

ARTICLE V
GENERAL DESIGN STANDARDS AND REQUIREMENTS

500 GENERAL REQUIREMENTS

- A. The principles, standards, and requirements of this Article shall be applied by the Commission in evaluating and reviewing proposed subdivision and land development plans, and shall be considered the minimum standards in all municipalities where the Commission's jurisdiction is that of an approval body as prescribed in Section 105 of this Ordinance. The Commission may impose more restrictive standards where it is deemed appropriate or necessary in order to protect the public health, safety or welfare.
- B. Land shall be suited to the purpose for which it is to be subdivided or developed.
- C. Applicants are encouraged to utilize the *Conservation Subdivision Design: Four Step Process* and the design principles illustrated in Appendix H.

501 HAZARDOUS AREAS

Those lands which are subject to hazards of life, health, or property as may arise from fire, flood, disease, geologic conditions, excessive slopes, contamination by hazardous materials and substances, unstable soils or soils of inadequate weight bearing strength, sites with very poor access, or considered to be uninhabitable for other reasons shall not be approved for development unless the hazards have been eliminated or adequate safeguards and/or remediation have been taken to the satisfaction of the Commission to prevent further aggravation to and damage from such hazards.

502 PLANNING AND ZONING CONSISTENCY

- A. The location and design of all subdivisions and land developments shall conform to, and be generally consistent with, the Union County Comprehensive Plan, the municipal comprehensive plan, and any and all other plans and official maps duly adopted by the county or municipality in which the subdivision or land development is situated.
- B. New subdivisions and land developments shall be coordinated with all existing or proposed developments on adjacent properties in order to provide for the harmonious development of the entire area.
- C. The location and design of all subdivision and land developments shall conform to any applicable municipal zoning ordinance. The Commission shall not grant plan approval until the municipal zoning officer certifies that the plan is consistent with local zoning requirements.

503 BLOCKS

- A. Blocks for residential developments shall generally have a minimum length of 500 feet and a maximum length of 1,600 feet.
- B. Residential blocks shall be of sufficient depth to accommodate two (2) tiers of lots. Exceptions to this may be permitted for double or reverse frontage lots that border an arterial or collector street or where a barrier such as a watercourse or railroad is present.
- C. The depth and width of blocks in nonresidential areas may vary from Sections 503.A and 503.B and shall be determined by the nature of the use in order to serve the public convenience. Nonresidential blocks shall be adequate to provide for safe and convenient traffic circulation, off-

street parking and loading areas, setbacks, and landscaping, as required by this Ordinance and applicable municipal zoning ordinances.

504 LOT STANDARDS

A. General Lot Standards

1. Lots shall be laid out to provide buildable areas, reasonable access, usable yards and open space areas, with minimum disturbance to the site. The soil, geologic, and topographic conditions of the site should be compatible with proposed lot uses.
2. The configuration of lots shall be based upon the minimum and maximum lot area requirements, the salient natural features, existing improvements, proposed improvements, and the adjacent development pattern.
3. Lot configurations should provide for flexibility in building locations while providing safe vehicular and pedestrian circulation.
4. Lots that are two (2) or more times the minimum lot area requirements shall be designed with configurations that allow for additional subdivision.

B. Specific Lot Requirements

1. Wherever feasible lot lines shall follow municipal boundaries rather than cross them. Where a lot is divided by a municipal boundary the minimum standards of the each municipality shall apply.
2. Side lot lines shall be substantially at right angles or radial to street lines.
3. All lots shall front on and have access to an existing or proposed public street or a private street in accordance with Sections 509 through 516 of this Ordinance.
4. Lots that require access to an arterial or collector street shall be avoided. Where lots adjoin arterial or collector streets, access to said lots shall be from local streets, service or marginal access roads.
5. Lots shall be laid out and graded to provide proper drainage away from all buildings.
6. All portions of a tract being developed shall be taken up in lots, streets, public grounds, recreation areas or other proposed uses so that remnants and landlocked areas shall not be created.
7. Corner lots shall have additional width to permit sufficient setbacks from both streets.
8. Double frontage lots are prohibited except where provided as reverse frontage lots to reduce driveway intersections along a street with a high volume of vehicular movements.

505 LOT OR AREA REQUIREMENTS

- A. The minimum lot or area requirements shall be determined by the applicable municipal zoning ordinance, or where local standards have not been officially established, the standards of Table 505-1 and this Ordinance shall apply.

- B. The prescribed minimum lot or area requirements may be increased by the Commission in those areas with development limitations as described in Section 501 and elsewhere in this Ordinance in order to assure the health, safety, and general welfare of the public.

Type of Dwelling or Use	Central Sewer and Water ¹		Central Sewer Only		Central Water Only ²		On-Lot Sewage and Water ²	
	Area (sq ft)	Width (ft)	Area (sq ft)	Width (ft)	Area (sq ft)	Width (ft)	Area (sq ft)	Width (ft)
Single Family ³	10,000	70	21,780	75	33,000	80	43,560	100
Two-Family Housing ⁴	5,000	70	10,500	75	16,500	80	21,780	100
Multi-Family Housing ⁵	3,000	30	Not Permitted		Not Permitted		Not Permitted	
Open Space Subdivisions								
Traditional Neighborhood								
Mobile Home Parks								
Campgrounds & RV Parks								
Commercial	Lot area for Commercial, Industrial and Institutional land uses shall be of sufficient size to incorporate all design elements of this Ordinance (parking requirements, sewage disposal, water supply, buffers and landscaping, etc.). At a minimum, lot area shall be the area required for sewage disposal in accordance with the PA DEP or 25% over the impervious surface square footage proposed for the lot, whichever is greater. In no case shall the width to depth ratio of the lot exceed 1:4.							
Industrial								
Institutional								

¹ - Areas of 15% or greater slope shall adhere to the minimum lot size and dimensions outlined under "Central Water Only".

² - Additional lot area may be required for proper installation of an on-lot sewage disposal system in accordance with PA DEP.

³ - Includes mobile homes not part of a mobile home park.

⁴ - Lot area for Two-Family is per unit but lot width is not on a per unit basis.

⁵ - Lot area and lot width is per unit for Multi-Family.

506 BUILDING SETBACK LINES

Building setback lines shall conform to any applicable zoning ordinance. Where no such ordinance exists, minimum setbacks from the edge of the existing or future right-of-way, whichever is greater, and from property lines shall be in accordance with this Section.

A. Minimum Building Setbacks

1. Front Yard: 25 Feet
2. Side Yard: 10 Feet
3. Rear Yard: 25 Feet

- B. Setback criteria for special types of subdivisions and land developments (i.e. Open Space Subdivisions, Traditional Neighborhood, Mobile Home Parks, Campgrounds & RV Parks) shall follow the provisions established in Article VI of this Ordinance.

507 MONUMENTS AND MARKERS

- A. All pins, monuments, and markers shall be established by a professional land surveyor licensed in the Commonwealth of Pennsylvania. The work shall be performed in accordance with criteria

recognized by the professional licensing board. No existing property line evidence shall be disturbed or removed in the course of establishing and locating boundaries, but shall be located and identified on a property survey plan and labeled as is deemed necessary to delineate ownership.

- B. Monuments, pins, or markers shall consist of the following materials and dimensions and shall be embedded no less than thirty inches (30"):
 - 1. Monuments - Concrete shall be at least 4"x4"x36" or similar circular area with a permanent distinguishing magnetic mark identifying the point on the property.
 - 2. Pins and Markers - Steel and other similar durable all weather permanent marker materials shall be at least 36" x 1/2" diameter. Railroad spikes or similar products can be used to locate intersections of streets and property corners within paved surfaces.
 - 3. For newly erected monuments it is recommended that a brightly colored wooden stake at least 1"x2"x36" be placed near the monument and/or colored flagging be placed on the monument. Survey caps and underground magnetic markers may also be utilized in conjunction with bars used for markers.
- C. It is encouraged that all boundary surveys and monuments be located in reference to the established control for the Union County GIS mapping. Surveys and subdivisions that are located within 1,500 feet of a Union County GIS Monument shall be tied to that monument with bearings to the nearest second and dimensions to the nearest 100th of a foot to identify the coordinates of at least two monuments and the remaining annotated property information.
- D. Monuments shall be placed at all newly established property corners and right-of-way lines to identify the intersection of adjoining properties, separately deeded properties of the same ownership, and access, utility, and drainage easements. Curved lines shall be identified at the points of tangent and changing degree of curvature.
- E. In subdivisions of 10 lots or greater, a minimum of two permanent reference monuments shall be established in the external boundary of the subdivision where the bar is set in concrete to meet the standards of a monument.
- F. Monuments for new subdivision or land development projects shall be set prior to Final Plan approval. Monuments disturbed during construction shall be re-established by the professional land surveyor promptly at the completion of construction activities, but in all cases prior to any lot sale or building occupation.
- G. Maintenance or Removal - It shall be the responsibility of the subdivider or developer to see that all monuments or markers are properly maintained until such time as the lot or tract is conveyed. Maintenance of such monuments or markers shall then become the responsibility of the new owner. Any monuments or markers that are removed shall be replaced by a registered professional land surveyor at the expense of the person(s) removing them.

508 EASEMENTS

Easements for sanitary sewer, water supply, stormwater drainage facilities, public or private utilities, and pedestrian access shall meet the standards of this Section.

- A. Easements shall be adjacent to property lines and street right-of-ways to the fullest extent possible.

- B. Nothing shall be placed, planted, set or put within an area of an easement that would adversely affect the function of the easement or conflict with the easement agreement.
- C. Utility Easements. The location and size of utility easements shall be reviewed and approved by the applicable utility company, but such easements shall not be less than 15 feet in width.
- D. Drainage Easements. Where a subdivision or land development is traversed by an existing or proposed watercourse, drainage way, channel, or stream, a drainage easement shall be provided that conforms substantially with the line of such feature at a width adequate to preserve the unimpeded flow of natural drainage without damaging adjacent property. The minimum width of drainage easements shall be 15 feet.
- E. Stormwater Facility Easements. Easements shall be reserved where stormwater drainage facilities are existing or proposed and shall have a minimum width of 15 feet. They shall be adequately designed to provide an area for the collection and discharge of water, the maintenance, repair, and reconstruction of the drainage facilities, and the passage of machinery for such work. They shall prohibit excavation, the placing of fill, buildings or other permanent structures or any other alterations that may adversely affect the flow of stormwater within any portion of the easement.
- F. Right of Access and Maintenance. All easements shall clearly identify who has the right of access and the responsibility for maintenance.
- G. Easements, including easement maintenance provisions, shall be prepared in a format suitable for recording and shall be referenced in the deeds of the lots.

509 STREET SYSTEM GENERAL ARRANGEMENT -The following criteria shall be considered in the design of streets (including private streets not dedicated) in all subdivisions and land developments:

- A. The arrangement of streets shall minimize congestion, avoid hazardous intersections, provide convenient and safe access to the property. They shall conform to the circulation plan of the County and municipal comprehensive plans, to official maps, and to such County, Municipal, and State road and highway plans as have been duly adopted.
- B. Proposed streets shall be coordinated with existing or proposed streets on adjacent properties and shall be planned and designed for the continuation of existing streets in adjoining areas, the proper projection of streets into adjoining undeveloped or unplatted areas and the continuation of proposed streets to the boundaries of the tract being developed. No subdivision or land development shall be approved that will result in a tract or parcel of land being landlocked.
- C. Streets shall be laid out to be harmonious with the existing and proposed site characteristics including, but not limited to, slope, best use, parcel layout, runoff, soil capacity, water table, floodplain, sight distance, traffic volume and safety, pedestrian use, traffic control, and parking.
- D. Curvilinear streets should be utilized only where their use will be consistent with adjoining development patterns, topography, and natural features of the site.
- E. Curvilinear streets shall not be used immediately adjacent to an existing grid street system without providing a transition that continues and projects the historic grid.
- F. Streets shall be laid out to preserve the integrity of their design.

- G. Streets shall be laid out to conform as much as possible to the topography in order to permit efficient drainage and utility systems, to require the minimum number of streets necessary for convenient and safe access, and to result in usable lots and satisfactory street grades.
- H. Streets which provide ingress and egress to residential areas of single and multiple family dwellings shall be laid out to discourage and minimize their use by through traffic and to discourage excessive speeds; however, street connectivity into and from adjacent areas is encouraged and will generally be required.
- I. If lots resulting from a subdivision or land development, including the tract residual, are large enough for re-subdivision, adequate street right-of-way to permit further subdivision and land development shall be provided as necessary.
- J. Where a subdivision or land development abuts a collector or arterial street the Commission may require an internal street system, marginal access street, rear service street, reverse frontage lots, shared driveways, or such other treatment as will provide protection for abutting properties, reduction in the number of intersections and driveways with the collector or arterial street, and separation of local and through traffic. Direct access to SR 0015, SR0045, SR0104, SR0304 and SR0192 shall be prohibited.
- K. Adequate vehicular and pedestrian access shall be provided to all lots.
- L. Where streets continue into adjacent municipalities the applicant shall coordinate the design of the street with both municipalities in order to ensure uniform cartway widths, pavement cross sections, and other public improvements.
- M. All proposed connections to existing streets shall be approved by the jurisdiction owning the existing streets.
- N. Streets shall be designed with drainage grates that are safe for crossing by bicycles and horse drawn vehicles.
- O. All streets being offered for dedication must meet the Pennsylvania Department of Transportation (Penn DOT) requirements for liquid fuel allocation.
- P. When streets are offered for dedication the applicant shall provide the required right-of-way, street geometry, street section, drainage facilities, and traffic control. Additional infrastructure may be required where design standards warrant further improvements based on traffic impact studies.
- Q. Proposed private streets (those not offered for dedication) shall meet all the design standards of this Ordinance, including but not limited to right-of-way, curbs, sidewalks, drainage, construction, traffic control, and setbacks.
- R. Where a subdivision or land development abuts or contains an existing street right-of-way of improper width or alignment, the Commission may require the dedication or reservation of additional land sufficient to widen the street or correct the alignment. Where an additional dedication or reservation is required, all building setback lines will be measured from such dedicated or reserved right-of-way line.
- S. The Commission shall have the right to determine the classification of roadway and street systems. This determination, if necessary, should be obtained prior to the design process.

510 TRAFFIC ENGINEERING REPORT

- A. The applicant shall prepare a Traffic Engineering Report where any of the following conditions exist:
1. It is estimated that the subdivision or land development will generate over two hundred (200) vehicle trips a day based upon the Institute of Transportation Engineers generation rates.
 2. The subdivision or land development will result in the creation of twenty-five (25) or more lots.
 3. Current traffic problems exist in the local area, such as a high accident location, confusing intersection, or a congested intersection that directly affects access to the subdivision or land development.
 4. The ability of the existing roadway system to handle increased traffic or the feasibility of improving the roadway system to handle increased traffic is limited.
 5. The proposed development alters the transportation patterns on a public street providing access to the development or proposes the removal or relocation of a street.
- B. The Traffic Engineering Report shall be prepared under the supervision of qualified and experienced transportation engineers with specific training in traffic and transportation engineering and at least two (2) years of experience in preparing Traffic Engineering Reports for existing or proposed developments.
- C. The Traffic Engineering Report shall at minimum be prepared in accordance with Penn DOT, Publication 201, "Engineering and Traffic Studies".
- D. The scope of the traffic study shall be reviewed and approved by the Commission and Commission Engineer prior to commencement. The scope shall include the proposed intersection and roadway, as well as the surrounding impacted transportation facilities.

511 REQUIRED RIGHT-OF-WAYS AND CARTWAYS

- A. Right-of-way and cartway widths contained in this Ordinance are the minimum required for public streets based upon the need to provide efficient movement of vehicles, serve utilities, accommodate ponding runoff, storage of plowed snow, emergency parking, temporary roadway adjustments during maintenance and accidents, and to accommodate future improvements.
- B. The applicant shall certify prior to final plan approval of a subdivision or land development that title to any street right-of-way is free and clear of all liens and encumbrances and that no prior right-of-way has been granted to any utility or any other person.
- C. Right-of-way and cartway widths should not be less than those required for all elements of the design cross sections, utility accommodation, and appropriate border areas, such as in cul-de-sacs, and by the Penn DOT Liquid Fuels Regulations. All plans shall be designed to provide for the entire right-of-way and cartway widths. Refer to Table 512-1 of this Ordinance for the minimum requirements.
- D. The Commission shall reserve the right to require a right-of-way width greater than Penn DOT specifications and the standards set forth in Table 512-1 of this Ordinance for reasons of public safety and convenience, for acceleration and deceleration lanes into parking lots, streets, or high density residential developments, or to provide for future service roads.

- E. The right of way and cartway width of a new public street that is a continuation of an existing street shall in no case be continued at a width less than the existing street. Where the right-of-way and cartway width of the new street is greater than the existing street, a transition area shall be provided, the design of which is subject to Commission approval.
- F. All of the right-of-way shall be graded similar to the street grade. The slope of banks along street centerlines shall be no steeper than the following:
 - 1. One (1) foot of vertical measurement for three (3) feet of horizontal measurement for fills.
 - 2. One (1) foot of vertical measurement for two (2) feet of horizontal measurement for cuts.

Where a cut or fill abuts a sidewalk there shall be a two (2) foot level area adjacent to the sidewalk and the fill slope shall not exceed three to one (3:1) slope.

G. Private right-of-ways shall be in accordance with those requirements prescribed for private streets in Section 512.L.5.

H. Where a subdivision or land development adjoins undeveloped acreage, new streets or reserved rights-of- way shall be provided to the boundary lines of the development.

512 STREET DESIGN STANDARDS - The following design criteria shall be considered the minimum standards in the design of streets in all subdivisions and land developments:

- A. Streets shall be designed for a twenty (20)-year service life. If a street is to be utilized prior to completion of construction, the utilized portion must be structurally designed to support all anticipated loading without significant loss of the designed service life of the street.
- B. Special consideration for future bus and truck routes must be taken into account in the design of streets for pavement thickness and width, sight distances and curb radii.
- C. Streets located in floodplain or flood prone areas shall be designed and constructed to meet the requirements of the applicable Floodplain Management Ordinance and Section 526 of this Ordinance.
- D. The existing Level of Service (LOS) on any adjacent street and intersection that will be affected by a proposed subdivision or land development shall not fall below LOS C if it is currently at LOS A, B, or C and shall not be further reduced if it is at LOS D, E, or F.
- E. Traffic calming techniques should be considered with projects that result in high vehicular or pedestrian traffic, areas of commercial development, and transition areas between commercial and residential development. Techniques shall be employed based on Penn DOT, Publication 383.
- F. **Design Speed.** The maximum design speeds and operating speeds shall be as shown in Table 512-1.
- G. **Vertical Alignment.**
 - 1. Vertical curves shall be used in changes of grade exceeding one percent. In order to provide proper sight distances, the minimum length (in feet) of vertical curves shall be as computed in accordance with the Commonwealth of Pennsylvania, Title 67, Transportation, Chapter 441as from time to time reenacted, amended, and/or replaced.

2. The minimum grade on all local streets shall be one half (0.5) percent. The maximum grade on any street shall not exceed twelve (12) percent; however, grades not more than sixteen (16) percent may be used for limited distances less than 300 feet and shall be subject to the approval of the Commission prior to design. Refer to Table 512-1.
3. Grades at intersections shall be as flat as possible. The grade of the approach where the traffic is required to stop shall not exceed four (4) percent grade change for forty (40) feet or greater depending on the stacking length of the vehicles caused by high traffic volume areas. Refer to Table 512-2 for further design requirements.

H. Horizontal Alignment

1. Alignment between control points should conform to topography, following closely the natural contours, consistent with the design speed, the traffic volumes to be served, the right-of-way and construction cost.
2. Horizontal curves shall be designed in accordance with Table 512-1.

I. Intersections

1. Streets shall intersect as nearly as possible at right angles, and no street shall intersect another at an angle of less than seventy-five (75) degrees, or more than one-hundred and five (105) degrees.
2. No more than two (2) streets shall intersect at the same point.
3. Street intersections shall be designed with a minimum of fifteen (15) foot radii, but should at all times be designed to safely accommodate the intended vehicular traffic such as combination trucks and buses. Refer to Table 512-2 for additional minimum curb radii.
4. The corner sight distances or clear sight triangle for each design speed shall be as specified in Table 512-2. The clear sight triangle shall be maintained as open space with no visual obstructions (Refer to Figure 1).
5. Sight distances for all intersection, horizontal alignments, or vertical alignments shall be designed to achieve the required minimum safe sight distances and safe stopping distances as specified in accordance with the Commonwealth of Pennsylvania, Title 67, Transportation, Chapter 441 as from time to time reenacted, amended and or replaced.
6. Any street intersecting with another street shall not be located closer than the distances specified in Table 512-2. Distances shall be measured from the centerline of the two intersecting streets along the centerline of said local, collector, or arterial street.
7. Where a subdivision or land development is provided access by a single street, the Commission may require a boulevard-type entrance that would consist of two streets having a width of 20 feet each separated by an island having a width of 10 feet within a right-of-way having a width of 70 feet.

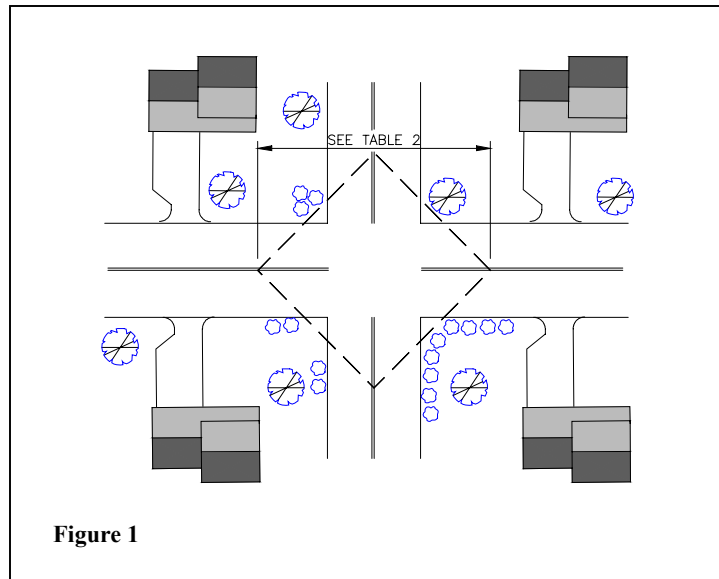


TABLE 512-1 - DESIGN STANDARDS

CRITERIA	ARTERIAL	COLLECTOR	LOCAL	PRIVATE
ADT	>3,000	1,000-3,000	200-1,000	25-750
DESIGN SPEED	55	40	30	25
OPERATING SPEED (MPH)	50	35	25	20
MINIMUM GRADE	0.5%	0.5%	0.5%	0.5%
MAXIMUM GRADE	6%	8%	12% ¹	12% ¹
RIGHT-OF-WAY WIDTH (FEET)	70 OR GREATER	60	50	50
CARTWAY WIDTH (FEET)	24	22	20 ³	20 ³
SHOULDER WIDTH WITH CURBS (FEET) ²	8	6	4	4
SHOULDER WIDTH WITHOUT CURBS (FEET) ²	8	8	6	6
PARKING LANE WIDTH (FEET)	NO PARKING LANE PERMITTED	10 IF PERMITTED	8 MIN.	8 MIN.
CARTWAY WITH PARKING AND CURB (FEET)	NO PARKING LANE PERMITTED	36	34	38 IF PERMITTED
HORIZONTAL CURVATURE (FEET) ⁴	750	500	150	150
REVERSE CURVE OFFSET (FEET)	300	150	100	100
VERTICAL CURVES (FEET)	SEE (4)	SEE (4)	SEE (4)	SEE (4)

¹ - Greater grades may be allowed at the discretion of the Commission with concurrence of the Commission engineer.

² - Shoulders in streets with curbs shall be constructed to cartway standards.

³ - All streets shall be curbed where lot widths are less than 80 feet.

⁴ - All sight distances shall be in accordance with the Commonwealth of Pennsylvania, Title 67, Transportation, Chapter 441 as from time to time reenacted and amended.

8. Any subdivision or land development, which can be expected to generate more than 200 vehicle trips per day shall provide any or all of the following facilities, as may be required to provide safe and efficient operation at any proposed driveway or street:
 - a. acceleration or deceleration lanes;
 - b. concrete median or median barriers;
 - c. left-turn lanes;
 - d. traffic signals;
 - e. lane markers; and
 - f. other such traffic control devices as may be necessary.
9. Turning lanes, medians, acceleration and deceleration lanes, traffic signals, lane markers and other such traffic control devices required shall be designed in accordance with Penn DOT Design Manuals.

J. Roadway Cross Sections

Minimum and desirable widths of roadway surface, shoulders, curbs, base, subbase material and surface courses shall be in accordance with the requirements specified in Table 512-1 and Table 512-3 below and Figure 2.

TABLE 512-2 - INTERSECTION DESIGN SPECIFICATIONS

DESCRIPTION	INTERSECTION TYPES				
	ARTERIAL WITH COLLECTOR	ARTERIAL WITH LOCAL ²	COLLECTOR WITH COLLECTOR	COLLECTOR WITH LOCAL	LOCAL WITH LOCAL
MINIMUM DISTANCE BETWEEN CENTERLINES (Same Side/Opposite Side)	800'/800'	800'/300'	500'/300'	500'/300'	300'/150'
ANGLE OF STREET INTERSECTIONS ¹	90	90	90	75 TO 105	75 TO 105
LENGTH/GRADE CHANGE OF INTERSECTION APPROACHES	100'/4%	80'/4%	80'/4%	60'/4%	40'/6%
MINIMUM CURB RADIUS	50'	20'	35'	25'	20'
MINIMUM INTERSECTION SIGHT TRIANGLE DISTANCE ³	300'	200'	200'	200'	150'

¹ – Angles should be designed to 90 degrees when possible.

² – Where the centerlines of local streets opening onto opposite sides of an arterial street are within 150 feet of each other, they shall be made to coincide by curving the streets to form a four-way intersection whenever possible.

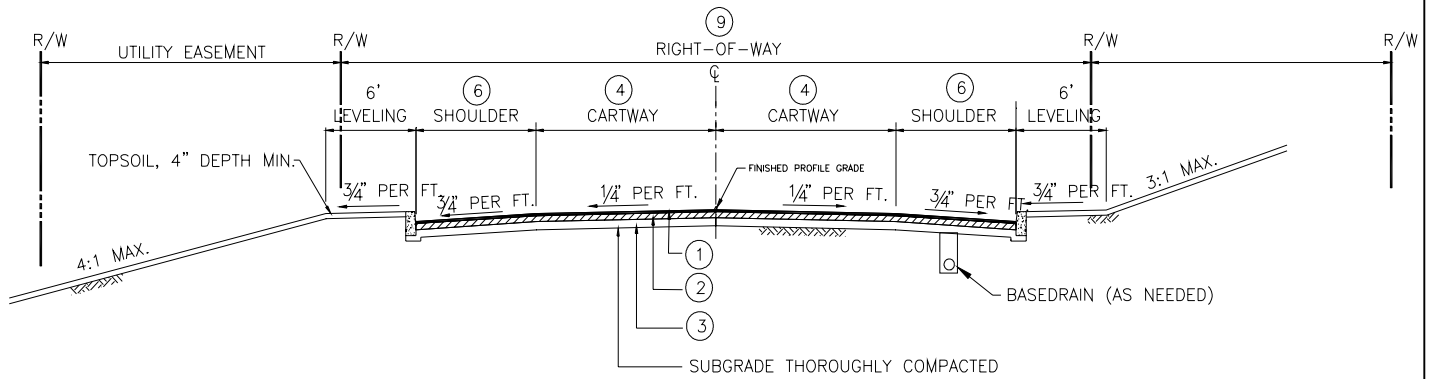
³ – This includes railroads. Refer to the detail for proper alignments.

K. Structures

1. Bridges, culverts, walls, tunnels and other structures should be designed in accordance with the current AASHTO publication “Standard Specifications for Highway Bridges” and Penn DOT Design Manual, Part 4, “Structures”.
2. The design of all structures is subject to the review and approval of the Commission Engineer.

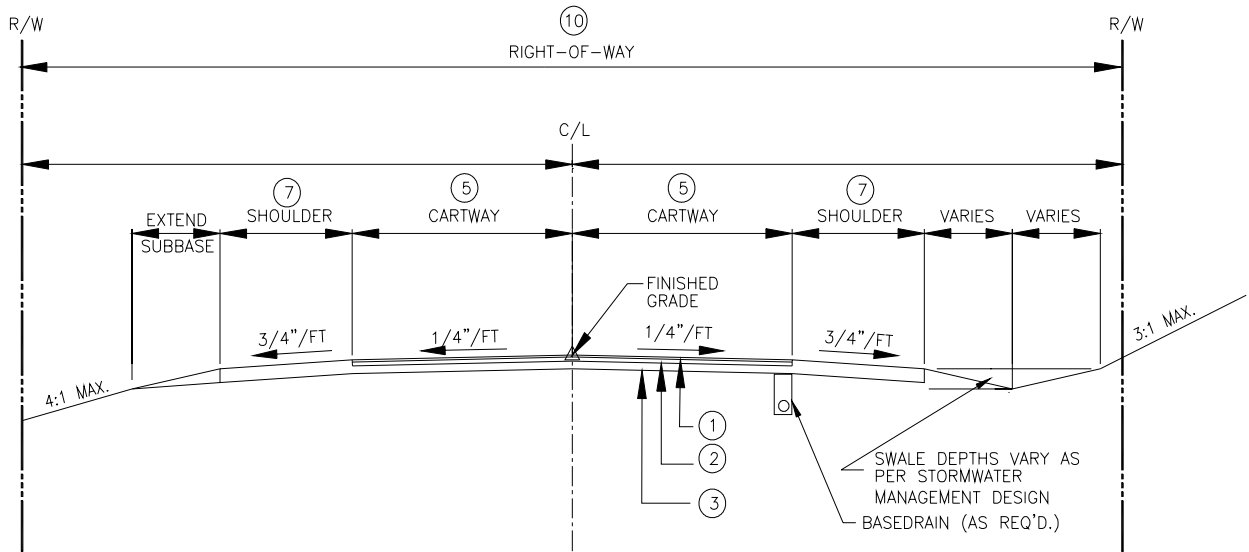
Figure 2

TYPICAL ROADWAY SECTIONS



TYPICAL ROADWAY SECTION WITH CURBING

NOT TO SCALE



TYPICAL ROADWAY SECTION WITH SHOULDERS

NOT TO SCALE

- ① - ID-2 WEARING COURSE - SEE TABLE 3
- ② - BITUMINOUS CONCRETE BASE COURSE - SEE TABLE 3
- ③ - 2A STONE SUBBASE - SEE TABLE 3
- ④ - CARTWAY WIDTH (CURBED) - SEE TABLE 1
- ⑤ - CARTWAY WIDTH (NON-CURBED) - SEE TABLE 1
- ⑥ - SHOULDER WIDTH (CURBED) - SEE TABLE 1
- ⑦ - SHOULDER WIDTH (NON-CURBED) SEE TABLE 1
- ⑧ - PAVEMENT BASE DRAIN WHEN REQUIRED
- ⑨ - RIGHT-OF-WAY LINE (CURBED)
- ⑩ - RIGHT-OF-WAY LINE (NON-CURBED)

TABLE 512-3 – ROAD & PARKING AREA CONSTRUCTION STANDARDS¹

TYPE	ARTERIAL	COLLECTOR	LOCAL	COM. / IND. DEDICATED	COM. / IND. PRIVATE ³
ID-2 WEARING COURSE	1.5"	1.5"	1.5"	1.5"	1.5"
BINDER BASE COURSE	3"	1.5"	NONE	2"	NONE
BITUMINOUS CONCRETE BASE COURSE	4"	4"	4"	4"	3"
2A AGGREGATE SUBBASE	8"	8"	6"	6"	6"
PAVEMENT CROSS SLOPE ²	2% MIN.	2% MIN.	2% MIN.	2% MIN.	2% MIN.
SHOULDER CROSS SLOPE	6%	6%	6%	6%	6%

¹ – Alternative designs in accordance with Penn DOT Publication 70 are subject to approval by the Commission Engineer.

² – Streets constructed at minimum grades of 0.5% shall have a 3% cross slope minimum.

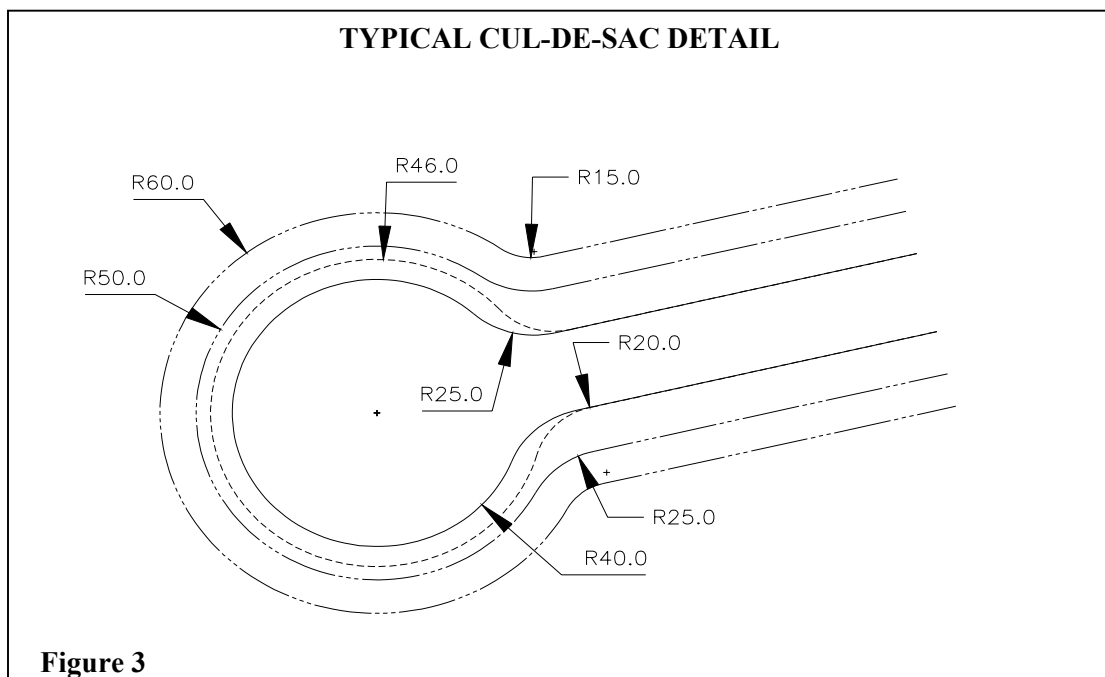
³ – Alternative paving materials and pavement sections subject to approval by the Commission Engineer.

3. For new construction projects, required bridge widths and design load structural capacities shall be designed using Penn DOT Design Manual, Part 2, “Rural Design Criteria Charts”
4. A 14’-0” minimum vertical clearance, plus an allowance of six (6) inches to accommodate future resurfacing, shall be provided for all new and reconstructed facilities on or over collector and local road facilities.
5. A 16’-0” minimum vertical clearance, plus an allowance of six (6) inches to accommodate future resurfacing, shall be provided for all new and reconstructed facilities on or over Interstate, limited access, and arterial facilities.
6. For additional vertical clearance requirements refer to Penn DOT Design Manual, Part 2 and Penn DOT Design Manual, Part 4.
7. The minimum width criteria and minimum design load structural capacities shall be as indicated in the applicable Penn DOT Design Manual, Part 2, Design Criteria Charts.

L. Special Streets

1. Cul-de-Sacs
 - a. A cul-de-sac will not be permitted when a through street is feasible. The feasibility of a through street will be based on the physical features of the tract proposed for development, the potential for extension of the street to adjoining lands, restrictions imposed by other government regulations, and the ability to design to meet all other requirements of this Ordinance. When cul-de-sacs are proposed, the application shall be accompanied by a written analysis of the merits of the design and the reasons that a through street would not be feasible. Approval of cul-de-sac streets shall be at the sole discretion of the Commission.
 - b. Cul-de-sacs shall not be used immediately adjacent to an existing grid street system without providing a transition that continues and projects the historic grid.

- c. Cul-de-sacs shall be prohibited where it is possible to provide loop streets that provide better access for emergency vehicles, fewer restrictions on snow removal, and improved pedestrian access.
- d. Permanently designed as such a cul-de-sac street shall not exceed one thousand (1,000) feet in length in a single family residential development, eight hundred (800) feet in length in commercial or industrial developments, and six hundred (600) feet in length in multi-family housing developments the length of which is measured from the centerline intersection with the through street to the center point of the turnaround.
- e. Permanent cul-de-sac streets shall have a paved, circular turnaround with a minimum radius to the curb line of forty-five (45) feet and the minimum radius of the right-of-way lines shall be fifty (50) feet. Refer to Figure 3 for minimum geometrical requirements.
- f. An interior island may be permitted in the cul-de-sac turnaround in residential areas at the discretion of the Commission.
- g. The centerline grade on a cul-de-sac street shall not exceed ten (10) percent and the grade of the diameter of the turnaround shall not exceed four (4) percent.
- h. Temporary cul-de-sacs may have circular, “T” shaped, or “hammerhead” shaped turnarounds. Turnarounds shall be constructed completely within the right-of-way. Restoration of paved areas within the right-of-way shall be the responsibility of the developer connecting to the temporary cul-de-sac.
- i. Unless future extension is clearly impractical or undesirable and is clearly demonstrated by the applicant to the Commission, the turnaround right-of-way shall be placed adjacent to the tract boundary with sufficient additional width provided along the boundary line to permit extension of the street at full width.



2. Dead End Streets
 - a. Dead end streets are prohibited unless designed as cul-de-sac streets or designed for future access to adjoining properties.
 - b. Any dead end street for access to an adjoining property or because of authorized phased development shall be provided with a temporary, all weather turnaround. The use of such turnaround shall be guaranteed to the public until such time the street is extended.
3. Half or Partial Streets - New half or partial streets are prohibited.
4. Alleys - Alleys may be permitted with the concurrence of the municipality in which they are located and shall comply with the following standards:
 - a. Alleys may not be used as the only means of access to a lot.
 - b. Alleys in residential developments shall have a minimum right-of-way width of 16 feet and a minimum cartway width of 12 feet.
 - c. Alleys in nonresidential developments shall have a minimum right-of-way width of 20 feet and a minimum cartway width of 16 feet. Where necessary, corners shall have a radius adequate to accommodate any large vehicles that may be expected to use the alley.
 - d. Dead end alleys shall not be permitted without an all weather turnaround, subject to the approval of the Commission and the Municipality.
 - e. The use of alleys for residential development shall be limited to PRD's, TND's, and Open Space Subdivisions with lot widths of 80 feet or less.
 - f. Alleys should be designed in accordance with the street standards in Section 512 of this Ordinance.
 - g. Alleys serving commercial developments should be sized to accommodate emergency vehicles and the vehicular turning movements desired.
5. Private Streets
 - a. All streets shall be planned to be offered for dedication as public streets.
 - b. Private streets shall be approved at the sole discretion of the Commission and shall not be approved without the concurrence of the governing body in the municipality in which the private streets are proposed.
 - c. Private streets shall be prohibited unless design objectives of the development warrant private ownership, and the municipality will not accept dedication of the street, and the following conditions are met:
 1. The private street shall serve not more than five (5) lots;
 2. A private right-of-way agreement shall be properly executed between the landowner granting the access and all affected parties abutting and adjoining said easement and shall create a private right-of-way not less than fifty (50) feet that shall run with the land and be available for the

use of all owners, present and future. This agreement at a minimum shall include all the provisions listed in Appendix I of this Ordinance and must be approved by the Commission and the Municipality prior to plan approval;

3. The adjoining landowners or an association of property owners must agree that the street(s) shall not be dedicated but shall be maintained by the adjoining landowners or association of property owners;
 4. The adjoining landowners or association of property owners must agree to the maintenance of the private street in a mud-free condition and agree that the adjoining lot owners or an association of property owners will provide for repair, snow removal, and any other necessary maintenance;
 5. The private street arrangement and agreement must be acceptable to the municipality in which it is situated; and
 6. An agreement must be entered into by the adjoining landowners or an association of property owners that shall be recorded with the Union County Recorder of Deeds as part of the Final Plan and subsequently reflected in the deeds of all future lot owners. This agreement shall establish the conditions under which the street will be constructed and maintained as well as conditions controlling the offer of dedication and provisions for funds sufficient to restore the private street to the standards required for public streets should dedication occur. At a minimum the agreement shall stipulate the provisions contained in Appendix I of this Ordinance.
- d. The private street system shall be designed and built to accommodate the type and volume of traffic anticipated to be generated and shall be constructed in accordance with the standards and criteria established in Sections 511, 512, 514 and 516 of this Ordinance.
 - e. A notation shall be included on the final plan and reflected in the deeds of sold lots identifying the street right-of-way as "Private" and identifying the entity responsible for maintenance.
 - f. All gates on private streets shall be located a minimum of thirty (30) feet from the public right-of-way and shall not open outward. Local fire department personnel shall have ready access to locking mechanisms on any gate restricting access.
 - g. Private streets shall be considered a required improvement and must be constructed prior to Final Plan approval or, in lieu of completion of improvements, the applicant must provide an acceptable guarantee to be approved by the Commission, Commission Engineer, Commission Solicitor, and the municipality in accordance with Article VII of this Ordinance.

513 STREET CONSTRUCTION STANDARDS

- A. At a minimum all street construction activities shall be performed in strict accordance with Penn DOT, Publication 408 including all references, supplements, and revisions, with Table 512-3 of this Ordinance, and with applicable municipal ordinances and requirements in order to ensure proper serviceability.

- B. **Liquid Fuels Requirement.** Any street or part thereof offered for dedication, or intended to be offered for dedication to a municipality for inclusion into the road system under this Ordinance, shall comply with the minimum requirements of Penn DOT covering the allocation of liquid fuel tax receipts and the standards outlined in this Ordinance.
- C. All streets and related facilities shall be staked-out during construction by a qualified individual in the construction, engineering, or surveying field to ensure that infrastructure is constructed in accordance with the approved design drawings.
- D. The applicant shall be responsible for implementing all necessary plans to control, mitigate, and eliminate any forms of pollution, disturbance, or destruction resulting from noise, odor, stormwater, and/or excessive loads or repetitions of loads that may occur during construction.
- E. The applicant shall furnish the necessary guards, watchmen, warning lights and similar items necessary to maintain state highway and other street traffic in accordance with Penn DOT Publication 203 requirements. In general, the applicant shall not be permitted to interrupt traffic without specific arrangements for detouring traffic in accordance with Penn DOT requirements. When traffic cannot be detoured, a minimum of ½ the roadway width shall be open at all times with traffic control.

514 STREET IMPROVEMENTS

A. Curbs and Gutter

- 1. Curbing may be required by the Commission for:
 - a. Stormwater management;
 - b. Road stabilization;
 - c. To delineate parking areas;
 - d. Ten feet on each side of drainage inlets;
 - e. At intersections;
 - f. At corners; and
 - g. At tight radii.
- 2. Curbs shall be required on public and private streets in subdivisions and land developments having lots 80 feet or less in width.
- 3. Curbs shall be constructed in accordance with Penn DOT Form 408 specifications as from time to time amended and /or replaced.
- 4. Concrete curb shall be eighteen (18) inches high, eight (8) inches wide, and have an exposed face of eight (8) inches. Refer to Figure 4. Alternative types of concrete curb can be approved at the Commission’s discretion with the concurrence of the municipality.
- 5. Terminal concrete curbs or terminal radii shall be provided at the start or cut-off locations as needed for streets to transition from one pavement section to another.
- 6. Curbing shall be designed to provide a ramp for bicycles and/or wheelchair access at each intersection, at the principal entrances to buildings which front on parking lots, and at all crosswalks.

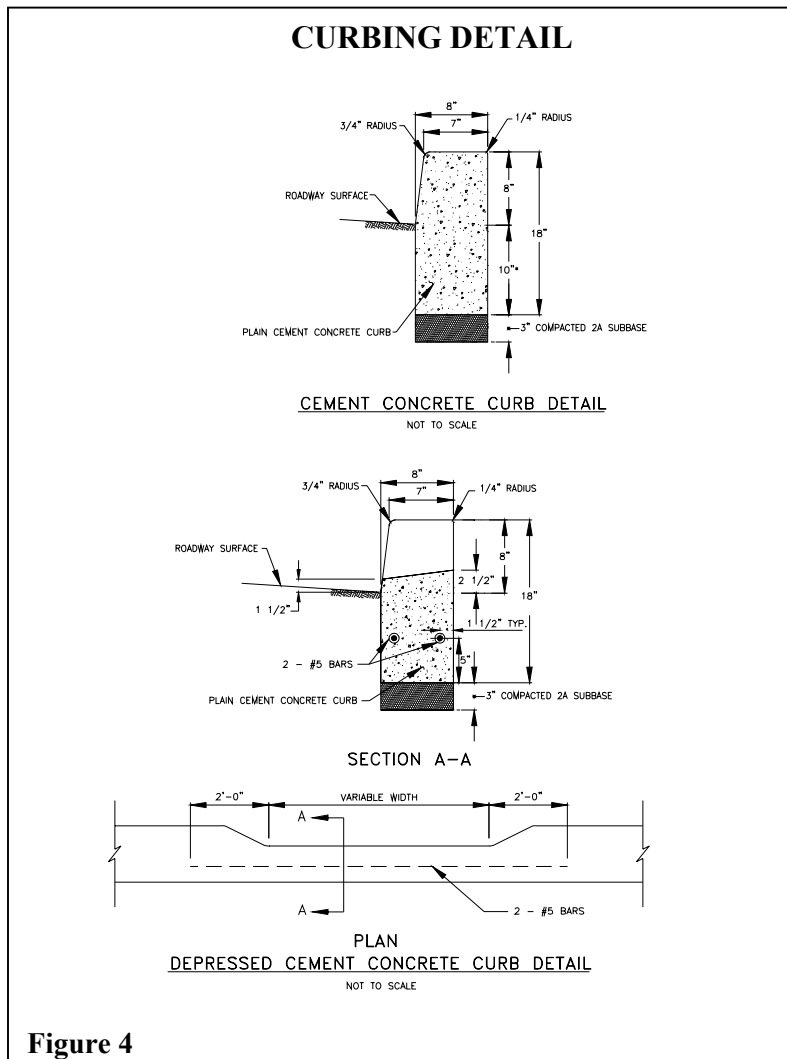


Figure 4

B. Shoulders

1. Paved shoulders and drainage swales shall be used instead of curbs when:
 - a. Shoulders are required by State or other law;
 - b. Soil or topographic conditions make the use of shoulders and drainage swales preferable; and
 - c. It is in the best interest of the community to preserve its rural character.
2. Shoulders shall be required on public streets where curbing is required. Refer to Figure 2.
3. The depth of shoulders shall be the combined depth of the surface and base courses. Refer to Figure 2 of Section 511 for the roadway pavement depths.

C. Sidewalks and Pathways

1. Sidewalks shall be required for streets where any of the following are met:
 - a. Distance to the nearest school is within State limits, which requires students to walk rather than be transported;

- b. To continue existing sidewalks from adjoining subdivisions or land developments;
 - c. To provide access to community facilities such as schools, shopping centers, recreation areas, etc.;
 - d. In subdivisions and land developments with lots less than 80 feet in width, including planned developments; and
 - e. Within planned business, commercial, and industrial developments, apartment complexes, townhouses, condominiums, and mixed-use developments.
2. Subdivisions and land developments not requiring sidewalks that are located adjacent to or within a reasonable distance of an existing or future rails to trails, rails with trails, greenway or other public trail system, shall consider access from the proposed development to the greenway or trail system through a network of pathways in the design and layout of the plan.
 3. Pedestrian way easements ten (10) feet wide may be required by the Commission through the center of blocks more than six hundred (600) feet long, to provide circulation or access to schools, playgrounds, shopping, or other community facilities.
 4. Sidewalks, where provided, shall be located within and be parallel to the street right-of-way; however, alternative locations will be considered to preserve topographic features or to provide visual interest, provided the applicant shows that an alternative systems maintains safe and convenient pedestrian circulation to the satisfaction of the Commission.
 5. Sidewalks, where provided, shall be on both sides of the street in front of all residential units. In lieu of sidewalks the Commission may alternatively approve pathways as part of a greenway network.
 6. The minimum width of all sidewalks and pathways shall be five (5) feet. Wider widths may be necessary near major pedestrian generators and employment centers and to accommodate federal Americans with Disability Act (ADA) requirements.
 7. There shall be a minimum four (4) foot planting strip of grass between the curb or shoulder and the sidewalk. This planting strip may be used for the location of underground utilities, streetlights, and street signs but shall not be used for the planting of street trees unless approval is granted by the local municipality.
 8. The grades and paving of the sidewalks shall be continuous across driveways except in non-residential and high-density developments and in certain other cases where heavy traffic volume dictates special treatment.
 9. The sidewalk shall be constructed of at least four (4) inches of Class AA concrete and a six (6) inch depth at intersections, and handicap and curb cut ramps and shall include rebar reinforcement. All curbs and sidewalks shall be underlain by four (4) inches of compacted crushed stone or gravel. Where sidewalks cross streets serving commercial and industrial uses the Commission may impose additional requirements.
 10. Pathways may be constructed of other materials including pervious materials, provided that the proposed materials and construction are appropriate to the surrounding land use and to the expected volume of pedestrian traffic, and are approved by the Commission Engineer.

11. Sidewalks and pathways shall be laterally pitched at a slope toward the street not less than one eighth (1/8) inch per foot to provide for adequate surface drainage.
12. At corners and pedestrian street-crossing points, sidewalks shall be extended to the curb line with an adequate apron area for anticipated pedestrian traffic and curb cuts and ramps designed in accordance with ADA accessibility requirements.
13. Sidewalks and pathways shall not exceed a seven (7) percent grade. All sidewalks and ramps, e.g. slopes greater than five (5) percent, shall be designed in accordance with federal ADA accessibility requirements.
14. Minimum construction standards for sidewalks shall be in accordance with Penn DOT Form 408 specifications.

D. Street and Parking Lot Lighting

1. Street and parking lot lighting shall be provided in accordance with an illumination plan designed in conformance with the standards of the local electric utility company and coordinated with the local municipality.
2. Street lighting shall be provided by the applicant and shown on subdivision and land development plans as follows:
 - a. At all new intersections in commercial and industrial areas;
 - b. At all new intersections on existing arterial or collector streets;
 - c. At the driveway, access, or entrance of any new commercial or residential development with ten lots or more or which enters onto an arterial road.
3. A lighting plan shall be provided to illustrate the locations of all free standing and wall mounted luminaries and the photogrametric contours at 0.1 intervals of candlepower.
4. Street lighting shall be provided in parking areas, along sidewalks, and between buildings as needed for public safety and convenience.
5. The placement, height, and shielding of lighting standards shall provide adequate lighting without hazard to drivers or nuisance to nearby residents and the design of the lighting standard shall be of a type appropriate to the development and the municipality. Refer to Table 514-1 for the design requirements.
6. Lighting types and levels shall be designed based on recommended intensities specific to the area being lighted; however, in no case shall lighting leaving the property exceed 0.5 foot-candles intensity.
7. All light fixtures, standards, and foundations shall be approved by the Commission and all lighting plans shall be prepared by a person qualified in the design field.

TABLE 514-1 - LIGHTING REQUIREMENTS

DESCRIPTION	FIXTURE TYPE					
	NON-SHIELDED FIXTURES ¹		SHIELDED FIXTURES - 90° CUTOFF		SHIELDED FIXTURES - <90° CUTOFF	
	MAX. PERMITTED ILLUMINATION (FOOTCANDLES)	MAX. PERMITTED HEIGHT	MAX. PERMITTED ILLUMINATION (FOOTCANDLES)	MAX. PERMITTED HEIGHT	MAX. PERMITTED ILLUMINATION (FOOTCANDLES)	MAX. PERMITTED HEIGHT
RESIDENTIAL	0.20	10	0.30	15	0.50	15
AGRICULTURAL/ CONSERVATION	0.20	15	0.50	15	1.0	20
COMMERICAL/ INDUSTRIAL	0.30	20	1.50	20	4.0	25
INSTITUTIONAL	0.30	20	1.50	25	4.0	30
STREET LIGHTING	AS PER PENN DOT REQUIREMENTS					

¹ To be used for decorative lighting only.

E. Street Signs

1. Design and placement of traffic control, regulatory, and street signs shall be provided by the applicant as needed and shall follow the requirements specified in Penn DOT Publication 236M, Handbook of Approved Signs.
2. At least two street name signs shall be placed at each four-way street intersection and one at each “T” intersection. Signs shall be installed under light standards (where applicable) and be free from visual obstruction.
3. The design of street name signs shall be consistent, of a style appropriate to the municipality, of a uniform size and color, and erected in accordance with municipal standards.
4. Private streets shall be provided with street name signs in accordance with this Section and the plan shall note that it is the responsibility of the developer to install the street name signs for private streets.
5. The owner/developer shall be responsible to obtain and install all necessary street signs and posts in accordance with the materials and workmanship prescribed in Penn DOT Publication 408 and all other applicable federal, state, county and local requirements.

F. Street Trees

1. A minimum of two (2) street trees with a minimum caliper of two and one half inches (2 ½) shall be planted for every 100-feet of street on both sides of the street in an alternating manner in residential developments with densities greater than one (1) dwelling unit per acre and in commercial land developments.
2. The trees shall be of sound nursery stock and shall consist of the recommended species in Table 514-2. Alternate species can submitted for approval by the Commission as recommended by a qualified person, but under no circumstances will any species recognized as invasive be permitted. See Appendix M for a list of invasive species.

TABLE 514-2 - STREET TREE SPECIES AND SITE SELECTION

COMMON NAME	PRIMARY CHARACTERISTICS											SECONDARY CHARACTERISTICS								
	MATURE HEIGHT (FEET)	FORM	MAXIMUM SPREAD (FEET)	MAINTENANCE NEEDS	DROUGHT TOLERANCE	SALT TOLERANCE	INSECT & DISEASE RESISTANCE	ALKALINE SOIL TOLERANCE	WET SOIL TOLERANCE	COMPACTED SOIL TOLERANCE	SHADE TOLERANCE	AIR POLLUTION TOLERANCE	LITTER PROBLEMS	TEXTURE	FALL COLOR	ORNAMENTAL FRUIT	ORNAMENTAL FLOWER	ORNAMENTAL BARK	WILDLIFE BENEFITS	PRUNING TIME
EMERALD GREEN - NORWAY MAPLE*	75	R	60	M	M	M	M	H	M	M	M	H	H	M	Y	N	N	N	Y	A
GREEN MOUNTAIN SUGAR MAPLE	75	R	60	M	M	L	M	L	M	M	M	H	M	M	Y	N	N	N	N	A
AUTUMN PURPLE WHITE ASH	60	R	55	L	L	M	M	M	H	M	L	M	L	M	Y	N	N	N	N	A
SUMMIT GREEN ASH	60	R	55	L	H	H	M	H	H	H	L	M	L	M	Y	N	N	N	N	A
SHADEMASTER HONEY LOCUST	70	S	60	L	H	H	M	H	H	H	L	H	L		Y	N	N	N	N	A
CHANTILEER CALARY PEAR	40	P	20	M	H	M	H	H	L	M	L	L	M	M	Y	Y	Y	N	Y	W
PIN OAK	75	P	55	M	M	M	H	L	H	M	L	M	M	M	Y	N	N	N	Y	W
GREENSPIRE LITTLE LINDEN	70	P	50	M	M	M	M	H	M	H	M	H	M	M	Y	Y	N	N	Y	A
VILLAGE GREEN ZELKOVA	60	V	60	L	H	H	H	H	H	H	M	H	L	M	Y	N	N	Y	N	A

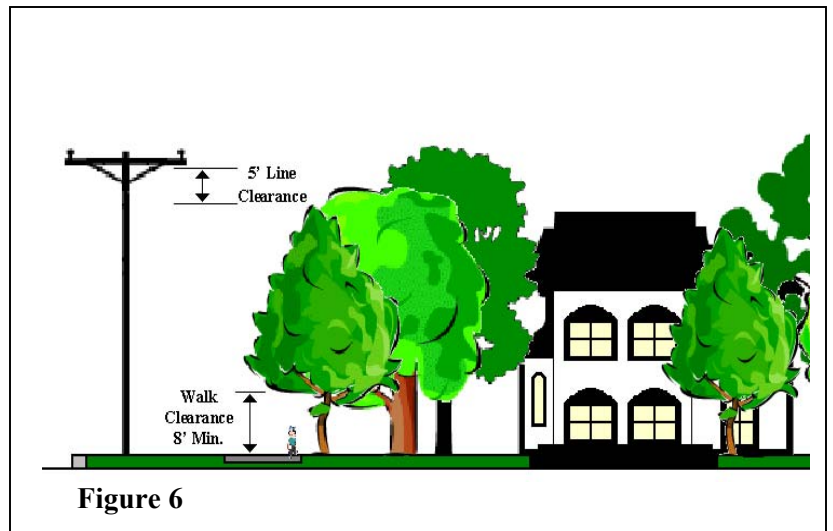
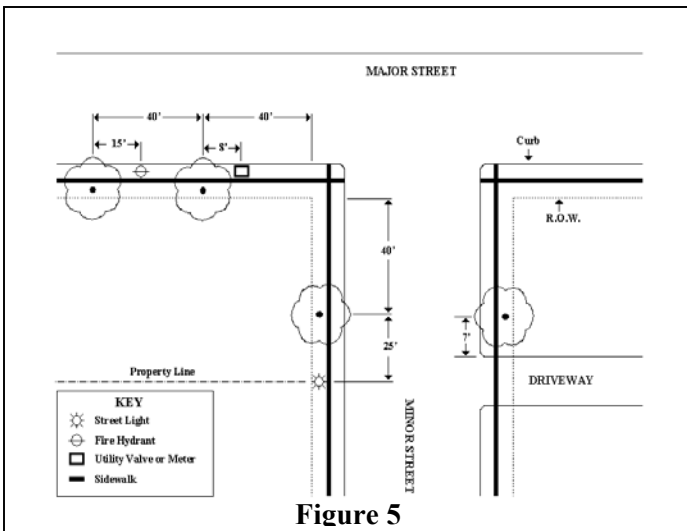
* Non-invasive cultivars only.

LEGEND

S = SPREAD
 R = ROUNDING
 V = VASE SHAPE
 P = PYRAMIDAL

L = LOW
 M = MEDIUM
 H = HIGH
 F = FINE
 C = COARSE

Y = YES
 N = NO
 A = ANYTIME
 W = WINTER



3. Tree selection shall follow the recommend selection criteria based on the site characteristics and species in Table 514-3 and Figures 5 and 6.
4. Trees shall be placed along right-of-way lines or setback from streets in a sufficient manner to maintain sight distance and safety.

515 STREET NAMES

- A. All streets shall be named.
- B. Continuations of existing streets shall be known by the same name.
- C. Names for new streets shall not duplicate or closely resemble names of existing streets or approximate such names by the use of suffixes such as “lane”, “way”, “drive”, “court” or “avenue”.
- D. All new street names are subject the to review and approval of the Union County Emergency Services Department and shall be consistent with the County Street Naming and Addressing Ordinance, policies, rules and/or regulations.
- E. Notice from the Union County Emergency Services Department that the proposed new street names are acceptable shall be submitted prior to plan approval.

516 LOT ACCESS AND DRIVEWAYS

- A. **Lot Access** – Access to any lot, tract, parcel, subdivision or development shall be provided in a manner that promotes a safe and efficient ingress and egress to a public street, limits the number of driveways, and promotes common points of ingress and egress that are adequate for existing and future growth, and in accordance with the following:
 1. The Commission may disapprove any point of ingress or egress to any lot, tract, parcel, or development from any street or highway when the proposed ingress or egress would create unsafe conditions, reduce the capacity of the adjoining street or highway, or result in substandard circulation and impaired vehicle movement.
 2. The Commission may require the applicant to provide ingress and egress to a particular lot or tract through the remainder of his property or other properties over which the applicant has control.
 3. In approving ingress and egress from any State road or highway, the Commission can only approve those access points that are not in conflict with safety standards of the Penn DOT. A Highway Occupancy Permit is required for each access point onto a state highway.
 4. The receipt of a Highway Occupancy Permit does not assume direct approval of the Commission. The Commission may require the applicant to reapply for a permit if the location of the Penn DOT approved access is in conflict with any provision of this Ordinance or if the Commission feels the location of the access will hinder the safe and efficient movement on any State road or highway or the proper development of the site.
 5. In instances where access onto a municipal street is proposed as part of a subdivision or land development proposal, in a municipality which has an access or driveway permit requirement, the applicant shall include a copy of such driveway permit as part of the plan submission, or a disclaimer signed by the applicant acknowledging this permit requirement shall be placed on the plans.

6. Direct access to SR 0015, SR0045, SR0104, SR0304 and SR0192 shall be prohibited.

B. **Access over the lands of others.** Generally the same road construction specifications should apply within the easement/right-of-way over lands of others as shall apply within the property being subdivided/developed. It shall be the applicant's responsibility to make any required improvements subject to obtaining the necessary rights to do so over lands of others. When a "landlocked" parcel exists which is proposed to be developed or subdivided, the applicant shall give notice to prospective buyers that the access is not a public street.

A notice shall be given in three (3) forms:

1. A letter shall be submitted from the developer's attorney and shall contain specific identification of the plan by name and number and a statement that the developer has authorized the letter. The letter should also specify the following:

a. Identify the location of the access road, describe the existing/proposed features: i.e. right-of-way width, length, cartway width, type of construction, etc.

b. A list of all construction and design standards as specified in this Ordinance that cannot be met and reasons why the normal and customary standards cannot be met.

c. A clear opinion of the developer's attorney that the applicant and all prospective purchasers will have either an easement or right-of-way across intervening lands of others. There must be a statement that access is not restricted in any manner, other than such limitation expressly contained in the letter.

2. Notation on the plan to be recorded shall reflect the above situation and be in a prominent location in larger and bolder type than customary plan notes. The note shall describe the location and design of the access road over land of others, identify all normal construction or design standards which are not met, and describe the legal nature of the applicant's use (i.e. easement or right-of-way). Such note shall also relieve the County and the Municipality of any liability with respect to the provision of an access road by a statement placing such responsibility on either the seller and/or the buyer.

3. Preparation of proper legal documentation concerning the easement rights and responsibilities for that portion of the access easement over lands of others, for recording in the Union County Recorder of Deeds Office.

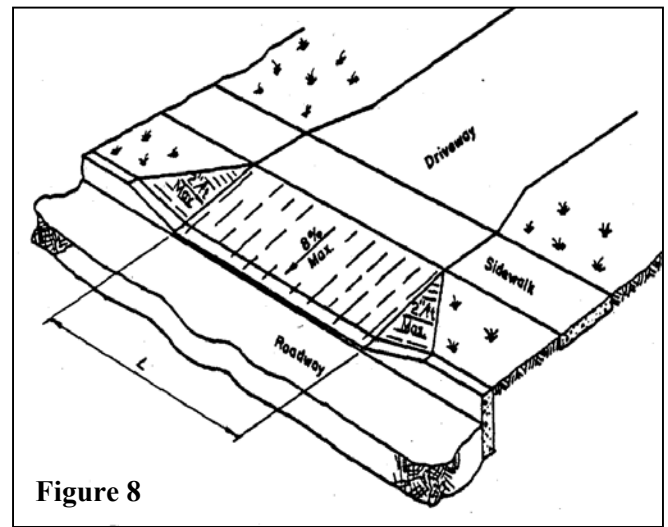
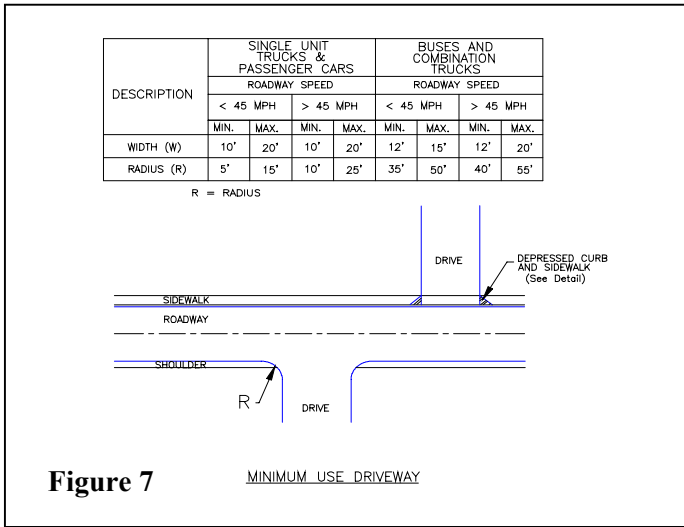
C. **Driveways** - Proposed driveways shall conform to any municipal standards that may exist within the applicable zoning ordinance or separately adopted driveway ordinance. Additionally, all driveways shall, at a minimum, be designed in accordance with the following:

1. All proposed lots shall be situated in such a fashion that safe and efficient driveway access can be provided onto a public or private street in accordance with this Section in order to facilitate the design of common points of ingress and egress that are adequate for existing and future growth.

2. Driveways shall not interfere with the normal traffic movement nor be inconsistent with the design, maintenance, and drainage of the street.

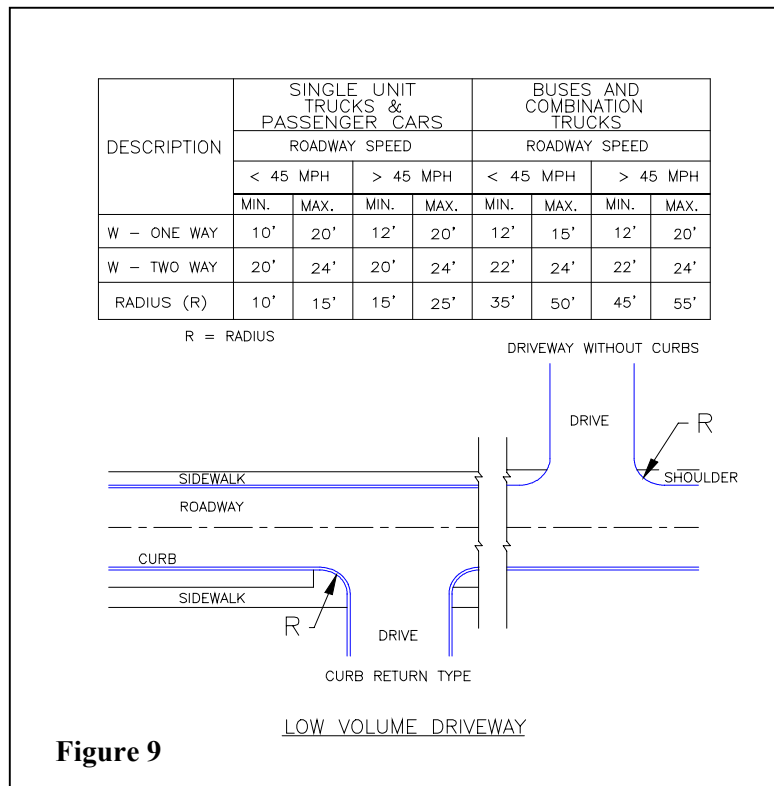
3. The Commission may require the joint or shared use of driveways to provide ingress and egress when such design would increase traffic safety by decreasing the potential for vehicular conflicts. In such cases a shared driveway maintenance and use agreement must be entered into by the respective property owners and recorded with the subdivision or land development plan.

4. In general all private driveway access shall be to a public street; however, private driveway access to private streets or across the lands of another shall only be permitted in the following circumstances:
 - a. Private driveway access shall be permitted to private streets when said streets are permitted under Section 512.L.5 of this Ordinance.
 - b. Private driveway access over lands of another shall be permitted only where:
 1. Not more than two (2) lots are involved;
 2. A complete right-of-way or easement agreement is prepared in a form acceptable to the Commission;
 3. The total number of lots involved shall include all existing and/or proposed lots utilizing the private driveway for access; and
 4. All of the other requirements of this Ordinance are met.
5. Requirements for private driveway access agreement(s) are as follows:
 - a. The private driveway access easement shall be designed to provide a driveway to accommodate traffic volumes of 25 vehicles per day or less and shall be constructed to provide a sound, all-weather driving surface, reasonably smooth and free from mud, dust or standing water. In no case shall the materials have less than an eight (8) inch depth of 2A or 2RC aggregate subbase.
 - b. A private right-of-way agreement shall be properly executed between the landowner granting access and all affected parties abutting and adjoining said easement and shall create a private right-of-way which shall be covenant running with the land. This agreement shall, at a minimum, include the provisions contained in Appendix I of this Ordinance and shall be recorded with the Union County Recorder of Deeds as part of the Final Plan and subsequently reflected in the deeds of all future lot owners.
 - c. Additional design requirements shall be in compliance with Sections 511, 512, and 513 of this Ordinance.
6. **Driveway Classifications.** For the purposes of this Section driveways are separated into the following four classifications:
 - a. Minimum Use Driveway – A driveway normally used by not more than 25-vehicles per day (See Figures 7 & 8), such as:
 1. Single family dwellings, duplexes; or
 2. Apartments with five units or less.



b. **Low Volume Driveway** – A driveway normally used by more than 25 vehicles per day but less than 750 vehicles per day (see Figure 9), such as:

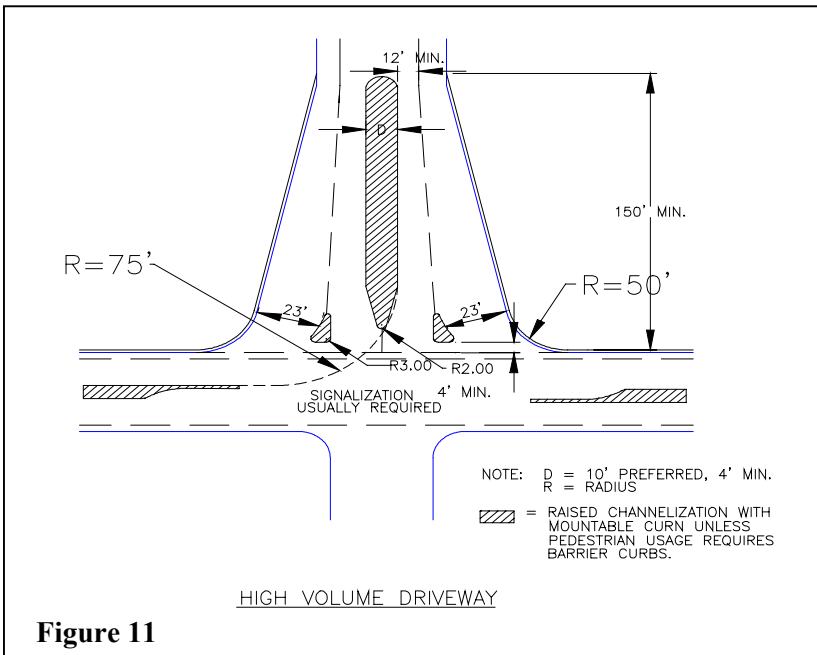
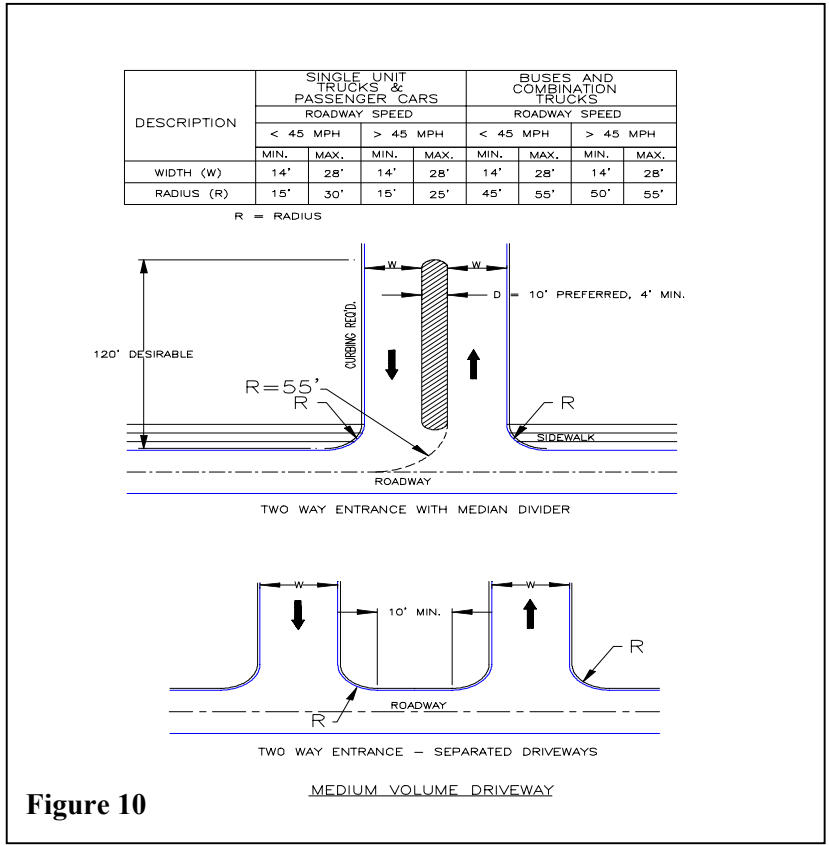
1. Office buildings;
2. Elementary and junior high schools; or
3. Car washes.



c. **Medium Volume Driveway** – A driveway normally used by more than 750 vehicles per day but less than 1,500 vehicles per day, which does not normally require traffic signalization (See Figure 10), such as:

1. Motels;
2. Fast food restaurants; or

3. Service stations and small shopping centers or plazas.
- d. High Volume Driveway – A driveway normally used by more than 1,500 vehicles per day, which often requires traffic signalization (See Figure 11), such as:
 1. Large shopping centers; or
 2. Multi-building apartment or office complexes.



7. **Driveway Design Standards.** Driveways shall be designed in accordance with Table 516-1, Figure 12 and all other geometric design standards not presented in Table 516-1 shall be in accordance with Sections 511, 512, and 513 of this Ordinance.

a. Driveways shall have a throat width and curb return radii based on the volume of traffic use of the intersection in accordance with Figures 7 through 11.

TABLE 516-1 - DRIVEWAY REQUIREMENTS

STREET DESIGNATION	MIN. DISTANCE BETWEEN DRIVEWAYS	MAX. DRIVEWAYS PER LOT	MINIMUM SETBACK	
			INTERSECTIONS	PROPERTY LINES
NON-LIMITED ACCESS HIGHWAY OR MAJOR ARTERIALS	400'	1	100'	30'
ARTERIALS AND MAJOR COLLECTOR STREETS	300'	2	100'	20'
COLLECTOR STREETS	200'	2	75'	10'
LOCAL STREETS	100'	1	50'	5'

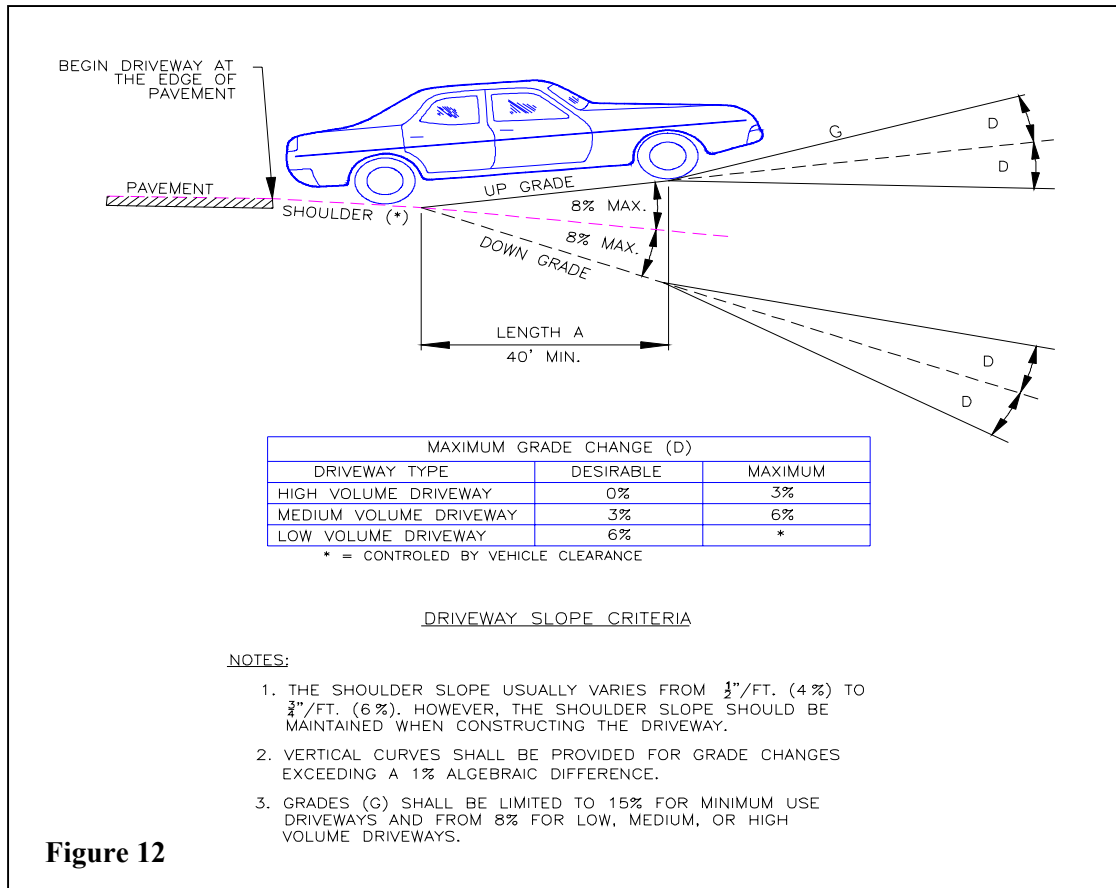


Figure 12

8. Driveways shall be located at a point within the property frontage that provides at least the minimum sight distance as prescribed below.
 - a. Sight distances shall be in accordance with the “Formula Sight Distance Measurement” Forms as presented in Appendix J of this Ordinance but in no case shall the sight distances be less than the minimum Safe Stopping Sight Distance as computed in accordance with Commonwealth of Pennsylvania, Title 67, Transportation, Chapter 441 as from time to time reenacted, amended, and/or replaced.
 - b. If sight distance requirements specified in this Section cannot be met, the Commission may:
 1. Prohibit left turns by exiting vehicles;
 2. Restrict turning movements to right turns in and out of a driveway;
 3. Require installation of a right turn acceleration or deceleration lane;
 4. Require installation of a separate left turn standby lane;
 5. Alter the horizontal or vertical geometry of the roadway;
 6. Require the removal of the physical obstruction from the line of sight; or
 7. Deny access to the highway.
 - c. Items in 516.C.8.b above shall be at the expense of the Applicant.
9. Driveways shall be constructed in the following manner:
 - a. All driveway cartways shall be constructed of a suitable stone base material appropriately compacted and graded to provide a permanent, sound, all-weather driving surface, reasonably smooth and free from mud, dust or standing water, designed to facilitate stormwater drainage patterns.
 - b. Driveways shall not be less than ten (10) feet in width and shall meet the design requirements depicted in Figures 7, 8, 9, 10, 11 and 12 and Table 516-1 of this Section.
 - c. 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.
 - d. Where a drainage ditch or swale exists the applicant shall install adequate pipe under the driveway in accordance with Penn DOT Publication 408. Drainage pipe installed under driveways shall meet the design requirements of applicable County and DEP approved Act 167 Stormwater Management Plans, municipal stormwater management ordinances, and/or stormwater management provisions contained in this Ordinance.
 - e. The side slopes for driveway embankments within the right-of-way shall not be steeper than ten (10) to one (1).

- f. Driveways that are gated shall have gates located a minimum of thirty (30) feet from the public right-of-way and shall not open outward. Fire department personnel shall have ready access to locking mechanisms on any gate restricting access.

517 OFF STREET PARKING AND LOADING REQUIREMENTS

Subdivisions and land developments shall provide off-street parking and loading areas designed to promote orderly and safe parking of vehicles and deliveries in accordance with the applicable municipal zoning ordinance or, where local zoning does not exist, the requirements of this Section.

A. General Design.

1. To the maximum extent practical parking and loading areas shall be provided at the side or rear of buildings in order to eliminate the visual impact of vast areas of pavement.
2. Adequate provision shall be made for ingress and egress to all parking and loading spaces and areas.
3. Customer Parking and circulation shall be separated from delivery service drives and loading areas.
4. Parking and loading areas shall be located entirely on the lot being served except where shared parking facilities are developed to serve multiple adjacent lots.
5. Off-street parking and loading areas shall be designed so that vehicles do not back or park over or into public walkways, sidewalks, and rights-of-way.
6. Curb radii or aisle treatments in parking areas shall be four (4) feet or greater to promote efficient turning movements.
7. All dead end parking lots shall be designed to provide, when necessary, sufficient back-up at stalls.
8. **Setback Distance.** Parking and loading areas shall be set back a minimum of fifteen (15) feet from street right-of-way lines and a minimum of ten (10) feet from side and rear property lines.
9. **Access.** Access to off-street parking areas shall be limited to a minimal number of well-defined entrance and exit lanes that are separated by dividers, planting islands, or in the case of low volume facilities, pavement markings. In no case shall unrestricted access along the length of a street upon which the parking abuts be permitted.
10. Painted lines, arrows, dividers and signs shall be provided to delineate and control parking, loading areas and internal circulation.
11. Any lighting used to illuminate off-street parking or loading areas shall be mounted and shielded in such a manner to effectively eliminate direct glare on adjacent properties or upon public streets.
12. All parking and loading areas shall include a minimum landscaped buffer of five (5) feet between the parking or loading area and right-of-way in accordance with Landscaping and Buffer Requirements in Section 518 of this Ordinance.

13. Where parking areas for nonresidential and multi-family uses contain five (5) or more spaces and are adjacent to residential or institutional developments, a solid screen of attractive fencing or evergreen vegetation shall be provided to a minimum height of five (5) feet.
 14. Large parking areas containing more than forty (40) spaces shall be broken down into sections, where possible. Landscaped dividing strips, berms, and similar elements shall separate large parking areas.
- B. **Construction Material.** Parking and loading areas, service drives, and exit and entrance lanes shall be designed and constructed in accordance with Section 512 of this Ordinance. The Commission may, on a case-by-case basis, permit parking areas for certain minor land developments considered to have minimum use and low volume entrances to be surfaced with a dust free all weather material such as compacted limestone. In such cases the Commission will require that the initial 50 feet of exit and entrance lanes be paved for the same.
- C. **Off-Street Parking Requirements.**
1. **Spaces Required.** The number of parking and loading spaces required shall be furnished in accordance with Table 517-2.
 2. **Parking Space Dimensions.** Individual off-street parking spaces shall be nine feet by eighteen feet (9'x18') with the following exceptions:
 - a. Angled off street parking spaces shall measure nine (9) feet wide by nineteen (19) feet long (9' x 19').
 - b. Parallel parking spaces shall measure eight (8) feet wide and be a minimum of twenty-three (23) feet long (8' x 23').
 - c. Parking spaces for the physically handicapped shall be twelve (12) feet wide.
 3. Parking facilities shall be located within the distances specified herein for the intended land use as measured from the furthest parking space, but in no case shall the distance exceed any requirements set forth by the Americans with Disabilities Act (ADA) or by the Pennsylvania Department of Labor and Industry (L&I).
 - a. Commercial and Industrial Development - a maximum of one thousand (1,000) feet for employee parking and five hundred (500) feet for customer parking.
 - b. Single Family or Two-Family Structures - off-street parking shall be provided behind the right of way line and may take the form of attached or separate garage(s), carport(s), or driveway(s).
 - c. Multi-Family structures - off-street parking shall be located within one hundred (100) feet of the structure.
- D. **Parking Facilities for Mixed-Use Developments.** For mixed-use developments the applicant can request approval from the Commission for shared parking following the methodology described in the publication *Shared Parking* by the Urban Land Institute and Barton Aschman-Associates, Inc. (Urban Land Institute, 1983) and *Shared Parking Planning Guidelines* by the Institute of Transportation Engineers, (1995).

E. **Phased Parking and Parking Oversupply.**

1. Where the total number of off-street parking spaces required may not be immediately required for a particular use, a phased parking plan may be permitted by the Commission, requiring that a portion of the parking area, not less than sixty-five (65 %) percent of the required spaces, be completed initially.
2. The site plan shall clearly indicate both the portion of the parking area to be initially paved and the remaining parking needed to provide the number of required spaces.
3. The site plan shall provide for adequate drainage of both the partial and total parking areas.
4. The portion of the parking area not to be paved initially shall be landscaped.
5. The applicant shall post a separate performance guarantee, in addition to the performance guarantee required for other improvements, which shall reflect the cost of installing the additional parking necessary to provide the total number of parking spaces required.
6. Prior to the expiration of a two (2) year period, the applicant may either install the additional parking shown on the site plan, or apply to the Planning Commission after the use has been in operation for eighteen (18) months for a determination as to whether or not the initial parking area provided is adequate. If the Planning Commission determines that the parking facility is adequate as originally constructed, the parking performance guarantee shall be released. If, however, the Planning Commission determines that the partial off-street parking area is not adequate, the applicant shall be required to construct the additional parking facilities in accordance with the terms of the performance guarantees. The Commission will require the applicant to provide a parking study prepared by a licensed professional engineer.
7. **Parking Oversupply.** Where the strict application of the parking space requirements presented in Table 517-2 would result in an oversupply of parking spaces, based upon a parking analysis conducted by a licensed professional engineer experienced in the construction and design of parking facilities, the applicant may request that the Commission, with approval of the Commission Engineer, permit a reduced number of parking spaces to be constructed, with the balance set aside in a natural state and a parking easement in place for future expansion if at some point it is necessary. As an alternative the applicant may request that a percentage of the parking area be delineated as peak or overflow parking, permitted to be constructed with a grass paver, reinforced turf grass, or other pervious construction methods approved by the Commission Engineer.

F. **Handicapped Parking Requirements.**

1. All non-residential and multi-family off-street parking areas shall provide spaces for use by motor vehicles that transport physically disabled persons in accordance with ADA standards.
2. Accessible parking spaces shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance. In buildings with multiple accessible entrances with adjacent parking, accessible parking spaces shall be dispersed and located closest to the accessible entrances.
3. All spaces shall be clearly identified with pavement markings and a sign that includes the international symbol for barrier free environments. The sign shall include a statement

informing the public that the parking space is reserved for use by physically disabled persons and what the fines are for illegally parking in spaces reserved for physically disabled persons.

4. **Space Dimensions.** Parking spaces reserved for use by the physically disabled shall be designed and constructed in accordance with ADA requirements but in no case shall they be less than twelve (12) feet in width.
5. **Required Spaces.** Where buildings are required to be accessible as per ADA or PA L&I requirements accessible spaces shall be provided in accordance with Table 517-1.

Table 517 - 1

Total Spaces In Lot	Handicap Accessible Spaces Required
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2% of total
1001 and over	20 plus 1 for each 100 over 1,000

G. **Bicycle Parking Facilities.** Non-residential land uses that could be visited by bicyclists or could have employees commute to work on bicycles shall provide bicycle-parking facilities in accordance with this section.

1. Five percent (5%) of the first fifty (50) vehicular spaces shall be for bicycle use. If more than fifty (50) spaces are to be provided, at least three percent (3%) of the number of spaces over fifty (50) shall be for bicycle use.
2. Each bicycle space shall be equipped with a device to which a bicycle frame and one (1) wheel can be attached using a chain or cable. There shall be adequate separation between adjacent bicycles to be attached or removed without moving other bicycles. The appearance of such devices shall be consistent with nearby urban design features.
3. Bicycle parking spaces shall be convenient to the structure for which they are provided and shall be visible from at least one (1) entrance to the structure.
4. Bicycle parking devices shall permit at least two (2) feet of free space between any device and the edge of the curb or sidewalk.

H. **Loading Area Requirements.**

1. All non-residential uses shall provide adequate loading area spaces to accommodate the intended needs of the proposed land use either inside or outside of a building.
2. All loading area spaces shall not be less than twelve (12) feet in width and shall have an overhead clearance of not less than fourteen (14) feet.

3. Loading areas adjacent to residential or institutional land uses shall provide a solid screen of attractive fencing or evergreen vegetation to a minimum height of six (6) feet.
4. Loading areas shall be designed to accommodate easy ingress and egress of all delivery vehicles and shall be designed to prevent interference with the flow and safety of traffic and pedestrians.
5. Loading spaces shall be provided at the minimum rate of one space (1) per 20,000 square feet of gross floor area (GFA) or portion thereof. Buildings over 50,000 square feet GFA shall provide two (2) spaces and one (1) for each additional 50,000 square feet of GFA.

Table 517-2

LAND USE	REQUIRED OFF-STREET PARKING SPACES
AGRICULTURE	
Landscape Nursery	(1) Space per 200 Square feet (SF) of Gross Floor Area (GFA)
Concentrated Animal Operations	(1) Space per employee
Farm Operation	(1) Space per employee, plus (1) space per licensed vehicle
Market or Auction House	(1) Space per every 100 SF GFA, and (2) spaces per vendor
COMMERCIAL	
Amusement/Entertainment:	
Bowling Alley	(5) Spaces per lane
Dance Halls	(1) Space per 50 SF GFA
Marina	(1) Space per boat slip, plus (10) spaces per launch
Theaters	Space per 3-Seats
Heavy Retail Services:	
Auto Sales and Service	(1) Space per 1,000 SF GFA
Vehicle Repair and Maintenance	(1) Space per 400 SF GFA
Offices/Professional Uses:	
Banks	(1) Space per 200 SF GFA, plus (1) space per drive-in lane & employee
Offices, General	(1) Space per 250 SF GFA, plus (1) space per employee
Medical Offices	(5) Spaces per doctor, plus (1) space per employee
Retail Services:	
Beauty or Barber Shop	(1) Space per every 100 SF GFA or (2) spaces for each operator
Convenience Market/ Gas Station	(1) Space per every 250 SF GFA (4 per 1,000 GFA)
Funeral Home	(1) Space per every (4) seats, or (25) spaces per chapel unit
Grocery or Supermarket	(5) Spaces per every 1,000 SF GFA
Hotel and Motel	(1) Space per guest room, plus (10) space per 1,000 SF GFA
Personal Services	(1) Space per 200 SF basement and first floor, and (1) per 300 SF GFA other, plus (1) per employee
Rental Storage	(1) Space per every 20 units, plus (1) space for every 300 SF
Repair Services	(1) Space per 300 SF GFA
Restaurant, Fast-Food w/ Drive-in	(2) Spaces per 3-seats

Restaurant, Standard	(1) Space per 3-seats, plus (1) space per every 100 SF GFA
Shopping Center	(5) Spaces per every 1,000 SF GFA
Tavern, Night Club, Lounge	Greater of (1) space per 50 SF GFA or (1) per 2-seats
INDUSTRIAL	
Manufacturing	Greater of (1) space per 1,000 SF, or (1) space per employee maximum shift
Truck Terminal	(1) Space per driver and (1) space per each resident employee maximum shift
Wholesale or Warehouses	(1) Space per employee maximum shift, plus (1) space per company vehicle
INSTITUTIONAL	
Church	(1) Space per every 4-seats
Day or Nursery School	(1) Space per employee, plus (1) space for every (6) visitors or students
Hospitals:	
General Services	(2) Spaces per every 3-beds, plus (1) space per employee on largest shift
Out Patient Services Only	(1) Space per employee, plus (1) space for every (6) visitors or students
Libraries and Museums	(1) Space per 250 SF GFA, or (1) space per 4-seats
Monasteries or Convents	(1) Space per 6 residents, (1) space per employee, and (1) space per 5-chapel seats
Nursing Home	(1) Space per every 6-beds, Plus (1) space per employee of largest shift
Prisons	(1) Space per employee of largest shift, plus 1 space per every (4) seats in visitation room
Cemetery	(1) Space per acre
Public Service Uses - Banquets, Gathers, Etc.	(1) Space per 3-Seats, plus (1) per 1,000 SF GFA
Schools:	
Elementary or Junior High	(1) Space per employee, plus (2) spaces per classroom, plus (1) per 4-auditorium seats
Senior High	(1) Space per employee, plus (4) space for classroom, plus (1) per 4-auditorium seats
Athletic - Outdoor	(6) Spaces per 1,000 SF of playing area
Athletic - Indoor	(4) Spaces per 1,000 SF of playing area
University - Off-Campus Housing	(1) Space per employee, plus (1) per 2-students
University - Campus Housing	(1) Space per employee, plus (1) per 4-students
RECREATION	
Out Door Recreation:	
Day Camps	(1) Space per staff, plus (5) space per 10-guests
Golf Course	(4) Spaces per hole, plus added spaces per restaurant uses if applicable
Outdoor Swimming	(1) Space per 75-SF of water surface
Tennis Court	(3) Spaces per court
Athletic/Sports Fields	(1) Space per player and 1 space per 3 persons of capacity
Community Parks	(1) Space per 4-projected users, (1) space per employee, and (1) space per 1,000 SF GFA

Indoor Recreation:	
Courts, Gyms, etc	(1) Space per 250 SF GFA and (1) space per every 3 projected patrons
Recreational or Community Center	(1) Space per 3-proected uses, plus (1) per 1,000 SF GFA
RESIDENTIAL	
Apartments and Condominiums	(2) Spaces per unit excluding garages
Mobile Homes	(2) Spaces per unit, plus (1) space per every 3-units
Single Family	(1) Space per bedroom excluding garages
Townhouse	(2) Spaces per unit excluding garages

518 LANDSCAPING AND BUFFER REQUIREMENTS

A. General.

1. Suitable and attractive landscaping shall be required:
 - a. Around buildings
 - b. Within and around the perimeter of parking areas
 - c. As a buffer between adjacent roads
 - d. Between land uses of different intensities
 - e. As a buffer between a proposed use and adjacent land
2. Applicants shall submit a landscape plan that includes the botanical names, common names, size, quantity, and general remarks for each plant proposed.
3. All landscaping and buffer yards shall be installed on the subject tract at the time of its development. Existing plant material to be preserved may be counted as contributing to the requirements contained herein.
4. Open storage areas, exposed machinery, service loading and trash disposal areas (such as dumpster or compactor sites) shall be effectively screened so as not to be visible from parking areas, roadways, or adjacent properties. Such areas shall be screened with architectural masonry, fencing, or landscaping with a height of at least six (6) feet.
5. Buffer yards may be used for passive recreation and for pedestrian, bicycle, or equestrian trails, provided that adequate plant material is retained to achieve the buffer effect, the total width of the buffer yard is maintained, and all other Ordinance requirements are met. The buffer yard is the applicable building setback area plus any additional buffer requirements required by Section 518.D and Table 518-1.
6. All landscape plantings shall be selected, considering the proper species and growth characteristics, to ensure adequate health and character with the existing and proposed conditions, such as overhead utilities, light, moisture, tolerance of road salts, leaf and fruit litter and confinements.
7. Plant species utilized in parking lots shall be tolerant of urban conditions.
8. Where possible, a hardy mix of native tree, shrub, and grass species shall be utilized for landscaping, and in no case shall plants identified as invasive species be used. Refer to Appendix M for more information on native and invasive species and recommended tree species for communities.

9. Plantings and other landscape treatments (i.e. architectural masonry walls, fences, berms) shall be appropriately located, clustered and spaced at strategic locations along all property lines, road frontage and within parking areas to provide the maximum screening, buffering and aesthetic appeal. The exact placement of required plants and structures is the decision of each applicant, except that the following conditions shall be met:
 - a. Where a combination of plant materials and fencing is used the fence shall be located to the interior or toward the more intensive use, and the plant material shall be located toward the less intensive use.
 - b. Landscape plantings shall be installed in such a manner as to provide clear sight distance triangles at all road and driveway intersections.
 - c. The applicant may establish, through a written and recorded agreement, that the immediately adjacent property owner(s) agree to allow a portion or the entire required buffer yard or landscape treatment on immediately adjacent portions of their land.
 10. Applicants are encouraged to integrate stormwater management into landscaping areas in the form of bio-retention and infiltration areas and other Best Management Practices (BMPs).
 11. The requirements of this Section are in addition to applicable street tree requirements contained in Section 514 of this Ordinance.
 12. All new plantings, and existing plant material credited toward meeting the requirements of this Section, shall be maintained and shall be replaced by and at the expense of the developer or responsible maintenance entity when they become diseased, fail to deliver the intended landscaping and buffer effect, or die.
- B. Classification of Plant Materials.** For the purposes of this Ordinance, plant materials are classified into four (4) types: deciduous trees, evergreen trees, deciduous shrubs and evergreen shrubs. The Penn State Cooperative Extension Office and the Pennsylvania Department of Conservation and Natural Resources Service Forester should be able to provide assistance in determining tree species compatible with Union County climate and soil conditions that are suitable for buffer yard, parking lot and general landscaping use. Appendix M contains information pertaining to native and invasive plant species and provides a listing of recommended community trees.
- C. Required Plantings** – The number and quality of trees and shrubs for each development site shall be determined as follows:
1. Deciduous trees shall have a minimum caliper measurement of two and one half (2 ½) inches, measured a minimum of six (6) inches above the soil line and shall have a minimum height of six (6) feet.
 2. Evergreen trees shall have a minimum height of six (6) feet.
 3. Evergreen shrubs, except for those used in low ground covers, shall have a minimum height of twenty-four (24) inches, except that where used in combination with an earthen berm approved by the Commission, the height may be reduced to eighteen (18) inches.
 4. Deciduous shrubs shall have a minimum height of twenty-four (24) inches, except that where used in combination with an earthen berm approved by the Commission, the height may be reduced to eighteen (18) inches.

5. Each site shall have a minimum of twelve (12) deciduous or fifteen (15) evergreen trees and three (3) deciduous shrubs or six (6) evergreen shrubs for each one (1) acre of the development, or any combination of the above that meets the intent of this Section (e.g. 6 deciduous trees and 8 evergreen trees plus 2 deciduous shrubs and 2 evergreen shrubs per acre). As an alternative, ten (10) deciduous trees or twelve (12) evergreen trees for each one (1) acre of the development shall be required if deciduous trees are four (4) inches in caliper or greater and evergreen trees are nine (9) feet in height or greater. Sites less than one (1) acre shall provide a proportionate number of the required per acre plantings.
6. Five (5) deciduous shrubs may be substituted for one deciduous tree and/or five evergreen shrubs may be substituted for one evergreen tree for a maximum of twenty percent (20%) of the tree requirement. The preservation of existing trees may also satisfy this requirement. A tabulation of this requirement shall be summarized on each landscape plan submitted.
7. Applicants may substitute the use of earthen berms and fencing for a portion of the required plantings, as permitted on a case-by-case basis by the Commission. Earth berms can vary in height and width, but should not be less than six (6) feet in height including planting types selected.
8. The Commission will require additional planting densities and structural treatments where appropriate, due to land use incompatibility and visual impacts resulting from the proposed development. The Commission will increase the required plantings specified in 518.C.5 as per Section 518.D of this Ordinance.

D. Additional Landscaping and Buffer Yard Requirements. Visual, noise, lighting, and other impacts of new development can often have a negative effect on community character, aesthetics, and property values. Additional landscaping and buffer yard is a combination of the required building setback and a visual buffer or barrier, together with required landscaping, designed to ameliorate nuisances between disparate or incompatible land uses caused by subdivisions and land developments. Additional landscaping and buffer yard requirements are based upon the intensity of the proposed land use and the adjacent property.

1. Buffer yards shall be located along the outer perimeter of a lot or parcel and shall extend to the lot or parcel boundary line.
2. Buffer yards shall not be located on any portion of an existing or dedicated public or private-street or right-of-way nor any access drive serving a lot or parcel.
3. Where woodlands, floodplains and drainage ways, and wetlands are in the buffer yard, the following rules shall apply:
 - a. Woodland areas shall be left undisturbed to the width of the buffer yard. The trees in the woodland and the length of the woodland area shall be deducted from all buffer yard requirements.
 - b. Floodplain and drainage ways shall be treated as any other buffer yard except that all plant material shall be tolerant of very wet conditions.
 - c. Wetland areas in buffer yards shall be protected in accordance with PA DEP requirements. Plantings shall be selected that meet the intent of the size and type required but are tolerant of the wetland conditions.
4. Buffer yard in addition to the building setback requirements is not required if the land use is the same on both sides of a property boundary (i.e. two single family residences). If

the land uses differ (i.e. a factory and a single family residence) a buffer yard shall be required and the intensity classes shall be determined.

5. The applicant shall first determine if any portion or property line of the site constitutes a boundary between different land use intensity classes. Land uses fall within the following intensity classes for determining buffer requirements:

Class I	Agricultural, Undeveloped and Vacant uses
Class II	Single Family Residential, Passive Recreation
Class III	Multi-Family, Townhouse, Mobile Home Parks
Class IV	Commercial, Institutional and Light Industrial uses having less than 50% impervious lot coverage.
Class V	Commercial, Institutional and Light Industrial uses having 50% or greater impervious lot coverage.
Class VI	Heavy Industry, Extraction Operations, and Waste Processing, Storage, Treatment or Disposal Facilities.

6. Using Table 518-1 determine the buffer yard distance requirement between the different land use intensity classes for each property line or segment thereof for the subject parcel.
7. All buffer yard areas shall be seeded with lawn or native/naturalized ground cover unless such vegetation is already fully established.
8. The Commission will require additional landscape plantings and/or a combination of plantings and structural treatments, depending on the severity of the impact of a proposed site and its use compared to uses adjacent to the site. The following formula will be used to calculate the additional landscaping that is required.
 - a. Determine the land use intensity of the proposed use of the site and all adjacent land uses.
 - b. Measure each property line in feet and divide by 100. Repeat for all property lines.
 - c. Subtract the land use intensity of the adjacent land use from that of the proposed use. For all property lines multiply this figure by the number obtained in step "b" above. A 50% reduction of this requirement may be taken for property lines adjacent to land uses that are considered Class I intensity in Section 518.D.
 - d. Add the figures for all property line segments obtained from step "c" above. This figure is the additional percentage of landscape plantings that the Commission will require at the site.
 - e. Multiply the base amount of landscaping (trees and shrubs) required by Section 518.C by the percentage obtained in step "d" above. This is then added to the base amount to determine the total minimum amount of landscaping required. All fractions of trees and shrubs shall be rounded to the nearest whole number.

Refer to Appendix L for two examples of how to apply the landscaping requirements of this Section.

Table 518-1 - Buffer Yard Requirement (Expressed in feet)

Proposed Intensity	Adjacent Land Use Intensity					
	Class I	Class II	Class III	Class IV	Class V	Class VI
Class I	-	-	-	-	-	100'
Class II	-	-	20'	30'	40'	200'
Class III	-	20'	-	15'	25'	100'
Class IV	-	30'	15'	-	20'	75'
Class V	30'	40'	25'	20'	-	50'
Class VI	100'	200'	100'	75'	50'	-

E. Parking Lot Landscaping Standards.

1. All residential and nonresidential parking lots with twenty (20) or more parking spaces shall contain a minimum amount of landscaping within the parking lot interior and adjoining entrance drives and circulation drives.
2. Parking aisles exceeding twenty (20) contiguous spaces shall be separated by a planting area.
3. 150 square feet of landscaped area shall be provided per twenty (20) parking spaces in the parking lot interior.
4. Parking and storage of vehicles in front yards of properties, other than lots in single-family subdivisions, shall be screened from the public right-of-way by an earthen berm and/or plant material which provides a dense visual screen.

F. Landscaping and Buffer Yard Maintenance

1. It shall be the responsibility of the developer, property owner or an association of property owners to permanently maintain required landscaping and buffer yards.
2. Any plant material that does not live shall be replaced within one (1) year.
3. In the event the developer, property owner, or an association of property owners, or their heirs, successors, and assigns fail to maintain the required landscaping and buffer yards, the municipality or the county may enter the property and take necessary and prudent action to maintain said landscaping and buffer yards, and to charge the costs of maintenance and/or repairs to the developer, property owner, or association of property owners. However, the municipality and the county are under no obligation to conduct said maintenance.

519 RESERVED

520 SEWAGE FACILITIES

A. General Requirements

1. All subdivisions and land developments shall be provided with sanitary sewage facilities in accordance with the official Act 537 Municipal Sewage Facilities Plan, and these shall be approved by the municipality, municipal authority, the PA DEP, and other public agencies responsible for the collection, conveyance, and treatment of sanitary sewage in the municipality in which the development is located. In municipalities where an official plan does not exist, the sewage disposal method shall be approved by the municipal officials during the initial project planning stages.

2. Applicants shall submit all necessary plans and specifications for the entire sanitary sewage disposal system, including the facilities related to collection, conveyance, and treatment.
 3. Applications for plan approval shall not be granted until the applicant has received all necessary sewage planning approvals from the municipality and the PA DEP, and all related fees have been paid.
 4. Subdivisions and land developments shall be connected to an existing public sewer system unless the applicant can clearly demonstrate that such connection is not feasible, or the PA DEP recognizes an alternate method of disposal. The Commission may require the applicant to have a feasibility study prepared by a registered professional engineer to show that a connection is not feasible.
 5. In those areas presently served by on-lot sewage disposal but are to be served by municipal sewer service within five (5) years, the Commission may require capped sewers, if recommended by the municipality, sewer service provider, other local responsible agency and/or the PA DEP.
 6. All plans for sanitary sewer systems (both public and private) shall be designed by a registered professional engineer in accordance with the requirements of the PA DEP or other governing rules and regulations, and shall be approved by the local sewer authority, the municipal engineer and/or Commission Engineer, the municipality, and the PA DEP.
 7. Subdivisions and land developments proposing no development of buildings or improvement of land for purposes requiring sewage facilities need not provide sanitary sewage facilities if the PA DEP has approved a non-building waiver request. Where a waiver is approved by the Sewage Enforcement Officer and PA DEP, the final plan for recording shall include the standard non-building notation. However, in all cases it shall be clearly demonstrated that either public sewer or on-lot sewage disposal can be achieved.
 8. Lot additions and consolidations need not provide sanitary sewage facilities if the receiving tract(s) has an existing permitted method of sewage disposal or if the Sewage Enforcement Officer and PA DEP has approved a non-building waiver request. Where a waiver is approved by the PA DEP, the final plan for recording shall include the applicable notation required by the PA DEP.
 9. All subdivision and land development plans shall contain appropriate notation indicating the method of sewage disposal.
- B. Public Sanitary Sewer. Where connection to public sewer is proposed, the applicant shall provide a written statement from the sewer service provider indicating that sufficient capacity to serve the proposed development is available, and such notice shall:
1. Be dated within forty-five (45) days of the plan application;
 2. Identify the term of the reservation of capacity based on hydraulic load, organic loads and compliance with the influent parameters for collection, conveyance and treatment;
 3. Provide capacity for the entire development [partial capacity based upon phases of development will not be accepted]; and

4. Include a statement from the sewer service provider indicating approval of the plans for design, construction standards, installation, and financial guarantees.
- C. Private Sanitary Sewer. Where connection to an existing public sewer system is not available, or has been determined to be unfeasible to the satisfaction of the Commission, the Commission may require the applicant to evaluate the installation of a privately owned sanitary sewer system. Where the use of a private sanitary sewer is proposed the applicant shall provide the following:
1. A detailed operations and maintenance plan;
 2. Evidence of approval from the municipality, municipal engineer, and the PA DEP;
 3. Agreements or covenants, acceptable for recording, as deemed necessary by the Commission, the municipality, and/or the PA DEP, to guarantee the maintenance and operation of said facility;
 4. A note on the plan and a clause in all deeds for lots referring to any maintenance agreements or covenants; and
 5. Any terms stipulating conditions of metering, inspection, rights of access, minimum standards for materials and workmanship, testing and enforcement.
- D. On-Lot Sewage Disposal. Where connection to an existing public sewer system or the installation of a private system is not feasible, the applicant may propose to utilize on-lot sewage disposal technology in accordance with this Section.
1. Applicant shall have soil percolation tests performed by the municipal Sewage Enforcement Officer, with no less than one test pit per lot shown on the plan, and where marginal conditions are discovered, satisfactory alternative sites shall be identified and preserved.
 2. Each lot shall be of a size and shape to accommodate the necessary on-lot sewage disposal systems in accordance with setback and design standards established by the municipality or PA DEP. Such standards shall ensure safe distances from buildings, property lines, water supplies and other improvements affecting normal function. The on-lot sewage disposal system shall be located on and fully contained within the lot it is intended to serve.
 3. The proposed on-lot sewage disposal system shall be approved by the PA DEP through the appropriate sewage planning review process, and written confirmation shall be received by the Commission prior to plan approval.
 4. The Commission shall not approve any subdivision or land development where an application fails to meet the required on-lot sewage planning requirements of the municipality, the PA DEP, and this Ordinance and/or a sewage permit cannot be obtained.

521 WATER SUPPLY

A. General Requirements

1. All subdivisions and land developments shall be provided with an adequate and safe supply of water for all intended land uses, and said water supply shall meet all applicable

federal, state, and local drinking water standards or be capable of economical treatment to attain such quality standards.

2. Applicants shall submit all necessary plans and specifications for the entire water supply system including the facilities related to sources, storage, treatment, and distribution.
3. For subdivisions and land developments not connecting to a public water supply, the Commission may require the applicant to demonstrate that a reliable, safe and adequate supply exists to support the water usage demands of the proposal without detrimental effects to future users and water sources of adjacent land uses. Such analysis would at a minimum contain information regarding estimated water demand, source of supply and capacity, source reliability, and source quality. The Commission reserves the right to require the applicant to drill a test well for the establishment of water quality and quantity in that area.
4. In areas where known groundwater problems exist, resulting from contamination or inadequate yields of potable supplies, the Commission may require the applicant to provide a feasibility study by a licensed professional engineer or hydrogeologist to evaluate the adequacy of water quality and quantity for the proposed development.
5. Applications for plan approval shall not be granted until the applicant has received all necessary water supply approvals from the municipality, the water supplier, the PA DEP, and/or the Susquehanna River Basin Commission.
6. Subdivisions and land developments shall be connected to an existing public water supply unless the applicant can clearly demonstrate that such connection is not feasible. The Commission may require a feasibility study prepared by a registered professional engineer to show that a connection is not feasible.
7. In those areas presently served by on-lot water supply wells, but proposed to be served by a public water supply within five (5) years, the Commission may require the installation of a capped water distribution system if recommended by the municipality, the water service provider, other local responsible agency and/or the PA DEP.
8. All plans for water supply systems (both public and private) shall be designed by a registered professional engineer and shall conform to current regulatory requirements. The local water supplier, the municipal engineer and/or Commission Engineer, the municipality and the PA DEP shall approve them.
9. Fire hydrants shall be installed as an integral part of any public or private water supply system and the placement, design, and construction of such shall meet the specifications of the local fire company, the public water supplier, and the municipality when applicable.
10. Applicants shall present evidence that the subdivision or land development is to be supplied with water by a certified public utility, a bona fide cooperative association of lot owners, or a municipal corporation, authority or utility. A copy of a Certificate of Public Convenience from the Pennsylvania Public Utility Commission (PUC) or an application for such certificate, a cooperative agreement or commitment or agreement to serve the area, whichever is appropriate, shall be acceptable evidence. In addition applicants shall be responsible for obtaining applicable Water Extension Permits from the PA DEP.
11. All subdivision and land development plans shall contain appropriate notation indicating the method of water supply.

B. Public Water Supply. Where connection to public water supply is proposed the applicant shall provide a written statement from the public water supplier indicating that sufficient supply to serve the proposed development is available, and such notice shall:

1. Be dated within forty-five (45) days of the plan application;
2. Identify the term of the reservation of supply;
3. Provide water supply for the entire development [partial supply based upon phases of development will not be accepted]; and
4. Include a statement from the public water supplier indicating approval of the plans for design, construction standards, installation, and financial guarantees.

C. Private Water Supply. Where connection to an existing public water supply is not available or has been determined to be unfeasible to the satisfaction of the Commission, the Commission may require the applicant to evaluate the installation of a privately owned water supply system. Where the use of a private water supply system is proposed the applicant shall provide the following:

1. A business plan consistent with the PA DEP, PUC, and/or American Waterworks Association (AWWA) guidelines to address all appropriate physical, operational, managerial, and financial issues necessary to determine system viability;
2. A detailed operations and maintenance plan that identifies the source of supply, source capacity, source reliability, source quality, proposed treatment, pumping and storage, distribution system, fire service, customer connections, system management, etc.
3. An operation, maintenance, and restoration fiscal plan that determines users fees for normal annual operations, upgrades and replacement based on the projected life and a contingency plan to address future treatment if the water source falls out of compliance with applicable safe drinking water regulations.
4. Evidence of approval from the municipality, municipal engineer, and the PA DEP;
5. Agreements or covenants acceptable for recording as deemed necessary by the Commission, the municipality, and/or the PA DEP to guarantee the maintenance of said facility; and
6. A note on the plan and a clause in all deeds for lots referring to any maintenance agreements or covenants.

D. On-Lot Water Supply. Where connection to an existing public water supply or the installation of a private water supply is not feasible the applicant may utilize on-lot water supply in the form of individual water wells in accordance with this Section.

1. Wells shall be installed according to applicable federal, state, and local well construction and permitting standards.
2. Wells shall be adequately isolated from on-lot sewage treatment facilities in accordance with the requirements of the PA DEP and the municipality and shall be safely isolated and protected from other potential sources of contamination.

522 OTHER UTILITIES

- A. Electric, telephone, television cable, and other utilities, both main and service lines, shall be placed underground within easements or dedicated public rights-of-way, but not under cartways unless approved in writing by the municipality and utility provider,
- B. All utilities shall be installed in accordance with the prevailing standards and practices of the utility or other companies and authorities providing such services and the laws of the Commonwealth.
- C. Underground utility installation shall not be required for the following:
 - 1. For service to industrial development; and
 - 2. For a project where the local utility service provider determines that the physical conditions render such underground installation unfeasible.
- D. Underground installation of the utility distribution and service lines shall be completed prior to street paving, storm drainage, and curbing and sidewalk installation.
- E. The Commission may require the installation of utilities prior to final plan approval where the cost of installation, including the cost of excavation for underground utilities, will not be completely paid by the utility company. In each case the Commission shall also consider the procedures for the applicable utility company involved with the extension of services.

523 STORMWATER MANAGEMENT AND DRAINAGE

The purposes of this section are to control accelerated runoff, erosion and sedimentation; promote the utilization and preservation of desirable existing natural drainage systems; encourage groundwater recharge; maintain existing natural flows of streams, including quantity, peak flows, flow type, and quality; preserve and restore flood carrying capacity of streams; provide for proper maintenance of all permanent stormwater management structures; protection of wellhead areas and community water supplies, and protection of downstream properties from impacts resulting from increased development.

A. Stormwater Management Districts

For the purpose of managing stormwater Union County is divided into the following Stormwater Districts, which are shown on the map included in Appendix N of this Ordinance:

- 1. Bull Run (Limestone Run) Stormwater District - All subdivision and land development activity occurring within the Bull Run watershed shall comply with the requirements of this Ordinance and the *Bull Run Act 167 Stormwater Management Plan*, adopted by the County of Union and approved by the PA DEP.
- 2. Buffalo Creek Stormwater District - All subdivision and land development activity occurring within the Buffalo Creek watershed shall comply with the requirements of this Ordinance and the *Buffalo Creek Act 167 Stormwater Management Plan*, adopted by the County of Union and approved by the PA DEP.
- 3. Fishing Creek/Cedar Run District - All subdivision and land development activity occurring within the Fishing Creek/Cedar Run watershed shall comply with the requirements of this Ordinance and the *Fishing Creek/Cedar Run Act 167 Stormwater Management Plan*, adopted by the County of Union and approved by the PA DEP.

4. Penns Creek Stormwater District - All subdivision and land development activity occurring within the Penns Creek watershed shall comply with the requirements of this Ordinance and the *Penns Creek Act 167 Stormwater Management Plan*, adopted by the County of Union and approved by the PA DEP.
5. West Branch Susquehanna River Stormwater District - All subdivision and land development activity occurring within the West Branch Susquehanna River watershed shall comply with the requirements of this Ordinance and the *West Branch Susquehanna River Act 167 Stormwater Management Plan*, adopted by the County of Union and approved by the PA DEP.
6. White Deer Creek Stormwater District - All subdivision and land development activity occurring within the White Deer Creek watershed shall comply with the requirements of this Ordinance and the *White Deer Creek Act 167 Stormwater Management Plan*, adopted by the County of Union and approved by the PA DEP.
7. White Deer Hole Creek Stormwater District - All subdivision and land development activity occurring within the White Deer Hole Creek watershed shall comply with the requirements of this Ordinance and the *White Deer Hole Creek Act 167 Stormwater Management Plan* adopted by the County of Union and approved by the PA DEP.

B. General Stormwater Management Requirements

1. The management of stormwater on the site, both during and upon the completion of construction, and the design of any temporary or permanent facilities or structures, and the utilization of a natural drainage system shall be in full compliance with this section.
2. Site designs shall minimize impervious surfaces and shall promote the infiltration of runoff through seepage beds, infiltration trenches, etc. where soil conditions permit, in order to reduce the size or eliminate the need for detention facilities.
3. Stormwater runoff generated from development, discharged directly into a wetland or other waters of the Commonwealth, shall be done in accordance with Federal and State regulatory requirements and shall be adequately treated to prevent water quality degradation of the receiving water body.
4. Annual groundwater recharge rates shall be maintained by promoting infiltration. At a minimum, annual recharge from the post development site shall mimic the annual recharge from the pre-development site conditions.
5. Applicants may select runoff control techniques, or a combination of techniques, which are most suitable to control stormwater runoff from the development site. Union County encourages applicants to consider alternative solutions, including Best Management Practices (BMP's) for stormwater management. Applicants are urged to consult the Pennsylvania Handbook of Best Management Practices for Developing Areas and to seek advice from the Union County Conservation District and the Commission Engineer. All stormwater designs are subject to the approval of the Commission Engineer. The Commission may request specific information on design and/or operating features of the proposed stormwater controls in order to determine their suitability and adequacy in terms of the standards of this Ordinance.
6. All storm water management facilities including detention basins, BMP's, sewers, and culverts shall be designed by an individual qualified and/or experienced in their design. These qualifications should be listed on the front cover of the plan narrative.

7. The anticipated peak rate of stormwater runoff from the site during and after full development shall not exceed the peak rate of runoff from the site prior to development activities, measured in accordance with the standards and criteria of this Ordinance.
8. Roof drains, to the greatest extent practical, shall drain to the land surface to promote overland flow and infiltration of stormwater but shall not discharge stormwater directly onto sidewalks, streets or neighboring property.
9. Existing points of concentrated drainage that discharge onto adjacent property shall not be altered without permission of the affected property owner(s) and shall be subject to any applicable discharge criteria specified in this Ordinance.
10. If existing diffused stormwater flow is to be concentrated the applicant must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other harm will result from concentrated discharge.
11. Storm sewers, swales, culverts, bridges, and related facilities shall be provided to:
 - a. Permit the unimpeded flow of natural watercourses;
 - b. Insure the drainage of all points along the line of streets;
 - c. Intercept stormwater runoff along streets at reasonable intervals related to the extent and grade of the area drained, and to prevent the flooding of intersections and the undue concentration of storm water; and
 - d. Insure unrestricted flow of stormwater under driveways, and at natural watercourses or drainage swales.
12. All natural streams, channels, swales, drainage systems and/or areas of surface water concentration shall be maintained in their existing conditions, unless an alteration is approved by the Commission and the municipality due to topographic conditions.
13. All stream encroachment activities, including work in and adjacent to waters of the Commonwealth or wetlands, shall comply with applicable PA DEP requirements.
14. Any stormwater facility located on a state or local highway right-of-way shall be subject to the approval of the Penn DOT or the municipality.
15. Applicants are encouraged to incorporate designs that take advantage of the stormwater credits presented in Appendix O of this Ordinance.
16. Off-site areas that drain through a proposed development site are not subject to release rate criteria when determining allowable peak runoff rates; however, on-site drainage facilities shall be designed to safely convey off-site flows from up-slope areas through the development site.
17. The design of all stormwater management facilities shall incorporate sound engineering principles and practices. The Commission shall reserve the right to disapprove any design that would result in the continuation of an existing, or create a new, adverse hydrologic or hydraulic condition.

C. Calculation Methodology

1. Stormwater calculations to determine runoff, peak flow rates, peak discharge, hydrographs and to design storm water runoff rate reduction facilities shall use a generally accepted calculation technique based on the Natural Resource Conservation Service (NRCS) Soil-Cover Complex method. Table 523-1 summarizes acceptable methods.
2. It is assumed that all methods selected by the design professional will be based on the individual limitations and suitability of each method for a particular site. The Commission may allow the use of the Rational Method to estimate **peak discharges** from drainage areas that contain 200 acres or less; however, the Rational Method shall not be used to generate **pseudo-hydrographs** for drainage areas greater than 10 acres.
3. For predevelopment flow rate determination, it shall be assumed that all undeveloped and pervious land shall be considered as “meadow” in good condition, unless the natural ground cover generates a lower curve number or Rational “C” value (i.e. forest) as listed in Appendix P-1 or Appendix P-2 of this Ordinance.
4. All calculations using the Soil Cover Complex method shall use the appropriate design rainfall depths for the various return period storms as presented in the table in Appendix P-3 of this Ordinance. If a hydrologic computer model such as PSRM or HEC-HMS is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The SCS "S" curve shown in Appendix P-4 of this Ordinance shall be used for the rainfall distribution.
5. All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times of concentration for overland flow and return periods from the Design Storm Curves from PA Department of Transportation Design Rainfall Curves (1986) shown in Appendix P-5 of this Ordinance. Times of concentration for overland flow shall be calculated using the methodology presented in Chapter 3 of Urban Hydrology for Small Watersheds, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times of concentration for channel and pipe flow shall be computed using Manning's Equation.
6. Runoff Curve Numbers (CN) for both existing and proposed conditions to be used in the Soil Cover Complex method shall be obtained from the table in Appendix P-1 of this Ordinance.
7. Runoff coefficients (c) for both existing and proposed conditions for use in the Rational Method shall be obtained from the table in Appendix P-2 of this Ordinance.
8. Where uniform flow is anticipated the Manning Equation shall be used for hydraulic computations and to determine the capacity of open channels, pipes, and storm sewers. Values for Manning's roughness coefficient (n) shall be consistent with Appendix P-6 of this Ordinance.
9. Routing of hydrographs through detention/retention facilities for the purposes of designing those facilities shall be accomplished using the Storage-Indication method or other recognized routing method subject to approval of the Commission Engineer. For drainage areas greater than 200 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph. The Commission Engineer may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

10. Any method approved by the Pennsylvania Department of Transportation or the Pennsylvania Department of Environmental Protection may be used to design the waterway areas of bridges.

Table 523-1: Acceptable Stormwater Management Computation Methodologies

Method	Method Developer	Applicability
TR-20 (or commercial package based on TR-20)	USDA NRCS	Where use of full hydrologic computer model is desirable or necessary.
TR-55 (or commercial package based on TR-55)	USDA NRCS	For plans within limitations described in TR-55.
HEC-1, HEC-HMS	US Army Corps of Engineers	Where use of full hydrologic computer model is desirable or necessary.
PSRM	Penn State University	Where use of full hydrologic computer model is desirable or necessary.
Rational Method	Emil Kuichling (1889)	For sites less than 10 acres, or as approved by the Commission Engineer.
Other Methods	Varies	Other computations approved by Commission Engineer.

D. Water Quality Requirements

1. For water quality, the objective is to provide adequate storage to capture and treat the runoff from 90% of the average annual rainfall in accordance with the following where P represents the depth of rain associated with 90% of the total rainfall events over 0.11 inches.

- a. The size of the water quality facility shall be based upon the following equation:

$$WQ_v = \frac{(1.2)(R_v)(A)}{12} \qquad P = 1.2 \text{ inches of rainfall}$$

Where: WQ_v = water quality volume (in ac-ft)
 R_v = $0.05 + 0.009(I)$ where I is percent impervious cover
A = area in acres*

*Treatment of the WQ_v for offsite areas and areas not disturbed is not required.

- b. Treatment of the WQ_v shall be provided at all developments where stormwater management is required. A minimum WQ_v of 0.2 inches per acre shall be met at sites or in drainage areas that have less than 15% impervious cover.
- c. The WQ_v shall be based on the impervious cover for the proposed site. Offsite existing impervious areas may be excluded from the calculation of the water quality volume requirements.
- d. When a project contains or is divided by multiple drainage areas, the WQ_v , shall be addressed for each drainage area.
- e. Drainage areas having no impervious cover and no proposed disturbance during development may be excluded from the WQ_v calculations. Designers are encouraged to use these areas as non-structural practices for WQ_v treatment.
- f. Where structural practices for treating the Recharge Volume (Re_v) are employed upstream of a BMP, the Re_v may be subtracted from the WQ_v used for design.

- g. Where non-structural practices are employed in the site design, the WQ_v can be reduced in accordance with the conditions outlined in Appendix O of this Ordinance.
 - h. The design of the facility shall consider and minimize the chances of clogging and sedimentation potential. Orifices smaller than three (3) inches in diameter are not recommended. However, if the design engineer can provide proof that the smaller orifices are protected from clogging by use of trash racks, etc. smaller orifices may be permitted.
 - i. When designing flow splitters for off-line practices, consult the small storm hydrology method provided in Appendix P-8 of this Ordinance.
2. To accomplish adequate water quality treatment the final WQ_v shall be treated by an acceptable BMP from the list presented in Appendix P-9 or an equivalent practice approved by the Commission Engineer. The applicant may submit original and innovative designs to the Commission Engineer for review and approval. Such designs may achieve the water quality objectives through a combination of BMPs.
 3. The water quality requirement can be met by providing a 24-hour draw down of a portion of the WQ_v in conjunction with a stormwater pond or wetland system. Referred to as extended detention (ED), this is different from providing the extended detention of the one-year storm for the channel protection volume (Cp_v). The ED portion of the WQ_v may be included when routing the Cp_v .
 4. In selecting the appropriate BMPs or combinations thereof, the applicant shall consider the following:
 - a. Total contributing area.
 - b. Permeability and infiltration rate of the site soils.
 - c. Slope and topography.
 - d. Seasonal high water table.
 - e. Depth to bedrock.
 - f. Proximity to building foundations and wellheads.
 - g. Erodibility of soils.
 - h. Subgrade stability and susceptibility to sinkhole formation
 - i. Land availability and configuration of the topography.
 - j. Peak discharge and required volume control.
 - k. Stream bank erosion.
 - l. Efficiency of the BMPs to mitigate potential water quality problems.
 - m. The volume of runoff that will be effectively treated.
 - n. The nature of pollutants being removed.
 - o. Creation and protection of wildlife habitat.
 - p. Enhancement of aesthetic and property values.
 - q. Maintenance requirements.
 5. Stormwater Hotspots - If a site is designated as a stormwater hotspot, as per Table 523-2, it has important implications for how stormwater is managed.
 - a. A greater level of stormwater treatment is required at hotspot sites to prevent pollutant wash off after construction.
 - b. For areas designated as hotspots design and implementation of a Stormwater Pollution Prevention Plan may be required containing operation practices at the site to reduce the generation of pollutants by preventing contact with rainfall.

- c. Stormwater Pollution Prevention Plans shall follow the requirements of the U.S. EPA NPDES stormwater program.
- d. The following land uses and activities are not normally considered hotspots:

Residential streets and rural highways, residential development, institutional development, commercial and office developments, non-industrial rooftops, pervious areas except for golf courses and nurseries. Large highways and retail gasoline outlet facilities are not designated as hotspots, though it is important to ensure that stormwater plans for these facilities adequately protect groundwater.

Table 523-2: Stormwater Hotspots

Vehicle Salvage Yards and Recycling Facilities*
Vehicle Service and Maintenance Facilities
Vehicle and Equipment Cleaning Facilities*
Fleet Storage Areas (bus, truck, etc)*
Industrial Sites
Marinas (service and maintenance)*
Outdoor Liquid Container Storage
Outdoor Loading/Unloading Facilities
Public Works Storage Areas
Facilities that Generate or Store Hazardous Materials*
Commercial Container Nursery
Golf Courses
Other land uses and activities as designated.

* Stormwater Pollution Plan implementation may be required for these land uses or activities under the U.S. EPA NPDES stormwater program.

E. Groundwater Recharge (Infiltration/Recharge/Retention) Requirements

- 1. Design of the infiltration/recharge stormwater management facilities shall give consideration to providing ground water recharge to compensate for the reduction in the percolation that occurs when the ground surface is paved and roofed over. These measures are encouraged particularly in hydrologic soil groups A and B, and shall be utilized wherever feasible.
- 2. The criteria for maintaining recharge is based on the USDA average annual recharge volume per soil type divided by the annual rainfall in Union County (40 inches per year) and multiplied by 90%. This keeps the recharge calculation consistent with the WQ_v methodology. Thus, an annual recharge volume requirement shall be specified for a site as follows:

- a. Percent Volume Method

$$Re_v = [(S)(R_v)(A)]/12$$

Where: $R_v = 0.05 + 0.009(I)$, where I is percent impervious cover
 A = site area in acres

- b. Percent Area Method

$$Re_v = (S)(A_i)$$

Where: A_i = the measured impervious cover

<u>Hydrologic Soil Group</u>	<u>Soil Specific Recharge Factor (S)</u>
A	0.40
B	0.27
C	0.14
D	0.07

- c. The recharge volume is considered part of the total WQ_v that must be provided at a site and can be achieved either by a structural practice (e.g., infiltration, bioretention), a non-structural practice (e.g., buffers, disconnection of rooftops), or a combination of both.
 - d. Drainage areas having no impervious cover and no proposed disturbance during development may be excluded from the Re_v calculations. Designers are encouraged to use these areas as non-structural practices for Re_v treatment.
 - e. The Re_v and WQ_v are inclusive. When treated separately, the Re_v may be subtracted from the WQ_v when sizing the water quality BMP.
 - f. Recharge/infiltration facilities may be used in conjunction with other innovative or traditional BMPs, stormwater control facilities, and nonstructural stormwater management practices.
 - g. Where pervious pavement is permitted for parking lots, recreational facilities, non-dedicated streets, or other areas, pavement construction specifications shall be noted on the plan.
3. Basis for Determining Recharge Volume
- a. If more than one Hydrologic Soil Group (HSG) is present at a site, a composite soil specific recharge factor shall be computed based on the proportion of total site area within each HSG. **The recharge volume provided at the site shall be directed to the most permeable HSG available.**
 - b. **The “percent volume” method is used to determine the Re_v treatment requirement when structural practices are used to provide recharge.** These practices must provide seepage into the ground and may include infiltration and exfiltration structures (e.g., infiltration, bioretention, dry swales or sand filters with storage below the under drain). Structures that require impermeable liners, intercept groundwater, or are designed for trapping sediment (e.g., forbays) may not be used. In this method, the volume of runoff treated by structural practices shall meet or exceed the computed recharge volume.
 - c. **The “percent area” method is used to determine the Re_v treatment requirements when non-structural practices are used.** Under this method, the recharge requirements are evaluated by mapping the percent of impervious area that is effectively treated by an acceptable non-structural practice and comparing it to the minimum recharge requirements.
 - d. Acceptable non-structural practices include filter strips that treat rooftop or parking lot runoff, sheet flow discharge to stream buffers, and grass channels that treat roadway runoff.
 - e. The recharge volume criterion does not apply to any portion of a site designated as a stormwater hotspot or any project considered as redevelopment. In addition, the Commission, with the concurrence of the Commission Engineer, may alter or eliminate the recharge volume requirement if the site is situated on unsuitable soils (e.g. marine clays), on karst, or in an urban redevelopment area. In this situation, non-structural

practices (percent area method) shall be implemented to the maximum extent practicable and the remaining or untreated Re_v included in the WQ_v treatment.

- f. If Re_v is treated by structural or non-structural practices separate and upstream of the WQ_v treatment, the WQ_v is adjusted accordingly.
4. Soils Evaluation
 - a. **A detailed soils evaluation of the project site shall be performed to determine the suitability of recharge facilities.** The evaluation shall be performed by a qualified professional, and at a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, and subgrade stability.
 - b. **Extreme caution shall be exercised where infiltration is proposed in geologically susceptible areas such as strip mine or limestone areas.** Extreme caution shall also be exercised where salt or chloride would be a pollutant since soils do little to filter this pollutant and it may contaminate the groundwater. It is also extremely important that the design professional evaluate the possibility of groundwater contamination from the proposed infiltration/recharge facility and recommend that a hydrogeologic justification study be performed if necessary. Whenever a basin will be located in an area underlain by limestone, a geological evaluation of the proposed location shall be conducted to determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent ground water contamination and, where necessary, sinkhole formation.
 - c. The Commission may require the installation of an impermeable liner in stormwater management facilities underlain by limestone or in areas of karst topography. A detailed hydrogeologic investigation may be required. The developer may also be required to provide safeguards against groundwater contamination for uses that may cause groundwater contamination, should there be an accident or spill.
 5. All recharge/infiltration facilities shall be designed to completely drain within 72 hours of reaching maximum capacity.

F. **Channel Protection Storage Volume (Stream Bank Erosion) Requirements**

1. Stream Channel Protection shall be considered in implementing the standards of Section 523.G of this Ordinance. If a stormwater storage facility needs to be constructed then, to protect channels from erosion, the outflow structure shall be designed to provide **24 hour extended detention of the one-year; 24-hour storm event.** The method for determining the Channel Protection Storage Volume (Cp_v) requirement is detailed in Appendix P-10 of this Ordinance.
2. For discharges to streams having verified naturally reproducing wild trout or currently being stocked with trout (based upon the most recent resource classification or other appropriate documentation of the Pennsylvania Fish and Boat Commission or other appropriate agency), only 12 hours of extended detention shall be provided. The rationale for this criterion is that runoff will be stored and released in such a gradual manner that critical erosive velocities during bankfull and near-bankfull events will seldom be exceeded in downstream channels.
3. Basis for Determining Channel Protection Storage Volume
 - a. The models HEC-HMS, TR-55 and TR-20 (or an equivalent approved by the Commission Engineer) shall be used for determining peak discharge rates.

- b. The rainfall depth for the one-year 24-hour storm event in Union County is 2.4 inches.
- c. Off-site areas shall be modeled as present land use in good condition for the one (1) year storm event.
- d. The length of overland flow used in time of concentration (t_c) calculations is limited to no more than 150 feet.
- e. The Cp_v storage volume shall be computed using the detention lag time between hydrograph procedures outlined in Appendix P-10 of this Ordinance. The detention lag time (T) for a one-year (1) storm is defined as the interval between the center of mass of the inflow hydrograph and the center of mass of the outflow hydrograph.
- f. Cp_v is not required at sites where the one-year post development peak discharge (q_i) is less than or equal to 2.0 cfs. A Cp_v orifice diameter (d_o) of less than 3.0 inches is subject to approval by the Commission Engineer and is not recommended unless an internal control for orifice protection is used.
- g. Cp_v shall be addressed for the entire site. If a site consists of multiple drainage areas, Cp_v may be distributed proportionately to each drainage area.
- h. Extended detention storage provided for the Cp_v does not meet the WQ_v requirement (i.e. Cp_v and WQ_v shall be treated separately).
- i. The stormwater storage needed for the Cp_v may be provided above the WQ_v storage in stormwater ponds and wetlands; thereby meeting all storage criteria except Re_v in a single facility with appropriate hydraulic control structures for each storage requirement.
- j. Infiltration is not recommended for Cp_v control because of large storage requirements.

G. Overbank and Extreme Event Flood Protection Requirements

For a site located within two or more districts, the peak discharge rate from any sub-area shall be the pre-development peak discharge for that sub-area. The calculated peak discharges shall apply regardless of whether the grading plan changes the drainage area by sub-area.

1. Bull Run Watershed - The Bull Run Watershed Release Rate Area Maps in Appendix Q-1 of this Ordinance illustrate the release rate subareas. The percentage of pre-development peak rate of runoff that can be discharged from an outfall on the site after development are prescribed in Table 523-3. The Release Rates apply uniformly to all land development or alterations within a subarea. Procedures for applying the Release Rate Percentage are contained in Appendix P-7.
2. Buffalo Creek Watershed – The Buffalo Creek Watershed Runoff Control Districts Map in Appendix Q-2 of this Ordinance illustrates the three (3) major Runoff Control Districts; shown as “A”, “B”, and “C”. Development sites located in the “A”, “B”, and “C” Districts must control post-development runoff rates to pre-development runoff rates as shown in Table 523-4.

Table 523-3: Bull Run Watershed Release Rates

Subareas		Release Rate (%)
Bull Run Watershed	1	80
	2	50
	3	100
	4	100
	5	60
	6	60
	7	100
	8	70
	9	50
	10	60
Miller Run	37-40	100
	42-45	100
	46	75
	47	100
	49-51	100

Table 523-4: Buffalo Creek

Runoff Control Districts	A	Subareas	Post-Development Design Storm	Pre-Development Design Storm
		1-4 16 28-39 58-59	2-Year 10-Year 50-Year	1-Year 10-Year 50-Year
B	5-15 17-27 40-55 60-65 70-75	2-Year 10-Year 50-Year	1-Year 5-Year 25-Year	
	C	79-81 56-57 66-69 76-78 82-92	2-Year 10-Year 50-Year	1-Year 10-Year 50-Year

3. Fishing Creek/Cedar Run Watershed - In the Fishing Creek/Cedar Run Watershed post-development runoff rates must be controlled to pre-development runoff rates as follows:

Type of Storm	Control for Development
2-Year	2-Year Pre-development Peak Runoff
10-Year	10-Year Pre-development Peak Runoff
25-Year	25-Year Pre-development Peak Runoff

4. [Reserved for performance standards to be determined by a Penns Creek Act 167 Watershed Plan.]

5. [Reserved for performance standards to be determined by a West Branch Susquehanna River Act 167 Watershed Plan.]
6. White Deer Creek Watershed - The White Deer Creek Watershed has a 100% Release Rate for the percentage of pre-development peak rate of runoff that can be discharged from an outfall on the site after development. The Release Rates apply uniformly to all land development or alterations within the watershed. Procedures for applying the Release Rate Percentage are contained in Appendix P-7.
7. [Reserved for performance standards to be determined by a White Deer Hole Creek Act 167 Watershed Plan]
8. General Stormwater Management Requirements- In those areas without approved Act 167 Stormwater Management Plans runoff shall be controlled so that post-development runoff rates shall not exceed pre-development runoff rates for the 2-, 5-, 10-, 25-, 50-, and 100-year storm events. All other standards of this Ordinance shall also apply.

H. **Design Considerations**

1. All storm sewers shall be able to convey the post-development runoff from a 10-year design storm without surcharging inlets, and shall be constructed using PennDOT Form 408 Specifications, Standard Details, unless otherwise directed by the Commission.
2. Storm water roof drains shall not discharge into any municipal sanitary sewer line or over a sidewalk.
3. Inlets shall be placed at the curb line where a curbed section is installed. Inlets required for parallel or cross drainage without a curbed section shall be set at the centerline of the ditch.
4. Structures shall be PennDOT Type M pre-cast concrete or cast-in-place Class A concrete. Brick or block structures shall not be permitted. Solid concrete block or brick may be incorporated into a structure only for grade adjustment of the casting.
5. All water obstructions (bridges, culverts, outfalls or stream enclosures) shall have ample waterway opening to carry expected flows, based on a minimum post development peak storm frequency of twenty-five (25) years and shall have a minimum of one (1) foot of freeboard measured below the lowest point along the top of the roadway.
6. Bridge and culvert construction shall be in accordance with the Pennsylvania Department of Transportation specifications and shall meet the requirements of the Pennsylvania Department of Environmental Protection.
7. Any drainage conveyance facility and/or channel that does not fall under PA DEP Chapter 105 Regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 10-year design storm. Conveyance facilities to or exiting from stormwater management facilities (i.e detention basins) shall be designed to convey the design flow to or from that structure.
8. Roadway crossings located within designated floodplain areas shall be able to convey runoff from a 100-year design storm.
9. Any stormwater management facility designed to store runoff and requiring an earthen berm or embankment shall be designed with an emergency spillway to handle flow up to and including the 100-year post-development conditions. The height of the embankment

must be set to provide a minimum of one (1) foot of freeboard above the maximum pool elevation, computed when the facility functions for the 100-year post-development inflow.

10. Stormwater management facilities that require a dam safety permit under PA DEP Chapter 105 shall meet the applicable dam safety requirements, which may require the facility to pass storms larger than the 100-year event.
11. Adequate erosion protection shall be provided along all open channels and at all points of discharge.
12. Detention basins for stormwater peak discharge storage shall comply with the following criteria:
 - a. Basins shall be installed prior to any earthmoving or land disturbance in contributing drainage areas the basin will serve. The phasing of their construction shall be noted in a narrative and on the plan.
 - b. Basins located in an area underlain by limestone may require a geologic evaluation to determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent ground water contamination and, where necessary, sinkhole formation. The Commission may require basins located over limestone to have an impermeable liner.
 - c. Soils used in construction of basins shall have low erosion factors ("K factors").
 - d. Energy dissipators and/or level spreaders shall be installed at points where pipes or drainage ways discharge to or from basins. Discharge from basins shall be into a natural waterway or drainage way.
 - e. Exterior slopes of compacted soil shall not exceed one foot (1') vertical per three feet (3') horizontal and may be further reduced if the soil has unstable characteristics.
 - f. Interior slopes of the basin shall not exceed one foot (1') vertical per three feet (3') horizontal except with the approval of the Commission. Where concrete, stone, or brick walls are used for steeper interior slopes, the basin shall be fenced with a permanent wire fence at least forty-two inches (42") in height, and a ramp of durable, non-slip materials for maintenance vehicles shall be provided for basin access.
 - g. Outlet structures within basins that will control peak discharge flows and distribute the flows by pipes to discharge areas shall be constructed of concrete or polymer-coated steel or aluminum. They shall have childproof, non-clogging trash racks over all design openings exceeding twelve (12") inches in diameter, except those openings used to carry perennial stream flows. Small outlet structures may be constructed of Schedule 40 PVC.
 - h. Where spillways will be used to control peak discharges in excess of the ten (10) year storm, control weirs shall be constructed of concrete of sufficient mass and structural stability to withstand the pressures of impounded waters and outlet velocities.
 - i. Concrete outlet aprons shall be designed as level spreaders and shall extend at a minimum to the toe of the basin slope. The incorporation into the concrete apron

of any large stone found on the site is encouraged to provide a more natural appearance.

- j. Inlet and outlet structures shall be located at maximum distance from each other. The Commission may require a rock filter berm or rock-filled gabions between inlet and outlet areas when the distance is deemed insufficient for sediment trappings.
- k. Temporary and permanent grasses or stabilization measures shall be established on the sides of all earthen basins within fifteen (15) days of initial construction.

I. Drainage Plan Contents - In addition to the Plan Requirements required in Article IV of this Ordinance Applicants are required to submit the following additional materials for the purposes of evaluating stormwater management.

- 1. Narrative describing the overall general stormwater management concept.
- 2. General description of permanent stormwater management techniques and construction specifications.
- 3. Complete hydrologic, hydraulic and structural computations for all stormwater management facilities.
- 4. Complete calculations for determining compliance with Sections 523.C, 523.D, 523.E, 523.F and 523.G of this Ordinance.
- 5. Horizontal and vertical profiles of all open channels, including hydraulic capacity.
- 6. Total of upstream drainage flowing through the site.
- 7. The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing municipal stormwater collection system that may receive runoff from the project.
- 8. Overland drainage paths.
- 9. A Declaration of Adequacy and Highway Occupancy Permit from Penn DOT when the utilization of a Penn DOT storm drainage system is proposed.
- 10. Plan for the long-term maintenance of all stormwater management facilities, including a Standard Stormwater Facilities Maintenance Agreement suitable for recording in the Union County Recorder of Deeds Office. See Appendix R.

J. Municipal Stormwater Maintenance Fund

- 1. Persons installing stormwater storage facilities shall be required to pay a specified amount to the municipal stormwater maintenance fund of the municipality in which the project is located, to help defray the costs of periodic inspections and maintenance expenses.
- 2. If the stormwater storage facility is to be privately owned and maintained, the deposit to the municipal stormwater maintenance fund shall cover the cost of periodic inspections performed by the municipality for a period of ten (10) years, as estimated by the Commission or Municipal Engineer. After that period of time, inspections will be performed at the expense of the municipality.

3. If the stormwater storage facility is to be owned and maintained by the municipality in which it is located, the deposit shall cover the estimated costs for maintenance and inspections for ten (10) years. The Commission or Municipal Engineer will establish the estimated costs utilizing information submitted by the applicant.
4. If a stormwater storage facility also serves as a recreation facility (i.e. ballfield, lake), the municipality in which the facility is located may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purposes.
5. If at some time a stormwater storage facility (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facility, the unused portion of the maintenance fund deposit will be applied by the municipality to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after the costs of abandonment should be paid by the municipality to the depositor.

524 EROSION AND SEDIMENTATION POLLUTION CONTROL AND GRADING

Subdivision and land development activities shall be conducted in strict accordance with this Section in order to prevent accelerated erosion and resulting sedimentation.

- A. No changes shall be made in the contour of the land, no grading, excavating, removal, or destruction of topsoil, trees or other vegetative cover shall be commenced until a plan for minimizing erosion and sedimentation has been reviewed and approved by the Union County Conservation District and the Union County Planning Commission as part of an application for Preliminary or Final Plan approval.
- B. All applications for subdivision and land development approval will be required to submit an Erosion and Sedimentation Pollution Control Plan and obtain necessary approvals from the Conservation District where land disturbance is proposed. This shall include small projects that are proposing disturbance on less than one (1) acre. In lieu of an Erosion and Sedimentation Pollution Control Plan the Commission may accept a written statement from the Conservation District indicating that said plan is not necessary for the project.
- C. All subdivision and land development applications shall conform to applicable municipal ordinances and the requirements of Chapter 102 of Administrative Code, Title 25, "Erosion Control Rules and Regulations", as amended or replaced, and to the requirements of the Pennsylvania Department of Environmental Protection.
- D. The Erosion and Sedimentation Pollution Control Plan shall be prepared by a person trained and experienced in erosion and sedimentation pollution control methods and techniques.
- E. No grading, removal of vegetation, construction or other disturbance shall be permitted on soils that are classified as slide-prone or unstable in the Union County Soil Survey or on any other areas of a proposed development that exhibit signs of instability or subsidence except in accordance with the provisions of this section
- F. The following measures shall be taken to effectively minimize erosion and sedimentation and shall be included where applicable:
 1. Stripping of vegetation and grading shall be kept to a minimum.
 2. Vegetation to be retained shall be protected during the construction process and trees and other vegetation shall be marked and roped off to protect them from damage by construction equipment. Filling around trees shall also be avoided.

3. Topsoil from areas where cuts and fills have been made shall be stockpiled and uniformly redistributed after grading, to aid in the revegetation process.
 4. Development plans shall preserve significant natural features, cut and fill operations shall be kept to a minimum, and plans shall conform to the topography so as to create the least erosion potential and to handle adequately the volume and velocity of surface water runoff.
 5. Whenever feasible natural vegetation shall be retained, protected and supplemented.
 6. The disturbed area and the duration of the exposure shall be kept to a minimum.
 7. Disturbed soils shall be stabilized by permanent vegetation and/or by engineered erosion control and drainage measures.
 8. Temporary vegetation and/or mulching shall be used to protect exposed critical areas during development.
 9. Provisions shall be made to effectively accommodate the increased runoff caused by changed soil and surface conditions during and after development. Where necessary the rate of surface water runoff shall be structurally retarded during development.
 10. Sediment in water runoff shall be trapped until the disturbed area is stabilized by the use of debris basins, sediment basins, silt fence, hay bales, rock filter berms, and/or similar measures.
- G. The following additional erosion and sedimentation control design standards and criteria shall be applied where infiltration Best Management Practices (BMP's) are proposed as part of the stormwater management plan:
1. Areas proposed for infiltration BMP's shall be protected from sedimentation and compaction during construction phases so as to maintain their maximum infiltration capacity.
 2. Infiltration BMP's shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has received final stabilization.
- H. The applicant shall be responsible for protecting adjacent and downstream properties from any damage that occurs as a result of earth disturbance on the development site.
- I. Fill areas shall be prepared by removing organic material such as vegetation and rubbish and any other material determined by the engineer to prevent proper compaction and stability of the soil.
- J. Maximum steepness of graded and cut slopes shall be no greater than two (2) horizontal units to one (1) vertical unit (2:1) except when the Commission approves alternatives under the following conditions:
1. Where the height of a proposed slope will not exceed ten (10) feet, then a maximum slope steepness of one to one (1:1) may be allowed where the soil and geologic conditions permit, and if doing so will help to preserve existing vegetation or other significant natural features. The cut or fill shall be located so that a line having a slope of two (2) horizontal to one (1) vertical and passing through any portion of the slope face will be entirely inside the property lines of the proposed development.

2. Where a concrete or stone masonry retaining wall, designed to sound engineering standards, sealed by a registered professional engineer, and approved by the Commission Engineer, is constructed to support the face of the slope.
3. The material in which the excavation is made is sufficiently stable to sustain a slope steeper than two (2) horizontal to one (1) vertical (2:1), and a written statement is provided by a licensed civil engineer experienced in erosion control and slope stability that is acceptable to the Commission Engineer and the local municipality. The statement shall state that the site has been inspected and that the deviation from the slope specified in this Ordinance will not result in injury to persons or damage to property.
4. All fill is located so that settlement, sliding, or erosion will not result in property damage or be hazardous to adjoining property, streets, alleys, or structures.

K. Graded slopes of twenty (20) or more feet in height shall be benched every twelve (12) feet.

1. Benches shall have a minimum width of six (6) feet and a maximum slope of five (5) percent.
2. Benches shall be planted with trees at a rate of one (1) tree per thirty (30) lineal feet of bench. Tree plantings shall meet the requirements of Section 518 of this Ordinance.

525 STEEP SLOPES

- A. Structures and grading of land shall be located on portions of a development site where the slope is less than twenty-five percent (25%).
- B. A limited amount of disturbance, up to twenty-five percent (25%) of the steep slope area with grades between twenty-five percent (25%) and thirty-five percent (35%), may be approved if evidence of the safety of any proposed disturbance has been documented. Such evidence of the safety of any proposed disturbance shall require a site investigation and certification in writing, by a registered professional soils engineer, engineering geologist, or civil engineer with demonstrated competency and experience in soils engineering, that the proposed activity will not create or exacerbate unsafe conditions.

526 FLOODPLAIN MANAGEMENT

The requirements of this Section are intended to protect property owners from increased flood hazards resulting from inappropriate development in the floodplain and to protect potential buyers from purchasing land which may not be suitable for development. Plans shall also comply with the applicable Federal Emergency Management Agency (FEMA) and municipal floodplain management regulations.

- A. The inclusion of a floodplain within lots in order to meet the minimum lot area and/or yard requirements is allowed provided each lot contains sufficient area exclusive of the 100-Year regulatory floodplain for buildings and, when applicable, for on-lot sanitary sewage disposal systems and replacement areas.
- B. The Commission may require the applicant, as a stipulation of plan approval, to include the following note on the plan and a similar reference in the deed for lots containing floodplain areas:

"NOTE: Lot(s) No. ___ are completely or partially within the regulatory floodplain and any development on such lots shall occur in accordance with all federal, state, and municipal floodplain management regulations. In addition, lending institutions may require the mandatory purchase of flood insurance for home mortgages. "

- C. All public and private utilities and facilities shall be designed and constructed to preclude flood damage and shall be floodproofed up to the Regulatory Flood Elevation in accordance with the Federal Emergency Management Agency (FEMA) floodproofing guidelines. Documentation by a Professional Engineer or Architect shall be provided indicating compliance with FEMA guidelines in regard to the following minimum conditions: (1) a flood elevation certificate shall be provided for all building construction; (2) a determination of the structural adequacy against pressure, velocity, uplift, siding, overturning, and impact; and (3) a statement of the types of materials and safeguards incorporated to prevent leakage, spillage or contamination.
- D. Final street elevations shall not be less than the 100-Year regulatory base flood elevation.
- E. When a site is adjacent to or traversed by a watercourse that does not have a 100-Year regulatory floodplain delineated, all structures shall be setback at least 50 feet from the top of the nearest stream bank.

527 WETLANDS

- A. No subdivision or land development shall involve uses, activities, or improvements that would result in encroachment into, regrading of, or placement of fill in wetlands in violation of state and/or federal regulations.
- B. Activities shall be prohibited that will alter, diminish, or eliminate hydrologic conditions, existing hydric soil conditions, or wetland plant species.
- C. If wetlands are to be altered by the proposed activity the Commission shall require copies of appropriate permits and approvals granted by state and/or federal regulatory agencies prior to plan approval.
- D. The Commission may require the applicant, as a stipulation of plan approval, to include the following note on the plan and a similar reference in the deed for lots containing wetland areas:

"NOTE: Wetlands exist on Lot(s) No. _____. Wetlands are protected under state and federal law and caution should be exercised to ensure that any development proposed for Lot No. _____ does not disturb the wetlands."
- E. A jurisdictional wetland delineation by the United States Army Corps of Engineers is strongly encouraged and may be required where wetlands exist and could be impacted by development activities.
- F. Development activities are encouraged to avoid wetland impacts by design with the natural environment. Wetlands should be used to compliment development by integrating stormwater management and water quality management activities where practical.

528 SOLUTION PRONE CARBONATE GEOLOGY AND SINKHOLES

- A. All subdivisions and land developments in areas underlain by carbonate geology shall be designed and constructed to minimize any impacts which may affect, increase, diminish, or change any natural drainage, natural springs, water quality, geological stability or groundwater table.
- B. Subdivisions and land developments that pose significant risks of stimulating the formation of sinkholes or of causing hydrologic connection of contaminated surface water with subsurface aquifers shall not be approved without certification, from a professional engineer and/or other qualified individual with demonstrated competency in geology or hydrogeology, that such proposed use and design is safe and environmentally sound.

- C. When the Commission determines there is probability that a project will affect or be affected by carbonate geologic hazards, the Commission may require the submission of a hydrogeologic report.
- D. In making a determination whether or not a project will affect or be affected by carbonate geologic hazards, the Commission shall consider the carbonate features in the vicinity, testimony of qualified experts (i.e. professional geologist, hydrogeologist, or engineer with documented expertise of carbonate geology), recommendation by the municipality, and such other reasonable information as may be available.
- E. All sinkholes shall be posted by permanent and clearly visible on-site notices prohibiting any disposal of refuse, rubbish, hazardous wastes, organic matter or soil into the sinkhole. Concrete liners, rockfill or other acceptable capping procedures may be permitted in the sinkhole for purposes of preventing dumping of said materials with the approval of the Commission Engineer.
- F. All sinkholes shall have a buffer as determined necessary for public safety. The buffer size will vary based upon site conditions and an analysis of drainage in the sinkhole area by a professional engineer or other qualified individual with demonstrated competency in geology or hydrogeology.
- G. No stormwater management basins shall be placed in or over sinkholes, closed depressions, lineaments in carbonate areas, fracture traces, caverns, ghost lakes, or disappearing streams.
- H. New sinkhole formation, as a result of construction activities or natural causes, shall be reported to the Commission and the PA DEP. Emergency repairs may be required under the supervision of the PA DEP or the Commission's Engineer to prevent groundwater contamination.
- I. Improvements necessary to safeguard against groundwater contamination, or structural instability for proposed development, or construction activities as a result of the hydrological investigation, will be a condition of final subdivision or land development plan approval.

529 NATURAL FEATURES

A. Habitats and Natural Features of Special Concern

- 1. Where the presence of natural features and habitats of special concern (i.e. those areas listed in the Natural Areas Inventory of Union County or habitats of rare, threatened and endangered species) is known or suspected, or where required by the PA DEP or other permitting agency, the applicant shall notify the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) of the proposed subdivision or land development and request a determination concerning the presence of significant resources from the Pennsylvania Natural Diversity Index (PNDI).
- 2. Where a proposed subdivision or land development includes an identified natural feature and/or habitat of special concern, such as rare, threatened or endangered species which are regulated by municipal, state, or federal law, the applicant shall provide evidence of compliance with any applicable regulation.
- 3. The Commission will impose conditions it deems reasonable and appropriate in order to protect such habitats and to prevent degradation of natural features.

B. Existing Wooded Areas

- 1. Subdivisions and land developments shall be designed to avoid unnecessary removal or destruction of trees and understory vegetation, particularly in undeveloped tract areas.

2. At least twenty-five percent (25%) of the number of trees that exist at the time of plan approval shall be maintained or replaced immediately following construction. Replacement trees shall be a mix of native species with a minimum trunk caliper of two (2) inches and a minimum height of six (6) feet. They shall be planted at a density equivalent to that existing before development.
 3. Development activities are encouraged to integrate wooded areas into stormwater management design to promote natural infiltration of runoff where practical.
 4. Priority shall be given to the preservation of trees and vegetation in 100-year floodplains, wetlands, stream corridors and steep slopes.
 5. Any tree that may be noteworthy because of its species, age, uniqueness, rarity or status as a landmark due to historical or other cultural associations shall be preserved unless removal is deemed necessary determined by a professional arborist, forester, or landscape architect or if the tree is likely to endanger the public or an adjoining property.
 6. Trees to be preserved shall be protected during construction and the critical root zones shall be clearly staked and protected by fencing to prevent damage.
- C. **Stream Corridors-** In order to prevent increased erosion, stream bank instability, non-point source and thermal pollution, the removal of trees and vegetation shall be not be permitted within fifty feet (50') of the top bank of any watercourse. Invasive species, however, may be removed if replaced with native vegetation and, selective timber harvesting is permitted as part of the development if accompanied by a certified forest resources and timber management plan prepared by a qualified professional forester.

530 STANDARDS FOR PROTECTION FROM WILDFIRE

The number of homes and developments in wooded areas of the county has been on the rise, which greatly increases the potential of wildfire damage to life and property. The standards in this Section are intended to provide minimum planning and design standards for the protection of life and property from wildfire. These standards are based upon the recommendations of the Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Emergency Management Agency, Office of the State Fire Commissioner, National Fire Protection Association, and local fire protection districts.

- A. The standards in this Section shall apply to those subdivisions and land developments that are within a wildland/urban interface or wildland/urban intermix, as determined by the local fire protection district and/or the applicable state Bureau of Forestry office.
- B. When it is determined that a proposed subdivision or land development is within a wildland urban interface or intermix area, the applicant shall, at the discretion of the Commission, be required to prepare and submit a wildfire hazard severity analysis of the area to determine relative hazard ratings. The analysis shall at a minimum consider the following and shall follow the Wildfire Hazard Severity Analysis and associated information contained in: *NFPA 299: Standards for Protection of Life and Property from Wildfire*. (1997 or as amended or reprinted)
 1. The history of local weather, including wind factors, relative humidity, and temperatures.
 2. An evaluation of all vegetative fuels and other combustible materials and their potential to contribute to the intensity and spread of wildfire.
 3. An evaluation of all structures that lack external fire-resistant features.

4. An evaluation of slope and aspect in regard to the potential to increase the threat of wildfire.
 5. Fire history and documented behavior of previous wildfire characteristics in the area.
 6. Fire-safe routes for evacuation and access for emergency service apparatus.
 7. All other factors that can affect the risk of fire ignition or the spread of wildfire. These additional factors can be positive (risk reducing) or negative (increasing risk).
- C. When the hazard analysis, performed in accordance with Section 530.B above, identifies a threat from wildfire, the applicant shall consult and obtain in writing from the local fire protection district and/or applicable state Bureau of Forestry office a recommendation for an adequate defensible space and other necessary safety and wildfire hazard precautions. A copy of said recommendations shall be provided the Commission.
- D. The Commission may require certain structural and non-structural improvements to the property depending on the wildfire hazard severity identified through the severity analysis, and shall take into consideration the recommendations offered by the local fire protection district and the Bureau of Forestry office. These improvements may include, but shall in no way be limited to, the following: creation of an adequate defensible space, reduction of wildfire fuel load within and outside the defensible space, initial and ongoing removal of ground fuel on the property, thinning and pruning of vegetation, removal of dead trees, installation of hydrants or dry hydrants, chimney and flue screens, etc.
- E. For subdivisions and land developments considered a moderate or greater wildfire hazard, the applicant shall prepare and submit, for review and approval by the Commission and local fire protection district, an Emergency Action Plan for Wildland Fire Emergencies in accordance with the most recent edition of: *A Model Prevention, Pre-suppression and Preparedness Plan: Wildland/Urban Interface Guidance Document, Commonwealth of Pennsylvania, Department of Conservation and Natural Resources, Bureau of Forestry, 2000*. Said plan shall be reviewed every two years by the owner/developer and or the Association of Homeowners.
- F. Principal structures in subdivisions and land developments within the urban wildland interface or intermix shall maintain a minimum separation distance of sixty (60) feet.
- G. Plans for all subdivisions and land developments located within a wildland urban interface or intermix shall contain the following notation:
- "The land area shown hereon meets the definition of a wildland urban interface or intermix, and as such may present an increased risk to life and property resulting from wildfires. Property owners should consult the "Developer's Checklist for Fire Disaster Potential", "Fire Disaster Potential Checklist for the Homeowner" and the wildfire hazard severity analysis or Emergency Action Plan for Wildland Fire Emergencies that was prepared for this development."
- H. A maintenance plan and agreement suitable for recording shall be submitted that identifies the ongoing property maintenance associated with wildfire prevention and the entity or entities responsible for ongoing maintenance activities.

531 CULTURAL AND HISTORIC RESOURCES

- A. **Archaeological Investigations.** Where the presence of archaeological features is known or suspected, or where required by the PA DEP or other permitting agency, the applicant shall notify the Pennsylvania Historic and Museum Commission (PHMC) of the proposed subdivision or land

development and request a determination concerning the presence of significant resources from PHMC.

- B. **Historic Resource Preservation.** Subdivisions and land developments shall be designed to preserve, adaptively reuse, or otherwise provide for the historic features of Union County, and new construction shall be designed to be visually complimentary to historic structures and sites. If due to size, scale, construction material, or type of proposed use, a subdivision or land development would jeopardize the historic value of a site or structure, such new construction shall be screened or otherwise visually buffered.
- C. **Historic Resource Demolition.** No historic feature as defined in this Ordinance shall be infringed upon, demolished, or moved from its original foundations without approval of the Commission. The applicant shall submit to the Commission letters from the PHMC and from the Union County Historical Society with their review and recommendation. In evaluating any request for demolition of a historic feature the Commission shall take into account the significance of the property, the condition of the feature and the potential for repair, restoration, stabilization and reuse, the impact of the feature in relation to the total project, and the hardship, if any, on the applicant.
- D. **Retention of Local Names.** Applicants are encouraged to perpetuate historic names or geographic references that are traditionally associated with the area in which a project is located, rather than proposing project names that are not consistent with Union County traditions or culture.

532 COMMUNITY AND NATURAL FEATURES IMPACT ANALYSIS

- A. All subdivisions and land development applications that involve the creation of 25 or more dwelling units, generate 200 vehicle trips or more per average weekday, or are considered a development of regional significance, shall be required to include a Community Impact and Natural Features Analysis in accordance with this Section.
- B. **Community Impact Analysis.** The Community Impact Analysis shall analyze and evaluate the impact of the proposed subdivision or land development on community facilities and shall include but not be limited to a detailed examination of the following:
 - 1. Water supply analysis, including the volume of water needed to support the proposed use, source(s), source viability, source quality, and impact of proposed use on surface water flows, groundwater levels, and adjacent wells.
 - 2. Sewage collection and treatment.
 - 3. Accessibility to and adequacy of emergency services (ambulance, fire and police).
 - 4. Surface, ground, and storm water management including potential for contamination of surface and groundwater supplies.
 - 5. A Visual Impact Assessment which shall include (i) a Zone of Visibility Map to determine the locations from which the facility may be observed, (ii) pictorial representations of key viewpoints as may be appropriate, including but not limited to public roads, public parks, public lands, historic districts and sites, and other locations where the site is visible to large numbers of persons, and (iii) an assessment of the visual impact of the facility as it relates to appropriate screening.
 - 6. Air quality impacts, including a description of proposed emissions and specific information related to impacts upon human health and the environment.

7. Other community facilities that may be impacted
8. A comparison shall be made and submitted of the estimated costs for services to the municipality versus the estimated revenues to be generated from the subdivision or land development.
9. The applicant shall demonstrate that the appropriate providers of utility services, including but not limited to, electric, sewer, water, telephone, and refuse removal have certified that services will be provided to the site.
10. A Traffic Engineering Study shall be prepared as part of the Community Impact Analysis in accordance with Section 510 of this Ordinance.
11. A market analysis that shall demonstrate a sufficient market exists for the specific types of development proposed.

C. **Natural Features Analysis.** The Natural Features Analysis shall analyze and evaluate the impact of the proposed subdivision or land development on natural features on the subject tract and the surrounding area. This analysis shall include but not be limited to the following:

1. An analysis of natural drainage patterns and water resources, including streams, natural swales, ponds, lakes, wetlands, floodplain areas and permanent and seasonal high water table areas.
2. An analysis of the site geology that considers characteristics of underlying rock formations, shallow bedrock, aquifers, karst features, and factors that may cause the rock formations to be unstable.
3. An analysis of soil types present on the site including a delineation of prime agricultural soils, hydric soils, unstable soils, soils most susceptible to erosion, and evidence that the soil is suitable for the intended uses.
4. An analysis of topography.
5. An analysis of existing vegetative cover emphasizing the location of woodland and meadowland areas. Dominant tree and plant species shall be identified and certification shall be given that no vegetation on the site is classified as Rare, Threatened or Endangered or listed as worthy of special protection in the Union County Natural Areas Inventory. A PNDI search shall be conducted.
6. An analysis of impacts on wildlife and wildlife habitat and certification shall be given that no species of wildlife or wildlife habitat on the site is classified as Rare, Threatened or Endangered or listed as worthy of special protection in the Union County Natural Areas Inventory.

D. The Community Impact and Natural Features Analyses shall contain proposals to minimize any adverse impacts identified, including, where appropriate, alternative solutions or proposals.

533 PARKS AND OPEN SPACE RESERVATION

A. **Voluntary Provision.** Applicants for approval of major subdivisions and land developments are encouraged to the maximum extent practicable to include open space areas and facilities to meet the recreational needs of residents, employees, and other users of the proposed development.

- B. **Mandatory Open Space Dedication.** Applicants for approval of subdivisions and land developments shall set aside and dedicate adequate areas for parks, open space and recreational uses in accordance with the officially adopted county, municipal or multi-municipal parks and recreation master plan that meets the requirements of the Pennsylvania Municipalities Planning Code for the municipality in which the project is located.
- C. **Fee in Lieu of Dedication.** Municipalities with official parks and recreation master plans may accept fees in lieu of land dedication. All such fees shall be calculated based upon the requirements of the applicable municipality.
- D. **General Standards of Dedicated Lands.** Lands to be dedicated shall meet the following minimum standards:
1. Land area shall be reasonably located so as to serve all residents of the subdivision or land development.
 2. Land area intended for park and open space use shall be accessible from a public street or shall adjoin and become part of an already existing public park or open space area which is accessible to a public street.
 3. No more than twenty-five (25%) percent of the park and open space land shall contain detention basins or other stormwater management facilities or be located within a floodplain or wetland unless such area is part of a linear trail or greenway along an existing watercourse.
 4. When public park and open space land exists adjacent to the tract being subdivided or developed the dedicated, park and open space land shall be located to adjoin and enlarge said lands.
- E. **Private Reservation of Open Space.** With approval of the Commission, and of the local municipality having an official parks and recreation master plan, an applicant may elect to fulfill open space requirements by a private reservation of open space and recreation areas through the establishment of an association of property owners or through the donation of a conservation easement to a land trust or other appropriate conservation organization.
- F. **Ownership and Maintenance of Private Open Space.** Private open space areas shall be owned and maintained by the developer, association of property owners, land trust or other entity acceptable to the Commission. A plan for ownership and maintenance of the private open space shall be provided with the plan and shall at a minimum meet the requirements of Section 605.K and 605.L of this Ordinance.