STOP (R1-1) 30"x30"	5.2
18"x36"	4.5	48"x48"	16.0	120"x24"	20.0	STOP (R1-1) 36"x36"	7.4
18"x48"	6.0	48"x60"	20.0	120"x30"	25.0	STOP (R1-1) 48"x48"	13.2
21"x15"	2.2	60"x12"	5.0	144"x12"	12.0	INTERSTATE ROUTE MARKER (M1-1) 24"x24"	3.2
24"x24"	4.0	60"x24"	10.0	144"x18"	18.0	INTERSTATE ROUTE MARKER (M1-1) 30"x24"	4.0
24"x36"	6.0	60"x42"	17.5	144"x24"	24.0	INTERSTATE ROUTE MARKER (M1-1) 36"x36"	7.2
24"x48"	8.0	60"x60"	25.0	144"x30"	30.0	INTERSTATE ROUTE MARKER (M1-1) 45"x36"	9.0

NOTES:

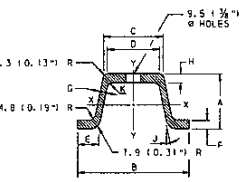
1. TO DETERMINE THE POST SIZE, ENTER THE GRAPH WITH THE VALUES OF A AND B. THE SHADED AREA INDICATES THE APPROPRIATE POST SIZE REQUIRED.
2. 50.8 mm (2") AND 44.5 mm (1.75") POSTS MAY HAVE LESS THAN 2.1 m (7') CLEARANCE BETWEEN EACH OTHER WHEN USED IN TWO-POST INSTALLATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).
4. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

STEEL SQUARE POSTS (SYSTEM C) SELECTION TABLES

RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 4 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B



METRIC UNITS

STEEL POST DIMENSIONS

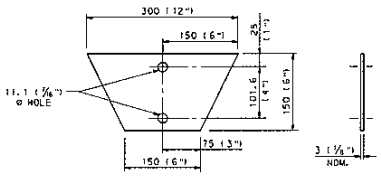
* WEIGHT Kg/m	DIMENSIONS (MILLIMETERS)									
	A	B	C	D	E	F	G	H	J	K
3.71	39.6	19.5	31.8	26.9	16.0	4.1	3.3	3.8	12.5°	3.3 R
5.94	44.4	88.9	42.4	35.8	18.3	6.4	4.6	5.8	11.5°	4.8 R

ENGLISH UNITS

STEEL POST DIMENSIONS

* WEIGHT LBS/FT.	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	J	K
2.5	1.56	3.13	1.25	1.06	0.63	0.16	0.13	0.15	12.5°	0.13 R
4.0	1.75	3.50	1.67	1.41	0.72	0.25	0.18	0.23	11.5°	0.19 R

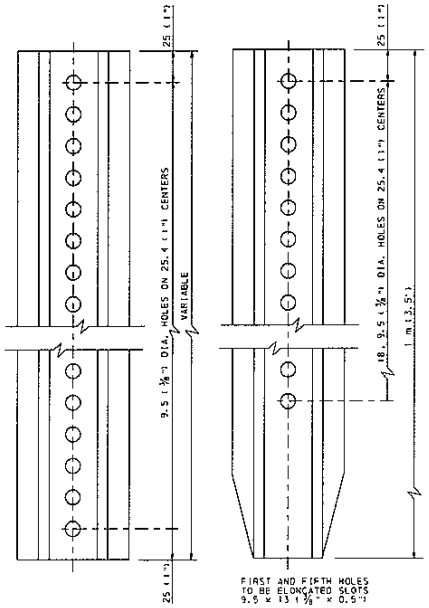
* ±3.5%

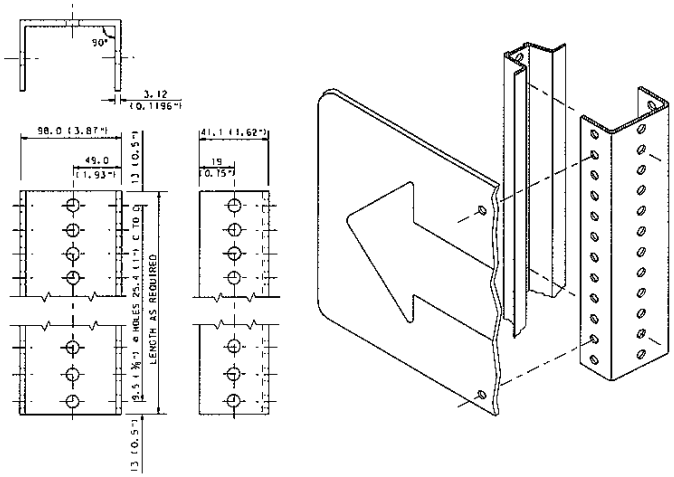


ANCHOR PLATE

NOTES:

1. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH PUB. 408.
2. FORMED-CHANNEL SIGN MOUNTS SHALL BE MILD STEEL.
3. ANCHOR BOLTS SHALL BE 7.94 mm (5/16") - 18 UNC x 38 (1.5") FULLY THREADED, GRADE 9 HEX HEAD. A FLANGED ANCHOR BOLT MAY BE SUBSTITUTED FOR THE STANDARD ANCHOR BOLT AND FLAT WASHER.
4. WASHERS SHALL BE 7.94 mm (5/16") GRADE 9 PLATED.
5. LOCKNUTS SHALL BE 7.94 mm (5/16") - 18 UNC THREADS, HEX HEADED.
6. ANY OTHER DEPARTMENT APPROVED BREAKAWAY CONNECTION APPROVED FOR THIS KIND OF POST MAY BE SUBSTITUTED FOR THE UNIVERSAL SPACER.
7. SEE SHEET 6 OF 9 FOR SPACER AND ANCHOR BOLT DETAILS.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).
9. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.





FORMED-CHANNEL SIGN MOUNT

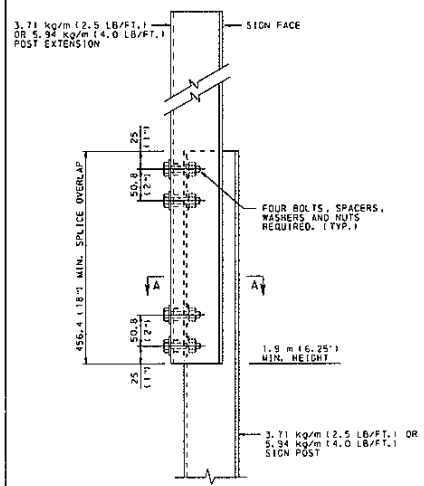
USE WHEN IT IS NECESSARY TO MOUNT SIGNS ON THE SIDE OF A CHANNEL BAR POST IN ADDITION TO THE NORMAL SIGN MOUNTING LOCATION ON THE FLANGED FACE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

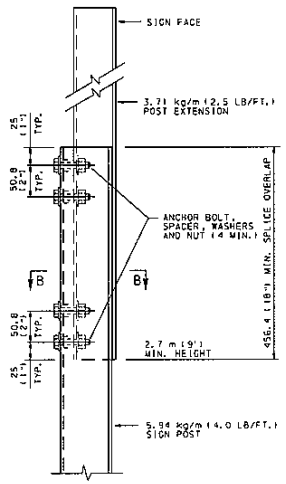
CHANNEL BAR POSTS (ROLLED STEEL RAILS) MATERIAL DETAILS

RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 5 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B



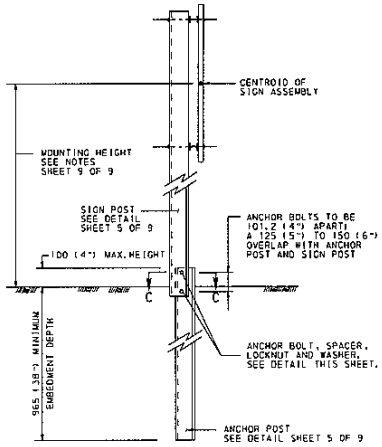
POST EXTENSION SPLICE DETAIL A

FOR USE IN EXTENDING SIGN POSTS

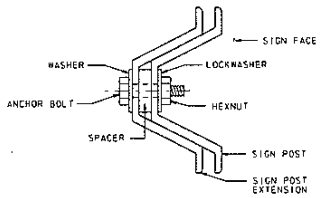


ALTERNATE POST EXTENSION SPLICE DETAIL B

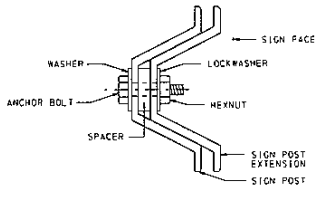
FOR USE IN EXTENDING SIGN POSTS



INSTALLATION DETAIL



SECTION A-A



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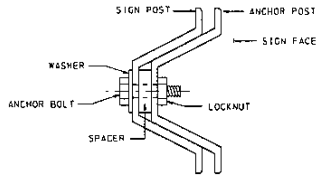
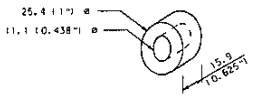
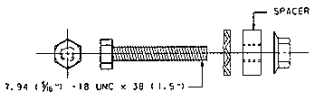


SECTION C-C



SPACER DETAIL

ZINC PLATED



ANCHOR BOLT, WASHER, SPACER AND LOCKNUT

ANCHOR BOLTS TO BE 38 (1.5"), GRADE 9, HEX HEAD.

ANCHOR SPLICE INSTALLATION INSTRUCTIONS:

1. DETERMINE THE PROPER SIZE SIGN POST AND ANCHOR POST FROM THE APPROPRIATE GRAPH ON SHEET 7 OF 9. USE 3.71 kg/m (2.5 LB/FT.) ANCHOR POSTS WITH 3.71 kg/m (2.5 LB/FT.) SIGN POSTS AND 5.94 kg/m (4.0 LB/FT.) ANCHOR POSTS WITH 5.94 kg/m (4.0 LB/FT.) SIGN POSTS.
2. REMOVE A SHOVEL OF SOIL AT THE POST LOCATION TO ALLOW FOR FINAL ATTACHMENT OF THE SIGN POST TO THE ANCHOR POST.
3. DRIVE ANCHOR POST WITH A DRIVE CAP TO WITHIN APPROXIMATELY 300 mm (12") ABOVE GROUND LEVEL. PLACE ONE BOLT AND WASHER IN FIFTH HOLE FROM THE END OF THE EXPOSED ANCHOR POST. SECURELY TIGHTEN SPACER ONTO BOLT.
4. DRIVE ANCHOR POST TO 100 mm (4") ABOVE GROUND LEVEL. PLACE REMAINING BOLT AND WASHER IN FIRST HOLE FROM THE END OF POST AND SECURELY TIGHTEN SPACER ONTO BOLT. (BOLTS 101.6 mm (4") APART).
5. NEST TOP SIGN POST OVER PROTRUDING ANCHOR POST BOLTS THROUGH FIRST AND FIFTH HOLES OF TOP SIGN POST. THIS WILL RESULT IN A 125 mm (5") TO 150 mm (6") OVERLAP.
6. PLACE A LOCKNUT ON EACH BOLT (A STANDARD LOCKWASHER AND NUT MAY BE USED IN LIEU OF THE LOCKNUT). TIGHTEN BOLTS AND NUTS BY TURN-OF-NUT METHOD. BRING NUT TO A SNUG TIGHT CONDITION TO ENSURE THAT ALL PARTS ARE BROUGHT TOGETHER INTO FULL CONTACT WITH EACH OTHER, THEN TIGHTEN AN ADDITIONAL ⅓ TURN.
7. RESTORE SOIL AROUND THE ANCHOR POST.

INSTALLATION IN SOFT SOIL:

1. USE THE ANCHOR PLATE IN AREAS WITH SOFT SOIL. BOLT THE TOP ANCHOR BOLT 25.4 mm (1") BELOW THE BOTTOM ANCHOR POST BOLT, 16 TO 7 HOLES FROM THE END OF THE ANCHOR POST).

POST EXTENSION SPLICE NOTES:

1. TO EXTEND THE HEIGHT OF A SIGN POST, A MAXIMUM OF ONE SPLICE MAY BE MADE.
2. FOUR ANCHOR BOLTS WITH SPACERS, WASHERS, LOCKWASHERS AND NUTS ARE REQUIRED (LOCKNUTS MAY BE USED IN LIEU OF STANDARD LOCKWASHERS AND NUTS). SEE THIS SHEET FOR ANCHOR BOLT SYSTEM.
3. POST EXTENSION SPLICE DETAIL A IS PREFERRED OVER POST EXTENSION SPLICE DETAIL B. WHEN DETAIL A IS USED, 3.71 kg/m (2.5 LB/FT.) POSTS SHALL USE A 3.71 kg/m (2.5 LB/FT.) POST EXTENSION POST FOR SPLICE EXTENSIONS; 5.94 kg/m (4.0 LB/FT.) POSTS SHALL USE A 5.94 kg/m (4.0 LB/FT.) POST EXTENSION POST FOR SPLICE EXTENSIONS. WHEN DETAIL A IS USED, POST EXTENSION SPLICES SHALL BE MOUNTED ON THE BACK (NON-IMPACT) SIDE OF THE SIGN POST. SPLICES SHALL BE MADE AT A MINIMUM HEIGHT OF 1.9 m (6.25'), MEASURED TO THE BOTTOM OF THE SPLICE.
4. POST EXTENSION SPLICE DETAIL B IS PERMITTED FOR USE TO PROVIDE A FLUSH SIGN MOUNT SURFACE FOR 5.94 kg/m (4.0 LB/FT.) POSTS. WHEN DETAIL B IS USED, 3.71 kg/m (2.5 LB/FT.) POST EXTENSION SPLICES MAY BE NESTED ON THE FRONT OF A 5.94 kg/m (4.0 LB/FT.) POST. SPLICES SHALL BE MADE AT A MINIMUM HEIGHT OF 2.7 m (9'), MEASURED TO THE BOTTOM OF THE SPLICE.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).
2. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

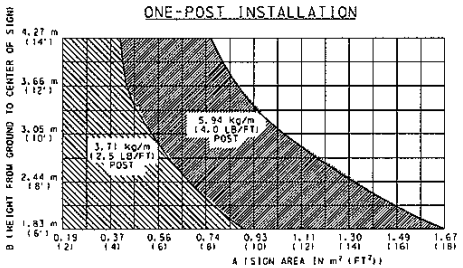
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

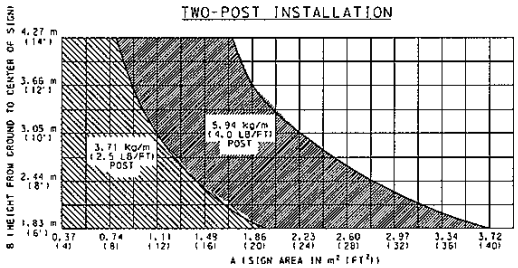
CHANNEL BAR POSTS ERECTION DETAILS

RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 6 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B

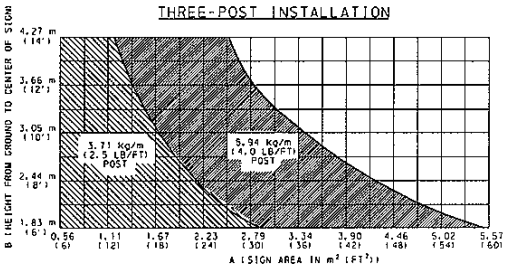
ONE-POST INSTALLATION

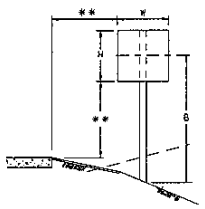


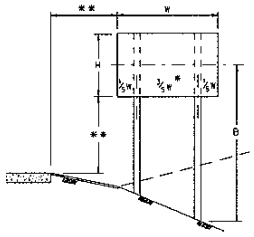
TWO-POST INSTALLATION

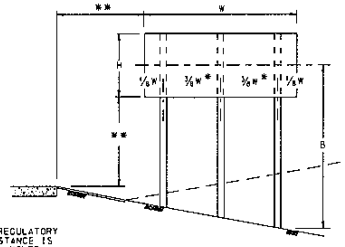


THREE-POST INSTALLATION









A = SIGN AREA (SEE TABLE).
A = W x H FOR SQUARE OR RECTANGULAR SIGNS,
WHERE: W = WIDTH OF SIGN
H = HEIGHT OF SIGN

* WHEN ERECTING STANDARD WARNING OR REGULATORY SIGNS THAT ARE PREPUNCHED, THIS DISTANCE IS THE DISTANCE BETWEEN THE HORIZONTAL HOLES.

** SEE SHEET 9 OF 9 FOR SIGN LOCATION/INSTALLATION DETAILS.

METRIC UNITS

SIGN AREA TABLE

SQUARE OR RECTANGULAR SIGNS						IRREGULAR SHAPED SIGNS	
SIZE (mm x mm)	AREA (m²)	SIZE (mm x mm)	AREA (m²)	SIZE (mm x mm)	AREA (m²)	SIGN (mm x mm)	AREA (m²)
200x1200	0.24	750x375	0.28	1800x300	0.54	YIELD (R1-2) 900 x 900	0.35
300x450	0.14	750x600	0.45	1800x600	1.08	YIELD (R1-2) 1200 x 1200	0.62
300x600	0.18	750x750	0.56	1800x900	1.62	YIELD (R1-2) 1500 x 1500	0.97
300x750	0.22	750x900	0.68	1800x1200	2.16	NO PASSING PENNANT (W14-3) 1200 x 900	0.50
300x900	0.27	750x1200	0.90	1800x1500	2.70	RAILROAD WARNING (W10-1) 900 DIA.	0.64
300x1200	0.36	750x1500	1.12	2400x600	1.44	SCHOOL (S1-1) 750 x 750	0.42
450x375	0.17	900x900	0.81	2400x1200	2.88	SCHOOL (S1-1) 900 x 900	0.61
450x450	0.20	900x1200	1.08	3000x300	0.90	STOP (R1-1) 600 x 600	0.30
450x600	0.27	900x1350	1.22	3000x375	1.12	STOP (R1-1) 750 x 750	0.47
450x900	0.40	1200x1200	1.44	3000x600	1.80	STOP (R1-1) 900 x 900	0.67
450x1200	0.54	1200x1500	1.80	3000x750	2.25	STOP (R1-1) 1200 x 1200	1.19
525x375	0.20	1500x300	0.45	3600x300	1.08	INTERSTATE ROUTE MARKER (M1-1) 600 x 600	0.29
600x600	0.36	1500x600	0.90	3600x450	1.62	INTERSTATE ROUTE MARKER (M1-1) 750 x 600	0.36
600x900	0.54	1500x1050	1.58	3600x600	2.16	INTERSTATE ROUTE MARKER (M1-1) 900 x 900	0.68
600x1200	0.72	1500x1500	2.25	3600x750	2.70	INTERSTATE ROUTE MARKER (M1-1) 1125 x 900	0.80

ENGLISH UNITS

SIGN AREA TABLE

SQUARE OR RECTANGULAR SIGNS						IRREGULAR SHAPED SIGNS	
SIZE (In. x In.)	AREA (FT²)	SIZE (In. x In.)	AREA (FT²)	SIZE (In. x In.)	AREA (FT²)	SIGN (In. x In.)	AREA (FT²)
8"x48"	2.7	30"x15"	3.1	72"x12"	6.0	YIELD (R1-2) 36"x36"	3.9
12"x18"	1.5	30"x24"	5.0	72"x24"	12.0	YIELD (R1-2) 48"x48"	6.9
12"x24"	2.0	30"x30"	6.3	72"x36"	18.0	YIELD (R1-2) 60"x60"	10.8
12"x30"	2.5	30"x36"	7.5	72"x48"	24.0	NO PASSING PENNANT (W14-3) 48"x36"	5.6
12"x36"	3.0	30"x48"	10.0	72"x60"	30.0	RAILROAD WARNING (W10-1) 36" DIA.	7.1
12"x48"	4.0	30"x60"	12.5	96"x24"	16.0	SCHOOL (S1-1) 30"x30"	4.7
18"x15"	1.9	36"x36"	9.0	96"x48"	32.0	SCHOOL (S1-1) 36"x36"	6.8
18"x18"	2.3	36"x48"	12.0	120"x12"	10.0	STOP (R1-1) 24"x24"	3.3
18"x24"	3.0	36"x54"	13.5	120"x15"	12.5	STOP (R1-1) 30"x30"	5.2
18"x36"	4.5	48"x48"	16.0	120"x24"	20.0	STOP (R1-1) 36"x36"	7.4
18"x48"	6.0	48"x60"	20.0	120"x30"	25.0	STOP (R1-1) 48"x48"	13.2
21"x15"	2.2	60"x12"	5.0	144"x12"	12.0	INTERSTATE ROUTE MARKER (M1-1) 24"x24"	3.2
24"x24"	4.0	60"x24"	10.0	144"x18"	18.0	INTERSTATE ROUTE MARKER (M1-1) 30"x24"	4.0
24"x36"	6.0	60"x42"	17.5	144"x24"	24.0	INTERSTATE ROUTE MARKER (M1-1) 36"x36"	7.2
24"x48"	8.0	60"x60"	25.0	144"x30"	30.0	INTERSTATE ROUTE MARKER (M1-1) 45"x36"	9.0

NOTES:

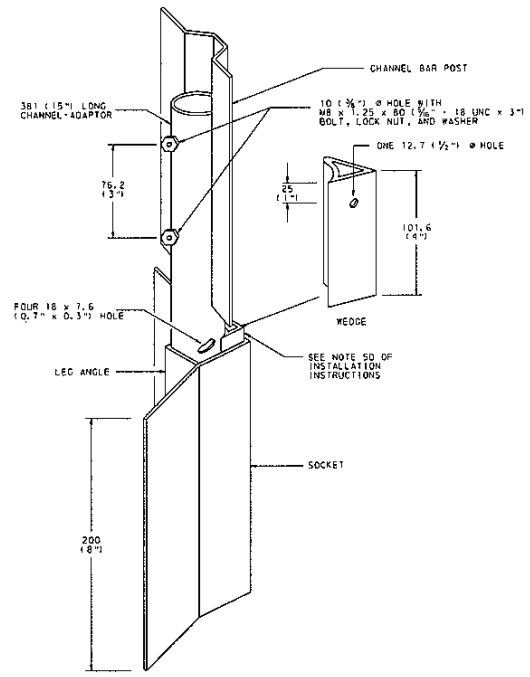
1. TO DETERMINE THE POST SIZE, ENTER THE GRAPH WITH THE VALUES OF A AND B. THE SHADED AREA INDICATES THE APPROPRIATE POST SIZE REQUIRED.
2. 3.71 Kg/m (2.5 LB/FT.) AND 5.94 Kg/m (4.0 LB/FT.) POSTS MAY HAVE LESS THAN 2.1 m (7') CLEARANCE BETWEEN EACH OTHER WHEN USED IN TWO-POST AND THREE-POST INSTALLATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).
4. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

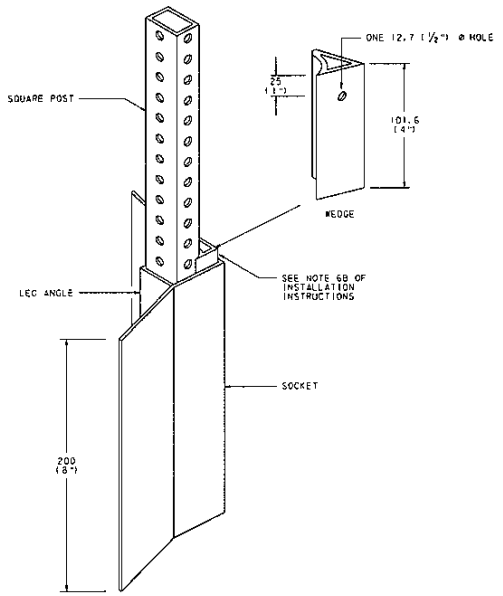
POST-MOUNTED SIGNS, TYPE B

CHANNEL BAR POSTS SELECTION TABLES

RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 7 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B



ELEVATION



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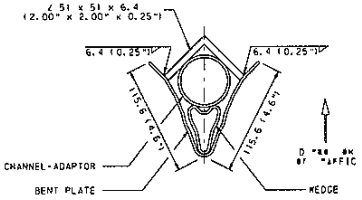
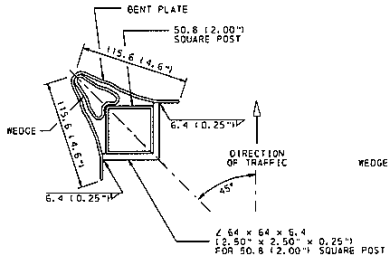
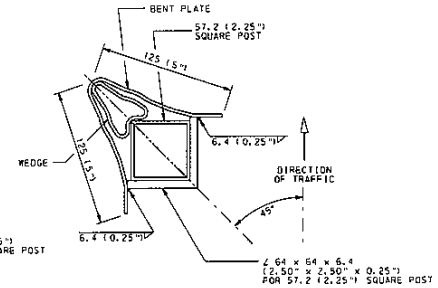


PLAN

CHANNEL BAR POST - SOCKET SYSTEM



PLAN



PLAN

SQUARE POST - SOCKET SYSTEM

NOTES:

1. SOCKET SHALL CONSIST OF A BENT PLATE ATTACHED TO A LEG ANGLE BY A MINIMUM OF SIX 6.4 mm x 38.1 mm (0.25" x 1.5") FILLET WELDS. THE TOP OF THE BENT PLATE SHALL BE FLUSH WITH THE TOP OF THE LEG ANGLE.
2. SOCKET TO BE DIP-COATED WITH A RUST INHIBITING PRIMER MEETING FED. SPEC. TTP636.
3. BENT PLATE SHALL BE 2.7 mm (0.1046") HOT ROLLED CARBON SHEET STEEL, COMMERCIAL QUALITY, ASTM A 569/A 569M.
4. LEG ANGLE SHALL BE ASTM A 36/A 36M.
5. WEDGE SHALL BE STEEL TUBING MADE TO ASTM A 500, GRADE B SPECIFICATIONS.
6. CHANNEL-ADAPTOR SHALL BE GALVANIZED STEEL MADE FROM 48 mm (1.9") OD TUBE WITH 3.0 mm (0.1196") WALL THICKNESS, ASTM A 500, GRADE B.
7. BOLTS TO BE M8 x 1.25 x 80 (5/16" x 3") HEX HEAD, GRADE 5, ZINK PLATED WITH WASHERS.
8. NUTS SHALL BE M8 x 1.25 (5/16" - 18 UNC) THREADS, NYLON INSERT LOCK NUTS.
9. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS NOTED OTHERWISE. ENGLISH UNITS IN PARENTHESIS (").
10. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

INSTALLATION INSTRUCTIONS:

1. SOCKET SYSTEMS ARE APPROVED FOR CONCRETE INSTALLATIONS.
2. SOCKET SYSTEMS ARE APPROVED FOR USE WITH 3.71 kg/m (2.5 LB/FT.) CHANNEL BAR POSTS AND 50.8 mm (2.00") AND 57.2 mm (2.25") STEEL SQUARE POSTS.
3. PLACE SOCKET IN A HOLE WITH THE TOP OF THE SOCKET FLUSH WITH THE TOPS OF THE ORIGINAL CONCRETE ELEVATION.
4. PLACE CONCRETE AROUND THE SOCKET. DO NOT PLACE CONCRETE INSIDE THE SOCKET WHERE THE WEDGE AND CHANNEL-ADAPTOR OR POST ARE TO BE PLACED.
5. FOR CHANNEL BAR POST INSTALLATIONS - AFTER THE CONCRETE HAS CURED:
   - A. ATTACH THE CHANNEL BAR POST TO THE CHANNEL- ADAPTOR USING TWO BOLTS, LOCK NUTS, AND WASHERS.
   - B. INSERT THE LOWER PORTION OF THE CHANNEL- ADAPTOR INTO THE SOCKET UNTIL THE FOUR PIERCED HOLES ARE AT THE SAME HEIGHT AS THE TOP OF THE SOCKET.
   - C. ROTATE THE TWO UPPER HOLES IN THE CHANNEL- ADAPTOR TOWARD ONCOMING TRAFFIC.
   - D. POSITION THE WEDGE IN THE SOCKET WITH ITS HOLE AT THE TOP, AND DRIVE THE WEDGE INTO THE SOCKET UNTIL THE TOP OF THE WEDGE IS FLUSH WITH THE TOP OF THE SOCKET.
6. FOR STEEL SQUARE POST INSTALLATIONS - AFTER THE CONCRETE HAS CURED:
   - A. INSERT THE SQUARE POST FULLY INTO THE SOCKET.
   - B. POSITION THE WEDGE IN THE SOCKET WITH ITS HOLE AT THE TOP, AND DRIVE THE WEDGE INTO THE SOCKET UNTIL THE TOP OF THE WEDGE IS FLUSH WITH THE TOP OF THE SOCKET.

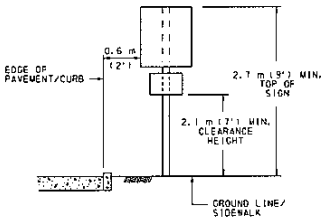
TAPCO INDUSTRIES OR EQUAL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

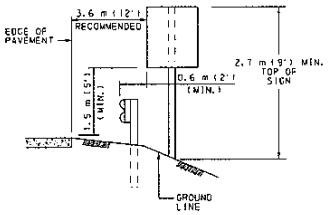
POST-MOUNTED SIGNS, TYPE B

SOCKET SYSTEM FOR CONCRETE INSTALLATIONS

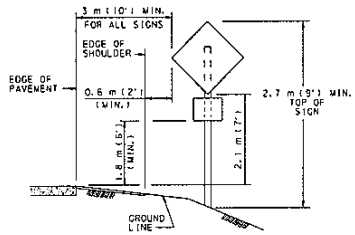
RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 8 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B



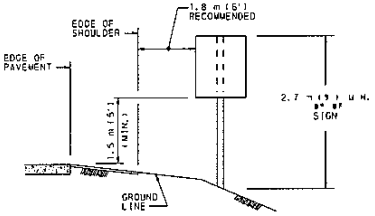
BUSINESS OR RESIDENTIAL AREA



RURAL AREA
CONVENTIONAL HIGHWAY (NO SHOULDER)



FREEWAY / EXPRESSWAYS



RURAL AREA
CONVENTIONAL HIGHWAY (WITH SHOULDER)

NOTES:

SIGN CLEARANCE HEIGHT

1. CLEARANCE HEIGHT SHALL BE MEASURED FROM THE BOTTOM OF THE SIGN TO A LEVEL LINE PROJECTED FROM THE NEAR EDGE OF ROADWAY. THIS MAY RESULT IN A SIGN HEIGHT GREATER THAN THE MINIMUM HEIGHT REQUIRED WHEN MEASURED FROM THE GROUND LEVEL TO THE BOTTOM OF THE SIGN. IN BUSINESS AND URBAN AREAS THE CLEARANCE HEIGHT SHALL ALSO BE MEASURED FROM THE BOTTOM OF THE SIGN TO THE GROUND LEVEL OR SIDEWALK AREA TO REDUCE THE POSSIBILITY OF PEDESTRIANS COLLIDING WITH THE SIGN.

LATERAL SIGN CLEARANCE

2. SIGNS SHOULD BE PLACED AS FAR AS PRACTICAL FROM THE EDGE OF THE ROADWAY TO REDUCE THE POSSIBILITY OF VEHICLES HITTING THE SIGNS. WHEN GUIDE RAIL IS PRESENT, SIGNS WILL BE PLACED BEHIND THE GUIDERAIL.

3. ROUTE MARKER SIGNS WITH AUXILIARY SIGNS (NORTH, SOUTH, ETC.) SHALL BE CONSIDERED A SINGLE SIGN ASSEMBLY. THE CLEARANCE HEIGHT IS MEASURED FROM THE BOTTOM OF THE LOWEST AUXILIARY SIGN TO A LEVEL LINE PROJECTED FROM THE NEAR EDGE OF ROADWAY.

4. BUSINESS OR URBAN AREAS

   A. IN BUSINESS, COMMERCIAL OR RESIDENTIAL DISTRICTS, OR WHERE PARKING AND/OR PEDESTRIAN MOVEMENTS ARE LIKELY, OR WHERE THE SIGN MAY BLOCK VISIBILITY, THE BOTTOM OF ALL SIGNS (INCLUDING AUXILIARY SIGNS) SHALL BE A MINIMUM OF 2.1 m (7') ABOVE GROUND AND THE NEAR PAVEMENT EDGE.

   B. LATERAL CLEARANCE RECOMMENDED IS 0.6 m (2') BEHIND CURB. IF SIDEWALK WIDTH IS LIMITED, OR WHEN EXISTING UTILITY POLES ARE CLOSE TO THE CURB A 0.3 m (1') CLEARANCE IS PERMISSIBLE.

5. RURAL AREAS

   A. CONVENTIONAL HIGHWAYS. ALTHOUGH 2.1 m (7') MINIMUM SIGN HEIGHT CLEARANCE IS RECOMMENDED, IN RURAL DISTRICTS WHERE THE CONDITIONS LISTED IN NOTE 4A ARE NOT LIKELY, SIGNS MAY BE MOUNTED AT A MINIMUM CLEARANCE HEIGHT OF 1.5 m (5'). IF A SUPPLEMENTAL SIGN IS INSTALLED BELOW THE MAIN SIGN, THE CLEARANCE HEIGHT OF THE SUPPLEMENTAL SIGN MAY BE 1.2 m (4').

   WHEN GUIDERAIL OR CONCRETE BARRIERS ARE PRESENT A 0.6 m (2') LATERAL CLEARANCE IS RECOMMENDED.

   WHEN SHOULDERS ARE NOT PRESENT IT IS RECOMMENDED THAT SIGNS BE PLACED 3.6 m (12') FROM THE EDGE OF ROADWAY. WHERE SHOULDERS ARE PRESENT A 1.8 m (6') LATERAL CLEARANCE IS RECOMMENDED.

   B. FREEWAY AND EXPRESSWAYS. DIRECTIONAL SIGNS SHALL BE HAVE A MINIMUM CLEARANCE HEIGHT OF 2.1 m (7'). HOWEVER, IF A SUPPLEMENTAL SIGN IS INSTALLED BELOW THE MAIN SIGN, THE SUPPLEMENTAL SIGN MAY HAVE A CLEARANCE HEIGHT OF 1.8 m (6'), PROVIDED THAT A 2.4 m (8') CLEARANCE HEIGHT IS MAINTAINED FOR THE MAIN SIGN.

   ALL ROUTE MARKER, REGULATORY, AND WARNING SIGN ASSEMBLIES SHALL MAINTAIN A 1.8 m CLEARANCE HEIGHT TO THE BOTTOM OF THE SIGN ASSEMBLY (INCLUDING AUXILIARY SIGNS).

   A 0.6 m (2') MINIMUM LATERAL CLEARANCE IS REQUIRED BEHIND UNMOUNTABLE CURB OR ROADWAY SHOULDER.

   A 3.0 m (10') MINIMUM LATERAL CLEARANCE FROM THE EDGE OF THE NEAREST TRAVEL LANE IS RECOMMENDED.

6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. ENGLISH UNITS IN PARENTHESIS ( ).

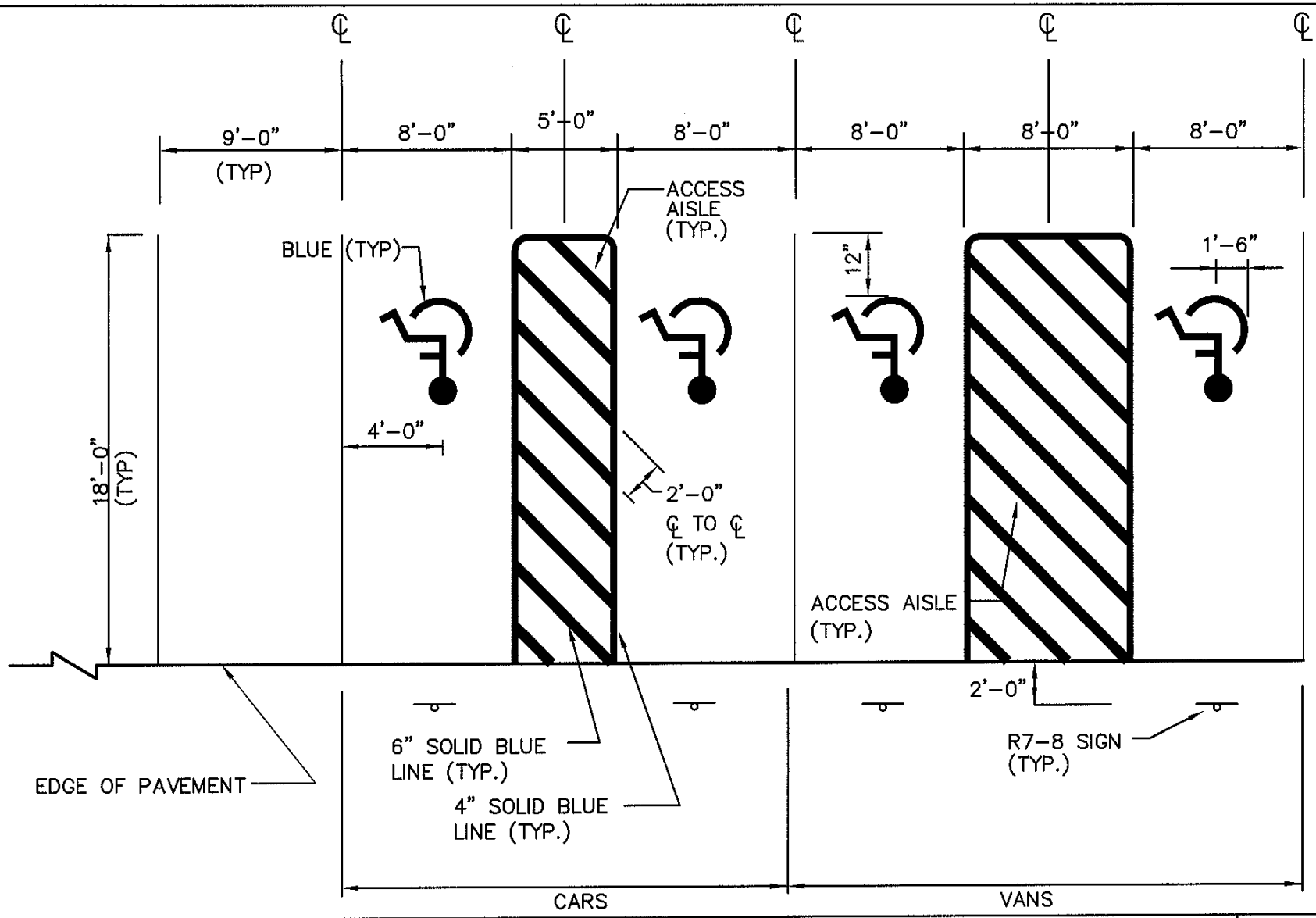
7. EITHER ALL METRIC OR ALL ENGLISH UNITS MUST BE USED ON PLANS. METRIC AND ENGLISH UNITS SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

POST-MOUNTED SIGNS, TYPE B

SIGN LOCATION/INSTALLATION DETAILS

RECOMMENDED MAY 25, 2007	RECOMMENDED MAY 25, 2007	SHT. 9 OF 9
CHIEF, TRAFFIC ENGINEERING AND OPERATIONS DIVISION	CHIEF HIGHWAY ENGINEER	TC-8702B

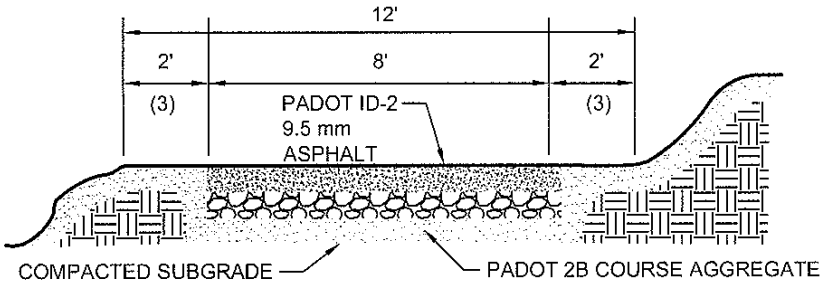


LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

ACCESSIBLE AND TYPICAL PARKING STALL DELINEATION

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



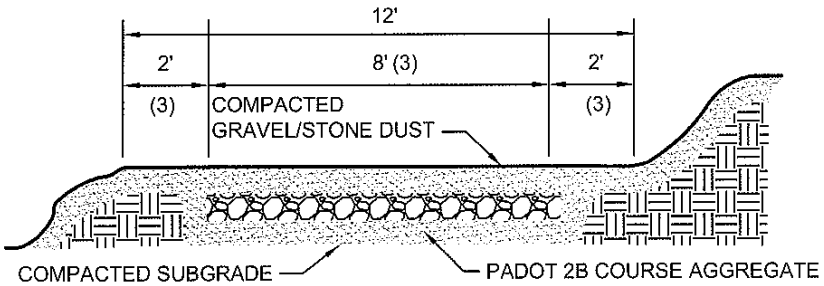
(NOT TO SCALE)

NOTES:

1) STANDARD WIDTH 8'. IF HEAVY USAGE IS ANTICIPATED THEN GREATER WIDTH MAY BE REQUIRED. FOR LIMITED USE TRAILS, NARROW WIDTH MAY BE ACCEPTABLE.

2) SUITABLE FOR BIKE AND PEDESTRIAN USE.

3) PROVIDE 2' GRADED SHOULDER.



(NOT TO SCALE)

NOTES:

1)SUITABLE FOR EQUESTRIAN USE; ALL-TERRAIN (MOUNTAIN) BICYCLE USE AND HIKING.

2) SUSCEPTIBLE TO WASH-OUT ON SLOPES GREATER THAN 5%.

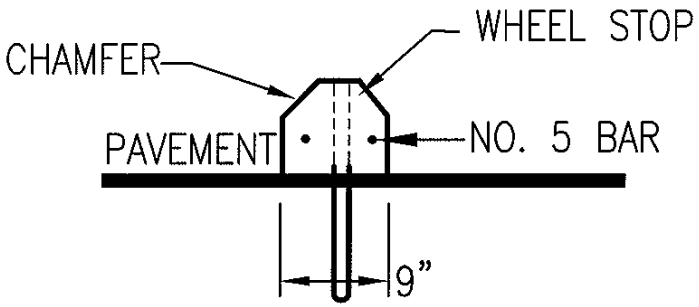
3) STABILIZED SURFACE WIDTH TO BE BASED ON ANTICIPATED USAGE.

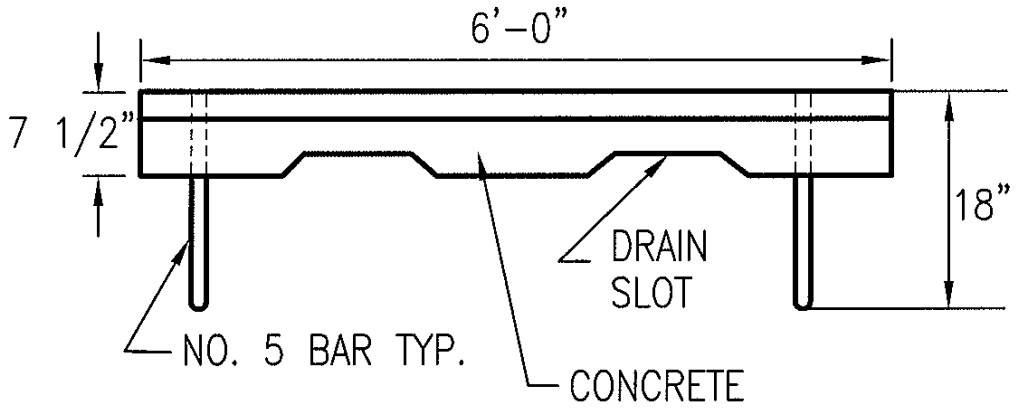
LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

WALKING TRAIL DETAIL

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



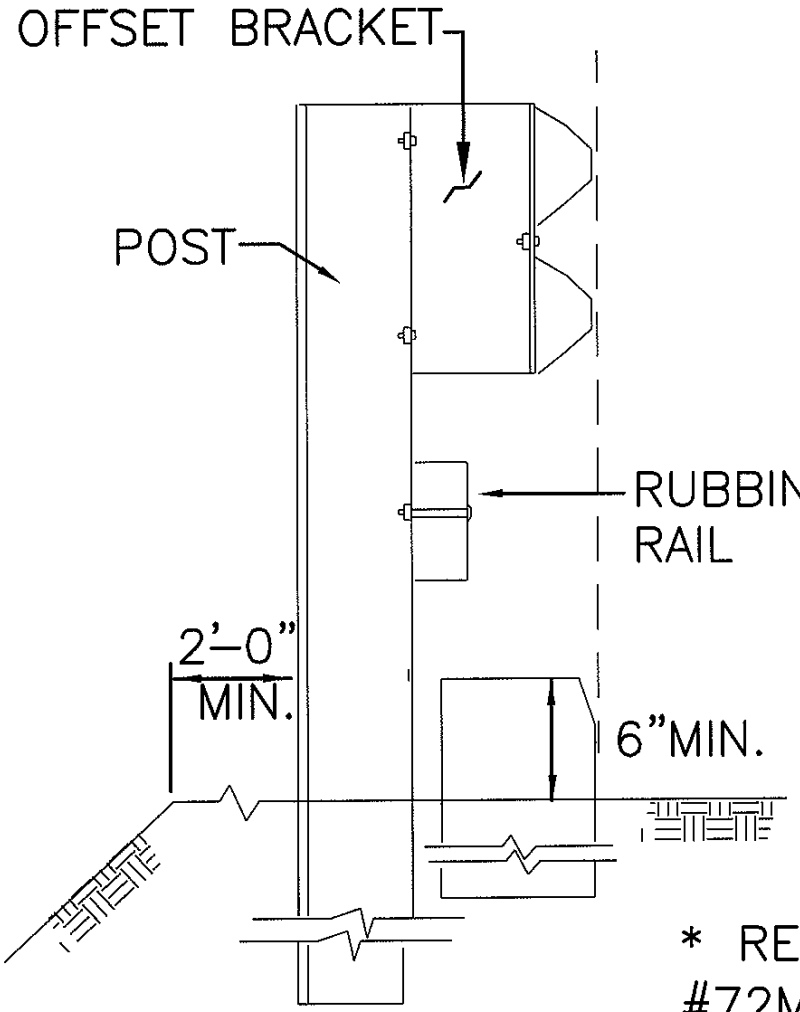


LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

CONCRETE BUMPER BLOCK

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	



* REFER TO PENNDOT PUBLICATION #72M LATEST EDITION FOR 6' WIDE RAIL STANDARDS.

LIMERICK TOWNSHIP

646 WEST RIDGE PIKE
LIMERICK, PA 19468

GUIDE RAIL WITH CURB OR RUBBING RAIL

SCALE:	NTS
DATE:	2/18/08
DWN BY:	
REV:	
REV BY:	KRH
DWG #:	
JOB #:	
SHEET:	

LIMERICK TOWNSHIP
IMPROVEMENT CONSTRUCTION PROCEDURES, MATERIALS AND SPECIFICATIONS

SPECIFICATIONS

Township Road Access by Driveways and Streets

Driveways:

1. Any and all driveways constructed within Township right-of-way shall be paved at a minimum from the edge of the existing Township paved cartway to the existing right-of-way line as may be determined by the Township. The length of paving may be required to be extended by the permittee at the request if the Township depending on driveway lengths, slopes and areas of drainage problems.

2. The paved portions of driveways within the right-of-way shall consist of four inches (4") minimum depth (19 mm) on four inch (4") minimum depth of crushed stone. The edge between the driveway and street cartway shall be sealed with AC20 asphalt cement 12 inch width.

3. The Township, upon field inspection, shall determine whether a pipe shall be used under the drive. The pipe, when required, shall be determined by drainage computations using a ten (10) year storm frequency. The minimum pipe size shall be fifteen (15) inches unless approved otherwise. The pipe shall be located at least six (6) feet from the edge of cartway unless field conditions, upon Township inspection, indicate modification of this criteria. The minimum length of pipe shall be twenty (20) feet or extend at least two (2) feet minimum on each end beyond the edges of the driveway pavement. Flared end sections shall be required, other methods of outlet and inlet protection may be approved by the Township.

When swales are used the gutter shall be at least six (6) inches lower than the edge of cartway and six (6) feet from the edge of cartway. This criteria may be modified by the Township if field conditions dictate such.

Streets and Driveways:

1. The general design criteria for the access of all driveways and new streets to a Township road with respect to locations, sight distances, angle of approach, maintenance, restoration of damaged areas and general conditions shall be in conformance with attached exhibit Penn DOT Title 67, Chapter 441 Access to and Occupancy of Highways by Driveways and Local Roads (see exhibit.)

GENERAL PROCEDURE FOR
SUBDIVISION AND LAND DEVELOPMENT
PROJECT PRECONSTRUCTION & CONSTRUCTION PHASE

1. Supervisors approve, but don't sign plan – subject to escrow.
    a. Engineer gets copy of final plan
2. Developer's engineer or contractor submits improvements construction cost estimate to Township Engineer for review. Township engineer develops escrow and forwards copy to:
    a. Township
    b. Solicitor
    c. Developer
3. Solicitor generates and attaches escrow agreement.
4. Supervisors sign plan and agreement.
   Copy to:
    a. Developer
    b. Solicitor
    c. Township Engineer
5. Preconstruction meeting requested by engineer or township.
    a. Developer and contractors
    b. Township representatives
    c. Township engineer
6. Preconstruction meeting – developer presents:
    a. 2 sets of construction plans
    b. 2 sets of Erosion & Sediment Control Plan
    c. Copies of necessary permits and approvals
    d. Materials and Equipment Shop Drawings as may be required
7. Begin Construction
8. Inspections – See text.
9. Periodic reimbursements:
    a. Developer request release from Township
    b. Township submits request to Engineer for approval
    c. Engineer approves or adjusts amount of request
    d. Township authorizes release by bank or controlling agency
10. End of construction, final inspection.
11. Release remaining construction cost and contingency.
12. After 1 year release maintenance escrow.

PRE CONSTRUCTION CONFERENCE AGENDA

I. Introductions

II. General Discussion of the Project

III. Tentative Work Schedule

IV. Tentative Inspection Schedule

V. Developer / Contractor Responsibilities

VI. Defective Work and Quality Control Procedures

VII. Escrow Disbursement Request Procedures

PRECONSTRUCTION CONFERENCE CHECK LIST

I. Introductions

II. List of developers / contractors

_____ contact names

_____ phone numbers

III. Tentative work schedule

_____ construction start date

_____ construction phases organized correctly

a. Erosion & Sediment Control
b. Storm Water Runoff Control
c. Site grading
d. Road construction
e. Utilities
f. Curb & Sidewalk

_____ Inspection Schedule

IV. Developer / Contractor responsibilities

V. Defective work and quality control procedures.

VI. Escrow Account disbursement request procedures.

_____ Proper request submittal

a. Request submitted to Township
b. Inspected and approved by Engineer

_____ Submittal Form

a. All request reference item no.
b. All request include quantity

_____ Final inspection

a. Release any of remaining construction funds
b. Release of contingency funds

SECTION 200 – GEOTEXTILES

200.1 DESCRIPTION – This work is the furnishing and installing of geotextiles, for the class specified.

200.2 MATERIAL – Use geotextiles meeting the requirements of Section 735 for the specified class and type.

For bedding use any open-graded stone meeting the requirements of Type C or better aggregate, as specified in Section 703.2, except that No. 2A or No. 10 coarse aggregate will not be permitted.

Use steel securing pins, 18 inches long x 3/16-inch in diameter, pointed at one end, and with the 1 ½-inch washer head at the other end. If permitted, alternate securing devices may be used. Certify as specified in Section 106.06(b)3.

Use cover material, as specified or indicated.

200.3 CONSTRUCTION – As shown on the Standard Drawings, and as follows:

(a) General. Remove and replace fabric areas damaged during construction. Lab or sew replaced fabric, as specified for the class of fabric used. No traffic or construction equipment will be permitted on the fabric.

(b) Class 1 – Subsurface Drainage. Provide smooth side and bottom trench surfaces so the fabric does not bridge depressions in the soil and is not damaged by rock projections. Use fabric of a width to permit a minimum trench-width overlap across the backfill at the trench top. Lay the fabric in the prepared trench without stretching. Lay the top of the fabric back on the sides to allow for the placement of the aggregate backfill and pipe. Overlap end of rolls an amount equal to the trench bottom or sides, fill them with acceptable granular material to prevent distortion or damage to the fabric

Backfill aggregate and install pipe in a manner to prevent damage to the fabric. Compact aggregate backfill and overlap the fabric across the trench top. Do not allow the fabric to be exposed for more than 2 weeks without covering with backfill.

(c) Class 2 – Erosion Control. Use Type A or Type B fabric, as indicated or specified. Remove vegetation, large stones, and other debris from the area to be protected and grade the surface to a relatively smooth condition. Undercut areas of soft material and replace with acceptable compacted material, as directed.

Place the fabric on the prepared area in a loose and unstretched condition to minimize shifting, puncturing, or tearing of the fabric. Join adjacent edges and ends with a folded seam and sew using a single lock-type stitch seam or a double chain-type stitch seam equivalent in strength to the fabric tensile strength. Sewing may be done on-site or by the manufacturer. Overlap only if permitted and then as directed. Provide a minimum overlap of 1 foot. For underwater placement, overlap a minimum of 3 feet. Offset adjacent roll ends a minimum of 5 feet when lapped. Lay and overlap the fabric in the direction shown in Table A for the indicated use.

If permitted, anchor the fabric in place by securing pins or other acceptable methods, along sewn seams or overlaps, at the spacing shown in Table B. Also place securing pins on a maximum 6 foot grid on the unsewn or unlapped portions of the fabric.

Where slopes are flatter than 6:1, if permitted, securing pins may be eliminated, provided that aggregate, rock or other acceptable means are used to secure the fabric.

TABLE A
Fabric Placement

Operation	**Slope Stabilization Runoff Protection and Internal Seepage Piping**	**Stream Slop Protection**	**Wave Protection**
Direction of fabric laying	Up and down (parallel with slope direction)	Parallel to stream flows from upstream to downstream	Up and down (parallel with slope direction
Overlap direction	Upslope over downslope	Upstream over downstream and upslope over downslope	Upslope over down slope

TABLE B
Securing Pin Spacing*

Slope	**Steeper than 3:1**	**4:1**	**Flatter than 4:1**
Pin Spacing along sewn seams or overlaps	2 feet	3 feet	5 feet

*Place additional pins to secure unlapped portions, as specified.

Cover the fabric with the covering material as soon as possible, so the fabric is not exposed for more than 4 weeks for Type A and 2 weeks for Type B. Prevent slippage of the cover material on the fabric.

Do not drop rocks, 2 feet or larger in dimension, directly on the fabric from a height greater than 1 foot. Do not allow the rock placement procedure to puncture or damage the fabric. A minimum 6-inch layer of bedding stone and a greater drop-height combination may be used if the combination produces the placement, thickness, gradation and fabric integrity requirements, and if permitted.

(d) Class 3 – Sedimentation Control. Use Type A or B fabric, as indicated or specified. Install in accordance with Section 865.3.

(e) Class 4 – Layer Separation. Use for the separation of subgrade and other layers. Place the fabric on normally prepared subgrade area extending the full width of the sub-base layer being protected. Place fabric in a loose and unstretched condition to minimize shifting, puncture, and/or tearing. Overlap fabric roll-ends and edges a

minimum of 12 inches with adjacent material. Place subbase material within 2 weeks after placement of fabric to minimize exposure. Place sub-base material in a manner to minimize slippage of the fabric. If excessive slippage occurs, use steel securing pins as specified in Section 212.2 at a maximum spacing of 6 feet.

(f) Fabric. Use fabric consisting of long chain polymeric filaments or yarns such as polyethylene, polyamide, polyvinyledene-chloride, polypropylene, or polyester formed into a stable network so that the filaments or yarns retain their relative position to each other. For Class 1, Class 2, and Class 3 Geotextiles, use woven or non-woven fabric. Use fabric inert to commonly encountered construction chemicals or substances. During periods of shipment and storage, protect the fabric from direct sunlight, ultraviolet rays, temperatures greater than 140F, mud, dirt, dust, and debris. To the extent possible, maintain the fabric wrapped in a heavy-duty covering or shield from direct sunlight.
Geotextiles will be rejected at the time of installation if any defects, deterioration, or damage was incurred during manufacture, transportation, or storage.

(g) Physical Requirements. Table A, for the indicated construction class and type.

(h) Acceptance. Acceptance of the geotextile will be based on certified test data submitted by the manufacturer and on testing by MTD.

(i) Certification. Certify each shipment as specified in Section `06.03(b)3. Visibly label all shipments on the fabric or its container with the manufacturer's name, fabric type or trade name, lot number, and material quantity.

(j) Certification. Certify each shipment as specified in Section `06.03(b)3. Visibly label all shipments on the fabric or its container with the manufacturer's name, fabric type or trade name, lot number, and material quantity.

TABLE A

Geotextile Physical Requirements*

Fabric Property	Test Method	CONSTRUCTION CLASS					
		Class 1	Class 2		Class 3		Class 4
		Subsurface Drainage	Erosion Control		Sediment Control		Separtion
			Type A	Type B	Type A	Type B	
1. Grab Tensile Strength, lbs.	ASTM-D1682(1")	90	200	120	200	120	270
2. Grab Tensile Elongation, %	ASTM-D1682	20	15-45	15	15-45	15	15
3. Burst Strength, psi	ASTM-D751 (Diaphragm Method)	150	400	200	400	200	430
4. Puncture, lbs.	ASTM-D3787 (5/16" flatrod)	40	80	40	80	40	110
5. Trapezoid Tear Strength, lbs	ASTM-D1117	50	75	50	75	50	75
6. Apparent Opening Size (AOS) Sieve No.	CW-02215[1]	≥#40 (≤425 μm)	#40-100** (425μm-150μm)	≥#40 (≤425μm)	--	--	≥#70
7. Water Permeability, k, cm/sec.	PA Test Method No. 314	0.01***	0.01***	0.01***	--	--	--
8. Abrasion Resistance, lbs.	ASTM-D1175 & D1682	25	55	25	--	--	40
9. Slurry Flow Rate, gal./min./ft.	VTM-51[2]	--	--	--	0.3	0.3	--
10. Retention Efficiency, %	VTM-51[2]	--	--	--	75	75	--
11. Percent Open Area	CW-02215[1]	--	4.0**	--	--	--	--
12. Sewn Seam Breaking Strength, lbs.	ASTM-D1682	--	200	120	--	--	--
13. Ultraviolet Resistance, Strength Retention, %	ASTM-D1682, after 500 hrs of Xenon or Atlas Twin Arc Weather-o-meter	--	--	--	70% of 1	70% of 1	--

* The numerical values indicate the average minimum roll value or the minimum to maximum range. Average minimum roll value for Class 3 material is in the warp direction only.

** Design Specified

*** $k_{fabric} \geq 10$ times k_{soil}

[1]U.S. Army Corps of Engineer's Specifications

[2]Virginia D.O.T. Test Method

SECTION 300 – SUBGRADE

300.1 DESCRIPTION – This work is preparation of the road bed.

300.2 CONSTRUCTION –

(a) General. Form roadbed to the established subgrade elevation and compact to specified density requirements, using equipment specified in Section 108.05(c)3.a, 3.b, 3.e, or 4.

(b) Density Requirements. Compact subgrade to not less than 100% of the determined dry-weight density. Dry-weight density for material in place in the field will be determined, in accordance with PTM No. 106, Method B. In-place density or compaction will be determined, in accordance with PTM No. 112 or PTM No. 402. When material is too coarse to use these methods, compaction will be determined based on nonmovement of material under compaction equipment specified in Section 210.3(a).

At the time of compaction, maintain the subgrade material's moisture content not more than 2 percentage points above optimum moisture for that material. However, on subgrades displaying pronounced elasticity or deformation under rolling, maintain a moisture content not greater than optimum at the time of compaction or at the time of placing the overlaying construction. When the specified stability cannot be obtained, excavate material in the area to a depth that, when replaced and recompacted at a moisture content not exceeding optimum, the subgrade will have required stability.

(c) Subgrade Requirements. In continuous lane construction, complete, progressively maintain, and protect subgrade sufficiently in advance of the succeeding operation. Prior to placement or pavement structure, promptly and satisfactorily reshape and recompact, or remove and replace, damaged or unsatisfactory areas.

Check subgrade for grade and slope. However, where subgrade is constructed using an automatic grading machine which cutes the subgrade and is controlled by reference line or lines, templates for checking grade and slope will not be required.

Test the finished surface for irregularities by using a template cut to the required cross section of the surface. Equip the template with metal or other vertical extensions attached to each end, so the bottom of the template will be at the elevation of the top of the surface. Furnish at least three templates. Test the cross section for surface irregularities at intervals of not more than 25 feet.

Install string lines with ample support, offset along each side to control the elevation. Maintain string lines until the surface is completed and deficiencies corrected.

Use a 10 foot straightedge to test for longitudinal irregularities in the surface. Hold the straightedge parallel to the road centerline in contact with the surface. Move the straightedge from one side of the surface to the other. Advance along the surface in 5 foot increments.

Correct all surface irregularities exceeding 1/2 – inch by loosening the surface and removing or adding material as required. Compact the corrected area and surrounding surface by rolling

300.3 MEASUREMENT AND PAYMENT

(a) **Subgrade.** Subgrade will be considered incidental to the immediate overlying pavement structure and will not be paid for separately. Subgrade, when required for shaping and finishing unpaved classes of work, will be considered incidental to those items of work.

Commonwealth of Pennsylvania

Pennsylvania Code

Title 67. Transportation

Department of Transportation

CHAPTER 441. ACCESS TO AND OCCUPANCY OF HIGHWAYS BY DRIVEWAYS AND LOCAL ROADS

Last Revised April 2006

ARTICLE III. HIGHWAYS

Chap.		Sec.
441.	ACCESS TO AND OCCUPANCY OF HIGHWAYS BY DRIVEWAYS AND LOCAL ROADS	441.1
443.	ROADSIDE REST AREAS	443.1
445.	OUTDOOR ADVERTISING DEVICES	445.1
447.	HAZARDOUS WALKING ROUTES	447.1
449.	LIQUID FUELS TAX FUNDS	449.1
451.	CONTROL OF JUNKYARDS AND AUTOMOTIVE DISMANTLERS AND RECYCLERS	451.1
453.	[Reserved]	453.1
455.	CONSULTANT HIGHWAY DESIGN ERRORS—STATEMENT OF POLICY	455.1
457.	PREQUALIFICATION OF BIDDERS	457.1
459.	OCCUPANCY OF HIGHWAYS BY UTILITIES	459.1

CHAPTER 441. ACCESS TO AND OCCUPANCY OF HIGHWAYS BY DRIVEWAYS AND LOCAL ROADS

Sec.
441.1. Definitions.
441.2. Purpose and application.
441.3. Permit application procedure.
441.4. Permit fees.
441.5. Issuance of permits.
441.6. General conditions.
441.7. General driveway requirements.
441.8. Driveway design requirements.
441.9. Driveway layout illustrations.
441.10. Penalties and enforcement.

Authority

The provisions of this Chapter 441 issued under the State Highway Law (36 P. S. § 670-420), unless otherwise noted.

Source

The provisions of this Chapter 441 adopted March 28, 1980, effective April 1, 1980, 10 Pa. B. 1392, unless otherwise noted.

Cross References

This section cited in 67 Pa. Code § 212.5 (relating to installation and maintenance responsibilities).

§ 441.1. Definitions.

The following words and terms, when used in this chapter, have the following meanings, unless the context clearly indicates otherwise:

Acceleration lane—The portion of roadway adjoining the traveled way constructed for the purpose of enabling a vehicle entering a roadway to increase its speed to a rate at which it can safely merge with traffic.

Access—A driveway, street or other means of passage of vehicles between the highway and abutting property, including acceleration and deceleration lanes and such drainage structures as may be necessary for the proper construction and maintenance thereof.

Central Permit Office—The office for the control of issuance of permits located at:

Pennsylvania Department of Transportation
Bureau of Highway Services
Central Permit Office
Transportation and Safety Building
Harrisburg, Pennsylvania 17120

Combination—Two or more vehicles physically interconnected in tandem.

Commonwealth—The Commonwealth of Pennsylvania.

County office—Any of the various maintenance district offices of the Department.

Curbline—A line formed by the face of the existing curb or in its absence the outer edge of the shoulder, along which curbing is or may be located.

Deceleration lane—The portion of the roadway adjoining the traveled way constructed for the purpose of enabling a vehicle that is exiting a roadway to slow to a safe speed after it has left the mainstream of traffic.

Department—The Department of Transportation of the Commonwealth.

Director—The director of the Department's Bureau of Highway Services.

District office—Any of the 11 engineering district offices of the Department.

Divided highway—A highway divided into two or more roadways and so constructed as to impede vehicular traffic between the roadways by providing an intervening space, physical barrier, or clearly indicated dividing section.

Driveway—Every entrance or exit used by vehicular traffic to or from properties abutting a highway. The term includes proposed streets, lanes, alleys, courts, and ways.

Driveway width—The narrowest width of a driveway measured perpendicular to the centerline of the driveway.

Egress—The exit of vehicular traffic from abutting properties to a highway.

Equipment—All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and completion of the work.

Form 408—The latest revision of highway construction specifications issued by the Department.

Frontage width—The distance along the right-of-way line in front of an abutting property.

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High volume driveway—A driveway used or expected to be used by more than 1500 vehicles per day.

Highway—A highway or bridge on the system of State highways and bridges, including the entire width between right-of-way lines, over which the Department has assumed or has been legislatively given jurisdiction.

Improved area—The area within the right-of-way which has been constructed for highway purposes, including roadbed, pavement, shoulders, slope, sidewalks, drainage facilities, and any other appurtenances.

Ingress—The entrance of vehicular traffic to abutting properties from a highway.

Inspector—The Department's authorized representative assigned to inspect permit operations.

Intermediate island—The section of right-of-way between driveways from the pavement edge or curb to the property line.

Joint-use driveway—A driveway shared by and constructed to provide access to two or three properties.

Limited access highway—A highway to which owners or occupants of abutting lands and other persons have no legal right of access except at points and in the manner determined by the Department.

Local road—Every public highway other than a State highway. The term includes existing or proposed streets, lanes, alleys, courts, and ways.

Low volume driveway—A driveway used or expected to be used by more than 25 but less than 750 vehicles per day.

Median—Any structure or area which separates the paved traveled ways for opposing directions of traffic.

Medium volume driveway—A driveway used or expected to be used by more than 750 but less than 1500 vehicles per day.

Minimum use driveway—A residential or other driveway which is used or expected to be used by not more than 25 vehicles per day.

Own—To hold title to land or a building or be a tenant in a lease that will not terminate within 15 years of the permit issuance date.

Pavement edge—The edge of the main traveled portion of any highway, exclusive of shoulder.

Permanent curbing—Plain or reinforced cement concrete curb which meets Department standards.

Permit—A highway occupancy permit (Form M-945P) issued by a district office pursuant to this chapter.

Person—Any natural person, firm, copartnership, association, corporation, or political subdivision.

Plans—Drawings which show the location, character, and dimensions of the proposed occupancy and related highway features, including layouts, profiles, cross sections, drainage, and other details.

Property line clearance—The distance measured along the pavement edge or curb between the property frontage boundary line and the near edge of the driveway.

Publication 43—A Department publication, sometimes called "Bulletin 43," containing requirements for the maintenance and protection of traffic on construction projects.

Publication 68—A Department publication containing regulations governing the design, location, and operation of all official traffic signs, signals, and markings on and along highways.

Publication 90—A Department publication containing requirements for work area traffic control during highway maintenance operations and utility work.

Right-of-way—The area which has been acquired by the Department for highway purposes.

Roadway—That portion of a highway improved, designed, or ordinarily used for vehicular travel, exclusive of the sidewalk or shoulder.

Roadway construction standards—Department Publication No. 72 containing the Department's design standards for roadway construction.

Secretary—The Secretary of the Department.

Setback—The lateral distance between the right-of-way line and the roadside building, liquid fuel pump island, display stand, or other object, which will result in space for vehicles to stop or park between such objects and the right-of-way line.

Shoulder—The portion of the roadway, contiguous to the traffic lanes, for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses and pavements.

Shoulder line—The intersection of the shoulder slope with the side slope or ditch slope.

Sidewalk—A paved walkway, continuous for a reasonable distance and an integral part of the highway, constructed solely for use by pedestrians.

Stabilized material—Any aggregate such as aggregate cement, aggregate bituminous or lime pozzyolan, placed in such a manner as to provide a smooth, stable, all-weather surface not subject to undue raveling.

Stopping sight distance—The distance required by a driver traveling at a given speed to stop the vehicle after an object on the roadway becomes visible to the driver.

Supplement—An amendment to a highway occupancy permit issued on Department Form M-945S.

Traveled way—The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

Traffic control device—Any sign, signal, marking or device placed or erected for the purpose of regulating, warning, or guiding vehicular traffic or pedestrians, or both.

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Turning radius—The radius of an arc which approximates the turning path of the exterior corner of a vehicle.

Vehicle—Every device in or by which any person or property is or may be transported or drawn upon a highway. The term includes special mobile equipment as defined in the Vehicle Code.

Notes of Decisions

Responsible Person

The pavement cartway used for vehicular traffic was beyond the curb line which separated the highway from pedestrian traffic and was, therefore, the responsibility of the Commonwealth, not the city. *Ruch v. City of Philadelphia*, 587 A.2d 830 (Pa. Cmwlth. 1991).

Absent an agreement on maintenance at an intersection of a city street and a state highway, the State is responsible for maintaining only that portion of the vehicular intersection between actual or extended curb lines of its highway, without any reference to sidewalks; the city is responsible for maintaining crosswalks and other areas up to the actual or extended curb lines of the state highway at the vehicular intersection. *Crigler v. City of Philadelphia*, 667 A.2d 470 (Pa. Cmwlth. 1995).

Roadway

The State is responsible for maintaining only those vehicular areas on its streets between curb lines. The crosswalk on the lane was not between existing curb lines available to vehicular traffic on the street; it is beyond the outer edge of the shoulder, along which curbing may be located on the street. Thus, the State would have no liability for plaintiff's injuries caused by a fall in a pothole on the crosswalk of the lane. *Crigler v. City of Philadelphia*, 667 A.2d 470 (Pa. Cmwlth. 1995).

Cross References

This section cited in 67 Pa. Code § 441.8 (relating to driveway design requirements).

§ 441.2. Purpose and application.

(a) *General rule.* It is in the public interest to regulate the location, design, construction, maintenance and drainage of access driveways, local roads, and other property within State highway right-of-way for the purpose of security, economy of maintenance, preservation of proper drainage and safe and reasonable access.

(b) *Other requirements.* Issuance of a permit under these regulations does not relieve the permittee from any additional responsibility to secure other Federal, State, or local approvals or permits as may be required by law.

(c) *Authority.* These regulations are made pursuant to the State Highway Law (36 P. S. §§ 670-101—670-1102), especially section 420 thereof (36 P. S. § 670-420).

(d) *Safety requirements.* Nothing contained in this chapter is intended to relax existing safety requirements.

Notes of Decisions

Permittee Required to Obtain All Required Approvals or Permits

Although the Department of Transportation had authority to approve satisfactory completion of roadwork authorized by its permit, regulations did not confer upon the Department the authority to permit landowner to open and operate a new land use; Township had authority to enforce its zoning ordinance and land development regulations, and had final approval of the land development and issuance of the required certificate of occupancy. *Smithfield v. Kessler*, 882 A.2d 17, 23 (Pa. Cmwlth. 2005).

Police Powers

Although driveway opening on to State highway was established prior to promulgation of these regulations, this regulation could be applied retroactively to reasonably limit ingress and egress since property is held subject to valid police power regulations "made, and to be made, for the health and comfort of the people." *Department of Transportation v. Longo*, 510 A.2d 832 (Pa. Cmwlth. 1986).

§ 441.3. Permit application procedure.

(a) *General rule.* No driveway, local road or drainage facility or structure shall be constructed or altered within State highway right-of-way and no drainage facility of the Department may be altered or connected onto without first obtaining a permit from the Department. A permit may not be required for maintenance.

(b) *Who may execute applications.* Permit applications shall be submitted in the name of and executed by the owner of the property.

(c) *Where to submit application.* Permit applications shall be submitted to either the district or county office having jurisdiction over the county in which the proposed work will be performed.

(d) *When to submit applications.* Permit applications shall be submitted prior to the construction of any building which the proposed driveway will serve to assure that the driveway can be constructed in accordance with this chapter.

(e) *Application procedure and required information.* Permit applications:

(1) Shall be submitted in person or by mail on a properly completed Department Form M-945A.

(2) Shall be signed by the applicant.

(3) Shall include five sets of plans, of a quality sufficient for microfilming, detailing the location and pertinent dimensions of both the proposed installation and related highway features.

(4) Shall be accompanied by a check or money order, payable to the Department, in the appropriate amount, as set forth in § 441.4 (relating to permit fees).

(5) Shall be submitted to the Department at least 30 days prior to the anticipated start of work.

(6) Shall contain proof of ownership.

(f) *Traffic control plan.* Submission of the traffic control plan shall be as follows:

(1) When the applicant anticipates that it will be necessary to close a portion of a lane to vehicular traffic in order to perform the permitted work, the applicant shall submit a traffic control plan with the application.

(2) The district office may require the applicant to submit a traffic control plan if it is anticipated that a potential hazard or interference to vehicular or pedestrian traffic will result from performance of the work.

(3) The traffic control plan shall be either:

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(i) A detailed drawing, showing all traffic control devices.

(ii) a reference to a standard drawing found in Publication 43 or Publication 90, provided the referenced standard drawing properly depicts the work area and completely addresses the needed traffic control.

(g) *Drainage control plan for other than minimum use driveways.* Drainage control plan for other than minimum use driveways shall be as follows:

(1) If it can reasonably be anticipated that there will be an increase in the flow of water onto the highway or into highway drainage facilities as a result of action by the applicant, or that there will be an increase in the flow of water onto the property of some other person as a result of any action authorized by the permit, a drainage control plan shall be submitted with the application. The drainage control plan shall contain the following:

(i) Source of water.

(ii) Existing flow in cubic feet per second.

(iii) Predicted flow in cubic feet per second.

(iv) Where drainage currently flows.

(v) Where drainage ultimately outlets.

(vi) Hydraulic computations showing effect of additional flow on existing highway drainage system.

(2) Issuance of a permit shall be conditioned upon the Department's approval of the drainage control plan.

(h) *Drainage release for other than minimum use driveways.* If it can reasonably be anticipated that there will be an increase in the flow of water onto the property of some other person as a result of action, authorized by the permit, a drainage release shall be submitted with the application. Where possible, drainage releases—Form L-15 or CC-15—will be obtained, by and at the expense of the applicant, from all property owners over whose land additional drainage will flow. All drainage releases shall be notarized and recorded, by and at the expense of the applicant, in the County Office of the Recorder of Deeds. If a drainage release cannot be obtained from any affected property owner, the Department may nonetheless issue a permit if it determines that there is no reasonable and prudent alternative available to the applicant and the applicant executes an indemnification agreement acceptable to the Department.

(i) *Plans for other than minimum use driveways.* The permit application for all driveways other than those classified as minimum use shall include a plan which illustrates, as a minimum, the following, including dimensions where applicable:

(1) Existing highway pavement, ditches, right-of-way and relevant property lines, highway appurtenances, utilities, and medians.

(2) Existing and proposed building, including a description of present and proposed use of building.

(3) Details of internal traffic circulation, parking, and traffic signs.

(4) Design features of existing and proposed driveways, curbs, tapers, acceleration, and deceleration lanes including the following:

(i) Driveway width.

(ii) Driveway radii and other points of curvature.

(iii) Driveway grades or profile view of drive.

(iv) Driveway angle relative to the highway.

(v) Dimensions of traffic islands adjacent to the highway and within the development that separate traffic flow from or onto the highway.

(vi) Driveway surface material and traffic island materials.

(vii) Location of all required traffic control devices.

(5) Distance from each existing and proposed driveway to the following:

(i) Nearest intersecting street, road, and highway.

(ii) Nearest driveway on adjacent properties.

(iii) Street, road, highway, or driveways opposite the site.

(iv) Relevant property lines and property lines extended to the roadway.

(v) Building and business appurtenances on the site.

(6) Sight distance in each direction from each proposed driveway.

(7) The number of vehicles per day which are expected to utilize each proposed driveway.

(j) *Review by municipalities, planning commissions, and zoning boards.* Review by municipalities, planning commissions, and zoning boards shall comply with the following:

(1) Certain local governing bodies wish to review driveway applications within their jurisdictions.

(2) A listing of these municipalities and local agencies is available from the appropriate district office.

(3) Each application for an access driveway within one of these jurisdictions must be accompanied by evidence which indicates that the location and type of access being requested has been reviewed by that municipality or agency.

(4) The Department will consider any comments or recommendations resulting from this review prior to approving the access permit.

(k) *Authority to reject application.* The Department will examine and determine the genuineness, regularity, and legality of every application, and may reject any application if not satisfied of its genuineness, regularity or legality, or the truth of any statement contained in the application. The Department may also make such investigations and require such additional information as it deems necessary.

(l) *Penalty for falsifying application.* Information provided in applications must be accurate. Section 4904 of the Crimes Code, (18 Pa. C.S. § 4904), makes it a misdemeanor for a person to mislead a public servant in performing an official function by making any written false statement which the person does not believe to be true.

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(m) *Newspaper or mail receptacles.* Permits are not required for the placing of newspaper receptacles or mail boxes, although their location is subject to the maintenance requirements of the Department.

§ 441.4. Permit fees.

(a) *Permit issuance fees.* Issuance fees shall be used to defray costs incurred by the Department in reviewing and processing the application and plan, including the preliminary review of the site location identified in the application, and issuing and processing the permit.

(1) Issuance fees shall be as follows:

(i) Minimum use driveways—$15.

(ii) Low volume driveways—$30.

(iii) Medium volume driveways—$40.

(iv) High volume driveways—$50.

(2) Supplement fee each six-month time extension or each submitted change shall be—$10.

(b) *General permit inspection fees.* General inspection fees shall be used to defray costs incurred by the Department in spot inspection of permitted work or subsequent inspection after the permitted work has been completed, to insure compliance with the permit and this chapter; they shall be as follows:

(1) Minimum use driveway—$10 each.

(2) Low volume driveway—$20 each.

(3) Medium volume driveway—$35 each.

(4) High volume driveway—$50 each.

(c) *Exemptions.* Permit issuance fees and general permit inspection fees shall not be payable by any of the following:

(1) The Commonwealth.

(2) Political subdivisions of this Commonwealth.

(3) Governmental authorities organized under the laws of this Commonwealth.

(4) The Federal government.

(5) Charitable organizations which are exempt from or in compliance with act of August 9, 1963, P. L. 628, No. 337 (10 P. S. §§ 160-1—160-17).

(d) *Additional inspection fees.* If the Department determines that the permitted work is of sufficient magnitude or importance to warrant assignment of one or more employes to inspect the permitted work on a more than spot inspection basis, the permit will so indicate and the permittee shall be charged for all salary, overhead, and expenses incurred by the Department for inspection.

(e) *Refunds.* The Department will refund the general permit inspection fees on unused permits. In order to be eligible to receive such a refund, the permittee shall deliver the request with the permittee's copy of the permit to the issuing district permit office on or before the permit expiration date.

(1) A refund processing fee of $10 shall be deducted from the general permit inspection fees.

(2) The permit issuance fee shall not be refundable on unused permits.

(f) *Miscellaneous fees.* The applicant shall pay notary and recording costs including the cost of recording the permit in the County Office of the Recorder of Deeds when required, and the cost of all drainage releases. Permits shall be recorded whenever deemed necessary by the Department, including when:

(1) a permit requires drainage facilities to be installed and maintained;

(2) a permit authorizes one or more high volume driveways to be constructed; or

(3) an access covenant (Form CC-14) is executed with the permit as specified in paragraph (16) of § 441.6 of this title (relating to general conditions).

Cross References

This section cited in 67 Pa. Code § 441.3 (relating to permit application procedure); and 67 Pa. Code § 441.10 (relating to penalties and enforcement).

§ 441.5. Issuance of permits.

(a) *General rule.* Upon application duly made, in accordance with this chapter, a permit will be issued by the appropriate district office, subject to this chapter and the conditions contained on the permit and its attachments and supplements. The permit will be the authority of the applicant to proceed with the work and will also serve as a receipt for the fees accompanying the application.

(b) *Permit issued only to property owner.* Permits will be issued only to the owners of the property. Permits will not be issued to contractors of the property owner nor to any person other than the owner of the property.

(c) *Permits not issued for certain structures.* Permits will not be issued for bus stop shelters or phone booths, or for advertising signs, liquid fuel pumps, loading platforms, weight scales, or any structure which the Department deems not proper for occupancy of the right-of-way. However, the Department may authorize bus stop shelters or phone booths by written agreement.

(d) *Permits not issued for certain highways.* Permits will not normally be issued for occupancy of or access to any limited access highway. In exceptional cases, the Department in conjunction with the Federal Highway Administration, where applicable, may make exceptions.

(e) *Waiver of design requirements.* Waiver of design requirements shall be as follows:

(1) If any design requirement set forth in this chapter cannot be met, the director may waive the requirement if the following conditions are satisfied:

(i) no other reasonable access is available;

(ii) the applicant has done all that can reasonably be done to satisfy the design requirements;

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(iii) if additional land is required, the applicant provides satisfactory evidence that it cannot be purchased at a reasonable price;

(iv) no traffic problem will be created; and

(v) the applicant executes an indemnity agreement satisfactory to the Commonwealth.

(2) In the case of a temporary access for extracting natural resources for a period of no more than one year, any design requirement set forth in this chapter which cannot be met may be waived by the district engineer, provided conditions (i), (ii), (iii), and (v) of paragraph (1) of this subsection are satisfied.

(f) *Permit requiring agreement.* Where the applicant will be required to perform a substantial amount of work, the Department may require the applicant to execute an agreement as a prerequisite to issuance of the permit.

(g) *Requesting permit time extension.* A permit shall be valid for a six-month period or multiples thereof as specified on the permit. If the permittee has not completed all authorized work by the completion date specified on the permit, an application shall be submitted requesting a time extension. If approved, a supplement may be issued by the district office, authorizing work to continue for an additional six-month period.

(h) *Work completion notification.* When all permitted work has been completed, the self-addressed post card (Form M-945G) which accompanies the permit shall be mailed to the district office.

(i) *Permanent permit microfilm record.* The permit, together with plans, relevant correspondence, and any supplements issued, will be microfilmed, and the microfilm record will be retained in the central permit office.

§ 441.6. General conditions.

The following conditions shall apply to permits issued under the provisions of this chapter:

(1) *Scope of permit.* The permit shall be binding upon the permittee, its agents, contractors, successors, and assigns.

(i) The permittee shall be responsible for causing compliance with all terms and conditions of the permit by its employes, agents, and contractors.

(ii) The permit shall be located at the work site and shall be available for inspection by any police officer or representative of the Department.

(iii) The permit shall be maintained by the permittee as a permanent record and remain in effect, subject to the permit conditions and this chapter, as long as the driveway or the facility authorized by the permit exists.

(iv) Responsibility for compliance with the terms of the permit cannot be assigned or transferred by the permittee without first obtaining approval from the Department after submitting Form M-948, Assignment of Permit or License.

(v) The permittee shall be principally liable to the Department for any failure to comply with the permit and this chapter. The principal liability of

the permittee to the Department shall not preclude the permittee or the Department from bringing any action against the permittee's contractor, subcontractor, engineer, architect, or any other person.

(vi) The permittee shall be the only party in interest in any action against the Department before the Board of Claims involving disputes arising from the permit.

(vii) Disputes between the permittee and the Department shall be governed by the appropriate provisions in Form 408.

(viii) A permit shall be valid only as long as the traffic volume of the driveway does not exceed the approved driveway classification as set forth in § 441.8(a) of this title (relating to driveway design requirements).

(ix) The Department, in granting a permit, will waive none of its powers or rights to require the future change in operation, removal, relocation, or proper maintenance of any access within State highway right-of-way.

(2) *Additional restrictions.* All work authorized by the permit shall be subject to the following:

(i) All applicable laws, rules, and regulations, including but not limited to the following:

(A) Act of October 26, 1972 (P. L. 1017, No. 247) (53 P. S. § 1611), concerning environmental control measures related to pollution and the preservation of public natural resources.

(B) Act of December 10, 1974 (P. L. 852, No. 287) (73 P. S. §§ 176—182), concerning protection of the public health and safety by preventing excavation or demolition work from damaging underground utility facilities.

(C) Act of October 5, 1978 (P. L. 1104, No. 260) (72 P. S. §§ 4651-1—4651-10) which provides that the Board of Claims shall have jurisdiction of claims against the Commonwealth arising from contracts.

(D) O.S.H.A. construction safety and health regulations, 39 Fed. Reg. 22801 (June 24, 1974) and 29 CFR § 1926.1 *et seq.*

(E) 42 U.S.C. § 2000d, as implemented by 49 CFR § 21 and 23 CFR § 230.101 *et seq.*

(F) Ordinances enacted by local municipalities which contain more stringent minimum safety requirements than this chapter.

(ii) Any rights of any person.

(iii) The conditions, restrictions, and provisions of the permit.

(3) *Work to conform to Department standards.* The work shall be done at such time and in such a manner as shall be consistent with the safety of the public and shall conform to all requirements and standards of the Department including, but not limited to, Form 408. If at any time it shall be found by the Department that the work is not being done or has not been properly performed, the permittee upon being notified in writing by the Department shall immediately take the necessary steps, at its own expense, to place the work in

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condition to conform to such requirements or standards. In case any dispute arises between the permittee and the Department's inspector, the Department's inspector shall have the authority to suspend work until the question at issue can be referred to and be decided by the district office.

(4) *Permittee responsibilities.* Permittee responsibilities shall be as follows:

(i) The permittee shall pay all fees, costs, and expenses incident to or arising from the project, including the cost of related highway improvements which increased traffic or surface drainage may necessitate. The permittee shall reimburse the Department for any and all inspection costs within 30 days after receipt of the Department's invoice.

(ii) In the event of failure or neglect by the permittee to perform and comply with the permit or the provisions of this chapter, the Department may immediately revoke and annul the permit and order and direct the permittee to remove any or all structures, equipment, or property belonging to the permittee or its contractors from the legal limits of the right-of-way and to restore the right-of-way to its former condition. In the event the Department determines that such structures, equipment, or property pose a threat to the public safety and the permittee fails to remove the same after notice from the Department to do so, the Secretary or his attorneys, or any attorney of any court of record shall be authorized to appear for the permittee, and to enter an amicable action of ejectment and confess judgment against the permittee; and the attorney shall be authorized to issue forthwith a writ of possession without leave of court, all at the cost of the permittee.

(iii) If work is stopped on a project for any reason, other than at the end of any normal work day, and any ditch or trench, in the opinion of the Department, remains open for an unreasonable period, the permittee, if so directed, shall refill the ditch or trench and work shall not be resumed until the permittee is prepared to proceed immediately with the work to its completion. In the event the permittee fails to refill the ditch or trench or proceed to completion of the work upon notice from the Department to do so, the Department may perform the necessary and required work and shall be reimbursed for the costs by the permittee within 30 days after receipt of the Department's invoice.

(iv) If the permittee, after making an opening in the surface to place or repair a drainage facility or for any other purpose, fails to restore any portion of the right-of-way to conform with Department specifications upon notice from the Department to do so, the Department may perform the work and the permittee shall reimburse the Department for the costs within 30 days after receipt of the Department's invoice.

(5) *Restoration of slopes.* All disturbed slopes or earthen areas shall be restored to their original condition, or in a manner approved by the Department.

(6) *Altering drainage prohibited.* Unless specifically authorized by the permit, the permittee shall not:

(i) alter the existing drainage pattern or the existing flow of drainage water; or

(ii) direct additional drainage of surface water onto or into the highway right-of-way or highway facilities in a way which would have a detrimental effect on the highway or highway facilities.

(7) *Disposition of materials.* Disposition of materials shall comply with the following:

(i) The permittee shall keep the improved area free of all material which may be deposited by vehicles traveling upon or entering onto the highway during the performance of work authorized by the permit.

(ii) The permittee shall be responsible for controlling dust conditions created by its operations.

(iii) All excess material and material that is not suitable for backfill shall be removed and disposed of outside the right-of-way as the work progresses.

(iv) All retained suitable material shall be placed or stored outside the improved area, and in such a manner that there will be no interference with the flow of water in any gutter, drain, pipe, culvert, ditch, or waterway.

(8) *Equipment damaging highway.* Equipment damaging the highway shall conform with the following conditions:

(i) To protect the pavement and shoulders, all equipment shall have rubber wheels or runners and shall have rubber, wood, or similar protective pads between the outriggers and the surface, unless otherwise authorized by the permit.

(ii) In the event that other than rubber equipped machinery is authorized for use, the pavement and shoulders shall be protected by the use of matting, wood, or other suitable protective material having a minimum thickness of four inches.

(iii) If the equipment damages the pavement or shoulders, the permittee shall restore the pavement or shoulders to their former condition, at the expense of the permittee.

(9) *Traffic protection and maintenance.* Maintenance and protection of traffic shall be carried out in accordance with the requirements of the Department, as set forth in Publication 43 and Publication 90.

(i) The permittee shall provide and maintain all necessary precautions to prevent injury or damage to persons and property in accordance with instructions furnished by the district office. A traffic control plan shall be submitted to and approved by the district office before closing any portion of a lane to vehicular traffic.

(ii) Traffic control devices shall be provided in accordance with Publication 43 and Publication 90. Any open trench or hole shall be adequately barricaded to prevent possible injury to pedestrians and the motoring public. All traffic control devices shall be of an approved type. Signs shall conform to the requirements of Publication 68.

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(iii) Designated employes shall be assigned by the permittee to direct one lane traffic. Flagmen shall be provided as specified in the permit and in accordance with Publication 43 and Publication 90.

(10) *Restoration.* All disturbed portions of the highway, including slopes and all appurtenances and structures such as guard rail or drain pipes, shall be restored by the permittee to a condition at least equal to that which existed before the start of any work authorized by the permit. This includes providing appropriate end treatments on guard rail systems where existing guard rail is being broken by the driveway.

(11) *Approval by inspector.* Approval by the Department's inspector of all or part of any permitted work shall not constitute acknowledgment that the work was performed in accordance with the permit, nor shall such approval of the inspector act as a release of the permittee or waiver by the Department of its right to seek performance or restitution by the permittee.

(12) *Maintenance.* All driveways and adjacent areas within the highway right-of-way shall be continuously maintained by the property owner so as to conform to the permit and so as not to interfere or be inconsistent with the design, maintenance, and drainage of the highway, or the safe and convenient passage of traffic upon the highway.

(13) *Indemnification.* The permittee shall fully indemnify and save harmless and defend the Commonwealth, its agents and employes, of and from all liability for damages or injury occurring to any person or persons or property through or in consequence of any act or omission of any contractor, agent, servant, employe, or person engaged or employed in, about, or upon the work, by, at the instance, or with the approval or consent of the permittee; from any failure of the permittee or any such person to comply with the permit or this chapter; and, for a period of two years after completion of the permitted work, from the failure of the highway in the immediate area of the work performed under the permit where there is no similar failure of the highway beyond the area adjacent to the area of the permitted work.

(14) *Insurance.* The permittee shall, when requested by the Department, submit to the district office a certificate or certificates of insurance for public liability and property damage, in form and amount satisfactory to the Department, to cover any loss that may be incurred for or on account of any matter, cause, or thing arising out of the permitted construction.

(15) *Damage to highway.* Restoration of highway shall include the following:

(i) If there is a failure of the highway, including slope or any other appurtenance thereto, in the immediate area of the permitted work within two years after the completion of the permitted work and there is no similar failure of the highway beyond the area adjacent to the area of the permitted

work, the permittee shall have absolute responsibility to make all temporary and permanent restoration including restoration of the adjacent area if it has also failed.

(ii) If there is a failure of the highway, including slope or any other appurtenance thereto, in the area adjacent to the immediate area of the permitted work within two years after the completion of the permitted work and there is no similar failure of the highway in the area of the permitted work or beyond the area adjacent to the area of the permitted work, it shall be presumed that the work done by the permittee was the proximate cause of the failure and the permittee shall be responsible to make all temporary and permanent restoration unless the presumption is rebutted by clear and convincing evidence.

(iii) If there is a failure of the highway, including slope or any other appurtenance thereto, in the immediate area of the permitted work, which occurs more than 2 years after the completion of the permitted work, and there is no similar failure of the highway beyond the area adjacent to the area of the permitted work, it shall be presumed that the work done by the permittee was the proximate cause of the failure and the permittee shall be responsible to make all temporary and permanent restoration, including any failure of the adjacent area if it has also failed, unless the presumption is rebutted by clear and convincing evidence.

(iv) If there is a failure of the highway, including slope or any other appurtenance thereto, in the area adjacent to the immediate area of the permitted work, which occurs more than 2 years after the completion of the permitted work, the permittee shall be responsible to make all temporary and permanent restoration if the permitted work was the proximate cause of the failure.

(v) If the permitted work is the proximate cause of damage to the highway, including slope or any other appurtenance thereto, beyond the adjacent area, the permittee shall be responsible for all remedial work and shall make all temporary and permanent restoration.

(vi) Where the permittee has the responsibility to restore the highway, including slope or any other appurtenance thereto, under subparagraphs (i)—(v), including instances where a presumption of responsibility has not been rebutted, the permittee shall have the duty to restore the improved area in accordance with the permit. If the permittee fails to restore the improved area properly, the Department will have the authority to do the work at the expense of the permittee. The permittee shall reimburse the Department for the costs within 30 days after receipt of the Department's invoice.

(16) *Future additional driveways.* Future additional driveways shall consist of the following:

(i) If the Department anticipates that a property may be subdivided and that such subdivision will result in an unacceptable number or arrangement

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of driveways or both, the Department may require the property owner to enter into an access covenant (Form CC-14) prior to issuance of a permit.

(ii) The access covenant will restrict access to the approved locations regardless of whether the land is later subdivided or conveyed to other persons, or both.

(iii) The access covenant shall become a part of the permit, which shall be recorded in the County Office of the Recorder of Deeds.

(17) *Use of highway prohibited.* Prohibited use of the highway shall be as follows:

(i) No part of the right-of-way shall be used for servicing vehicles, displays or conducting business. The area between the edge of the pavement and the right-of-way line shall be kept clear of all buildings, sales exhibits, business signs, vehicles, service equipment and similar items.

(ii) Improvements on private property adjacent to the right-of-way shall be so located that parking, stopping, and maneuvering of vehicles on the right-of-way will not be necessary in order for vehicles or patrons to be served. New liquid fuel pump islands installed in service stations adjacent to the highway shall be located at least 12 feet outside the right-of-way, in order for a driveway permit to be issued. See Figure 11 and Figure 12.

Notes of Decisions

Discretion

Hearing officer committed no abuse of discretion by order approving application for highway occupancy permit upon conditions that permittee pay for traffic signal and driveway access as this was within exercise of power to make reasonable rules and regulations governing the use of highways and flow of traffic thereon. *Popple v. Department of Transportation*, 575 A.2d 973 (Pa. Cmwlth. 1990).

Preemption

The fact that the Department of Transportation issued a highway occupancy permit for direct access does not preempt the township's ability to abide by its duly enacted ordinance, which contains safety standards stricter than the Department's. The township's requirement that the landowner establish access other than that approved by the Department was affirmed. *Shelbourne Square Assocs., L.P. v. Exeter Township*, 794 A.2d 946 (Pa. Cmwlth. 2002).

Cross References

This section cited in 67 Pa. Code § 441.4 (relating to permit fees).

§ 441.7. General driveway requirements.

(a) *General rule.* Driveways shall be located, designed, constructed and maintained in such a manner as not to interfere or be inconsistent with the design, maintenance and drainage of the highway.

(b) *General location restrictions.* Access driveways shall be permitted at locations in which:

(1) Sight distance is adequate to safely allow each permitted movement to be made into or out of the access driveway.

(2) The free movement of normal highway traffic is not impaired.

(3) The driveway will not create a hazard.

(4) The driveway will not create an area of undue traffic congestion on the highway.

(c) *Specific location restrictions.* Specific location restrictions shall include the following:

(1) Access driveways may not be located at interchanges, ramp areas, or locations that would interfere with the placement and proper functioning of highway signs, signals, detectors, lighting or other devices that affect traffic control.

(2) The location of a driveway near a signalized intersection may include a requirement that the permittee provide, in cooperation with the municipality, new or relocated detectors, signal heads, controller and the like, for the control of traffic movements from the driveway.

(3) Access to a property which abuts two or more intersecting streets or highways may be restricted to only that roadway which can more safely accommodate its traffic.

(4) The Department may require the permittee to locate an access driveway directly across from a highway, local road, or access driveway on the opposite side of the roadway if it is judged that offset driveways will not permit left turns to be made safely or that access across the roadway from one access to the other will create a safety hazard.

(d) *Local roads.* An access intended to serve more than three properties or to act as a connecting link between two or more roadways shall be, for the purpose of this chapter, considered a local road and not a driveway regardless of its ownership. As such, its design must be in accordance with the Department's current standards governing the design of local roads. All other requirements of this chapter shall be complied with before the local road will be allowed access onto a State highway.

(e) *Number of driveways.* The number and location of entrances which may be granted will be based on usage, interior and exterior traffic patterns, and current design policy of the Department.

(1) Normally, only one driveway will be permitted for a residential property and not more than two driveways will be permitted for a nonresidential property.

(2) If the property frontage exceeds 600 feet, the permit may authorize an additional driveway.

(3) Regardless of frontage, a development may be restricted to a single entrance/exit driveway, served by an internal collector road separated from the traveled way.

(f) *Approaches to driveways.* Driveway approaches shall conform to the following standards:

(1) The location and angle of an access driveway approach in relation to the highway intersection shall be such that a vehicle entering or leaving the driveway may do so in an orderly and safe manner and with a minimum of interference to highway traffic.

(2) Where the access driveway approach and highway pavement meet, flaring of the approach may be necessary to allow safe, easy turning of vehicular traffic.

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(3) Where the highway is curbed, driveway approaches shall be installed 1 1/2 inches above the adjacent highway or gutter grade to maintain proper drainage. See Figure 5.

§ 441.8. Driveway design requirements.

(a) *General.* General requirements shall be as follows:

(1) The ability of a driveway to safely and efficiently function as an integral component of a highway system requires that its design and construction be based on the amount and type of traffic that it is expected to serve and the type and character of roadway which it accesses. This chapter separates driveways into four classifications, based on the amount of traffic they are expected to serve. A description of each classification and typical examples of land uses normally associated with each follows:

(i) Minimum use driveway, see Figure 7. A driveway normally used by not more than 25 vehicles per day, such as:

(A) single family dwellings, duplex houses; or

(B) apartments with five units or less.

(ii) Low volume driveway, see Figure 8. A driveway normally used by more than 25 vehicles per day but less than 750 vehicles per day, such as:

(A) office buildings;

(B) elementary and junior high schools; or

(C) car washes.

(iii) Medium volume driveway, see Figures 9, 11, and 12. A driveway normally used by more than 750 vehicles but less than 1500 vehicles per day, which does not normally require traffic signalization, such as:

(A) motels;

(B) fast food restaurants; or

(C) service stations and small shopping centers or plazas.

(iv) High volume driveway, see Figure 10. A driveway normally used by more than 1500 vehicles per day, which often requires traffic signalization, such as:

(A) large shopping centers; or

(B) multi-building apartment or office complexes.

(2) The design features described in this section and illustrated in the attendant figures are to be used by the applicant in designing the driveway plans which accompany the application. Dimensions shall be selected from the range of values shown on the appropriate figure, unless site conditions warrant a deviation. The Department may require design details which are more stringent than those specified in this chapter to insure the safe and efficient operation of any proposed driveway.

(3) Figures 7, 8, and 9 show two sets of design values. The applicant shall design his driveway using the values appropriate for the posted speed of the roadway being accessed.

(b) *Angle of access driveway approach.* Angle of access driveway approach shall include the following:

(1) Access driveway approaches used for two-way operation shall be positioned at right angles, that is, 90 degrees, to the highway or as near thereto as site conditions permit, except as authorized in Figure 11.

(2) When two access driveways are constructed on the same property frontage and used for one-way operation, each of these driveways may be placed at an angle less than a right angle, but not less than 45 degrees to the highway, except that along divided highways where no openings are allowed in the median the minimum angle of an exit driveway may be 30 degrees, as shown in Figure 12.

(c) *Driveways adjacent to intersections.* Driveways serving properties located adjacent to a highway intersection shall be subject to the following:

(1) There shall be a minimum ten foot tangent distance between the intersecting highway radius and the radius of the first permitted driveway.

(2) The distance from the edge of pavement of the intersecting highway to the radius of the first permitted driveway shall be a minimum of 20 feet on curbed highways and 30 feet on uncurbed highways.

(3) Paragraphs (1) and (2) of this subsection may be waived only if the intersecting highway radius extends along the property frontage to the extent that compliance is physically impossible.

(d) *Property line clearance.* Except for joint-use driveways, no portion of any access shall be located outside of the property frontage boundary line.

(e) *Multiple driveways.* Multiple driveways serving the same property must be separated by a minimum distance of 15 feet measured along the right-of-way line and 20 feet measured along the shoulder, ditch line, or curb. When the distance between multiple driveways is 50 feet or less measured along the shoulder or ditch line, the area between shall be clearly defined by permanent curbing. This curb shall be placed in line with existing curb or two feet back of the shoulder or ditch line on uncurbed highways. It shall be extended around the driveway radii to the right-of-way line.

(f) *Site requirements.* Site requirements shall be as follows:

(1) All nonresidential buildings shall be located a sufficient distance from the right-of-way line to provide ample driving area and parking off the right-of-way to prevent storage of vehicles on the access driveways and to prevent the back-up and turning of vehicles on the highway pavement.

(2) The radii of internal curves shall be as large as possible to allow a direct movement from the highway into a proper position to obtain service or parking without any interference to other vehicles attempting the same maneuver.

(3) Applications for driveways providing access to drive-in-service developments shall, when requested, include information relative to the amount of

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storage provided between the service facility and the right-of-way, the number of service operations anticipated during peak periods, and the hours and days of operation.

(4) The area between the right-of-way line adjacent to and on both sides of a driveway shall be used as a clear zone to provide a physical barrier between the traveled way and activity on private property. This area shall remain free of any obstructions which may interfere with a clear line of vision for entering or exiting vehicles.

(g) *Curbing.* Requirements for curbing shall conform with the following:

(1) The permit may require the installation of curbing wherever it is required to control access or drainage, or both. All curbing must be permanent curbing, as defined in § 441.1 of this title (relating to definitions).

(2) Where property abutting the right-of-way line could be used as parking area, the permit may require curbing, permanent guardrail, or fencing to be constructed along the right-of-way line in order to prohibit vehicle encroachment upon the sidewalk or shoulder area.

(3) If, in the opinion of the Department, there is a high probability that vehicles would otherwise utilize a portion of the property frontage other than the approved driveway to gain access to the property, the permit may require curbing or other physical barriers to be constructed.

(4) When curb exists adjacent to the proposed driveway, the line and grade of the existing curb shall be matched, unless otherwise authorized by the permit.

(h) *Sight distance.* Conditions for sight distance shall be as follows:

(1) Access driveways shall be located at a point within the property frontage limits which provides at least the minimum sight distance listed in the appropriate following table:

Table 1—Safe Sight Distance for passenger cars and single unit trucks exiting from driveways onto two-lane roads.

Posted Speed (mph)	*Safe Sight Distance—Left*[1] *(feet)*	*Safe Sight Distance—Right*[1] *(feet)*
25	250	195
35	440	350
45	635	570
55	845	875

[1] Measured from a vehicle ten feet back of the pavement edge.

Table 2—Safe Sight Distance for buses and combinations exiting from driveways onto two-lane roads.

Posted Speed (mph)	*Safe Sight Distance—Left*[1] *(feet)*	*Safe Sight Distance—Right*[1] *(feet)*
25	400	300
35	675	625
45	1225	1225
55	2050	2050

[1] Measured from a vehicle ten feet back of the pavement edge.

Table 3—Safe Sight Distance for passenger cars and single unit trucks exiting from driveways onto four and six-lane roads.

Posted Speed (mph)	*Safe Sight Distance—Left*[1] *(feet)*	*Safe Sight Distance—Right*[2] *(feet)*
25	175	195
35	300	350
45	500	570
55	785	875

[1] Measured from a vehicle ten feet back of the pavement edge to a vehicle approaching in the outside lane.

[2] Measured from a vehicle ten feet back of the pavement edge to a vehicle approaching in the median lane.

Table 4—Safe Sight Distance for buses and combinations exiting from driveways onto four and six-lane roads.

Posted Speed (mph)	*Safe Sight Distance—Left*[1] *(feet)*	*Safe Sight Distance—Right*[2] *(feet)*
25	300	300
35	625	625
45	1225	1225
55	2050	2050

[1] Measured from a vehicle ten feet back of the pavement edge to a vehicle approaching in the outside lane.

[2] Measured from a vehicle ten feet back of the pavement edge to a vehicle approaching in the median lane.

Table 5—Safe Sight Distance for passenger cars and single unit trucks entering driveways by left turns.

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Posted Speed	*Safe Sight Distance in Feet* [1]		
(mph)	*2-Lane*	*4-Lane*	*6-Lane*
25	190	205	220
35	300	320	345
45	445	470	500
55	610	645	680

[1] Measured from the point where a left-turning vehicle stops to a vehicle in the outside lane.

Table 6—Safe Sight Distance for buses and combinations entering driveways by left turns.

Posted Speed	*Safe Sight Distance in Feet* [1]		
(mph)	*2-Lane*	*4-Lane*	*6-Lane*
25	330	360	390
35	485	530	575
45	690	750	810
55	905	990	1075

[1] Measured from the point where a left-turning vehicle stops for a vehicle in the outside lane.

(2) In using Tables 1 through 6 the following additional requirements shall apply:

(i) Tables 2, 4, and 6 shall be used in lieu of Tables 1, 3, and 5 only when combination traffic exceeds 5.0% of the total traffic using the proposed driveway.

(ii) Posted speeds shall be used unless operating speeds vary from the posted speed by more than ten miles per hour, in which case the Department may require that operating speeds be used.

(iii) The sight distances in Tables 1 through 4 apply only when highway grades are zero to 3.0%, either up or down.

(A) When the highway grade in the section to be used for acceleration, after leaving the driveway, ascends at 3.0—5.0%, the sight distance in the direction of approaching ascending traffic may be increased by a factor of 1.4.

(B) When the highway grade ascends at greater than 5.0%, sight distance may be increased by a factor of 1.7.

(C) When the highway grade in the section to be used for acceleration after leaving the driveway descends at 3.0—5.0%, sight distance in the direction of approaching descending highway traffic may be reduced by a factor of 0.6.

(D) When the road descends at greater than 5.0%, sight distance may be reduced by a factor of 0.5.

(iv) The sight distance values in Tables 1 through 6 are desirable for safe operation of the driveway. Sight distance values less than desirable will be accepted only if it is impossible to achieve the desirable value by locating the driveway at any point within the property frontage boundaries. The minimum acceptable sight distance values shall be computed from the following formula:

$$SSSD = \frac{1.47\ Vt + V^2}{30\ (f+g)}$$

SSSD = Minimum safe stopping sight distance (feet).
V = Velocity of vehicle (miles per hour).
t = Perception time of motorist (average = 2.5 seconds).
f = Wet friction of pavement (average = 0.30).
g = Percent grade of roadway divided by 100.

(3) If sight distance requirements as specified in this chapter cannot be met, the Department may:

(i) prohibit left turns by exiting vehicles;
(ii) restrict turning movements to right turns in and out of a driveway;
(iii) require installation of a right turn acceleration lane or deceleration lane;
(iv) require installation of a separate left turn standby lane;
(v) alter the horizontal or vertical geometry of the roadway; or
(vi) deny access to the highway.

(i) *Grade of access driveway.* Grade of access driveway shall be constructed in the following manner:

(1) All driveways shall be constructed so as not to impair drainage within the right-of-way, alter the stability of the improved area, or change the drainage of adjacent areas.

(2) Where a drainage ditch or swale exists, the permittee shall install adequate pipe under the driveway in accordance with Form 408. Drainage pipe installed under driveways shall be at least 15 inches in diameter.

(3) The side slopes for driveway embankments within the right-of-way shall not be steeper than ten to one. See Figure 6.

(4) Grade requirements in uncurbed shoulders within the right-of-way shall conform to Figure 1.

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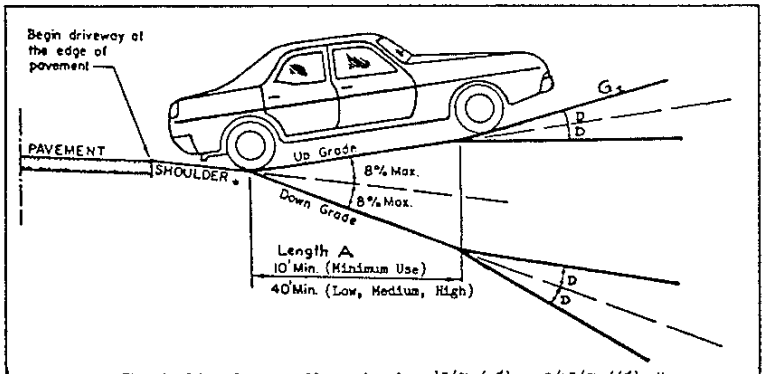

* The shoulder slope usually varies from ½"/ft.(4%) to 3/4"/ft.(6%). However, the shoulder slope should be maintained when constructing the driveway.

For grade changes greater than those shown in Figure 1, vertical curves at least 10 feet long shall be constructed and length "A" shall be increased.

Grades (G_2) shall be limited to 15% for minimum use driveways and from five percent to eight percent for low, medium or high volume driveways within the right-of-way.

	Maximum Grade Change (D)	
	Desirable	Maximum
High Volume Driveway	0%	±3%
Medium Volume Driveway	±3%	±6%
Low Volume Driveway	±6%	Controlled by Vehicle Clearance

Figure 1

(5) Grade requirements where curbs and sidewalks are present.

(i) The driveway approaches shall be installed 1 1/2 inches above the adjacent roadway or the gutter grade to maintain proper drainage. See Figure 5.

(ii) The difference between the cross slope of the roadway and the upward grade of the driveway approach shall not exceed 8.0%.

(iii) When a planted area exists in front of the sidewalk, one of the following three cases shall apply:

(A) When the grass strip between the curb and the sidewalk is wide enough to maintain an 8.0% maximum driveway approach grade, construct the driveway as shown in Figure 2.

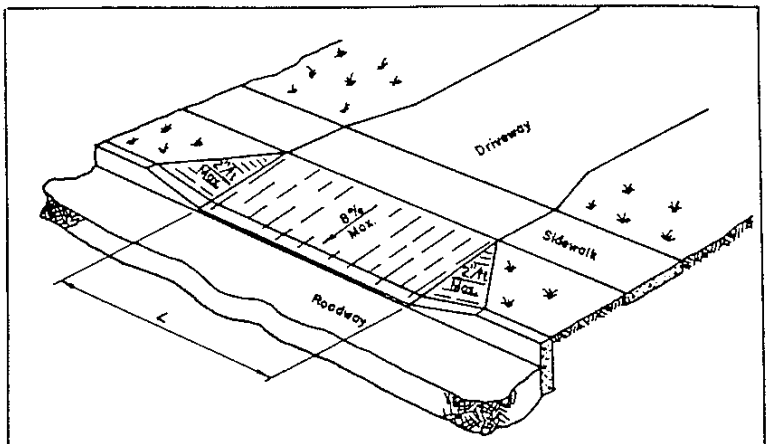

Figure 2 NOTE: The L distance should be adequate to accommodate turning vehicles.

(B) If the driveway grade would exceed 8.0%, depress the outer edge of the sidewalk and maintain a maximum sidewalk cross slope of 6.0%. This will enable the driveway slope to stay within the 8.0% slope limit. See Figure 3.

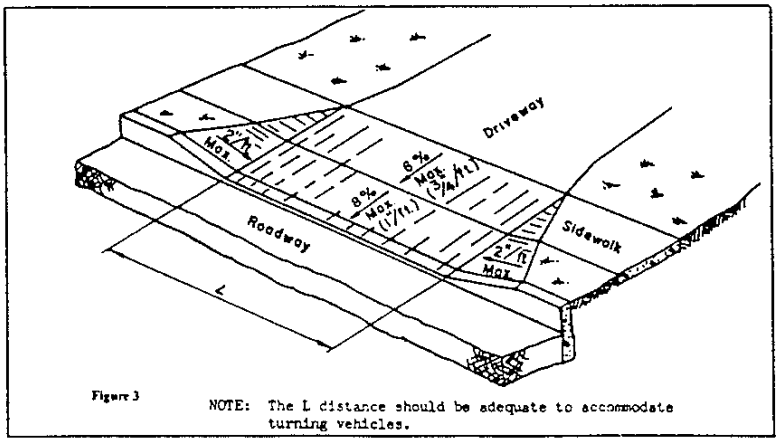

Figure 3 NOTE: The L distance should be adequate to accommodate turning vehicles.

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(C) If the sidewalk cross slope would exceed 6.0%, as indicated in clause (B) of this subparagraph, depress the entire sidewalk. The amount of depression shall not exceed 1 1/2 inches at the inner edge of the sidewalk. The longitudinal slope of the sidewalk shall not exceed two inches per foot. See Figure 3.

(iv) When the sidewalk is directly against the back of the curb and the sidewalk is at least five feet wide, the curb shall be sloped as shown in Figure 5 of this subsection. This will eliminate the need for depressing the back edge of the sidewalk. For sidewalks narrower than five feet, the curb will be sloped and the back edge of the sidewalk will be depressed (maximum 1 1/2 inches) to maintain an 8.0% maximum grade on the driveway. The longitudinal grade of the sidewalk shall not exceed two inches per foot.

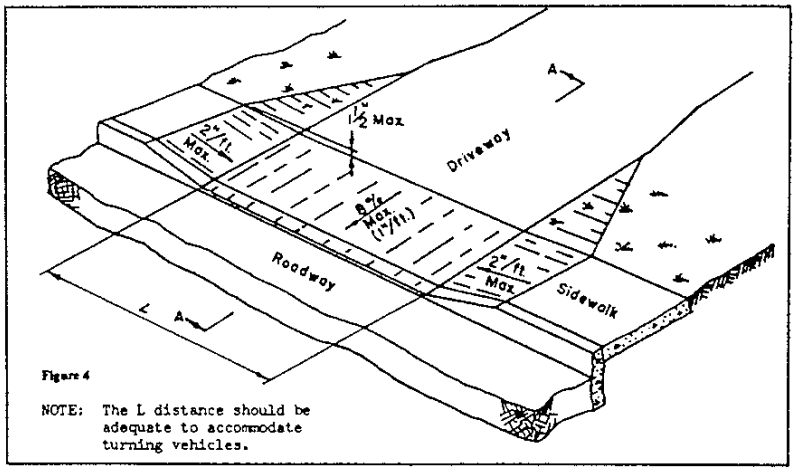


Figure 4

NOTE: The L distance should be adequate to accommodate turning vehicles.

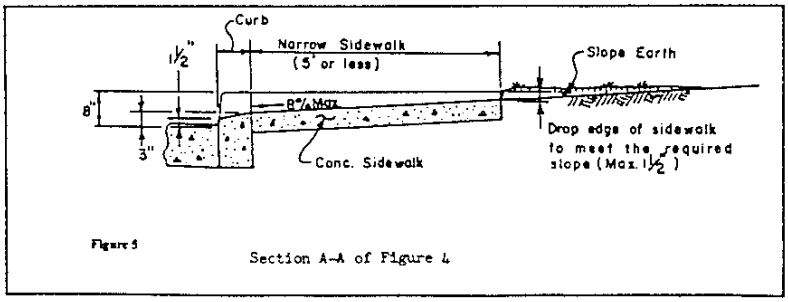
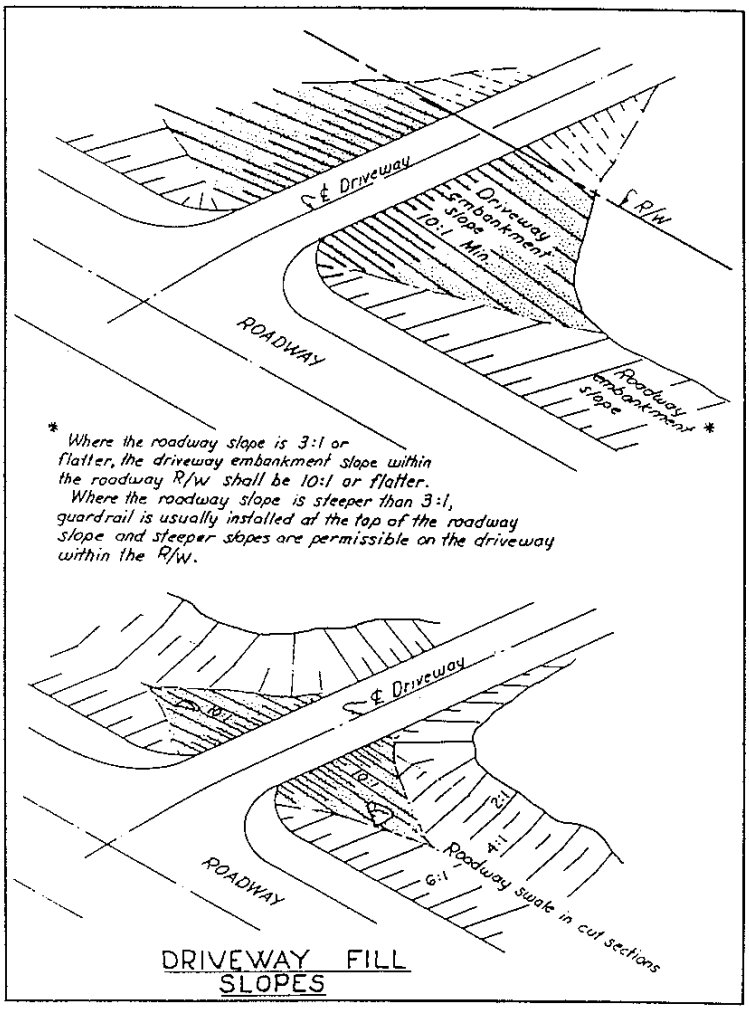


Figure 5

Section A-A of Figure 4

Figure 6



(j) *Auxiliary lanes.* Auxiliary lanes shall consist of the following:

(1) *Acceleration and deceleration lanes.* The combination of highway speed, volumes, location, and arrangement of driveways and intersections may require the installation of an acceleration or deceleration lane, or both, to serve a proposed low, medium, or high volume driveway. When required by the per-

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mit, a speed change lane of sufficient length and width shall be constructed to allow vehicles to safely decelerate or accelerate when entering or leaving the property.

(2) *Left turn stand-by lanes.* The permit may require the installation of a left turn stand-by lane to separate and protect left turning vehicles from through traffic if failure to do so would result in an undue hazard to the traveling public.

(3) *Additional right-of-way for lanes.* Where the width of the highway right-of-way is insufficient to permit the construction of a needed auxiliary lane, the permittee shall provide any necessary additional right-of-way.

(4) *Cost.* When required, auxiliary lanes shall be constructed, at no cost to the Department, in accordance with the Roadway Construction Standards and Form 408.

(5) *Lane in front of another property.* If an auxiliary lane must be located in front of property of another person, the applicant shall be required to secure the approval of the other person or indemnify the Commonwealth against any action which the other person may bring against the Commonwealth.

(k) *Access driveway pavement.* Access driveways shall be appropriately surfaced with a stabilized material between the traveled way and the right-of-way line unless a higher type material is specified by the permit. Low, medium, and high volume driveways which provide access to paved highways shall be paved within the right-of-way. Materials used in the construction of driveways shall meet the requirements of Form 408. The driveway pavement shall be at least four inches thick within the right-of-way.

(l) *Driveways relative to ramps.* Ramps are intended to provide access from one roadway or roadway system to another with a minimum amount of conflict or interference from other traffic. To insure the integrity of this intended function, no access driveway will be permitted on a ramp or within 50 feet of the intersection of the edge of pavement of the ramp or its speed change lane with the edge of pavement of the intersecting roadway. Exceptions will be considered only if the enforcement of this subsection would result in the prohibition of reasonable access from the adjacent property to the highway system.

(m) *Median openings.* Median openings shall consist of the following:

(1) The removal of a portion of median divisor along a divided highway to provide access to and from traffic in both directions will not be permitted unless it is determined that the operating characteristics of the highway system will be improved by such action.

(2) A left turn standby lane shall be installed to separate and protect left turning vehicles whenever a median opening is permitted.

(3) Requests for removal of a median divisor will not be granted without the approval of the director.

(n) *Shoulder upgrading.* Where the existing shoulder on either side of a proposed low, medium, or high volume driveway is not adequate to allow its use by

turning vehicles, the permittee shall upgrade the shoulder area for a minimum of 100 feet on either side of the driveway. The type of shoulder to be installed will be specified by the permit, in accordance with the volume and type of traffic expected to use the driveway.

(o) *Traffic control devices.* Requirements for traffic control devices shall be as follows:

(1) *Nonelectrically powered devices.* The permittee shall, at his own expense, install and maintain all nonelectrically powered traffic control devices, as specified in the permit, which are required to provide for the safe and orderly movement of vehicular or pedestrian traffic, or both. These devices shall include, but not be limited to, any required regulatory, warning or guide signs, delineators, and pavement markings.

(2) *Electrically powered devices.* Electrically powered devices shall consist of the following:

(i) When power operated devices, including traffic signals, are required for proper traffic control, a traffic signal permit (Form TE 964) shall be obtained in addition to the occupancy permit. The permit to own and operate a traffic control device shall be requested by and issued to only the appropriate municipality.

(ii) Applications for driveways which include traffic signal control shall be accompanied by the following additional information:

(A) An engineering study in sufficient detail to allow determination of the need for signal control and the adequacy of its design and operation.

(B) Location of traffic signal heads, poles, controller, and detectors.

(C) Phasing and timing diagrams.

Source

The provisions of this § 441.8 amended November 27, 1981, effective October 17, 1981, 11 Pa. B. 4159. Immediately preceding text appears at serial pages (62045) and (62046).

Cross References

This section cited in 67 Pa. Code § 441.6 (relating to general conditions).

Notes of Decisions

Although driveway opening on to State highway was established prior to promulgation of the regulations, the regulation could be applied retroactively to reasonably limit ingress and egress since property is held subject to valid police power regulations "made, and to be made, for the health and comfort of the people." *Department of Transportation v. Longo*, 510 A.2d 832 (Pa. Cmwlth. 1986).

§ 441.9. Driveway layout illustrations.

Figures 7 through 12 illustrate and supplement the minimum design requirements described in this chapter. Although site conditions may not allow strict adherence to the dimensions shown in these illustrations, every effort shall be

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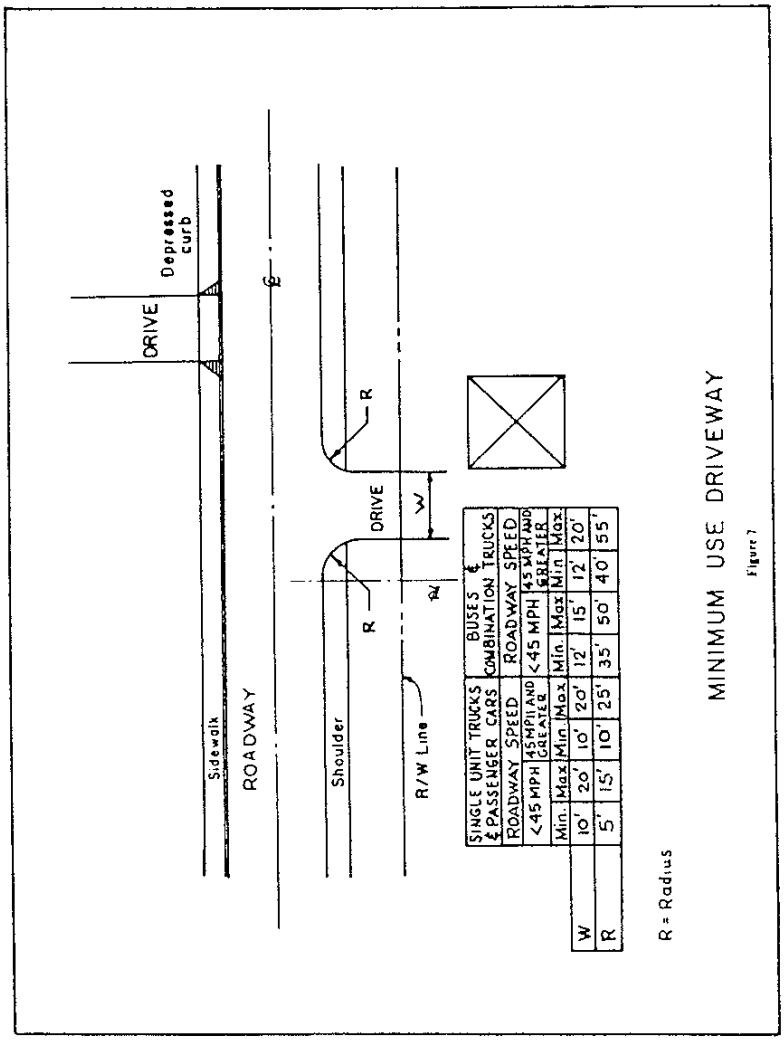
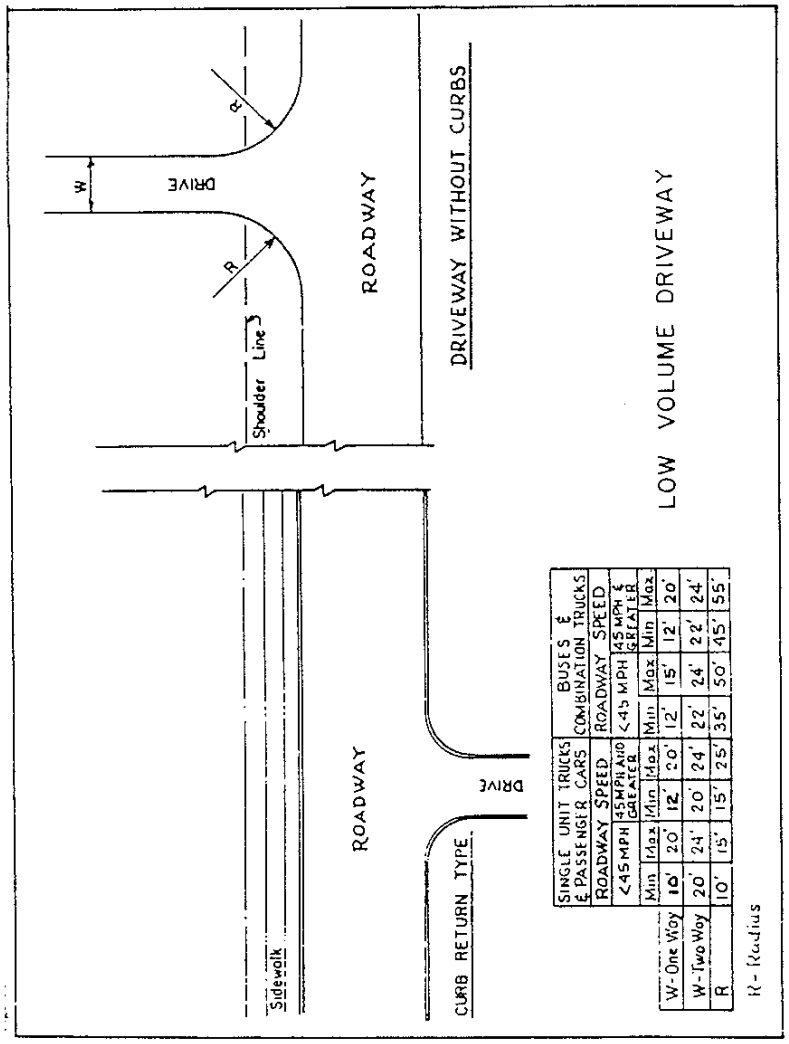
made to design and construct the safest and most efficient access onto the State highway.





	SINGLE UNIT TRUCKS & PASSENGER CARS				BUSES & COMBINATION TRUCKS			
	ROADWAY SPEED				ROADWAY SPEED			
	<45 MPH		45 MPH AND GREATER		<45 MPH		45 MPH & GREATER	
	Min	Max	Min	Max	Min	Max	Min	Max
W-One Way	10'	20'	12'	20'	12'	15'	12'	20'
W-Two Way	20'	24'	20'	24'	22'	24'	22'	24'
R	10'	15'	15'	25'	35'	50'	45'	55'

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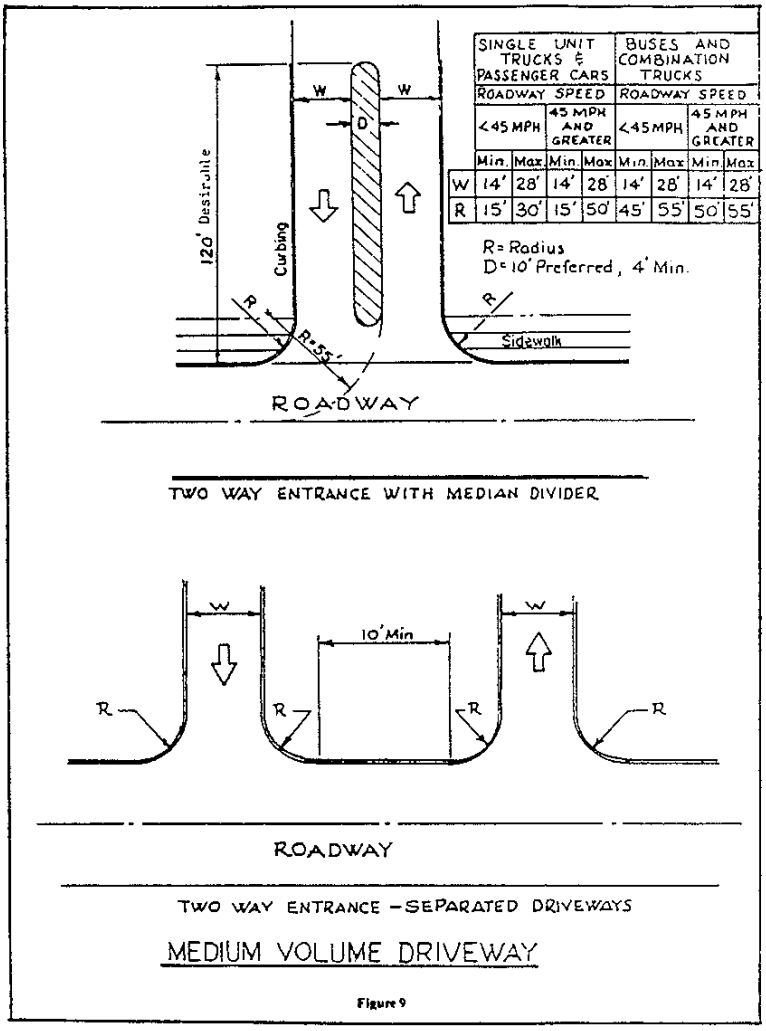

	SINGLE UNIT TRUCKS & PASSENGER CARS				BUSES AND COMBINATION TRUCKS			
	ROADWAY SPEED				ROADWAY SPEED			
	<45 MPH		45 MPH AND GREATER		<45 MPH		45 MPH AND GREATER	
	Min.	Max	Min.	Max	Min.	Max	Min.	Max
W	14'	28'	14'	28'	14'	28'	14'	28'
R	15'	30'	15'	50'	45'	55'	50'	55'

R = Radius
D = 10' Preferred, 4' Min.

Figure 9

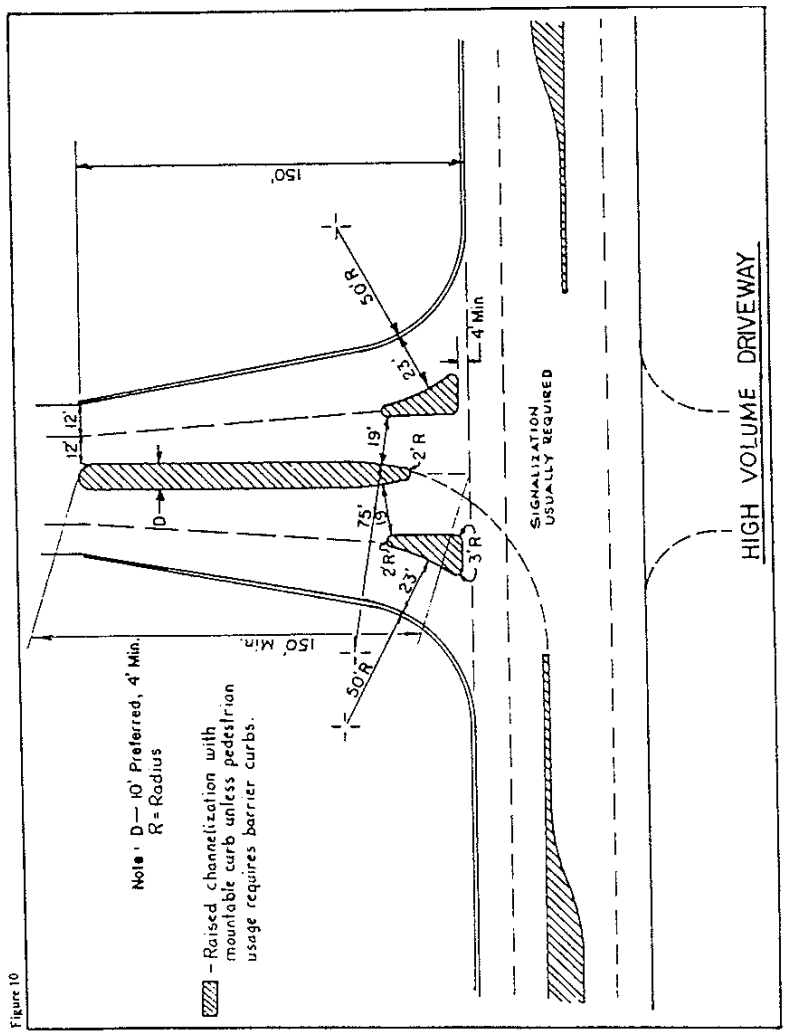

Figure 10

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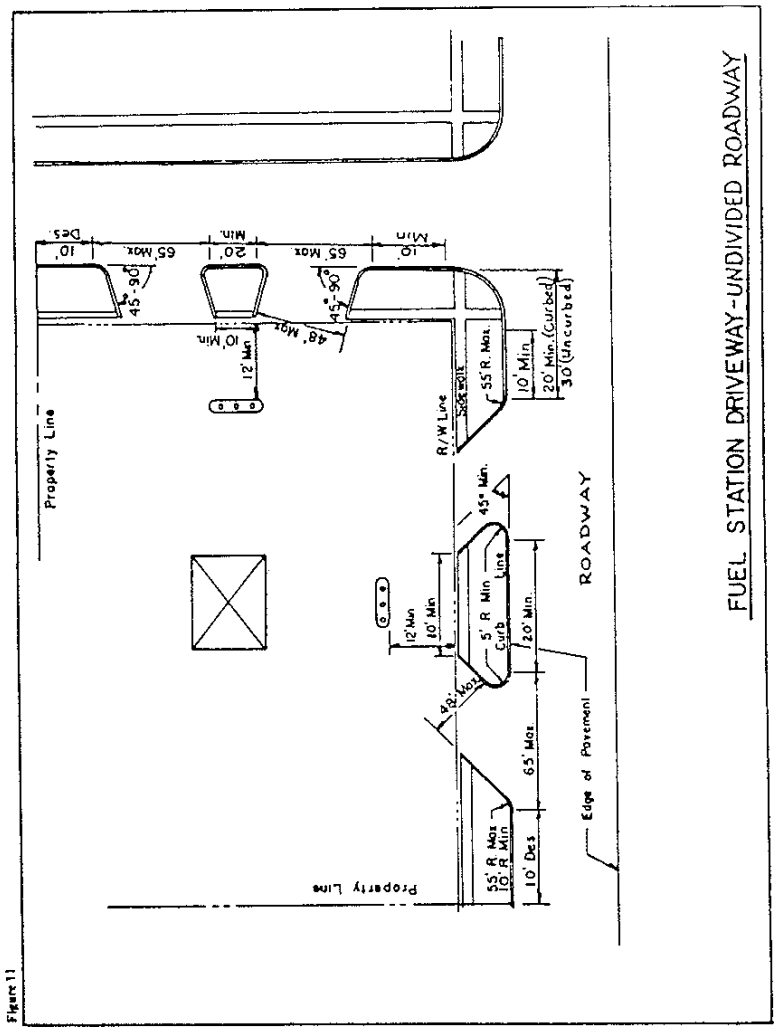
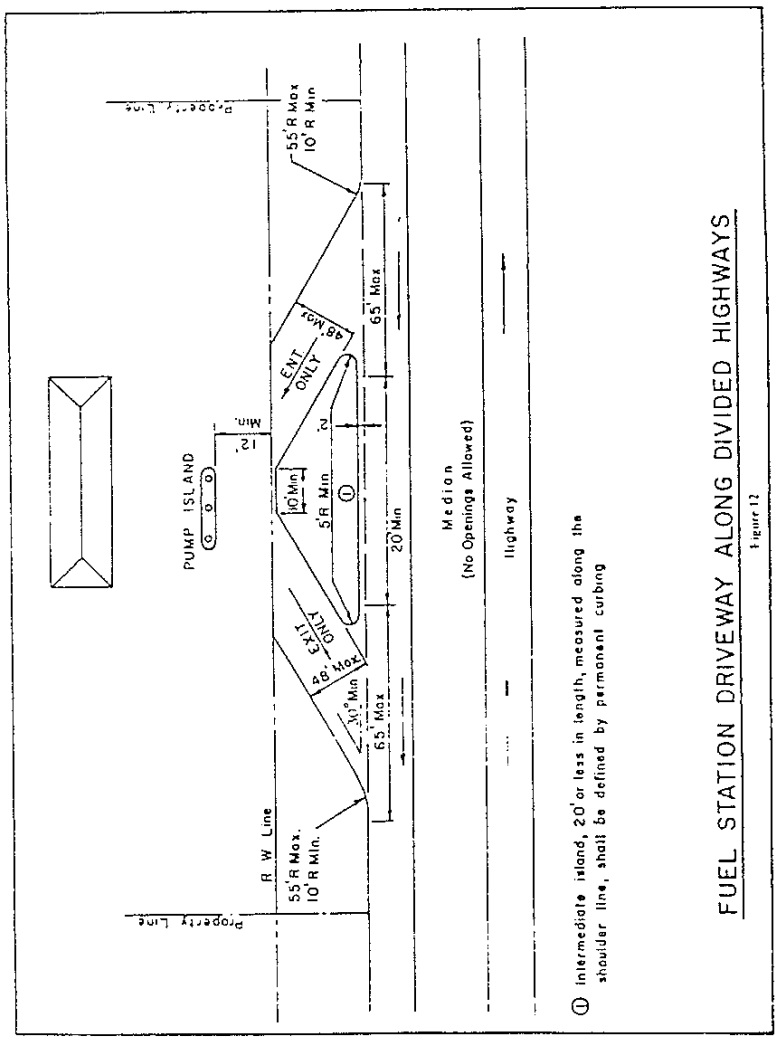

FUEL STATION DRIVEWAY-UNDIVIDED ROADWAY
ROADWAY
Property Line
Property Line
R/W Line
Sidewalk
Edge of Pavement
Des.
10'
65' Max.
Min.
20'
65' Max.
Min.
10'
45°-90°
45°-90°
48' Max.
10' Min.
12' Min.
55' R. Max.
10' Min.
20' Min. (curbed)
30' (uncurbed)
45° Min.
5' R Min.
Curb Line
12' Min.
10' Min.
20' Min.
48' Max.
65' Max.
55' R Max
10' R Min.
10' Des.

Figure 11



FUEL STATION DRIVEWAY ALONG DIVIDED HIGHWAYS

figure 12

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§ 441.10. Penalties and enforcement.

(a) *General rule.* A violation of this chapter or the permit requirements shall constitute grounds for imposition of any or all of the following penalties:

(1) Upon receipt of oral or written notice of a violation from the authorized representative of the Department or a police officer whose jurisdiction includes the permitted work area, the permittee shall cease to perform further work in the permitted area except to restore the area to a safe condition. Further work may not commence in the permitted area until the violation has been remedied. If the permittee has received oral notice of the violation, written notice shall be sent to the permittee within 10 days of receipt of the oral notice.

(2) Confiscation of the applicant's permit by a police officer or authorized representative of the Department.

(3) Revocation of the applicant's permit by the Department.

(4) The Department may block driveways or sever, remove or block drainage facilities constructed without a permit or in violation of this chapter.

(5) The fines, imprisonment or other penalties as are provided by law.

(6) The other action as may be deemed necessary or proper after consultation with the Office of Chief Counsel.

(b) *Additional grounds for revocation.* Additional grounds for revocation shall be as follows:

(1) The Secretary may revoke a permit whenever he determines that the driveway or approaches or their use constitute a hazard to traffic or interferes with the proper use of the highway by the Department or the public.

(2) The director may revoke a permit for nonpayment of a fee specified in § 441.4 (relating to permit fees) including default of a check submitted for the payment.

(c) *Revocation procedure.* Prior to revocation of a permit except for nonpayment as specified in paragraph (2), the applicant shall be given an opportunity for a hearing in accordance with 2 Pa.C.S. §§ 501—508 (relating to practice and procedure of Commonwealth agencies).