

ARTICLE IV - DESIGN STANDARDS

Section 400. Application of Standards.

The following standards shall be applied by the Township and its staff in evaluating plans submitted for review and/or approval. It is intended that these standards be considered the minimum requirements and may be modified as necessary to protect the health, safety, and general welfare of the public. All plans submitted for approval under this ordinance shall incorporate these standards.

Section 401. General Site Standards.

The following requirements and guiding principles for subdivisions and land developments shall be observed with respect to the factors affecting the suitability of the site for such development.

- A. The submitted land development plan and guiding principles for subdivision and land developments shall be observed with respect to factors affecting the suitability of the site for such development.
- B. A land development must be coordinated with existing land development in the neighborhood so the entire area may be developed harmoniously.
- C. Land proposed for land development shall not be developed or changed by grading, excavating, or by the removal or destruction of the natural topsoil, trees, or other vegetative cover unless provisions for minimizing erosion and sedimentation are provided as required by the Pennsylvania Department of Environmental Protection and the Adams County Conservation District. The developer is responsible for obtaining approval and/or permits from one or both of these agencies as required.
- D. In a development where the average slope exceeds fifteen (15%) percent, the Township may require modifications to those regulations as may be recommended by the County Conservation District or the Township Engineer.
- E. In all developments, every precaution shall be taken to preserve all natural and historic features determined to be worthy of preservation by the Township. The developer is to provide evidence that the proposed subdivision and/or land development is not of natural or historic importance. Examples of such features would include, but not be limited to, wetlands, floodplains, large trees and stands of trees, watercourses, historic areas and structures, scenic view, etc. To ensure the protection of such features, the Township may require the following additional information to be submitted.
 - 1. A grading plan showing the existing and proposed ground elevations relative to the features.
 - 2. The accurate location of the features to be protected.
 - 3. An explanation of the precautions to be taken by the developer to protect such features.
- F. Any plans for the alteration of a watercourse shall be incorporated into the design plans and subject to approval by the Township, or where necessary, the U.S. Army Corps of Engineers, and/or Pennsylvania Department of Environmental Protection.

- G. Land subject to hazards of life, health, or property as may arise from fire, floods, disease, excessive noise, odor, falling aircraft, or considered uninhabitable for other reasons may not be developed unless the hazards have been removed or the plans show adequate safeguards against them.
- H. Except for a privately developed water body, developments adjacent to a river, stream, or other significant body of water shall adhere to the following standards.
 - 1. No building may be located within sixty (60) horizontal feet of the edge of any watercourse or have a first floor elevation less than three (3) feet above the ordinary high water level of the watercourse.
 - 2. Public access points shall be provided to the water body at an interval of not less than one point in every one-half (1/2) mile along the shoreline.
 - 3. No building or street may be erected in any area which is subject to flooding or which has been designated as floodplain area unless it is in strict compliance with related Township Ordinances and Regulations.
- I. Where the lots in a subdivision are large enough for re-subdivision or where a portion of the tract is not developed, suitable access to these areas shall be provided.
- J. In all instances when planning for development, it should be considered if a future access should be provided to other lands for the purpose of streets, utilities, or other facilities.

Section 402. Street and Highway Standards.

- A. General Standards:

All streets proposed to be constructed within the Township shall conform to the following general design requirements.

 - 1. Streets shall be logically related to topography so as to produce reasonable grades, satisfactory drainage and suitable building sites. Finished elevation of proposed streets shall not be below the regulatory flood elevation. The Township may require profiles and elevations to ensure compliance. Also, drainage structure openings shall be sufficient to discharge flood flows without duly increasing flood elevations or creating a backwater situation onto adjacent properties.
 - 2. Proposed streets, including functional classification shall be planned with regard to the existing street system, topographical conditions, public convenience in terms of fire protection and pedestrian traffic, probable volumes of traffic, existing and proposed use of land on abutting properties and future extensions of the street system. Functional classification shall be as indicated in the Liberty Township Comprehensive Plan or as recommended by the Township Engineer and/or Traffic Engineer. Final determination of the functional classification of proposed streets will be made by the Township Board of Supervisors.
 - 3. When a subdivision abuts or contains an existing or proposed primary or secondary highway, the Township may require a marginal access street, reverse frontage, reduction of the number of intersections and/or separation of local from through traffic or

other treatment which will provide protection for abutting properties.

4. No street shall terminate into a dead end. Any street dead ended for access to adjoining property or because of authorized staged construction shall be constructed in such a manner so as to provide a length which complies with the standards for cul-de-sac streets and shall be provided with a temporary paved turn-around and the use of such a turn-around shall be guaranteed to the public until such time as the street is continued. For streets in which the maximum length of a cul-de-sac will be exceeded due to proposed phasing limits of a development, in addition to a temporary cul-de-sac, the Township may require that additional length of street as necessary to connect to other existing street or accesses be financially secured.
5. In approving private streets or rights-of-way, the Township may attach additional standards and/or conditions relating to design and/or construction. The use of private streets will not be allowed when its use is to circumvent the specifications required for public streets. In the case where private streets shall be permitted a bonafide association shall be created which shall be responsible for ownership and maintenance of the private street and a copy of such association by laws should be reviewed by the Township and be recorded with the Final Plan. Private streets shall be designed and constructed to meet the requirements of this Ordinance.

When a street is open for public travel and not dedicated to the Township, in addition to complying with all Township design and construction standards for Public streets, the Developer will be required to submit for approval and record with the approved Final Plan, an agreement outlining the responsibilities for perpetual maintenance of the street which also shall release the Township of any liability regarding maintenance and acceptance of dedication. In addition, the Township shall reserve the right to require improvement bonding, surety, and inspection in accordance with the procedures of this Ordinance.

6. The proposed street system shall extend existing or recorded streets at the same width or at widths required by the Ordinance as determined by the Township, but in no case at less than the required minimum width.
7. The Township shall reserve the right to require alternate design standards relative to cartway, horizontal and vertical curves, and intersections where it is determined to be necessary to eliminate a potential safety hazard. Alternate design standards shall be as recommended by the Township Engineer in accordance with PennDOT and AASHTO Standards.
8. Where required, in response to safety considerations, and upon consultation with the Township Traffic Engineer, access to developments shall either be limited to single or required to have multiple accesses.
9. Where a proposed subdivision or land development is provided access by a single street, the Township may require a boulevard style entrance meeting the design/construction standards contained in this ordinance or as recommended by the Township Engineer.
10. Subdivisions consisting of more than twenty five (25) dwelling units or units of occupancy or, in the case of nonresidential developments, not more than two hundred

and fifty (250) average daily vehicle trips based on the latest edition of the Institute of Transportation Engineers Manual shall have at least two (2) points of access. This access is to be from a through street or, where the Township finds it to be appropriate, the continuation of an existing or proposed street to the boundary of the subdivision.

11. Unless otherwise allowed by the Township, site access for all developments shall be analyzed in conjunction with a traffic study or site access study and recommendations from the Township Traffic Engineer, and where recommended, shall be provided with more than one means of access.
12. Applicants for a subdivision or land development abutting a state route shall be responsible for obtaining approval of any proposed improvements, and for obtaining a Pennsylvania Department of Transportation Highway Occupancy Permit.
13. If a proposed development utilizes an existing driveway and if the development proposes a change in use which may impact driveway regulations, a determination must be made to conclude if the preexisting driveway will require modifications. Any necessary modifications must be consistent with the regulations of this ordinance.
14. Prior to Final Plan approval, applicants shall certify that title to any street right-of-way is unencumbered by any liens or other obligations and that no prior right-of-way has been granted. The Township may require a title search.

B. Street Widths.

1. Minimum street right-of-way and cartway widths shall be as follows:

Road Classification	Required Right-of-way (ft.)	Total Cartway Width (ft.) ¹
Arterial/Collector	Criteria to be as determined by the Township with minimum 60 foot required right-of-way, 40 foot cartway width.	
Neighborhood Collector	60'	24'
Minor Neighborhood Street	50'	20'
Alley	20'	12'

(1) Final width to be a recommended by the Township Engineer and/or Traffic Engineer.

2. Provision for additional street width or shoulder (right-of-way, cartway, or both) may be required when determined to be necessary by the Township to facilitate for aspects such as:
 - a. Public safety and convenience.
 - b. Traffic in commercial and industrial areas and in areas of high density.
 - c. Widening of existing street where the width or alignment does not meet the requirements of the preceding paragraphs.

- d. Where topographic conditions require excessive cuts and fills.
 - e. When curbs will not be required.
 - f. To accommodate on-street parking.
 - g. Where a boulevard access is proposed or required.
3. In the case of a plan for a Subdivision or Land Development fronting on an existing public street of improper right-of-way and/or cartway width, the developer shall provide the following:
- a. Any required dedication of land for increasing the existing right-of-way to meet the requirements of this Ordinance. The right-of-way must be centered from the centerline of the existing road.
 - b. Improvements of roadway to meet cartway, curb, sidewalk, gutters or other standards of this Ordinance.

C. Street Grades:

The grades of streets shall not be less than the minimum or more than the maximum requirements listed below:

TYPES OF STREETS	MINIMUM GRADE	MAXIMUM GRADE
Arterial streets	As determined by the Township after consultation with the Pennsylvania Department of Transportation.	
Collector streets	1.0%	7.0%
Minor streets & Alleys	1.0%	10.0%
Intersections	1.0%	4.0% (for 100' from intersection)

- 1. In all differential grades exceeding one (1%) percent, vertical curves shall be used in changes of grade and shall be designated for proper sight distance.
- 2. On permission of the Township, minor street grade under special topographic conditions may exceed ten (10%) percent for distances of one hundred (100) feet or less provided the grade does not in any case exceed twelve (12%) percent.
- 3. Standards for minimum and maximum grade refer to both positive and negative grades.
- 4. All streets shall be designed so as to provide for the discharge of surface water from the right-of-way. The slope of the crown on a street shall not be less than one-fourth (1/4) of an inch per foot and not more than three-eighths (3/8) of an inch per foot, as determined by the Township Engineer. Where a curve is banked to reduce lateral vehicular acceleration as required by the design speed of the road, the required crown is eliminated. Adequate facilities shall be provided at all low points along the street and

other points necessary to intercept runoff.

D. Horizontal Curves.

1. Where connecting street lines deflect from each other at any point the line must be connected with a true circular curve. Horizontal curves must be justified by a traffic engineering analysis and shall be based on a correlating maximum proposed speed limit. The minimum radius of the centerline for the curve must be as follows:

TYPE OF STREET	MINIMUM RADIUS
Arterial	As determined following completion of traffic studies and consultation with PennDOT and the Traffic Engineer.
Collector	300 feet
Minor	150 feet

2. Straight portions of the street must be tangent to the beginning or end of the curve. Except for minor streets, there must be a tangent of at least one hundred (100) feet between reverse curves. For curves on arterial streets (or as otherwise determined by the Township Engineer), proper super-elevation must be provided as required by the Township or the Pennsylvania Department of Transportation.
3. The Township may require that Sight Easements be provided in order to maintain adequate stopping sight distances.
4. The development must be provided with speed limit and other related signs in which speeds have been determined by the required engineering studies to be recommended for the horizontal curve design.

E. Vertical Curves.

1. Vertical curves are required where the algebraic difference exceeds one (1%) percent or as determined by the Township Engineer.
2. Proper sight distance shall be provided with respect to vertical road alignments. The minimum sight distance measured along the centerline from (3.5) feet to height of an object (0.5) feet above grade shall be as follows:

TYPE OF STREET	SIGHT DISTANCE
Arterial	As required by PennDOT design criteria for the posted speed.
Collector	400 feet
Minor	250 feet
Alley	100 feet

F. Cul-de-Sac Streets.

1. Cul-de-sac streets designed to be so permanently, shall not exceed one thousand (1,000) feet in length measured from the centerline of the intersecting street to the centerpoint of said cul-de-sac. If a cul-de-sac street intersects another cul-de-sac street, the maximum total length of the sum of the streets shall not exceed fifteen hundred (1,500) feet.
2. Cul-de-sacs shall have a paved turnaround having a minimum diameter of one hundred (100) feet and a legal right-of-way of one hundred twenty (120) feet in diameter.

Dimension and/or layout is subject to change where, in the opinion of the Township, a revised dimension and/or layout is necessary for reasons of safety, maintenance, accessibility, construction, etc. Alternate cul-de-sac dimensions may be allowed provided it is based upon a recognized standard and has been reviewed and recommended by the Township Engineer and Road Superintendent.

3. Temporary cul-de-sacs shall be designed to standards of permanent cul-de-sacs.
4. Where required, a designated area shall be shown for disposal of snow. Such area shall be provided with an easement acceptable to the Township.
5. All cul-de-sac circles shall be graded to create a center high point with all flow directed toward its edges.
6. Only one (1) driveway per lot is permitted to enter a Cul-de-Sac Street. Also; joint driveways and private roads are not permitted to enter a Cul-de-Sac Street.
7. The minimum cul-de-sac or loop street length is two hundred and fifty (250) feet, to be measured as described in this ordinance.

G. Loop Roads.

1. In the case of a proposed loop road the maximum length, measured along its centerline from the intersection of a public street to the beginning of the loop, shall be one thousand (1,000) feet.
2. Cul-de-sac and loop streets, whether existing or proposed, shall provide access to not more than twenty five (25) dwelling units or units of occupancy or, in the case of nonresidential developments, not more than two hundred and fifty (250) average daily vehicle trips based on the latest edition of the Institute of Transportation Engineers Manual.
3. Permanent cul-de-sac streets and loop streets are not allowed when a through street is feasible as determined by the Township Engineer.

H. Intersections.

1. No intersection shall involve the junction of more than two (2) streets.

2. Right-angle intersections shall be used wherever possible. In no instance, however, shall streets intersect at an angle of less than seventy-five (75) degrees or more than one hundred five (105) degrees. Intersections of two arterial streets shall be subject to Pennsylvania Department of Transportation standards.
3. Intersections shall be improved on all sides by leveling areas. Such leveling areas shall have the minimum length of one hundred (100) feet (measured from the intersection of the centerlines) within which no grade shall exceed a maximum of four (4%) percent. Where a through street exists or is proposed, the four (4%) percent leveling area may be waived pending review of the Township Engineer.
4. Proper sight lines shall be provided and maintained at all intersections. Measured along the street centerline, there must be a clear sight triangle of seventy-five (75) feet. Where either of the two (2) streets is a collector street a clear sight triangle of one hundred (100) feet shall be required and where either of the two (2) streets is an arterial, a clear sight triangle of one hundred fifty (150) feet shall be required. Within such triangles, no vision-obstructing object shall be permitted.
5. Design of curb or edge of pavement must take into account such factors as types of turning vehicles, likely speeds of traffic, angle of turn, etc., but in no instance shall the radius of the curb or edge of pavement be less than the following:

<u>INTERSECTION</u>	<u>CURVE RADIUS</u>
Minor with Minor Street	25 Feet
Minor with Collector	30 Feet
Collector with Collector	35 Feet

Where determined to be necessary due to speed considerations, clear sight triangle side may increase. Increased values shall be in accordance with PennDOT or AASHTO Standards.

Safe sight distances shall be provided at all intersections. Standards for design shall comply with AASHTO and the Pennsylvania Department of Transportation whichever shall be most applicable as determined by the Township Engineer.

6. Street intersection spacing shall be based on a traffic engineering analysis and shall be a function of street classification and proposed design speed limit. The following table contains minimum recommended intersection spacing. Such traffic engineering analysis shall be prepared in accordance with ITE Traffic Engineering Handbook recommendations and shall be subject to the review of the Township Engineer or Township Traffic Engineer.

Type of Intersection (Distance in Feet)

	Arterial/ Arterial	Arterial/Collector or Minor	Collector/ Collector	Collector/Minor	Minor/Minor (3)
Min. Distance Separation (1)	800	800	600	500	250
Min Distance Separation (2)		Must be in alignment		500	250

- (1) Minimum distance between centerlines of intersections.
- (2) Minimum centerline separation for streets where intersections are on direct opposite sides of the intersecting street.
- (3) Internal development street intersections.

- I. Slope of Bank along Streets.
The slope of banks along streets measured perpendicular to the street 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.

- J. Partial and Half-Streets.
The dedication of half-streets at the perimeter of new developments is prohibited, except to complete existing half-streets.

- K. Names of Streets.
Names of new streets shall not duplicate or approximate existing or platted street names, or approximate such names by the use of suffixes such as "lane", "court", or "avenue". In approving the names, consideration shall be given to existing or platted street names within the postal delivery district served by the local post office. New streets shall bear the same name or number of any continuation or alignment with an existing street. All street names shall be approved by the Board of Supervisors in coordination with the Adams County Emergency Mangement Agency and the Adams County Mapping Office.

- L. Reserve Strips.
Controlling access to streets by reserve strips is prohibited except where their control is definitely placed in the Township under control approved by the Township. A reserve strip is a parcel of ground in separate ownership separating a street from other adjacent properties or from another street.

- M. Alleys.
 1. Alleys are permitted in single family, detached or semi-detached residential development to provide access to the rear of lots that have frontage on a public minor, collector, or arterial streets. Alleys shall be permitted provided that they are not proposed to be dedicated to the Township and that the developer must make adequate provision for the perpetual maintenance of the alley. The applicant shall in addition, provide for an

easement enabling the Township to perform emergency maintenance in the event that the property owner should fail to do so and shall establish a procedure whereby the Township shall be able to assess the cost of such emergency maintenance upon the land owner.

2. While the use of dead end alleys is generally discouraged, where alleys do dead end, they shall be provided with a Township approved turn-around conforming to one of the Standard Township Cul-De-Sac Street Exhibits.
3. Intersection involving alleys shall be provided with a minimum radius of ten (10) feet.

N. Alternate Design Criteria for Low-Volume Roads.

1. Subject to the recommendation of the Township Engineer, the following alternate criteria may be permitted for minor/local streets located within proposed subdivisions and land developments in which the streets are not proposed to be dedicated to the Township. These streets shall generally have an estimated ADT (average daily traffic) volume of fifteen hundred (1500) vehicles per day or less. The proposed ADT shall be determined by a traffic impact study or site access study. Alternate standards must be supported by AASHTO or other recognized standard. The following standards shall apply:
 - a. For greater speeds a specific design and traffic study shall be submitted for review and recommendation by the Township Engineer.

	Design Speed (mph)			
	15	20	25	30
Minimum Cartway Width	20'	20'	20'	20'
Minimum Centerline Radius	45'	90'	165'	260'
Safe-Stopping Sight Distances	80'	115'	155'	200'
Minimum Rate of Vertical Curvature	(Sag) 10 (Crest) 3	17 7	26 12	37 19
Curb Radii	15'	15'	15'	15'

2. Cul-de-sacs without center islands shall have a turnaround diameter of sixty (60) feet while cul-de-sacs with center islands shall have a minimum diameter of ninety (90) feet and minimum travel lanes of twenty (20) feet. Rights-of-way shall extend a minimum of ten (10) feet from the edge of pavement.
3. Design criteria not specifically addressed in this section shall be in accordance with the general road design standards set forth in this Ordinance.
4. Provisions for additional street width (right-of-way, cartway, shoulders etc.) may be required when determined to be necessary by the Township in specific cases for:

- a. Public safety and convenience.
- b. Traffic in commercial and industrial areas and in high-density residential development.
- c. Widening of existing streets where the width does not meet the requirements of the preceding paragraphs.
- d. Where topographic conditions require excessive cuts and fills.
- e. When curbs are required.

Section 403. Off Street Parking.

Off street vehicular parking facilities shall be provided in accordance with the Liberty Township Zoning Ordinance.

- A. For uses which are not addressed in the Zoning Ordinance, the required parking spaces shall be based on a study as prepared by the developer and approved by the Township Engineer. The study shall address the following:
 - 1. The type of use and estimated number of trips generated during peak conditions (inbound and outbound).
 - 2. Estimated parking duration per vehicle (turnover rate).
 - 3. Based on estimated number of trips generated and average parking duration per trip, calculate the number of spaces required. In addition one space shall be provided for every two (2) employees working during the maximum shift.

Section 404. Access Drives.

A. Residential Driveways.

Access to any public street or highway in a residential area shall be governed by the following:

- 1. Within ten (10) feet of a street right-of-way line, an access drive may not exceed twenty (20) feet in width nor be less than twelve feet (12) in width.
- 2. The number of access drives on a street frontage, may not exceed two (2) per lot.
- 3. An access drive or driveway may not cross a street right-of-way line:
 - a. Within forty (40) feet of the right-of-way line of an intersecting street when entrance is from an arterial street.
 - b. Within thirty-five (35) feet of the right-of-way line of an intersecting street when entrance is from a collector street.

- c. Within twenty-five (25) feet of the right-of-way line of an intersecting street entrance is from a minor street.
 - d. Within fifteen (15) feet of a fire hydrant.
 - e. Within forty (40) feet of another access drive on the same property.
 - f. Within five (5) feet from the edge of a storm drain inlet.
 - g. Separation of driveways from property lines shall be as specified in the Liberty Township Zoning Ordinance. In instances where it is not specified within the Zoning Ordinance the minimum separation shall be five (5) feet from a property line (except for common access to two driveways).
4. The drive may not exceed a slope of five (5%) percent within twenty-five (25) feet of the street right-of-way lines. Where a drive enters a bank through a cut, the shoulders of the cut may not exceed fifty (50%) percent in slope within twenty-five (25) feet of the point at which the drive intersects the street right-of-way.
5. All driveways shall have a minimum safe sight distance in accordance with the Pennsylvania Department of Transportation Rules and Regulations. Furthermore, all driveways which access Township roads shall be required to obtain a driveway permit from Liberty Township. Plans shall indicate the following information:
 - a. Minimum (limiting) sight distances along each proposed lot, where applicable.
 - b. The location of proposed driveways.
 - c. Field verified slopes along the road in both directions from each lot.
 - d. Speed limit of existing road in each direction.
 - e. Location of trees and other visual obstructions which affect sight distances.
6. Width, turning radius, and slope requirements shall also conform to chapter 441 of the Pennsylvania Department of Transportation Rules and Regulations.
7. The minimum angle between the centerline of the driveway and the street shall not be less than sixty-five (65) degrees.
8. A clear sight triangle of seventy-five (75) feet measured along the street and ten (10) feet into the driveway centerline shall be maintained. Permanent obstructions other than mail boxes and utility poles shall be prohibited.
9. All accesses shall be provided with a drainage culvert or gutter/swale as determined following consultation with the Township Road Superintendent. The minimum size of the pipe, unless otherwise approved, shall be fifteen (15) inches in diameter or equivalent open area arch/elliptical pipe and constructed of polyethylene (dual wall, smooth lined) or concrete. The site grading or stormwater management plan for a proposed development or building lot shall include calculations for sizing of access driveway culverts. Drainage structures within the Pennsylvania Department of Transportation (PA

DOT) right-of-way (where applicable) shall be subject to the review and approval of the PA DOT.

10. To prevent drainage and erosion problems and to minimize future maintenance, access driveways shall be surfaced with a stabilized material within the public street right-of-way. Where access is to a paved roadway, driveways shall be surfaced with Bituminous or Concrete material within the legal right-of-way.
11. In the event that an access drive will serve more than one residence, more stringent standards may be applied pending review and recommendation of the Township Engineer.
12. Driveways shall be constructed so that motorists are not required to back on to the roadway.

B. Joint-Use Residential Driveways.

1. The use of joint-use driveways will not be allowed when its use is to circumvent the specifications required for street frontage.
2. A joint-use driveway may serve up to three (3) lots containing single-family dwellings.
3. All joint use driveways shall have a minimum cartway width of sixteen (16) feet and an accompanying right-of-way width of fifty (50) feet.
4. Joint-use driveways shall be designed in accordance with this ordinance.
5. Cross access and maintenance easements shall be required to ensure common use of, access to, and maintenance of, joint-use driveways; such easements shall be recorded in language acceptable to the Township Solicitor, and depicted on the subdivision plan.

C. Multifamily, Commercial and Industrial Access Drives.

Access drives to any public street or highway in the case of a multi-family commercial or industrial development shall at a minimum conform to the standards for residential access drives, with the exception that all commercial or industrial drives shall be paved (at full width) with a bituminous material meeting the design criteria of a minor street. Additional standards shall be as follows:

1. All access ways to any public street or highway shall be located at least two hundred (200) feet from the intersection of any two (2) street right-of-way lines, and shall be designed in a manner conducive to safe ingress and egress. Where practicable, exits shall be located on minor, rather than major streets or highways.
2. No design shall be approved which is likely to create a traffic hazard which has the potential to endanger public safety. Safety requirements which may be imposed in such a review shall include traffic control devices, acceleration or deceleration lanes; turning lanes, traffic and lane markings, and signs. The developer shall be responsible for the construction of any such traffic control devices which shall meet PennDOT approval.
3. A clear sight triangle meeting the requirements of this ordinance shall be provided.

4. A detailed design and drawing showing grades, drainage and geometric design elements shall be provided.
5. All design standards of the Pennsylvania Department of Transportation as may be amended, are hereby incorporated into this section of the Ordinance.

Section 405. Blocks.

A. General.

The length, width, and shape of blocks shall be determined with due regard for:

1. The provision of adequate sites for buildings of the type proposed.
2. Topography
3. Any other codes, plans and ordinances.
4. Requirements for safe and convenient vehicular and pedestrian circulation, including the reduction of intersections with major streets.

B. Block Length.

1. Blocks shall have a maximum length of one thousand six hundred (1,600) feet and a minimum length of eight hundred (800) feet, provided that the Township Planning Commission or Township Supervisors may increase the maximum and/or decrease the minimum length of blocks if the opinion of either body, topography of the land in question and/or surface water drainage condition warrant such a change.
2. In the design of blocks longer than one thousand (1,000) feet, special consideration shall be given to the requirements of satisfactory fire protection.
3. Where practical, blocks along major and collector streets shall not be less than one thousand (1,000) feet long.

C. Pedestrian Crosswalks.

1. Crosswalks shall be required wherever necessary to facilitate pedestrian circulation and to give access to community facilities.
2. Such crosswalks shall have a width of not less than six (6) feet and a paved walk of not less than four (4) feet. At a minimum all crossings shall be constructed to comply with the Americans With Disabilities Act of 1990 (or as most recently amended).
3. Crosswalks in mid blocks shall be provided with warning devices. The Township may also require that the developer provide the necessary engineering studies to justify the placement of crosswalks.
4. Where necessary to facilitate pedestrian circulation, rights-of-way with a minimum width of twelve (12) feet shall be provided.

D. Block Depth.

Residential blocks shall be of sufficient depth to accommodate two (2) tiers of lots, except:

1. Where reverse frontage lots are required along a major street.
2. Where prevented by the size, topographical conditions or other inherent conditions of property, in which case the Township may approve a single tier of lots.

E. Commercial and Industrial Blocks.

Blocks in commercial and industrial areas may vary from the elements of design detailed above if required by the nature of the use. In all cases however adequate provision shall be made for off street parking and loading areas as well as for traffic circulation and parking for employees and customers.

Section 406. Lots.

A. General Standards.

1. The size, shape and orientation of lots shall be appropriate for the type of development contemplated. Insofar as practical, side lot lines shall be at right angles to straight street lines or radial to curved street lines.
2. Where feasible, lot lines shall follow municipal boundaries rather than cross them, in order to avoid jurisdiction problems.
3. Land-locked lots are prohibited. When a portion of a tract has developments rights associated with it, the developer must provide suitable access to the area for future development.
4. Depth and width of parcels intended for non-residential uses shall be adequate for the use proposed and sufficient to provide satisfactory space for on-site parking, loading and unloading, setbacks, landscaping, etc.
5. If after subdividing, there exists remnants of land they shall either be incorporated into existing or proposed lots, or legally dedicated to public use, if acceptable to the Township.
6. No lots shall be created in any manner whatsoever which does not meet the minimum requirements of this or any other Township Ordinance.
7. Where dictated by topography, location, sewage disposal requirements, or other such conditions, the Township may require that the minimum lot size be increased. In such case, lot sizes within a subdivision may vary, provided Township approval is secured.

B. Lot Frontage.

1. All lots shall front upon a dedicated public street (existing or proposed), or upon an approved private street constructed to the Township's Specifications and Ordinances.

2. Double or reverse frontage lots are prohibited except where required to provide separation of residential development from major streets or to overcome specific disadvantages of topography, orientation, location or to allow access to a lower volume street as approved by the Township.
3. All residential reverse frontage lots shall have a planting screen easement parallel to the accepted rear lot line and twenty (20) feet in width across which there shall be no right of access.

C. Lot Soils Evaluation Tests.

1. Soil probe and percolation tests shall be performed for each lot of a proposed subdivision wherein buildings at the time of construction will not be connected to an existing public sewage disposal system. Each lot must be found satisfactory for on-site sewage disposal including an acceptable reserve or back-up area prior to the approval of the Preliminary Plan.
2. The soils tests called for above shall be performed in accordance with the regulations of the Pennsylvania Department of Environmental Protection. The Township Sewage Enforcement Officer will perform the tests and certify the results.
3. A planning module for land development for any new subdivision or land development shall be prepared by the developer and approved by the Township and the Pennsylvania Department of Environmental Protection prior to the approval of the Preliminary Plan.

D. Lot Sizes, Building Setbacks, and Standards.

Lot dimensions, sizes, and building setback requirements shall not be less than specified by the applicable Zoning Ordinance or as dictated by the Township Subdivision Ordinance as it relates to on-site sewage disposal or additional standards, whichever shall be more restrictive.

1. For condominium units the developer shall submit the following for review and approval by the Township:
 - a. A Declaration Plan in accordance with Act 117 of 1963, the Unit Property Act. All condominiums shall be subject to the provisions of the Unit Property Act. The Declaration and Declaration Plan must be recorded along with the Final Plan in the County Records Office.
 - b. An agreement or by-laws which outline the responsibilities of the property owner, developer and condominium association. The agreement shall address the items as required by statute and those items related to parking, maintenance of common areas, storm drainage, sewer, water, utilities, nuisances, solid waste and other items as required. The agreement shall be subject to review and recommendation of the Township Solicitor and/or Engineer (as applicable).
 - c. A copy of the Homeowner's Association Agreement must be provided for review by the Township.

- d. Condominium developments shall meet design requirements of this Ordinance.
2. For industrial developments no design shall be approved which does not conform to appropriate Federal, State, Regional, and local standards relative to water and air pollution, particle emission, noise, electrical disturbances, waste disposal, light, glare, heat, vibration, radioactivity, and outdoor storage of materials:
 - a. Fire and explosive hazards as governed by the Department of Labor and Industry and the laws of the Commonwealth of Pennsylvania.
 - b. Liquid and solid wastes as governed by the Pennsylvania Department of Environmental Protection.
 - c. Smoke as governed by the Pennsylvania Air Pollution Control Commission.
 - d. Other forms of air pollution as governed by the United States Environmental Protection Agency.
 - e. All applicable environmental permits must be obtained and copies submitted to the Township prior to Preliminary Plan Approval.
3. Water and sewer facilities shall be public systems or approved private systems. No individual on-site systems shall be approved for attached row, townhouse, or condominium units.
4. For attached row, or townhouse units a permanent easement shall be provided where the rear property line abuts any property other than a street for the purpose of non-vehicular ingress and egress by center property owners. Minimum width of said easement shall be five (5) feet. Vehicular access shall be included in such easement for maintenance purposes in which case access width shall accommodate a vehicle (minimum). In cases where vehicular access will be required a minimum of (10) feet in width shall be required.

E. Unique Lots.

1. Panhandle, wedge, corner, or double frontage lots shall only be developed as allowed by the Liberty Township Zoning Ordinance.

Section 407. Easements.

- A. Easements shall be provided for drainage facilities, overhead or underground public and private utility facilities in consultation with the Township Engineer, the Electric, Telephone, Sewer and Water Utilities, the Pennsylvania Department of Transportation, and the applicable Municipal Authority. No structures or trees shall be placed within such easements.
 1. The minimum width of such easements shall be twenty (20) feet for drainage, sewer and water facilities and underground utilities and ten (10) feet for overhead utilities. Larger widths may be required as recommended by the Township Engineer.

2. Wherever possible such easements shall be centered on the side or rear lot lines, or along the front lot lines.
- B. Where a subdivision or land development is traversed by a watercourse, drainage way, channel or stream, there shall be provided a drainage easement, width to be as determined by the Township Engineer, conforming substantially to the line of such watercourse, drainage way, channel or stream and of such width as will be adequate to preserve the unimpeded flow of natural drainage or for the purpose of widening, deepening, relocating, improving or protecting such drainage facilities or for the purpose of installing a storm sewer. Access easements shall also be required.
1. Also, where a land development or subdivision is traversed by a watercourse, stream, channel or other drainage way, the developer shall provide a drainage easement conforming substantially to the existing alignment of the drainage way. The easement shall be a width adequate to:
 - a. Preserve the unimpeded flow or natural drainage.
 - b. Widen, deepen, relocate, improve or protect the drainage way.
 - c. Install a stormwater sewer.
 - d. Accommodate a one hundred (100) year design storm.
 2. Any changes in an existing watercourse, stream, channel or other drainage way shall be approved and a permit issued by the PA DEP, Dams and Encroachment Division or its successor agency. Notification of permitted changes shall be forwarded by the Township to all affected adjacent communities, the Pennsylvania Department of Community Affairs or its successor agency and the Federal Insurance Administration.
 3. Under no circumstances shall any watercourse be altered such that the carrying capacity of the stream is reduced.
- C. Electric, Telephone and all other utility facilities shall be installed underground unless conditions require otherwise. The developer shall be required, prior to Final Plan approval, to obtain a letter from the appropriate utility company confirming that the developer has entered into an agreement to provide for an underground electric and telephone system in accordance with the Pennsylvania Public Utility Commission Investigation Docket #99, as amended, or has obtained a waiver from said Pennsylvania Public Utility Commission to allow overhead electric and telephone facilities.
- D. Drainage easements shall be required between all lots within a subdivision. They shall be centered on property lines wherever possible. Such easements shall preserve the unimpeded flow of natural drainage or provide for the construction of drainage facilities. In no case shall they be less than twenty (20) feet in width.
- E. Petroleum, Gas and Electric Transmission Lines - Where any petroleum, petroleum products, natural gas or electric transmission line traverses a land development, the developer shall confer with the applicable transmission or distribution company to determine the minimum distance which shall be required between each structure and the centerline of such transmission line. Transmission lines rights-of-way shall not be permitted to be

included within residential lots. Furthermore, all land grading and development activities proposed near such facilities shall be minimized to the greatest extent possible.

Additionally, the Township will require, with the preliminary plan application, a letter from the owner of the transmission line stating any conditions on the use of the tract and the right-of-way width, or a copy of the recorded agreement, which shall contain the above data.

- F. Flood proofing of all Utilities - All new or replacement public and/or private utilities and facilities in floodprone areas shall be elevated or flood-proofed up to the Regulatory Flood Elevation.
- G. No company intending to install any petroleum products or natural gas transmission line shall be allowed to construct the line on less than a fifty (50) foot right-of-way, such line to be installed in the center of the right-of-way for all existing transmission lines within the development.
- H. Where necessary to access to public or common lands, a pedestrian easement shall be provided with a width of no less than ten (10) feet. Additional width may be required by the Township depending on the purpose and the use of the easement.
- I. In the case of sanitary sewer and water lines, the required right-of-way or easement should be as required by the applicable authority.

Section 408. Land Grading Requirements.

- A. General - No land or parcel of land within the Township shall be graded or filled by any landowner, developer or subdivider unless and until there has been compliance under the provisions of this Ordinance.

(In the case of a subdivision and land development, the grading plan shall be submitted, reviewed, and approved as part of the Preliminary Plan process). The Land Grading Plan shall be subject to the review and approval of the Township Engineer in accordance with his or her recommendations and applicable local, state, and federal guidelines.

- B. Applicability - The provisions of this Section shall apply if the following conditions apply:
 - 1. A subdivision or land development in which improvements such as drainage, stormwater management, streets, buildings etc.
 - 2. Land is to be graded or filled to alter the existing contours more than an average of two (2) feet in elevation over any area in excess of five thousand (5,000) square feet.
 - 3. Land is to be filled to a depth of five (5) feet or more over any area in excess of one thousand (1,000) square feet.
 - 4. Land is to be graded or filled within an existing watercourse (whether an intermittent or flowing stream or any normally dry swale which carries any amount of water during rainfall).
 - 5. Where site grading plans are required as part of the building permit process, the standards and requirements of this section shall apply.

- C. Approval of Land Grading Plan - The Land Grading Plan and all information and procedures relative thereto, shall in all respects be in compliance with the provisions of this Section.
- D. Drawing Requirements for Land Grading Plan – At a minimum, the following data shall be shown on the Land Grading Plan:
1. The Plan shall be prepared and certification made as to its accuracy by a registered surveyor or registered professional engineer.
 2. Property Boundary consistent with the requirements for a preliminary plan under this ordinance.
 3. Location and description of bench mark to which contour elevations refer.
 4. Existing and proposed topographic contours of the area to be graded or filled at contour intervals of no more than one (1) foot. Spot elevations should be provided where flow direction cannot be properly determined by the required contour interval.
 5. All existing watercourses within five hundred (500) feet of the area to be graded or filled, whether on land owned by the applicant or by others, shall be shown on the Plan.
 6. Total acreage of tract.
 7. Location and identification of all existing and proposed public and private easements. All structures should include first floor elevations.
 8. Location of all existing and proposed structure, roads, utilities, parking areas, and development appurtenance.
 9. Existing and proposed street names.
 10. All proposed temporary and permanent erosion and sediment control and stormwater management facilities.
 11. A limit of disturbance line.
 12. Construction staging narrative.
 13. Detail drawings and specifications for all temporary and permanent erosion and sediment control and stormwater management facilities.
 14. All supporting calculations, documentation, and manufacturer's literature.
 15. Storm drainage calculations as may be required by the Township Engineer.
- E. Additional Drawing Requirement for Land Grading Plan - In addition to the Drawing Requirements previously stated, the following data shall be provided on the Land Grading Plan:
1. The plan shall be drawn to scale of not less than one (1) inch = fifty (50) feet, shall

indicate the magnetic north point, and owner's name and address.

2. Abutting property lines and the names of abutting landowners.
3. In cases of heavily wooded areas, the outline of the wooded areas and the location of trees which are to remain shall be shown.
4. In areas which are anticipated to experience seasonal high water table conditions, grading and drainage provisions should be provided for anticipated basement sump pump discharges.
5. A location map at a scale not smaller than one(1) inch = two thousand (2,000) feet shall be drawn showing:
 - a. Relation of tract to adjoining property.
 - b. Municipal boundary lines, if present.
 - c. Related road and highway system within one thousand (1,000) feet of tract.
6. Statement that the applicant is the owner, equitable owner or authorized by the owner in writing to make application for the proposed land grading.
7. Grading notes.
8. Residential driveway notes.

F. Construction Requirements

1. Fill - Fill shall not contain boulders or fractured rock or broken concrete over one (1) foot in largest dimension, or any organic material, trash, garbage, or broken asphalt paving. Fills of more than five (5) feet deep shall be compacted while being placed by a method approved by the Township Engineer.
2. Slopes - All constructed slopes shall not exceed the following:
 - a. Cut slopes in earth – two (2) horizontal, one (1) vertical feet
 - b. Cut slopes in rocks – one (1) horizontal, one (1) vertical feet
 - c. Fill slopes – three (3) horizontal, one (1) vertical foot

Slope limitations and allowances are subject to change pending review of the Township Engineer. The Township reserves the right to make limitations more stringent where public safety or protection of waterways, streets, and slopes are involved.

3. All grading must also meet the requirements of this Ordinance.

G. Other Requirements

1. During grading operations, necessary measures for dust control must be exercised.
2. Grading equipment shall not be allowed to cross streams. Provisions shall be made for the installation of temporary or permanent culverts or bridges.
3. No work will be allowed to commence until all applicable permits and approvals have been obtained. Where deemed necessary by the Township or State/Federal Law, the Adams County Conservation District must approve the grading plan.
4. Steep slope areas shall be preserved in their natural state whenever possible. Where construction of roads, buildings, driveways, or infrastructure cannot be avoided, disturbance shall be kept to the minimum area necessary and shall comply with the zoning ordinance.
5. A pre-construction walkthrough is required prior to clearing and grubbing operations to physically delineate the limits of disturbance for areas near trees, tree groves, slopes, streams, floodplains, wetlands, etc.

H. As-built plans

1. Where detailed grading plans are required for a specific structure an as-built plan shall be required. Approval of the as-built plan is required prior to receipt of a use and occupancy permit or release of financial surety (whichever is applicable).
2. As-built plans shall be provided at two stages of construction.
 - a. A written certification shall be provided at such time as the footing of the structure is completed to document the elevation of the structure (top of block elevation).
 - b. A plan submission shall be made upon completion of the building and finished grading.
3. Contents of the as-built plan shall be as required herein for as-built plans. Tolerances shall be as provided by the Township Engineer.

Section. 409. Sewage Disposal Systems.

Design of all sewage disposal systems shall be subject to review and approval of the Township as follows:

- A. In the case of on-site sewage disposal systems, testing, design, permitting, and installation shall be in accordance with applicable Township Ordinances and Rules and Regulations of the Pennsylvania Department of Environmental Protection. Review and approval shall be by the Township Sewage Enforcement Officer.
- B. In the case of central sanitary sewer systems and wastewater treatment facilities which are to be privately owned, the design plans and specifications shall be subject to review of the Township, as part of the Subdivision or Land Development Plan process. Design criteria shall be that of PADEP and as supplemented by the Township and/or Authority. Review and approval of the sanitary sewer system plans by the Township is required for Preliminary

Plan approval. Review and approval of the wastewater treatment facility plans by the Township is required for Final Plan approval. Following approval of the Township, the developer is required to obtain approval from the Pennsylvania Department of Environmental Protection. Final Plan approval will not be granted until the developer submits copies of all applicable permits.

- C. In the case of sanitary sewer systems and wastewater treatment facilities which are to be dedicated to the public, review and approval of design plans and specifications shall be by the applicable Municipal Agency or the Township in accordance with their Rules and Regulations. Review and approval of plans and specifications by the Township and/or applicable Municipal Authority shall be part of the Subdivision or Land Development Plan process. Review and approval of the sanitary sewer system by the Township is required for Preliminary Plan approval. Review and approval of the wastewater treatment facility by the Township is required for Final Plan approval. Final Plan approval will not be granted until the developer submits copies of all applicable permits from PADEP other government agencies.
- D. The Township may require a complete feasibility study at either Preliminary or Final Plan stage in which case the following additional requirements shall apply:
 - 1. Where there is an existing public sanitary sewer main within one thousand (1,000) feet, measured in straight-line distance from the terminus of the system to the nearest tract line of the development, and adequate treatment capacity is available, a complete sanitary collection system shall be installed and connected by the developer to the existing public sanitary sewer system. Prior to obtaining final subdivision and land development approval, approval to connect or hook onto the system must be obtained. Said approval shall be noted on the plan. If adequate treatment capacity is not presently available, the Township may require an agreement where the property would be required to connect at such time as capacity is available.
 - 2. For any plan proposing a privately owned community sewage system, the developer shall submit with the sewage facilities planning module a proposed agreement for review and approval by the Township Engineer and Township Solicitor which contains, at a minimum, the following:
 - a. The obligation of the Developer to install the system according to the design as approved by the Township;
 - b. The obligation of the developer to provide, prior to final plan approval, financial security, in form approved by the Township Solicitor, and in the amount approved by the Township Engineer, to secure one hundred ten(110%) percent of the estimated installation costs, which amount shall be subject to increase or decrease in accordance with Section 509 of the Pennsylvania Municipalities Planning Code;
 - c. A schedule of inspections of the installation to be performed by the Township Engineer, at intervals approved by him, with the agreement of the developer to bear the entire costs of such inspections;
 - d. The submission of as-built drawings at the time of completion of the system;
 - e. A covenant that upon a public sanitary sewer system becoming available (available being defined to be an operating system, the terminus of which is one thousand

(1,000) feet, or less, measured in straight-line distance to the nearest tract line of the development and which has capacity to service the total development) the private system shall be connected to such public system; and

- f. The provision of financial security, in form approved by the Township Solicitor, and in the amount approved by the Township Engineer, to secure the long-term operation, maintenance and replacement of the system, all in accordance with the requirements of the Township and the provisions of Chapter 71 of Title 27 of the Regulations of the Pennsylvania Department of Environmental Protection.
3. Where the site of the proposed development is more than one thousand (1,000) feet from the nearest available public sewer system, the developer may provide the proposed development with a complete public sanitary sewer system if adequate treatment capacity is available and all connection costs are assumed by the developer. If this is not feasible or desirable, the adequate provision of on-site subsurface or alternate sewage disposal systems approved by the Pennsylvania Department of Environmental Protection shall be investigated.
 4. Where installation of a public sanitary sewer system is not required, the developer or owner of the lot shall provide for each lot, at the time improvements are erected thereon, a private sewage disposal system consisting of a septic tank and tile absorption field or other sewage disposal system approved by the Pennsylvania Department of Environmental Protection and the Township Sewage Enforcement Officer.

Section 410. Water Supply Systems.

Prior to design of water systems where required by the Township a Water Resource Impact Study shall be completed for review and approval by the Township. Design of all water supply systems shall be subject to review and approval of the Township as follows:

- A. In the case of individual private on-site wells and distribution systems, reviews and approval shall be by the Township in accordance with standards of the PA DEP and applicable Township Ordinances. Review, approval and permitting shall be done prior to construction in accordance with the Township Well Ordinance.
- B. In the case of central Private or Public Water Systems, which will be privately owned, review and approval of plans and specifications shall be by the Township and where deemed necessary, the applicable Municipal Authority in accordance with the standards of the Township Well Ordinance, PA DEP and Township or Authority Rules and Regulations. Review and approval shall be part of the Preliminary Plan process. Following approval by the Township, the developer is required to obtain approval from PA DEP. Preliminary Plan approval will not be granted until the Township and/or Authority has approved the plans. Final Plan approval will not be granted until all permits are obtained. A Township well permit (where applicable) must be obtained prior to construction.
- C. In the case of Public Water Systems which will be dedicated to the public, review and approval of design plans and specifications shall be by the applicable Municipal Agency, or Authority in accordance with their Rules and Regulations. Review and approval of plans and specifications shall be part of the Preliminary Plan process. Preliminary Plan approval will not be granted until the developer submits copies of all applicable approvals from the local Municipal Agency or Authority. Final Plan approval will not be given until all permits are obtained from PA DEP and other government agencies.

- D. In any residential development where ten (10) or more homes are proposed on lots of less than one (1) acre each and on-site sewage disposal is also proposed, a central water system shall be provided in accordance with the requirements of this Ordinance.
- E. Where water is to be provided by means other than by private wells owned and maintained by the individual owners of lots within the subdivision or development, applicants shall present evidence to the Board of Supervisors or the Planning Commission, as the case may be, that the subdivision or development is to be supplied by a certified public utility, a bona-fide cooperative association of lot owners, or by a municipal corporation, authority, or utility. A copy of a certificate of Public Convenience from the Pennsylvania Public Utility Commission or an application for such certificate, a cooperative agreement, or a commitment or agreement to serve the area in question, whichever is appropriate, shall be acceptable evidence.
- F. In addition, in conjunction with completion of a feasibility study, the following requirements shall apply:
1. A Water Resources Impact Study shall be required when the proposed development is not under the jurisdiction of the DEP or will not be served by public water supplied by a Municipal Authority approved by the Township; and one (1) or more of the following conditions are met:
 - a. Individual, private on-site wells and distribution systems, in which lots will rely on groundwater as the primary source of drinking water, are proposed for use in residential subdivisions containing five (5) lots or more and the smallest created lot is less than five (5) acres in area.
 - b. The non-residential subdivision contains three (3) lots or more.
 - c. A proposed well is intended for non-residential use (i.e., industrial, commercial, geothermal heating or cooling, institutional, agricultural).
 2. A professional geologist licensed in the Commonwealth of Pennsylvania and qualified to conduct groundwater investigations shall prepare the Water Resources Impact Study. The purpose of the study will be to determine if there is an adequate supply of water for the proposed use and to estimate the impact of the additional water withdrawals on existing nearby wells, underlying aquifers and / or nearby surface water features (i.e., streams, wetlands, etc.). The Township Engineer shall review the impact study work plan, including proposed test well locations and pumping test procedures. Approval of the work plan by the Township Engineer shall be required prior to implementation.
 3. The adequacy of water supply shall be determined based upon the guidelines established in the Adams County Wellhead Protection Plan (ACWHPP) of four hundred (400) gpd per household for peak demand calculations, and used as a conservative estimate by which to perform a groundwater budget analysis.

A water system, which does not provide the minimum rate of supply of water for the proposed use, does not meet drinking water quality standards, and/or where the Township

Hydrogeologist/consultant deems adverse impacts to nearby wells, ponds, and streams, the system shall not be approved by the Township.

G. Water Resources Impact Studies:

The Water Resources Impact Study shall contain at a minimum the following information:

1. Calculations of projected water demands, including a determination of required fire flows.
2. Literature review and reference of published geologic and hydro-geologic reports.
3. A geologic map of the area within a one (1.0) mile radius of the proposed property boundaries and site.
4. The location of all faults, lineaments and fracture traces on-site and within one-half (1/2) mile of the proposed property boundaries.
5. The locations of all existing and proposed wells within one-fourth (1/4) mile of the site and all large withdrawal wells (one hundred thousand 100,000 gpd+) within 0.5 mile of the site.
6. Permission must be sought from all adjoining lot owners to test all current wells associated on their property.
7. The locations of all test wells (both pumped and observation), along with the proposed lot boundaries, should be located on an accurate site plot plan or basemap at a minimum scale of one (1) inch to five hundred (500) feet.
8. Define/map the boundary of the surface watershed in which the proposed development is located (use relevant USGS 7.5-minute topographic map as a base map). The approximate property boundary for the development shall be delineated on this surface watershed map.
9. Define known sources of groundwater contamination within this mapped surface watershed boundary and evaluate the potential impact(s), if any of this contamination on the proposed ground water use.
10. The location of all existing and proposed on-lot septic systems within one-fourth (1/4) mile of the site.
11. The location of all streams, perennial and intermittent, within one-fourth (1/4) mile of the site.
12. Define existing municipal, community, industrial and/or agricultural demands on groundwater resources located within 0.5 mile of the proposed development boundaries.
13. A Water-Table or Potentiometric Surface Map showing groundwater elevation contours and the direction of groundwater flow.

14. Calculate a water budget for the subject site from available information contained in published literature and government sources for the geologic formation(s) occupying the site. The budget calculations should document long-term average precipitation (inches per year, in/yr), total surface runoff (in/yr), evapotranspiration (in/yr), and groundwater recharge rates (in/yr and gallons per day per acre). The long-term average groundwater recharge rate should be reduced by forty (40%) percent to estimate the annual amount of groundwater recharge expected during years of drought conditions.
15. Confirm that there are no nearby groundwater users whose withdrawal would inhibit the development from meeting its proposed groundwater usage rate.
16. Divide the total annual groundwater recharge calculated for drought conditions for the proposed development by four hundred (400) gpd (one (1) Equivalent Dwelling Unit, EDU) to calculate the maximum number of residential building lots that can be adequately supplied by the groundwater resource underlying the subject development site.

H. Site Specific Report Requirements:

The following site-specific investigations shall be carried out in preparation of the Water Resources Impact Study:

1. The installation and testing of new water supply wells for residential developments shall be included as part of the impact study as follows:
 - a. One (1) test well and at least one (1) observation well shall be installed and tested on proposed developments of five (5) lots or more and the smallest proposed lot is less than five (5) acres in area.
 - b. For proposed developments of six (6) or more lots, test wells shall be installed and tested on thirty (30%) percent of the proposed lots. Test wells shall be located to be representative of both the variety of landforms and geologic formations contained by the proposed development.
 - c. For developments underlain entirely by Diabase, one test well shall be installed and tested on each lot to ensure an adequate water supply.
2. The installation and testing of new water supply wells for non-residential developments shall follow the frequency given below:
 - a. For a non-residential user proposing to withdraw twenty five thousand (25,000) gpd or less, one new test well shall be installed and tested. At least one (1) observation well is required to be monitored during both the pumping/recovery phase of the well test.
 - b. For a non-residential user proposing to withdraw more than twenty five thousand (25,000) gpd but less than one hundred thousand (100,000) gpd, two new test wells shall be installed and tested.

- c. A non-residential user under the PA DEP jurisdiction and will be reviewed by the Township. The Township shall not grant final plan approval until all necessary permits are obtained from all applicable regulatory agencies.
3. Any well installed in the Township for residential use, non-residential use or testing purposes requires a permit from the Township and shall be constructed and sampled in accordance with the Township's Well Ordinance. During the drilling and construction of the well, proper techniques of well development shall be utilized so as to obtain the best practical yield and quality, which is representative of the aquifer.
4. Each test well shall have an accurate geologic log prepared under the direction of a professional geologist licensed by the Commonwealth by a geologist during the drilling of the well, giving a detailed description of the type and thickness of soils and bedrock formations encountered. Additionally, the log should contain information on the depth and thickness of all water bearing zones encountered and the yield from each zone.
5. Pumping Tests and Recovery Tests – Each new test well shall be pumped at a constant discharge rate for a minimum period of eight (8) continuous hours. The discharge rate shall be appropriate to the blown yield of the well to adequately stress the aquifer but not dewater the well. Recovery levels shall be measured at regular intervals immediately following the pumping period until ninety (90%) percent recovery of the pre-test water level is achieved.
6. During the performance of each pumping recovery test, time-drawdown measurements (within accuracy of one-tenth foot) shall be taken from the pumped well and at least one nearby observation well. The time-drawdown measurements must be taken in both the pumped well and the observation well at the following minimum frequencies:
 - a. One (1) reading every minute for the first ten (10) minutes of the test.
 - b. One (1) reading every two (2) minutes for the ten (10) to one hundred (100) minute test interval.
 - c. One (1) reading every ten (10) minutes for the one hundred (100) to three hundred (300) minute test interval.
 - d. One (1) reading every twenty (20) minutes from three hundred (300) minutes to the end of the pumping period.
 - e. Repeat frequency for recovery phase of test.
7. All observation wells should be located within two hundred (200) feet horizontal distance from the pumping well, or be close enough to incur measurable drawdown during the pumping phase of the test. The observation well can be either a) an existing domestic well, but only if the domestic well is not actively pumped for the entire duration of testing (pumping and recovery phases) and its construction details (total depth and cased depth) penetrate the same hydro-geologic unit as the new well, or b) a new supply well on an adjacent lot if that adjacent well penetrates the same hydro-geologic unit as and its construction details (total depth and cased depth) are compatible with the new well

being tested, or c) a new well specifically installed as an observation well for test purposes and scheduled for permanent abandonment following relevant Township requirements after the testing has been completed.

8. The time-drawdown data collected from each pumping test should be used to define the local aquifer characteristics, including hydraulic conductivity, transmissivity, coefficient of storage, and the expected long-term yield of the well(s) being tested. Distance-drawdown relationships and impact on surrounding water users from the proposed groundwater withdrawal should be included in the assessment. A groundwater availability analysis should be included in the impact study to demonstrate that there are sufficient groundwater resources within the drainage basin to support both existing users and the proposed withdrawal. Raw time-drawdown data and field testing notes should be included in the report as an appendix.
 9. Water samples for chemical analyses should be collected from the pumped wells within one (1) hour of the scheduled end of the pumping phase of each test. Samples shall be analyzed at a DEP-certified laboratory for pH, total dissolved solids, iron, manganese, nitrate-nitrogen and coliform bacteria. A copy of the laboratory analytical report for each sample shall be included and summarized in the report.
 10. All water supply wells to be used for domestic purposes shall have a minimum yield of one (1.0) gpm. In the case of low yielding wells, i.e., less than five (5) gpm, the proposed water system shall be designed to be able to provide sufficient storage via oversize tanks and/or storage in the well bore to meet expected peak demand (i.e., four hundred (400) gpd).
- I. Water Resources Impact Study Determination:
When a Water Resources Impact Study is required, the Board of Supervisors will approve the use of on-lot water supply systems (wells) or non-residential use wells when:
1. This report indicates that justification of the project necessitates consideration of this type of water supply.
 2. The anticipated water supply yield is adequate for the type of development proposed.
 3. The installation of such systems will not endanger or adversely decrease the groundwater supplies to adjacent properties.

On relatively large projects, and when deemed appropriate and necessary by the Township Engineer, the analysis of the potential hydrologic impact using a groundwater model (i.e., MODFLOW) may be required in addition to the above fieldwork to adequately characterize and predict the overall impact the proposed project will have on availability groundwater resources.

Section 411. Associations For The Operation of Private Community Water or Sanitary Sewer Systems

A private homeowners association shall be formed by the developer, to which all lot owners must belong, and which shall be governed by the following minimum provisions:

- A. The association shall be charged with the responsibility for the operation, maintenance and replacement of the system, which obligation shall be transferred from the developer according to the schedule set forth in its operation bylaws or other agreement with the developer, and which schedule is approved by the Township.
- B. At the time of transfer of the system, the Association shall become the owner of the complete system, including the plant, pumps, conveyance facilities and appurtenances.
- C. The association must have perpetual existence and shall remain fully responsible for the operation, maintenance and replacement of the system until such time as it is dedicated to, and accepted by, a municipality or municipal authority having jurisdiction to provide public water or sanitary sewer services in the area in which the development is located.
- D. The association charter and/or bylaws shall provided for the collection of all operation, maintenance and replacement costs of the system, by assessments or other charges, from all lot owners serviced by the system.
- E. The association bylaws shall provide for the placement of liens against the owners of units/lots who have failed to pay any assessments or other charges when due; such liens to have priority over any lien filed to recover association debt.
- F. The association shall be required to maintain liability insurance at all times and in amounts acceptable to the Township, or as otherwise required by the Pennsylvania Department of Environmental Protection, covering the operation, maintenance and replacement of the system; the township shall be named as an additional insured on the association's liability policy.
- G. The association shall concurrently submit to the Township copies of all reports that are required to be submitted to the Pennsylvania Department of Environmental Protection regarding the operation, maintenance and repair of the system.
- H. The association shall provide copies of its financial statements to the Township on an annual basis, promptly after such statements are approved for the year.
- I. The association and all owners of lots within the development shall, during such ownership and/or use of the system, indemnify, defend and hold harmless the Township from any and all claims, demands, liabilities, damages and losses, including reasonable attorney fees, resulting, in whole or in part, from the construction, installation, operation, maintenance and/or replacement of the system.
- J. Prior to final plan approval, the developer and/or Association shall establish and maintain financial security with the Township to cover the costs of future operation, maintenance and replacement of the system in accordance with Chapter 71 of Title 25 of the Regulations of the Pennsylvania Department of Environmental Protection.
- K. The association shall enter into a contract for an operation/maintenance agreement with a Pennsylvania Department of Environmental Protection certified plant operator, and backup plant operator as required by its Regulations, which shall require the plant operator to comply with all federal and state laws and to provide copies to the Township on a quarterly basis or all reports made to any federal or state agency. The operator shall monitor the system as required by Pennsylvania Department of Environmental Protection. The

association shall, on an annual basis, provide a copy of the operators' license to the Township. The association shall notify the Township if the contract for operation/maintenance agreement changes, including but no limited to a different operator or back-up operator.

- L. The Township shall be deemed to be a third party beneficiary of the homeowners association agreement and if, for any reason, the Township expends monies to maintain, repair or replace the system due to a default by the association, the individual lot owners shall be responsible to reimburse the Township for any monies so expended, and failure to reimburse shall constitute grounds for the Township to place a lien on the lot owner's property. Nothing herein shall be construed to place any duty or responsibility on the Township with respect to any matter concerning the operation, maintenance or replacement of the system.
- M. The document containing the above provisions shall be presented to the Township Engineer and Township Solicitor for review and approval prior to final plan approval.

Section 412. Traffic Impact Studies.

A. Purpose and Intent:

The impact of new traffic from proposed land developments is an important aspect of assessing the overall impacts of new development in the Township. All new land developments will generate new traffic. Some land developments may generate enough traffic to create congestion and/or substantially increase the level of travel delay experienced by existing users of the township's transportation system. Corrective measures may be necessary to mitigate the transportation impacts of proposed land developments. These corrective measures could include new roads, traffic signals, turn lanes, and other intersection improvements. Traffic impact studies will allow the township to better determine the transportation demands of development proposals and provide for reduction of adverse impacts on the transportation system.

B. Objectives:

The township finds that requiring a traffic impact study for proposed developments that meet certain thresholds of applicability will help to achieve the following objectives:

1. Identify the amount of additional traffic that would be generated by the development;
2. Assess the impacts of the development on the operational performance of the Township's roadway system;
3. Determine the ability of the Township's current roadway system to accommodate the additional traffic demands of the development;
4. Determine the improvements necessary, if any, to accommodate the additional traffic associated with the new development;
5. Ensure safe and reasonable traffic conditions on streets after the development is complete;
6. Protect the substantial public investment in the street system;
7. Provide information relevant to comprehensive planning, transportation planning, transit planning and the provision of programs and facilities for traffic safety, road improvements, transportation demand management, pedestrian access and other transportation system considerations.

C. Short Title:

This Section shall be known and may be cited as the Traffic Impact Study Requirements.

D. Definitions:

DEVELOPMENT - Any land development, subdivision, and/or change in use proposed for consideration by the Township.

HORIZON YEAR - The horizon year shall be ten years into the future from the opening date of the proposed development.

INTERNAL TRIPS - Trips that are made within a multi-use or mixed-use development, by vehicle or by an alternate mode, such as walking.

LEVEL OF SERVICE (LOS) - A quantitative and qualitative measure defined by the "Highway Capacity Manual", latest edition of how well traffic flows on a given roadway or intersection. Level of Service relates to such factors as highway width, number of lanes, percentage of trucks, total traffic volume, turning movements, lateral clearances, grades, sight distance, capacity in relation to volume, travel speed and other factors which affect the quality of flow. Level of Service is typically summarized by letter grades described as follows:

Level "A" is a condition with low traffic volumes, high speeds and free-flow conditions.

Level "B" is a condition with light traffic volumes, minor speed restrictions and stable flow.

Level "C" is a condition with moderate traffic volumes, where speed and maneuvering are restricted to a limited degree by the amount of traffic.

Level "D" is a condition with heavy traffic operating at tolerable speeds, although temporary slowdowns in flow may occur.

Level "E" is a condition of very heavy flow and relatively low speeds. Under Level "E" the traffic is unstable and short stoppage may occur.

Level "F" is a condition of extremely heavy flow, with frequent stoppage and very slow speeds. It is an unstable traffic condition under which traffic often comes to a complete halt.

NEW TRIPS - Total vehicle trips, minus pass-by trips, minus internal trips, if applicable.

PASS-BY TRIPS - Vehicle trips which are made by traffic already using the adjacent roadway and entering the site as an intermediate stop on the way to another destination.

PEAK HOURS OF ADJACENT STREET TRAFFIC - The highest hourly volumes of traffic on the adjacent streets (four consecutive fifteen minute intervals) on a typical weekday between 7:00 a.m. to 9:00 a.m and/or between 4:00 pm to 6:00 pm.

SITE GENERATED PEAK HOUR - The highest hourly volume of traffic entering and exiting a development site. This peak may coincide with the peak hour of adjacent street traffic or occur at other times such as mid-day, late evening, or during the weekend.

LOCAL TRIP GENERATION STUDY - A study by a qualified professional of a minimum of three comparable developments of similar land use and development characteristics which provides empirical data on the actual number of trips entering and exiting said development(s) during the applicable peak hours.

QUALIFIED PROFESSIONAL - For purposes of conducting traffic impact studies as may be required by this Section, a qualified professional shall mean a registered professional engineer with experience in traffic engineering.

TRAFFIC IMPACT STUDY - An analysis and assessment, conducted by a qualified professional, that assesses the effects that traffic related to a proposed land development will have on the transportation network in a community or portion thereof. Traffic impact studies vary in their range of detail and complexity depending on the type, size and location of the proposed development.

TRIP - A single or one-directional travel movement with either the origin or destination of the trip inside the study site.

TRIP GENERATION - An estimate of the number of vehicle trips that will be generated due to the new development, which is calculated based on the type and amount of land uses in the proposed development and professionally accepted trip generation data for each such land use. Trip generation may be expressed on an average daily or peak hour basis.

E. Thresholds of Applicability:

A traffic impact study shall be required for any land-development proposal, subdivision, and/or change in use which is expected to generate fifty (50) or more new trips during any peak hour or five hundred (500) or more new trips during an average day. The estimated number of trips shall be determined in accordance with this Section.

The Township reserves the right to require a traffic impact study for developments generating less than 50 new trips during any peak hour in cases where traffic deficiencies exist in the area of the proposed development.

F. Exemptions:

1. A traffic impact study is not required if the land-development proposal is initiated by the Township.
2. A land development proposal may be exempted from the traffic impact study requirement if a prior traffic impact study for the subject property has been submitted to the township within the previous 2-years and the proposed development is substantially similar to that for which the prior traffic impact study was conducted.

G. Scoping Meeting:

Prior to beginning a traffic impact study, the applicant or its representative must schedule a scoping meeting with the appropriate representatives of the Township. The purpose of this scoping meeting is to discuss the availability of site-specific information concerning the development, available traffic counts from other studies, boundaries of the study area, time periods of study, and pending developments located nearby that may influence travel patterns within the study area. Representatives of adjoining municipalities shall be invited to the scoping meeting if the boundary of the study area as defined by this Section crosses the Township boundary.

The applicant shall submit the following information to the Township at least two weeks prior to the Scoping Meeting:

1. A brief description of the proposed project in terms of location, type, and intensity of land-use.
2. A map of the study area defined in accordance with the requirements of this Section.
3. Projected site generated traffic volumes determined in accordance with the requirements of this Section for average daily traffic, the peak hours of adjacent street traffic, and the peak hour of generator.

H. Time Periods of Study:

At a minimum, the traffic impact study must provide all the analyses identified by this Section for the morning and afternoon peak hours of adjacent street traffic during a typical weekday. Proposed retail developments must also provide all the analyses identified by this Section for the Saturday peak hour of generator. Proposed developments expected to have site-generated peak hour(s) that differ from the peak hours of adjacent street traffic must also include all the analyses identified by this Section for the peak hour(s) of the generator. Examples of these types of developments include, but are not limited to, elementary schools, high schools, movie theaters, churches, and stadiums. The time periods of study shall be established during the Scoping Meeting required by this Section.

I. Definition of Study Area:

The traffic impact study area shall include all major streets and intersections expected to accommodate fifty (50) or more new trips during any peak hour or five hundred (500) or more new trips during an average day. Major streets shall include all roadways with a functional classification other than local road or residential street. Major intersections shall include all junctions other than those involving only local roads or residential streets. The study area for all traffic impact studies shall include the driveway access points between the development and the external roadway system.

J. Required Contents of a Traffic Impact Study:

The traffic impact study must evaluate the adequacy of the existing transportation system to serve the proposed development and identify the expected impacts of the proposed development on the transportation system. The traffic impact study must provide adequate information for township staff to evaluate the development proposal and, when appropriate, recommend conditions of approval.

The qualified professional preparing the traffic impact study is encouraged to coordinate preparation with local staff and staff from other jurisdictions, as appropriate, to ensure that all necessary components are included in the traffic impact study and to reduce revision and review time.

The traffic impact study shall include at least the following minimum components:

1. Title Page. The title page shall list the name of the proposed development, the location of the proposed development, the name of the applicant, and the name of the qualified professional that prepared the study.

2. Certification. The traffic impact study shall be signed and sealed by a qualified professional. The seal shall be affixed to the title page.
3. Executive Summary. The executive summary shall describe the location and composition of the proposed land development, discuss the major findings of the traffic impact analysis, and list the recommendations of the qualified professional.
4. Table of Contents. The table of contents shall provide a page number listing of the major components of the traffic impact study.
5. Location Map. A location map shall illustrate the place of the proposed development and the location of intersections within the study area as defined by this Section.
6. General Site Description. The site description shall include the existing and proposed land uses, current zoning, size of the proposed development, number/location of access points onto the surrounding roadway system, construction phasing, and completion date of the proposed land development. A conceptual site plan of the proposed development shall be included in the traffic impact study.
7. Internal Transportation System. The traffic impact study shall describe the transportation system located within the proposed development site. This description shall include vehicular ingress and egress locations, existing or proposed internal roadways including the widths of cartway, widths of right-of-way, parking conditions, traffic channelization, traffic control devices, bicycle accommodations, and pedestrian accommodations.
8. External Transportation System. The traffic impact study shall describe the entire external roadway system within the study area defined by this Section. For major streets within the study area, this description shall include identification of route number, right-of-way widths, cartway widths, shoulder widths, presence/absence of curbing, Township functional classification, State functional classification, regional connectivity, posted speed limits, 85th percentile operating speed, roadside conditions, and pavement conditions. For major intersections within the study area, this description shall include a description of the intersection layout, number of lanes, approach gradient, lane-use control, type of traffic control, and traffic signal timing parameters. Where applicable, traffic signal permit plans shall be obtained from the Pennsylvania Department of Transportation and included in an Appendix to the traffic impact study. A sketch depicting existing conditions shall be provided in the traffic impact study for all roadways and intersections within the study area.
9. Nearby Development. The traffic impact study shall list and provide a brief description of other planned, pending, partially built-out, vacant, and/or partially occupied land developments within the study area that have received municipal land development approval. These nearby developments shall be identified during the Scoping Meeting required by this Section. All nearby developments listed in this section shall be included in the future-year traffic projections for the study area.
10. Programmed Roadway Improvements. The traffic impact study shall list and describe any roadway improvements that have been scheduled with guaranteed funding by either the Township or the Pennsylvania Department of Transportation for construction by the project horizon year. This information shall be identified during the Scoping Meeting

required by this Section. The programmed roadway improvements listed in this section shall be included in the future-year level-of-service analyses of the study area.

11. Existing Traffic Conditions. The traffic impact study shall identify existing traffic conditions for all roadways and intersections in the study area. The existing traffic data, including the traffic volumes for average daily traffic, peak hours of adjacent street traffic, and peak hour(s) of the generator, if applicable, shall be field collected by experienced personnel. Traffic counts for the weekday peak hours of adjacent street traffic and the weekday peak hour(s) of the generator shall be collected on a Tuesday, Wednesday, or Thursday during a week that does not include a federal and/or state holiday. The traffic impact study shall illustrate the existing traffic volumes on a schematic turn movement diagram of the study area.

The traffic counts shall be reflective of the year of when the report was prepared. Traffic counts between one and three years old may be used if factored to the current year using an appropriate growth rate for the area in question. Traffic counts older than three years shall not be used in the traffic impact study.

Seasonal adjustment of traffic counts is required when the study area is located within or near a major tourist destination. The seasonal adjustment factor shall adjust the field-collected traffic counts from the off-peak observed value to the expected value during the highest month of the peak season. In no case shall the seasonal adjustment factor be used to adjust the field-collected traffic counts to a lesser value.

The traffic impact study shall provide a discussion of the balance of the existing traffic counts between adjacent intersections. Potential mid-block sinks and sources of traffic shall be identified to justify any imbalance or the existing traffic counts shall be balanced to the higher of the observed values.

12. Trip Generation. The traffic impact study shall estimate trip generation for the proposed development based on the publication "Trip Generation" published by the Institute of Transportation Engineers (ITE), most recent edition. The independent variable selected for the calculation of trip generation shall be based on the procedures of "Trip Generation Handbook" by ITE, most recent edition. The method of calculation of trip generation (by weighted average rate, by equation, or by local data) shall also be based on the procedures of the "Trip Generation Handbook". If local data collection is required, the local data must be collected based on the procedures of the "Trip Generation Handbook" at a minimum of three similar sites and be presented in a manner that is verifiable by the township.

For retail developments, the traffic impact study shall estimate pass-by trips based on the procedures of the "Trip Generation Handbook" by ITE, most recent edition. The qualified professional must provide justification for any assumptions related to the estimate of pass-by trips, particularly in cases where the "Trip Generation Handbook" does not provide applicable data for the land-use or time period in question.

For multi-use developments containing a mixture of retail, office, and/or residential uses, the traffic impact study shall estimate the number of internal trips following the procedures of the "Trip Generation Handbook" by ITE, most recent edition. The total amount of internal trips for any one land-use within the multi-use site to/from all other land-uses of each type (retail, residential, or office) within the multi-use site shall be

limited to the applicable internal capture rate presented in “Trip Generation Handbook” for each type of land-use pairing. The qualified professional must provide justification for any assumptions related to the estimate of internal trips, particularly in cases where the “Trip Generation Handbook” does not provide applicable data for the time period in question.

For developments expected to generate more than thirty (30) trucks per day, the trip generation data shall include separate figures for trucks.

If phased development is proposed, a trip generation estimate shall be provided for the amount of development completed at the end of each phase.

13. Trip Distribution and Assignment. The traffic impact study shall estimate trip distribution based on one of the procedures suggested in the publications “Transportation and Land Development” by ITE, latest edition and “Transportation Impact Analysis for Site Development” by ITE, latest edition. The qualified professional may follow other methods for trip distribution/traffic assignment with the Township’s approval. Supporting data and calculations must be provided in the traffic impact study for verification of the trip distribution pattern.

When the site has more than one access driveway, logical routing and possibly multiple paths should be used to obtain realistic driveway volumes. A multi-use development may require more than one distribution and coinciding assignment for each land-use type.

Trip distribution for pass-by trips shall follow the procedures of the “Trip Generation Handbook” by ITE, latest edition. The amount of pass-by trips routed into the development site from any adjoining roadway shall be limited to 25 percent of the non-site related traffic volume on that roadway.

For developments expected to generate more than thirty (30) truck trips per day, the study shall include separate trip distribution figures for trucks. For the level-of-service analyses, the percentage of heavy vehicles by approach shall be recalculated to include the expected trucks that would be generated by the development. The traffic volume entries for the trucks in the traffic signal warrant analyses and auxiliary turn lane analyses required by this Section shall be adjusted to passenger car equivalents in accordance with the “Highway Capacity Manual”, latest edition.

14. Forecast Pre-Development Traffic Volumes. The traffic impact study shall provide opening year and horizon year forecasts of average daily traffic and peak hour traffic volumes for pre-development conditions. This forecast shall follow the build-up method recommended in “Transportation Impact Analysis for Site Development” by ITE, latest edition. Regional travel growth shall be estimated by adjusting existing through traffic volumes within the study area (un-related to specific land developments within the study area) by a growth rate reflective of the type of roadways within the study area. The growth rate referenced in this step shall be reflective of regional changes in travel growth from a minimum history of five years. Traffic related to the nearby developments within the study area shall be identified from available traffic impact studies or estimated following the procedures of this Section. The forecasted traffic volumes without development would equate to the sum of existing traffic, expected change in traffic due to regional growth, and expected traffic related to nearby developments.

The traffic impact study shall illustrate the forecasted pre-development traffic volumes on schematic turn movement diagrams of the study area.

15. Forecast Traffic Volumes With the Development. The traffic impact study shall provide opening year and horizon year forecasts of average daily traffic and peak hour traffic volumes for with development conditions. This forecast shall follow the build-up method recommended in "Transportation Impact Analysis for Site Development" by ITE, latest edition. The forecasted traffic volumes with development would equate to the sum of existing traffic, expected change in traffic due to regional growth, expected traffic related to nearby developments, and expected traffic from the development site.

The traffic impact study shall illustrate the forecasted traffic volumes with development on schematic turn movement diagrams of the study area.

16. Level-of-Service Analysis, Baseline Conditions. The traffic impact study shall provide a level-of-service analysis for all roadways and key intersections within the study area for all applicable peak hours for existing conditions, opening year conditions without new traffic associated with the proposed development, opening year conditions with new traffic associated with completed phases of the proposed development, horizon year conditions without new traffic associated with the proposed development, and horizon year conditions with traffic associated with full build-out of the proposed development. The level-of-service analysis shall reference the methodologies presented in the current edition of the Transportation Research Board's "Highway Capacity Manual". The qualified professional shall utilize the most recent edition of any computer software implementations of the Highway Capacity Manual.

The analysis of the baseline level-of-service conditions shall be based on the current geometric and traffic conditions unless otherwise specified by this Section. Traffic signal timings shall be optimized in a manner that minimizes overall intersection delay for all future year conditions. Programmed roadway improvements within the study area shall be considered for the level-of-service analyses of future year conditions, if scheduled for implementation by the future year under consideration. Any deviations from the default values suggested by the Highway Capacity Manual for ideal saturation flow rate, lane utilization, lost time, critical gap, follow-up time, etc. must be fully justified by the qualified professional in a manner that the Township can verify. Analysis parameters such as the peak hour factor and percentage of heavy vehicles shall be referenced by approach from the existing traffic counts taken within the study area. The peak hour factor for movements that directly enter the development site via an access driveway shall be set at 0.9. Unless otherwise specified by this Section, percent heavy vehicles for movements that directly enter the development site via an access driveway shall be set at 2 percent.

The results of the levels-of-service analysis shall be summarized in tabular form and identified on schematic diagrams for all roadways within the study area and for all lane-groups, approaches, and overall averages at all intersections within the study area.

17. Impact Identification. The traffic impact study shall identify the locations where traffic related to the proposed development has impacted level-of-service (LOS)/travel delay within the study area. Levels of service must not deteriorate below LOS C if pre-development traffic operates a LOS C or better conditions, be maintained if pre-development traffic operates at LOS D or LOS E, and be maintained at pre-development

levels of average travel delay if pre-development traffic operates at LOS F. A change in average travel delay of least 5 seconds per vehicle must occur along any roadway, lane-group, approached, or intersection average before the level-of-service is determined to have been impacted.

18. Mitigation Analysis. The traffic impact study shall suggest roadway improvements to mitigate any identified impacts that have occurred within the study area. A level-of-service analysis with the proposed mitigation shall be provided for all roadways and key intersections within the study area to demonstrate the effectiveness of the suggested roadway improvements. The level-of-service analysis shall reference the methodologies presented in the current edition of the Transportation Research Board's "Highway Capacity Manual,". The qualified professional shall utilize the most recent edition of any computer software implementations of the Highway Capacity Manual. Any deviations from the default values suggested by the Highway Capacity Manual for ideal saturation flow rate, lane utilization, lost time, critical gap, follow-up time, etc. must be fully justified by the qualified professional in a manner that the Township can verify. Analysis parameters such as the peak hour factor and percentage of heavy vehicles shall be referenced by approach from the existing traffic counts taken within the study area. The peak hour factor for movements that directly enter the development site via an access driveway shall be set at 0.9. Unless otherwise specified by this Section, percent heavy vehicles for movements that directly enter the development site via an access driveway shall be set at 2 percent.

The results of the mitigation analysis shall be summarized in a tabular comparison of pre-development level-of-service and with development level-of-service with proposed mitigation. The results of the mitigation analysis shall also be shown on schematic diagrams for all roadways within the study area and for all lane-groups, approaches, and overall averages at all intersections within the study area.

19. Preferred Level-of-Service Analysis – The traffic impact study shall suggest roadway improvements to provide a preferred level-of-service "C" along all roadways, lane-groups, approaches, and intersection averages within the study area for horizon year conditions with development. A level-of-service analysis with the proposed improvements to provide preferred level-of-service shall be provided for all roadways and key intersections within the study area to demonstrate the effectiveness of the suggested roadway improvements. The level-of-service analysis shall reference the methodologies presented in the current edition of the Transportation Research Board's "Highway Capacity Manual,". The qualified professional shall utilize the most recent edition of any computer software implementations of the Highway Capacity Manual. Any deviations from the default values suggested by the Highway Capacity Manual for ideal saturation flow rate, lane utilization, lost time, critical gap, follow-up time, etc. must be fully justified by the qualified professional in a manner that the Township can verify. Analysis parameters such as the peak hour factor and percentage of heavy vehicles shall be referenced by approach from the existing traffic counts taken within the study area. The peak hour factor for movements that directly enter the development site via an access driveway shall be set at 0.9. Unless otherwise specified by this Section, percent heavy vehicles for movements that directly enter the development site via an access driveway shall be set at 2 percent.

The results of the preferred level-of-service analysis shall be summarized in a tabular comparison of pre-development level-of-service and with development level-of-service

with proposed improvements to provide preferred level-of-service. The results of the mitigation analysis shall also be shown on schematic diagrams for all roadways within the study area and for all lane-groups, approaches, and overall averages at all intersections within the study area.

20. Proportional Impact Analysis – The traffic impact study shall identify the proportional impact of development traffic on all roadway and intersections within the study area. The proportional impact shall be calculated based on the change of the critical volume to capacity ratio between pre-development and with development conditions during the horizon year.
21. Traffic Signal Warrant Analysis_ The traffic impact study shall provide a traffic signal warrant analyses for all unsignalized intersections within the study area. The warrant analysis shall consider all of the vehicular volume-based conditions listed in the the Manual on Uniform Traffic Control Devices, current edition and the applicable publications of the Pennsylvania Department of Transportation. The warrant analysis shall include all applicable peak hours for existing conditions, opening year conditions without new traffic associated with the proposed development, opening year conditions with new traffic associated with completed phases of the proposed development, horizon year conditions without new traffic associated with the proposed development, and horizon year conditions with traffic associated with full build-out of the proposed development. If signal warrants are satisfied, a left-turn lane/left-turn phase warrant analysis shall be prepared based on procedures detailed by the Pennsylvania Department of Transportation in Publication 149.
22. Queue Analysis_ The traffic impact study shall provide a comparison of existing queue storage characteristics within the study area to the projected 95th percentile queue lengths for all applicable peak hours for existing conditions, opening year pre-development conditions, opening-year with development conditions, horizon year pre-development conditions, horizon year post development conditions, opening year with development conditions with suggested mitigation, and horizon year with development conditions with suggested mitigation. The applicant shall identify any improvements necessary to the queue storage characteristics of the study area to prevent gridlock and queue spill back conditions. The method used to identify the 95th percentile queue lengths is subject to Township approval.
23. Auxiliary Turn Lane Analysis_ The traffic impact study shall provide auxiliary turn lane analyses for the major street approaches to the proposed access points of the development with the external roadway system. Storage length requirements for warranted left-turn lanes shall be a minimum of 75-ft or sufficient distance to accommodate the 95th percentile queue. Storage length requirements for right turn lanes shall be 200-ft plus 100-ft taper for if a full width turn lane is warranted or 200-ft taper if a right-turn taper is warranted. The method used to evaluate auxiliary turn lane warrants is subject to Township approval.
24. Sight Distance. The traffic impact study shall identify available sight distance at each proposed access point between the development and the external roadway system. The traffic impact study shall provide a table that compares the available sight distance to the Township's requirements as specified in the Subdivision and Land Development Ordinance and the criteria of the Pennsylvania Department of Transportation as detailed in Title 67 of the Pennsylvania Code.

25. Improvement Sketches. The traffic impact study must provide sketches of any roadway improvements suggested to satisfy the requirements of this Section. The sketches shall show the improvements on a preliminary engineering drawing at a scale of one inch equals twenty five feet (1"=25'). The drawing must depict proposed lane configurations, lane widths, cartway widths, approach gradient, types of traffic control, right-of-way widths, utility locations, etc. A cost estimate for implementing the suggested improvements shall also be provided.

K. Costs and Fees:

The township assumes no liability for any costs of time delays (either direct or consequential) associated with the preparation and review of traffic impact studies. The applicant shall reimburse the township for all costs related to review of the traffic impact study. No permits for construction or occupancy of a development shall be issued until the applicant reimburses the Township for all such fees.

L. Submittal and Review of Study:

The applicant for the proposed development or the qualified professional shall submit five (5) paper copies of the traffic impact study to the Township for review. The level-of-service worksheets shall also be submitted to the Township on digital media in the software format used for the level-of-service analysis. The Township, at its discretion, may hire a qualified professional to review the traffic impact study. The Township at its discretion may also submit copies of the report to applicable review agencies including, but not limited to the Pennsylvania Department of Transportation, the county planning department, adjacent municipalities, the school district and/or metropolitan/rural planning organization. The traffic impact study will be considered a public report and will be made available for public review.

M. Coordination with the Pennsylvania Department of Transportation.

For developments where the Pennsylvania Department of Transportation (PennDOT) has required a traffic impact study, the traffic impact study shall follow the more restrictive requirements of PennDOT or this Ordinance.

Section 413. Landscaping.

Where required by the Township, all plans shall be accompanied by a Landscaping Plan. The Landscaping Plan shall be reviewed and approved as part of the Preliminary Plan phase. Subdivision plans which are exempt from submittal of a Preliminary Plan shall be exempt from submittal of a Landscaping Plan.

A. Plan Requirements:

Requirements of the Landscaping Plan are as follows:

1. Plan shall be prepared by an individual experienced in selection of plantings.
2. Detail drawings and specifications shall be provided on the plan where applicable.
3. There shall be a key or legend, which corresponds to the plan identifying type of plant.

4. Each lot within a subdivision or land development shall be provided with planting areas. In the case where the lot is intended for single family residential use specific plants do not have to be indicated, however the plan shall identify minimum areas for landscaping.
5. Design shall be in accordance with standard practice of landscape architecture.
6. Selection of plants and trees shall be based on the location of the site and local environmental influence such as slope, soil, wind, temperature, shade, rainfall, and etc.
7. The landscape plan shall be subject to review and approval by the Township Engineer and any necessary sub-consultant.
8. Responsibility for future maintenance shall be that of the property owner; however the developer is responsible for installation under the terms of the posted financial surety.
9. The subdivider or land developer and/or applicant shall be required to preserve all historic trees. The subdivider or land developer and/or applicant shall be responsible for contacting the Pennsylvania Historic and Museum Commission (PHMC) to verify historical significance of the trees. If significance is documented, the Township may require review of the proposed development by PHMC.
10. To minimize potential death or loss that may be caused by a disease that impacts a specific plant or tree species, whenever possible, a mix of multiple species within a development shall be used.

B. Plan Objectives:

1. To provide scenic relief for the purpose of conserving and enhancing the appearance of the community, especially in areas of potential scenic value and of historical note.
2. To assist property owners in maintaining the appearance of their neighborhoods.
3. To provide adequate buffer yards and planting screens to reduce glare; to abate other nuisances; to enhance planting areas in conjunction with streets; where such are required by the provisions of the Liberty Township Zoning Ordinance.
4. To accomplish one or more of the following purposes: screening, retard stormwater runoff, stabilize steep slopes, direct or restrict pedestrian access, define spaces, provide shade and/or complement and enhance the building and grounds, buffer and enhance natural resources such as wetlands, streams and wildlife habitat areas.
5. Any part or portion of a site in any district which is not used for building or other structures, loading, or parking spaces and aisles, sidewalks and designated storage areas shall be planted with a vegetative landscape, such as, but not limited to, an all season grass seed, sod or ground cover and properly maintained in accordance with Part 5, Improvement and Construction Requirements, in the Subdivision and Land Development Ordinance.
6. To conceal unsightly or objectionable elements of the subdivision or land development, such as loading areas and docks, trash receptacles, outside storage areas etc.

7. In the event unsightly or objectionable elements may not exist, a landscaping plan shall be provided.
8. If the construction schedule is delayed and landscaping can not be installed during the current season, the landscaping plan provided by the applicant to the Township shall specify a time frame for completion.

C. Design Requirements:

1. Street Trees:

For the safety, convenience, and attractiveness of any subdivision of one (1) or more lots, the applicant shall provide a minimum of one deciduous street tree per lot, or one deciduous street tree spaced at intervals of between seventy (70) and one hundred (100) feet apart or fraction thereof, whichever is greater, unless the lot is wooded or otherwise agreed upon by the Township. The following general standards must be considered when determining the selection and location of street trees:

- a. Location - Street trees shall be planted outside of the street right-of-way line, between the street line and the building setback line, but at least ten (10) feet from the edge of improved cartway or five (5) feet beyond the sidewalk.
 - (1) Street trees shall not be placed where they might interfere with the construction, use, or maintenance of any public or private sewage disposal system, water supply, or other utility/facility including sidewalks.
 - (2) Street trees shall not be planted opposite each other across streets but shall have alternate spacing.
- b. All street trees shall be kept free of branches and foliage from the ground level to a height of at least eight (8) feet above sidewalks and a minimum of one and one-half (1 ½) inch caliper tree trunk.
- c. Street trees shall be of nursery stock. They shall be of symmetrical growth, free of insects, pests and disease, suitable for street use and in conformity with the standards of the American Association of Nurseryman.
- d. Detailed street tree planting specifications should be provided and shall conform to this ordinance.
- e. No obstruction to vision. No trees, shrubs, landscaping or shall be permitted within any required clear sight triangle.
 - (1) At all intersections of streets, private roads and /or access drives, proper sight lines must be maintained as defined in accordance with the Street Design and Intersection Sight Distance Sections of this Ordinance.
 - (2) No existing walk, fence, sign, or other structure shall be altered, erected or constructed and no hedge, trees, shrubs, or other growth shall be maintained or permitted which may cause danger to traffic on a public road by obscuring the view within the Clear Sight Triangle.

- (3) No building, structure, grade or planting higher than two (2) feet above the centerline of the street shall be permitted within such clear sight triangle or in any area between the cartway and the right-of-way. Where no such right-of-way is defined, there shall be no such plantings over two (2) feet tall in height, at maturity, for a distance of twenty five (25) feet from the centerline for local streets and thirty (30) feet from the centerline for collector streets.
 - f. Native plants shall be incorporated as appropriate.
 - g. To the maximum extent practicable, mature, healthy trees of at least twelve (12) inches in caliper and other significant existing vegetation shall be retained and protected in accordance with this Ordinance. Such trees shall not be removed, except as provided on the approved subdivision and/or land development plan.
 - h. The subdivider or land developer and/or applicant shall be required to preserve all historic trees and, where required by the Township, shall be responsible for contacting the Pennsylvania Historic and Museum Commission (PHMC) to verify historical significance of the trees. If significance is documented, the Township may require review of the proposed development by PHMC.
2. Parking Area Landscaping
- In addition to the requirements of the Liberty Township Zoning Ordinance, the following shall apply:
- a. A layer of mulch four (4) inches deep shall be applied and maintained in all landscape areas or other approved material such as landscape stone.
 - b. Curbing shall be installed to separate the vegetative island areas from vehicular traffic. However, sumped vegetative areas will be considered when used as a stormwater management device.
 - c. The plant material should be located so as to accomplish one or more of the following purposes: screening, retard storm water runoff, direct or restrict pedestrian access, stabilize steep slopes, to help visually define travel lanes through or next to the parking lot, define spaces, provide shade and/or complement and enhance the building and grounds.
 - d. Deciduous street trees shall have a minimum branching height no lower than six (6) feet from finished grade, all other plant material used for interior landscaping shall not be over three (3) feet in height at maturity, including but not limited to, shrubs, annuals, and perennials.
 - e. All parking areas located greater than two hundred (200) feet from the intended land use shall be provided with paved accessible pedestrian walkways and elevated islands. Such walkways may occupy portions of the landscaped areas and be interrupted by necessary vehicular travel lanes. Wheelchair ramps meeting ADA requirements shall be provided.

3. Commercial / Industrial Area Landscaping

In addition to requirements of the Liberty Township Zoning Ordinance and other sections of this ordinance, the following shall apply:

- a. When a district boundary is a public street no buffer yard shall be required, unless the public street is adjacent to residential and/or lots used for residential purposes, then a buffer yard shall be required in accordance with the Zoning Ordinance.
- b. At the Township's discretion, additional site landscaping around proposed buildings or structures may be required.

D. Maintenance and Guarantee:

1. All landscaping, buffer yards and plant screening shall be installed and continually maintained by accepted practices as recognized by the American Association of Nurserymen.
2. No trees, shrubs, or landscaping shall be placed where they might interfere with the construction, use, or maintenance of any public or private sewage disposal system, water supply, or other utility/facility including sidewalks.
3. All landscaping vegetation should be placed clear of both existing and proposed utilities including gas, water and sewer pipes and underground and overhead utilities such as electrical, cable and telephone wires.
4. Planting and maintenance of all landscaping vegetation shall include, but not necessarily be limited to, provisions for surface mulch, guy-wires and stakes, irrigation, fertilization, insect and disease control, pruning, mulching, weeding, watering, replacement of dead plant material and be kept free of all debris and rubbish.
5. Any tree, shrub or landscaping which dies within eighteen (18) months of planting shall be replaced by the subdivider, developer or homeowner at his expense. Any street tree which dies after the eighteen (18) month period shall be replaced within one (1) year by the owner of the land on which such tree was located.
6. All final landscaping plans shall be accompanied by a cost estimate prepared by the landowner or developer. The cost estimate shall be evaluated by the Township and revised by the Township if necessary. The cost estimate shall serve as a basis of establishing an escrow account related to landscaping.
7. The applicant shall make arrangements acceptable to the Township for the property's long-term landscape maintenance. The applicant shall provide the names, addresses and telephone numbers of those persons or organizations who will be assuming such responsibilities.
8. At the Township's discretion, the applicant may be required to escrow sufficient funds for the maintenance and/or replacement of the proposed vegetation during an eighteen (18) month replacement period. In addition, an escrow may be required for the removal and replacement of specimen trees damaged during construction.

E Protection During Construction:

1. Protection of trees and existing vegetation to be retained during construction shall be required subject to the following:
 - a. Trees of twelve (12) inches caliper or more shall be preserved to the extent possible. The Board may require the landowner or developer to plant one (1) tree of not less than two (2) inches in caliper for each tree of twelve (12) inches caliper or more to be destroyed.
 - b. No soil shall be placed around trunks of preserved trees that are to be retained. For those trees which are to remain, tree wells may be required to preserve such trees when final grading exceeds five (5) inches in depth around preserved trees.
 - c. Trees to remain shall be protected with construction fence placed at the limit of the drip line around said trees.
 - d. No boards or other material shall be nailed to trees during construction, and no trees to remain shall be sprayed with paint.
 - e. Feeder roots of trees to remain shall not be cut closer than the drip line.
 - f. Operation of heavy equipment shall not be allowed over root systems to prevent soil compaction.
 - g. Tree trunks and exposed roots damaged during construction shall be protected from further damage by being pruned flush, and if trunks are scarred, they shall be traced out for proper healing.
 - h. Tree limbs damaged during construction shall be sawed flush to tree trunks and treated with tree paints as necessary.
 - i. Trees shall be given heavy application of fertilizer to aid in their recovery from possible damage caused by construction operations.
 - j. Construction debris shall not be disposed of on site.

Section 414. Recreation Areas/Facilities.

- A. Recreational areas shall be undivided by any streets, except where necessary to provide for proper traffic circulation and then only upon the recommendation of the Township Engineer and Planning Commission.
- B. Recreational areas shall be centrally located and readily accessible to the areas that they serve.
- C. Recreational areas shall be suitably landscaped either by retaining existing vegetation and wooded areas and/or by a landscaping plan for enhancing open space areas through plantings which are consistent and compliment the adjacent area.

- D. Recreational areas shall be free of all structures, except those related to outdoor recreational uses.
- E. Recreational areas shall be provided with sufficient perimeter parking (at discretion of Township) and with safe and convenient access by adjoining street frontage or other right of way easements capable of accommodating pedestrian, bicycle, maintenance and vehicle traffic.
- F. Recreational areas shall be suitable for active recreational uses to the extent deemed necessary by the Township, without interfering with adjacent dwelling units, parking, driveways and roads. Land to be used for active recreation shall not be in floodplain, on slopes exceeding 6%, in wetlands, stormwater facilities, or comprised of surface water.
- G. The cost associated with the development of recreational facilities / areas shall be bonded as in the case of other Public Improvements Bonding.
- H. Maintenance responsibilities for recreational facilities / areas that will not be dedicated to the Township shall be included on the Plans.
- I. The Plans shall indicate the extent of recreational areas and outline the general layout of proposed recreational facilities.