

CONSTRUCTION AND DESIGN STANDARDS

99.4. **CONSTRUCTION STANDARDS FOR PUBLIC AND PRIVATE IMPROVEMENTS**

99.4.1. **STREETS**

99.4.1.1. **STREET Classifications**

99.4.1.1.1. The STREET classification system is hereby adopted for STREETS in the TOWNSHIP:

- 99.4.1.1.1.1. Principal Arterial
- 99.4.1.1.1.2. Minor Arterial
- 99.4.1.1.1.3. Collector
- 99.4.1.1.1.4. Local Industrial
- 99.4.1.1.1.5. Local Commercial
- 99.4.1.1.1.6. Local Residential

99.4.1.1.2. The function classification of STREETS is as specified in the current Comprehensive Plan of the TOWNSHIP, adopted by the TOWNSHIP, for future conditions.

99.4.1.1.3. The functional classification of any STREET which is not specified in the current Comprehensive Plan of the TOWNSHIP, adopted by the TOWNSHIP, shall be determined by the ENGINEER consistent with the definitions for the STREET classification system.

99.4.1.2. **STREET Grading and Paving Schedule**

99.4.1.2.1. **Principal Arterial and Minor Arterial** – CONSTRUCTION STANDARDS shall be by the design of jurisdiction responsible for the STREET.

99.4.1.2.2. **Collector** – Typical section of paving and underdrains and shoulder grading for Collector Roads shall be in accordance with the construction standard in Figure 95.5.1.2.2. The geometric design shall be in accordance with the Commonwealth of Pennsylvania, Pennsylvania Department of Transportation, Bureau of Design, Design Manual 2, Publication 13M, Current Edition.

99.4.1.2.3. **Local Industrial and Local Commercial** – grading shall be in accordance with the construction on Figure 99.5.1.2.3a. Typical section of paving, curbing, underdrains and berm grading for commercial or industrial STREETS shall be in accordance with the construction standard in Figure 99.5.1.2.3b.

99.4.1.2.4. **Local Residential** – Grading shall be in accordance with the construction standard in Figure 95.5.1.2.3a. Typical sections of paving, curbing, and underdrains for local residential STREETS shall be done in accordance with the CONSTRUCTION STANDARDS in Figures 95.5.1.2.4a, and 95.5.1.2.4b. The use of the CONSTRUCTION STANDARDS in Figure 95.5.1.2.4c and 95.5.1.2.4d may be permitted under certain conditions to be determined by the TOWNSHIP. Geometric design shall be in accordance with the appropriate design speed and the design standards in Chapter 114 of the TOWNSHIP Code, Subdivision and Land Development.

99.4.1.2.5. **Trench Repaving in Bituminous Paving** – all trench repaving in bituminous pavement shall be constructed in accordance with the construction standard in Figure 99.5.1.2.5.

99.4.1.2.6. **Special Underdrain** – all special underdrains shall be constructed in accordance with the construction standard in Figure 99.5.1.2.6.

99.4.1.2.7. **Two Phase Paving** – when the bituminous paving is in a subdivision or other land development being developed at that time and it is anticipated that construction activity and heavy material hauling will be taking place for an extended period of time, a “second phase wearing surface” shall be applied (no sooner than the following paving season). The exact length of time of withholding the wearing surface course will be determined by the ENGINEER in conjunction with the TOWNSHIP MANAGER and Building Inspector.

99.4.1.2.8. **Curb Ramps** – the location and design of all curb ramps for access by disabled persons shall be approved by the ENGINEER. Such approval does not represent compliance with the Accessibility Guidelines of the Americans with Disabilities Act. (Added 6-1-92 by Ord. No. 1541)

99.4.1.3. **STREET Design Criteria**

99.4.1.3.1. **ALL STREET Classifications except Local Residential** – Geometric design shall be in accordance with the Commonwealth of Pennsylvania, Pennsylvania Department of Transportation, Bureau of Design, Design Manual 2, Publication 13M, Current Edition.

99.4.1.3.2. **Local Residential STREET** – the following design criteria generally represent minimum values, which implies the lowest acceptable limit. The elements of the design criteria shall conform to the following:

99.4.1.3.2.1. **Design Speed** – is the maximum safe speed that can be maintained over a specified section of roadway when conditions are favorable that the design features of the roadway govern.

99.4.1.2.3.1.1. The desirable design speed is 25 mph.

99.4.1.3.2.2. **Vertical Crest and Sag Curves** – Vertical Crest and Sag Curves -All minimum vertical curve lengths shall conform to AASHTO Standards and meet sight distance requirements for the height of the eye at 3.5 feet from the top of pavement to the level of the eye and 2.0 feet the height the object. (which is typically the headlights or tail lights of the vehicles) The following minimum K-values shall be used to compute the minimum curve length. Curve length must also be checked for Sight Distance and must exceed the minimum sight distance. For further information, see Chapter 3 of AASHTO, current edition, for vertical curves.

Design Speed (mph)	K-Value	
	Crest	Sag
20*	7	17
25	12	26
30	19	37
35	29	49
40	44	64
45	61	79
50	84	96
55	114	115

** 20 MPH Design Speed requires advanced approval by the ENGINEER and shall comply with AASHTO “A Policy on Geometric Design of Highways and Streets”, Latest Edition.*

99.4.1.3.2.3. **Horizontal Curvature** – is the circular arc which connects tangent lines.

99.4.1.3.2.3.1. The sharpest curve without superelevation is as specified in AASHTO “A Policy on Geometric Design of Highways and Streets, Chapter 3, Exhibit 3-26.

99.4.1.3.2.3.2. Reverse curves require a minimum 75 feet of tangent separating the points of curvature.

99.4.1.3.2.3.3. Maximum Rate of superelevation 0.04 ft./ft. will be required for a radius of 125 feet at a design speed of 20 MPH.¹

99.4.1.3.2.3.4. The minimum radius with superelevation: $R = 205$ feet, ($e_{\max} = 0.04$ ft./ft.)(Based upon 25 MPH design speed).

99.1.4.3.2.3.5. The minimum length of superelevation runoff and runout: See AASHTO “A Policy on Geometric Design of Highways and Streets, Chapter 3, Exhibit 3-29.

Follow Pennsylvania Department of Transportation Design Manual 2 method of attaining super elevation for local roads.

99.4.1.3.2.3.6. The minimum arc length of horizontal curve: $L = 60$ feet.

99.4.1.3.2.3.7. **Clear Sight Triangle** – no obstructions shall be located within the right of way or lot which obscure visibility at the intersection of two STREETS or of a STREET and a residential DRIVEWAY. A clear sight triangle, as defined by this Code, shall be maintained free of any obstructions. The sides of the clear sight triangle shall be measured along the centerline of the intersecting streets and shall meet the minimum standards shown in Figure 99.5.1.3.2.3.7. The clear sight triangle shall be shown on the Final Plat for recording if it is beyond the boundary of the right of way.

99.4.1.3.2.3.8. **Minimum Sight Distance** – when a new STREET intersects an existing STREET, the minimum sight distance at the intersection shall be provided in accordance with the requirements of Section 99.4.5.12.

99.4.1.3.3. **Local Residential and Commercial Cul-de-sacs** – cul-de-sacs shall meet the minimum standards shown in Figures 99.5.1.3.3.1., 99.5.1.3.3.2.a., 99.5.1.3.2.b and Chapter 114 of the CODE of the TOWNSHIP of Upper St. Clair entitled “Subdivision and Land Development”. All permanent local residential cul-de-sacs shall be offset circular cul-de-sacs with a forty (40) feet minimum radius.

99.4.1.3.3.1. Cul-de-sacs without islands are preferred by the TOWNSHIP and may be designed with a forty (40) feet minimum

¹ 20 MPH Design Speed requires advanced approval by the TOWNSHIP ENGINEER and shall comply with AASHTO “Geometric Design of Very-Low Volume Local Roads (ADT \leq 400), Latest Edition, for Crest Curves.

radius to the back of bituminous wedge curb. The cul-de-sacs shall meet the minimum standards shown in Figure 99.5.1.3.3.1.

99.4.1.3.3.2. Cul-de-sacs with islands shall be for local residential use only. Cul-de-sacs with islands shall have a minimum radius of 47 feet to the face of a bituminous wedge curb or gutter line with a 25 foot minimum pavement width. Cul-de-sacs and island shall meet minimum standards shown in Figures 99.5.1.3.3.2a. and 99.5.1.3.3.2b. The island area shall meet the geometric and vegetation requirements shown in Figure 99.5.1.3.3.2b.

99.4.1.3.3.3. Temporary turnarounds shall only be permitted to facilitate a multi-phase development. Temporary turnarounds shall be hammerhead, or T-type, cul-de-sacs in accordance with the Construction Standards in Figure 99.5.1.3.3.3. and shall have sufficient reserved right of way to accommodate a cul-de-sac without an island per section 99.4.1.3.3.1. of this Code. Bituminous wedge curbing is to be carried through the cul-de-sac to the match point with the future roadway extension.

99.4.2. **Storm Water Management Facilities**

99.4.2.1. **Storm Sewer Pipe** – Storm sewers shall be:

99.4.2.1.1. Reinforced Concrete Pipe (RCP) conforming to the appropriate class of ASTM C-76.

99.4.2.1.2. Smooth Flow Polyethylene Pipe (ADS N-12) conforming to the requirements of ASTM Designation F667 (and/or AASHTO Designation M-294). Installation shall be in accordance with ASTM Designation D-2321.

99.4.2.1.3. Polymer Coated Corrugated Steel Pipe (CMP) in detention facilities only, conforming to the requirements of AASHTO Designation M-245 and precoated in accordance with AASHTO Designation M) 246 may be substituted for reinforced concrete pipe for sizes of 42 inches diameter or greater.

99.4.2.2. **Storm Inlets** – storm inlets in STEET paving shall conform to the construction standard in Figure 99.5.2.2a when used at all locations except low points. Storm inlets in STREET paving shall conform to the construction standard in Figure 99.5.2.2b when used at low points. Storm inlets in off pavement areas shall conform to the construction standard in Figure 99.5.2.2c; however, the standard in Figure 99.5.2.2d may be used in certain circumstances when approved by the ENGINEER.

99.4.2.3. **Storm Manholes** – all manholes shall be precast concrete in accordance with the CONSTRUCTION STANDARDS in Figure 99.5.2.3a. Manholes in accordance with the CONSTRUCTION STANDARDS in Figures 99.5.2.3.b, 99.5.2.3.c, and 99.5.2.3.d may be approved by the ENGINEER under special conditions such as insufficient depth, large diameter pipes, etc.

99.4.2.4. **Post-Construction Stormwater Best Management Practices**

99.4.2.4.1. **Post-Construction Runoff Control Requirements**

99.4.2.4.1.1. No Regulated Earth Disturbance activities within the TOWNSHIP shall commence until approval by the TOWNSHIP of a plan which demonstrates compliance with State Water Quality Requirements after construction is complete.

99.4.2.4.1.2. The Best Management Practices (BMP's) must be designed to manage stormwater impacts from development and earth disturbance activities, to promote groundwater recharge, to protect and maintain existing used e.g. drinking water use, cold water fishery use) and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in "Special Protection" streams, as required by statewide regulations at 25 Pa. Code Chapter 93 (collectively) referred to herein as "State Water Quality Requirements").

99.4.2.4.1.3. To control post-construction stormwater impacts from Regulated Earth Disturbance activities, State Water Quality Requirements can be met by BMP's, including site design, which provide for replication of pre-construction stormwater infiltration and runoff conditions, so that post-construction stormwater infiltration and runoff conditions, so that post-construction stormwater discharges do not degrade the physical, chemical or biological characteristics of the receiving waters. As described in the DEP Comprehensive Stormwater Management Policy (#392-0300-002, September 28, 2002), this may be achieved by the following:

99.4.2.4.1.3.1. Infiltration: replication of pre-construction stormwater infiltration conditions.

99.4.2.4.1.3.2. Treatment: use of water quality treatment BMP's to ensure filtering out of chemical and physical pollutants from the stormwater runoff.

99.4.2.4.1.3.3. Streambank and Streambed Protection: management of volume and rate of post-construction

stormwater discharges to prevent physical degradation of receiving waters (e.g. from scouring and erosion).

99.4.2.4.1.4. The Department of Environmental Protection has regulations that require municipalities to ensure design, implementation and maintenance of Best Management Practices (BMP’s) that control runoff from new development and redevelopment (hereinafter “development”) after Regulated Earth Disturbance activities are complete. These requirements include the need to implement post-construction stormwater BMP’s with assurance of long-term operations and maintenance of those BMP’s.

99.4.2.4.1.5. Evidence of any necessary permit(s) for Regulated Earth Disturbance activities from the appropriate DEP regional office or the Allegheny County Conservation District must be provided to the TOWNSHIP. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2)) satisfies the requirements within §99.4.2.4.1.1.

99.4.2.5. **Storm Sewer Lateral Connection** – all sewer lateral connections shall be in accordance with applicable law. All sewer lateral connections shall be located at manholes or at locations approved by the TOWNSHIP MANAGER or his designated representative.

99.4.2.6. **Storm Water Detention Facilities**

99.4.2.6.1. **Design Storms** – Storm water management Facilities on all development sites shall control the peak storm water discharge for the 2, 10, and 100 year design storms. The SCS 24 hour, Type II Rainfall Distribution shall be used for analyzing storm water runoff in pre- and post-development conditions as well as for designing runoff control facilities (except storm runoff collection and conveyance facilities). The design storms, along with the 24 hour total runoff depths for these return periods, in the TOWNSHIP are:

Design Storm Return Period	24 Hour Rainfall Depth (inches)
2-year	2.6
10-year	3.5
100-year	5.2

The Rational Method shall be used for analyzing runoff for small watersheds (less than three (3) acres). The rational intensities for the design storms are as follows:

Design Storm Return Period	5 Minute Duration Rainfall in hour
2-year	4.1
10-year	5.2
25-year	5.6
100-year	6.5

(For additional information or data on other return periods, consult the “Rainfall Duration Frequency Tables for Pennsylvania,” produced by DEP, Office of Resource Management, Bureau of Dams and Waterways, Management, Division of Stormwater Management, Harrisburg, February, 1983.)

The post development peak flow shall not exceed predevelopment peak flow for the 2, 10, and 25-year storm events, and the detention facilities must be designed to safely release the Post-Development 100-year storm through the emergency spillway.

99.4.2.6.2. **Calculation Methods** – for the purposes of computing peak flow rates and runoff hydrographs from the development sites and drainage areas larger than three acres, calculations shall be performed using the methodologies presented in SCS Publication, Technical Release 55 (TR 55). For development sites less than three acres, the Rational Method shall be utilized and the modified rational method used for routing. The ENGINEER may approve the use of simulation computer programs for the storm water analysis and design. The calculations shall be submitted using the TR-55 worksheets. All graphs and/or charts used must be submitted.

99.4.2.6.3. **Underground Infiltration** – Underground infiltration devices may be permitted only on sites of 2 acres (or less where soil borings show that soils meet infiltration criteria of the ENGINEER.) Reference Allegheny County Soils Survey.

99.4.2.6.3.1. Construction and excavation shall be supervised by a soils ENGINEER who shall certify that the device is properly constructed.

99.4.2.6.3.2. To prevent sediment sealing of the infiltration plain during construction, no runoff shall be permitted to enter the infiltration facility until after the entire drainage area is stabilized.

99.4.2.6.3.3. To reduce premature clogging and facilitate renovation of the infiltration facility, a minimum layer of 6 inches of sand shall be placed on the bottom of the infiltration device before placing the stone storage medium. Whenever possible a dense vegetation strip shall serve as a straining medium through which runoff is spread in sheet flow prior to entering the infiltration facility. On top of the storage stone shall be placed a filter cloth and a layer of sand or pea gravel which shall be removed and replaced whenever it becomes clogged.

99.4.2.6.3.4. To provide access for periodic inspection to determine if the infiltration facility is functioning in accordance with design, an observation well is required. The observation well shall consist of a 4 inch vertical perforated pipe extending from the bottom of the infiltration device to just above the surface. The bottom of the vertical pipe shall be sealed and the top fitted with a lockable cap to reduce potential vandalism.

99.4.2.6.4. **Dry Detention Impoundments** – the design of dry detention impoundments shall be approved by the ENGINEER.

99.4.2.6.4.1. Inflow and outflow structures, and all facilities should be protected and designed to minimize safety hazards.

9.4.2.6.4.2. The Maximum slope of the detention pond embankments may not exceed 3:1 unless an alternative slope is demonstrated to be structurally sound and approved by the ENGINEER. Restriction of access, such as by fences, walls, or other effective devices, may be required depending on the location of the facilities.

9.4.2.6.4.3. A low flow channel must be installed from the inlet to the outlet structure to accommodate low flow periods. This channel must be designed and constructed of concrete, rip rap, or other erosion control mediums as approved by the ENGINEER. The minimum slope of the low flow channel and pond bottom shall be 2%.

9.4.2.6.4.4. A freeboard of one (1) foot is required on all ponds.

99.4.2.6.5. **Wet Pond Impoundments** – the design of wet pond impoundments shall be approved by the ENGINEER.

99.4.2.6.6. **Underground Detention Facilities** – the design of underground detention facilities shall be approved by the ENGINEER.

99.4.2.6.6.1. Access to the underground detention facility must be provided by manholes or risers a minimum of thirty-six (36”) in diameter. Step must be provided to the invert of the facility.

99.4.2.6.7. **Storm Water Detention Facility Maintenance** – A maintenance program for each storm water detention facility that is not intended for acceptance by the TOWNSHIP as a public improvement must be submitted for review and approval by the ENGINEER.

99.4.2.6.8. **As-Built Drawings** – An as-built drawing shall be required for each storm water detention facility constructed. The drawing shall represent an engineering certification of the volume of the facility and the depth versus storage relationship. This relationship shall be shown on the drawing in table form. The drawing shall be signed and sealed by a registered professional ENGINEER and submitted to the TOWNSHIP within sixty (60) days of the completion of the facility.

99.4.2.7. **Cradles and Reinforcements for Sewers** – all cradles and reinforcements for sewers shall be constructed in accordance with the construction standard in Figure 99.5.2.6.

99.4.2.8. **Endwall Details** – all endwall details shall be constructed in accordance with the construction standard in Figure 99.5.2.7. Plastic endwalls may be utilized if approved by the ENGINEER.

99.4.2.9. **Concrete Encasement and Anchors for Sewers** – all concrete encasement and anchors for sewers shall be constructed in accordance with the construction standard in Figure 99.5.2.8.

99.4.2.10. **Concrete for Drop Manholes** – all connections for drop manholes shall be constructed in accordance with the construction standard in Figure 99.5.2.9.

99.4.2.11. **Design Criteria for Storms Water Collection/Conveyance Facilities** – for the purposes of designing storm sewers, open swales and other storm water runoffs collection and conveyance facilities, the Rational Method shall be applied. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation rainfall charts. The design storm for storm sewers is 25 years. Calculation sheets must be submitted.

99.4.2.12. Collection/Conveyance facilities should not be installed parallel and close to the top or bottom of a major embankment to avoid the possibility of failing or causing the embankment to fail.

99.4.2.12. Where drainage swales or open channels are used, they shall be suitably lined to prevent erosion, designed to avoid excessive velocities and designed for ease of maintenance.

99.4.2.13. Alternative drainage facilities may be submitted for review by ENGINEER (wetlands, ground water recharge, detention facilities, etc...)

99.4.3. **Sanitary Sewer System**

99.4.3.1. **Sanitary Sewer Pipe** – sanitary sewer pipe shall be:

99.4.3.1.1. PVC (Polyvinyl Chloride), conforming to ASTM D-3034 or

99.4.3.1.2. ABS (acrylonitrile-Butadiene-Styrene) Composite Sewer Pipe (Truss Pipe), conforming to ASTM D-2751 or

99.4.3.1.3. Any alternative or exceptions to these standards of equal or better quality must be approved by the TOWNSHIP MANAGER or his designated representative with the advice of the ENGINEER.

99.4.3.2. **Sanitary Manholes** – see 99.4.2.3.

99.4.3.3. **Sanitary Sewer Lateral Connections** – see 99.4.2.4.

99.4.3.4. **Cradles and Reinforcements for Sewers** – see 99.4.2.6.

99.4.3.5. **Concrete Encasement and Anchors for Sewers** – see 99.4.2.8.

99.4.3.6. **Connections for Drop Manholes** – see 99.4.2.9.

99.4.4. **Pedestrian Circulation**

99.4.4.1. **SIDEWALKS (concrete)** – all SIDEWALKS shall be constructed in accordance with the following standards and as illustrated in Figures 99.5.4.1.a and 99.5.4.1.b.

99.4.4.1.1. Minimum width five (5) feet for residential; five (5) feet for nonresidential.

99.4.4.1.2. Setback from wedge curb three (3) feet.

99.4.4.1.3. Setback from curb zero (0) feet.

99.4.4.1.4. Slope - ¼ inch per foot toward curb.

99.4.4.1.5. Type of Material – four (4) inches of Class A concrete on three (3) inches of broken stone or gravel base (at DRIVEWAYS, use 6” of Class A concrete with 6” by 6” reinforcing steel at 68 pounds per 100 square feet)

99.4.4.2. **WALKWAYS (Bituminous)** – all WALKWAYS shall be constructed in accordance with the following standards and as illustrated in Figures 99.5.4.1. a and b.

99.4.4.2.1. Minimum width five (5) feet for residential; five (5) feet for nonresidential; setback from wedge curb 3 feet; or approved alternative approved by the ENGINEER.

99.4.4.2.2. Setback from curb zero (0) feet.

99.4.4.2.3. Slope - ¼ inch per foot toward curb.

99.4.4.2.4. Type of Material – three and one-half (3 ½) inches ID-2 Binder Course; one and one-half (1 ½) inches Surface Course.

99.4.4.3. Any alternates of equal or better quality must be approved by the TOWNSHIP MANAGER or his designated representative.

99.4.5. **DRIVEWAYS** – access onto TOWNSHIP STREETS

99.4.5.1. **General Requirements** – all DRIVEWAYS shall be located, designed, constructed, and maintained in such a manner as not to interfere or be inconsistent with the design, maintenance and drainage of the STREET. A traffic study may be required to justify the number and location of DRIVEWAYS requested.

99.4.5.2. **General Location Restrictions** – access DRIVEWAYS shall be permitted at locations in which:

99.4.5.2.1. sight difference is adequate to safely allow each permitted movement to be made into or out of the access DRIVEWAY;

99.4.5.2.2. the free movement of normal highway traffic is not impaired;

99.4.5.2.3. the DRIVEWAY will not create a hazard; and

99.4.5.2.4. the DRIVEWAY will not create an area of undue traffic congestion on the highway

99.4.5.3. **Specific Location Restrictions**

99.4.5.3.1. Access DRIVEWAYS shall not be located at interchanges, ramp areas, or locations that would interfere with the placement and proper functioning of highway signs, signal, detectors, lightening or other devices that affect traffic control.

99.4.5.3.2. The location of a DRIVEWAY near a signalized intersection may include a requirement that the permitted provide, in cooperation with the TOWNSHIP, new or relocated detectors, signal heads, controller, and the like, for the control of traffic movements from the DRIVEWAY.

99.4.5.3.3. Access to a property which abuts 2 or more intersecting STREETS may be restricted to only that STREET which can more safely accommodate its traffic.

99.4.5.3.4. The TOWNSHIP MANAGER or his designated representative may require the permitted to locate an access DRIVEWAY directly across from a highway, local road, or access DRIVEWAY on the opposite side of the roadway if it is judged that offset DRIVEWAYS will not permit left turns to be made safely or that access across the roadway from one access to the other will create a safety hazard.

99.4.5.3.5. The TOWNSHIP MANAGER or his designated representative may require that DRIVEWAYS outletting to cul-de-sacs be located so as to maximize the area available for snow storage.

99.4.5.4. **Number of DRIVEWAYS** – the number and location of DRIVEWAYS which may be granted will be based on anticipated usage and interior and exterior traffic patterns.

99.4.5.4.1. Normally not more than two DRIVEWAYS will be permitted for a property.

99.4.5.4.2. Regardless of frontage, a development may be restricted to a single entrance/exit DRIVEWAY.

99.4.5.5. **Approaches to DRIVEWAYS** – DRIVEWAY approaches shall conform to the following standards:

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

99.4.5.5.2. Where the access DRIVEWAY approach and STREET pavement meet, flaring of the approach may be necessary to allow safe, easy turning of vehicular traffic. A minimum radius of 30 feet is required for DRIVEWAYS which permit trucks.

99.4.5.5.3. Where the STREET is curbed, DRIVEWAY approaches shall be installed one and one-half (1 ½) inches above the adjacent highway or

gutter grade to maintain proper drainage. No filling of gutters shall be permitted.

99.4.5.6. **DRIVEWAY Classification** – the ability of a DRIVEWAY to safely and efficiently function as an integral component of a STREET system requires that its design and construction be based on the amount and type of traffic that it is expected to serve and the type and character of roadway which it accesses. DRIVEWAYS are separated into 4 classifications, based on the amount of traffic that are expected to serve. A description of each classification and typical examples of land uses normally associated with each follows:

99.4.5.6.1. Minimum use DRIVEWAY, See Figure 99.5.5.6.1. A DRIVEWAY normally used by not more than 25 vehicles per day, such as:

99.4.5.6.1.1. single family dwellings, duplex houses or

99.4.5.6.1.2. apartments with five units or less

99.4.5.6.2. Low volume DRIVEWAY, see Figure 99.5.5.6.2. A DRIVEWAY normally used by more than 25 vehicles per day but not less than 750 vehicles per day, such as:

99.4.5.6.2.1. office buildings

99.4.5.6.2.2. elementary and junior high schools

99.4.5.6.2.3. car washes

99.4.5.6.3. Medium volume DRIVEWAY, see Figure 99.5.5.6.3. A DRIVEWAY normally used by more than 750 vehicles but less than 1500 vehicles per day, which does not normally require traffic signalization, such as:

99.4.5.6.3.1. motels;

99.4.5.6.3.2. fast food restaurants; or

99.4.5.6.3.3. service stations and small centers or plazas

99.4.5.7. **General DRIVEWAY Design** – the design features described in this section and illustrated in the attendant figures are to be used by the applicant in designing the DRIVEWAY plans which accompany the application. Dimensions shall be selected from the ranges of values shown on the appropriate figure, unless site conditions warrant a deviation. The TOWNSHIP may require design details which are more stringent than those specified in this chapter to insure the safe and efficient operation of any proposed DRIVEWAY. Figures 99.5.5.6.1., 99.5.5.6.2.,

and 99.5.5.6.3. show two sets of design values. The applicant shall design his DRIVEWAY using the values appropriate for the posted speed of the roadway being accessed.

99.4.5.8. **Angle of access DRIVEWAY approach** – angle of access DRIVEWAY approach shall include the following:

99.4.5.8.1. Access DRIVEWAY approaches used for two-way operation shall be positioned at right angles, that is, 90°, to the STREET or as near thereto as site conditions permit, except as authorized by the TOWNSHIP upon recommendation of the Traffic ENGINEER.

99.4.5.8.2. When two access DRIVEWAYS are constructed on the same property frontage and used for one-way operation, each of these DRIVEWAYS may be placed at an angle less than a right angle, but not less than 45° to the STREET, except that along divided STREETS where no openings are allowed in the median the minimum angle of an exit DRIVEWAY may be 30°.

99.4.5.9. **DRIVEWAYS adjacent to intersections** – DRIVEWAYS serving properties located adjacent to a STREET intersection shall be subject to the following:

99.4.5.9.1. There shall be a minimum 30 foot length tangent distance between the intersecting STREET radius and the radius of the first permitted DRIVEWAY.

99.4.5.9.2. The distance from the edge of pavement of the intersecting highway to the radius of the first permitted DRIVEWAY shall be a minimum of 20 feet on curbed STREETS and 30 feet on uncurbed STREETS.

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

99.4.5.10. **Multiple DRIVEWAYS** – Multiple DRIVEWAYS serving the same property must be separated by a minimum distance of 30 feet measured along the shoulder, ditch line, or curb.

99.4.5.11. **Clear Sight Triangle** – the area between the right-of-way line adjacent to and on both sides of a DRIVEWAY shall be used as a clear sight triangle to provide a physical barrier between the traveled way and activity on a private property. This area shall remain free of any obstructions which may interfere with a clear line of vision for entering or exiting vehicles. See Figure 99.5.1.3.2.7. for the required clear sight triangle.

99.4.5.12. **Sight Distance**

99.4.5.12.1. Sight distance shall be measured from a height of the drivers eye above the road surface is three and one-half (3 ½) feet and to an object three and one-half (3 ½) feet in height. These conditions are for calculating the site distance for DRIVEWAY of low volume STREET. The minimum acceptable sight shall be computed from the following formula:

$d=1.47Vt+V^2/(30((a/32/2)\pm G)$
d = minimum safe stopping sight distance (SSD)
V = Velocity of Vehicle (miles per hour)
t = Brake reaction time (2.5 seconds)
a = deceleration rate (11.2 ft/sec ²)
G = percent of grade divided by 100

99.4.5.12.2. The minimum acceptable sight distance values shall be computed from the following formula:

$SSSD=1.47Vt + \frac{V^2}{30(f \pm g)}$
SSSD = Minimum safe stopping sight distance (feet)
V = Velocity of vehicle (miles per hour)
t = Perception time of motorist (average = 2.5 seconds)
f = wet friction of pavement (average = 0.30)
g = Percent grade of roadway divided by 100

See Figure 99.5.1.3.2.7. for the location of required sight distance. See Table 99.4.5.12.1. for the computed values of the minimum sight distance at various grades.

Table 99.4.5.12.1

Minimum Acceptable Safe Stopping Sight Distance (feet)

		Posted Speed (mph) on Adjacent Street							
		20	25	30	35	40	45	50	55
Approach on Adjacent Street	-15%	162	231	310	401	503	615	739	874
	-14%	157	222	298	384	480	587	405	832
	-13%	152	214	287	369	461	562	674	795
	-12%	148	208	277	355	443	540	647	762
	-11%	144	202	268	344	428	521	622	733

-10%	140	196	260	333	414	503	600	706
-9%	137	191	253	323	401	587	581	682
-8%	134	187	247	314	389	472	563	660
-7%	131	182	241	306	379	459	546	641
-6%	129	179	235	299	369	447	531	622
-5%	127	175	230	292	360	435	517	605
-4%	125	172	226	286	352	425	504	590
-3%	123	169	221	280	345	415	492	576
-2%	121	166	217	274	337	406	481	562
-1%	119	164	214	269	331	398	471	550
0%	118	161	210	265	325	390	462	538
1%	117	159	207	260	319	383	453	527
2%	115	157	204	256	314	376	444	517
3%	114	155	201	252	309	370	436	508
4%	113	153	198	249	304	364	429	499
5%	112	151	196	245	299	358	422	490
6%	111	150	194	242	295	353	415	482
7%	110	148	191	239	291	348	409	475
8%	109	147	189	236	287	343	403	467
9%	108	145	187	233	284	338	397	461
10%	107	144	185	231	280	334	392	454
11%	106	143	183	228	277	330	387	448
12%	105	141	182	226	274	326	382	442
13%	105	140	180	224	271	322	378	437
14%	104	139	178	221	268	319	373	431
15%	103	138	177	219	266	315	369	426

99.4.5.12.3. If sight distance requirements as specified in this chapter cannot be met, the TOWNSHIP may deny access to the STREET, unless restricted turning movements or required mitigating or corrective actions, such as indemnification from liability, are taken.

99.4.5.12.4. If an easement is required to provide adequate sight distance at a DRIVEWAY or the junction of two STREETS, the TOWNSHIP will specify the location and type of easement required. This easement will require that grading only be permitted as shown on the approved plan and that no vegetation be permitted above two feet from ground contours.

99.4.5.12.5. Applicant must measure all sight distance measurements must be recorded on Figure 99.5.1.3.2.7.

99.4.5.13. **Grade of Access DRIVEWAY** – grade of access DRIVEWAY shall be constructed in the following manner:

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

99.4.5.13.2. Where a drainage ditch or swale exists, the permittee shall install adequately sized pipe under the DRIVEWAY. Drainage pipe installed under DRIVEWAYS shall be at least fifteen (15) inch I.D., reinforced concrete pipe or ADS-N-12. The permittee shall be responsible for maintaining the pipe in a fully functioning, open condition.

99.4.5.13.3. Grade requirements in uncurbed shoulders within the right-of-way shall conform to Figure 99.5.5.6.3a and 99.5.5.6.3b.

99.4.5.13.4. Grade requirements where curb and SIDEWALKS are present.

99.4.5.13.4.1. The DRIVEWAY approaches shall be installed 1 ½' above the adjacent roadway or gutter grade for STREETS with concrete curbs to maintain proper drainage. For wedge curbs the DRIVEWAY approach shall be installed immediately behind the curb. See Figure 99.5.5.6.3c.

99.4.5.13.4.2. The difference between the cross slope of the roadway and the upward grade of the DRIVEWAY approach shall not exceed 8.0%.

99.4.5.13.4.3. When a planted area exists in front of the SIDEWALK, one of the following two (2) cases shall apply:

99.4.5.13.4.3.1. When the grass strip between the curb and the SIDEWALK is wide enough to maintain an 8.0% maximum DRIVEWAY approach grade, construct the DRIVEWAY as shown in Figures 99.5.5.6.3a and 99.5.5.6.3c.

99.4.5.13.4.4. When the SIDEWALK is directly against the back of the curb and the SIDEWALK is at least five feet wide, the curb shall be sloped as shown in Figures 99.5.5.6.3c and 99.5.5.6.3a of this subsection. This will eliminate the need for depressing the back edge of the SIDEWALK.

99.4.5.14. **Access DRIVEWAY Pavement** – all access DRIVEWAYS shall be paved in accordance with the standard in subsection 99.4.6.1.

99.4.5.15. Curbing Requirements

99.4.5.15.1. Installation of curbing may be required wherever it is necessary to control access or drainage, or both. All curbing must be permanent.

99.4.5.15.2. When curb exists adjacent to a proposed DRIVEWAY, the line and grade of the existing curb shall be matched, unless otherwise authorized by the permit.

99.4.5.16. **Auxiliary Lanes, Median Openings, Shoulder Upgrading and Traffic control Devices** – auxiliary lanes, median openings, shoulder upgrading and traffic control devices may be authorized or required upon recommendation of the Traffic ENGINEER. Unless accepted by the TOWNSHIP, such improvements shall be maintained by the permittee.

99.4.6. Parking Areas and DRIVEWAYS on Lots**99.4.6.1. Minimum Paving Standards**

99.4.6.1.1. For **DRIVEWAYS** and **PARKING AREAS** for single family.

99.4.6.1.1.1. Bituminous Paving:

6” Crushed Aggregate base
1 ½” ID-2 Binder Course
1” ID-2 Surface Course; or
4 ½” Bituminous concrete Base Course
1” ID-2 Surface Course

99.4.6.1.1.2. **Concrete Paving:** 5” Class “A” concrete with 6” by 6” steel mesh @ 68 lb./100 sq. ft.

99.4.6.1.1.3. Brick Paving:

99.4.6.1.1.3.1. Construct base course of dense graded aggregate, compacted to a depth of 4”

99.4.6.1.1.3.2. Construct adequate edge restraints.

99.4.6.1.1.3.3. Place bed of clean sharp sand, 1 ½” in depth

99.4.6.1.1.3.4. Install paving stones with joints of approximately 1/8”

99.4.6.1.1.3.5. When required, paving stones shall be cut with an appropriate cutter in order to provide neat undamaged edges.

99.4.6.1.1.3.6. Tamp pavers with a mechanical vibrator until uniformly level true to grade and free of movement.

99.4.6.1.1.3.7. Fill voids by sweeping in clean, fine sand.

99.4.6.1.2. For all DRIVEWAYS and PARKING AREAS other than single family.

99.4.6.1.2.1. **Bituminous Paving:**

6" Crushed Aggregate Base

1 ½" ID-2 Binder Course

1 ½" ID-2 Surface Course; or

4 ½" Bituminous Concrete Base Course

1 ½" ID-2 Surface Course

99.4.6.1.2.2. **Concrete Paving:**

6" Class "A" concrete with 6" by 6" steel mesh @ 68 lb./100 sq. ft.

99.4.6.2. **Parking Area Standards**

99.4.6.2.1. **Slopes**

99.4.6.2.1.1. Maximum 5% cross slope (along length of vehicle)

99.4.6.2.1.2. Maximum 7% longitudinal slope (perpendicular to vehicle)

99.4.6.2.1.3. Minimum 1% cross slope or longitudinal slope

99.4.6.2.2. **Curbs** – when required, curbs shall be constructed to the following standard:

99.4.6.2.2.1. 8" by 6" concrete deck curb; See Figure 99.5.6.2.2.1.

99.4.6.2.2.2. 8" by 24" standard concrete curb; See Figure 99.5.6.2.2.2.

99.4.6.2.2.3. Wedge curb with wheelstops, See Figure 99.5.6.2.2.3

99.4.6.2.2.4. Curb ramps—the location and design of all curb ramps for access by disabled persons shall be approved by the ENGINEER. Such approval does not represent compliance with the Accessibility Guidelines of the Americans with Disabilities Act [**Added 6-1-92 by Ord. No. 1541**]

99.4.6.2.3. Wheelstops shall be 10" by 7" by 8'-0". Precast reinforced concrete. See Figure 99.5.6.2.3

99.4.6.2.4. Bumper stops shall be Pennsylvania Department of Transportation Type 2-s Guide Rail without rubbing rail. Offset blocks are optional. See Figure 99.5.6.2.4.

99.4.6.3. **DRIVEWAY Standards**

99.4.6.3.1. **Grade** – maximum DRIVEWAY grade outside the right-of-way shall be 12% for low, medium and high volume DRIVEWAYS and 15% for minimum use DRIVEWAYS, and minimum DRIVEWAY grade shall be 1%

99.4.6.3.2. Width of DRIVEWAYS other than parking aisles and other than single family:

99.4.6.3.2.1. Minimum, one lane-one way: fifteen (15) feet;

99.4.6.3.2.2. Minimum, two-lane, one or two way: twenty-two (22) feet;

99.4.6.3.2.3. DRIVEWAY crown requirements: cross slope 2.5%

99.4.6.3.2.4. Governors DRIVEWAY: Minimum of twelve (12) feet and maximum of fifteen (15) feet.

99.4.6.3.2.5. **Curb Standard** – when provided, curbs shall meet the same standard as curbs in PARKING AREAS. See 99.4.6.2.2

99.4.6.3.3 Width at the STREET of DRIVEWAYS for single family residences: **[Added 4-7-08 by Ord. No. 1996]**

99.4.6.3.3.1. Minimum: ten (10) feet

99.4.6.3.3.2. Maximum: twenty (20) feet

99.4.6.3.4. All DRIVEWAYS must be a consistent width through the PUBLIC RIGHT-OF-WAY; width may increase once outside of the RIGHT-OF-WAY. **[Added 4-7-08 by Ord. No. 1996]**

99.4.7. **Fire Hydrants**

99.4.7.1. **Public Water Main Pipe Sizing** – minimum diameter of water mains serving public fire hydrants shall be 8” (203.2 mm). Larger diameter pipe shall be installed as calculated for flow volume and pressure requirements for special requirements as required by the public franchise granted jurisdiction in the **TOWNSHIP** by the Public utility Commission of the Commonwealth of Pennsylvania.

99.4.7.2. **Spacing Between Public Fire Hydrants**

99.4.7.2.1. **Maximum Spacing between Public Fire Hydrants** – shall be 1,200 feet, except that no building other than an accessory building shall be a distance greater than 600 feet from a hydrant. The maximum spacing distance shall be reduced where accessibility for operation of fire equipment and emergency vehicles is impaired by adverse terrain features.

99.4.7.2.2. **Exception** – the distance of 1,200 feet in Section 99.4.7.1. shall be modified to read 500 feet for properties with zoning classifications of C-1, C-2, C-3 RM, RM-P and PRT. With respect to properties with zoning classifications of C-2, C-3, RM, RM-P and PRT, no credit for hydrants shall be allowed where the hydrant location requires laying Fire Department hose across a STREET or highway other than a residential STREET.

99.4.7.3. **Spacing Between Private Fire Hydrants** – DEVELOPERS of properties with zoning classifications of R-5, C-3, SB, RM-P and PRT shall provide and maintain private fire hydrant and water supply main systems in which the hydrant spacing will conform to Section 99.4.7.2 provided any building is beyond the specified public hydrant distances in Section 99.4.7.2.1.

99.4.7.4. **Fire Hydrant Specifications**

99.4.7.4.1. Fire hydrants shall comply in all respects with latest AWWA specifications and shall be compression type, with the main valve opening against the pressure and closing with the pressure.

99.4.7.4.2. Fire hydrants shall be drain type, 5 ¼” valve opening with two hose (2 ½” ID, Pittsburgh Standard Thread) and one pumper (4 ½” ID, Pittsburgh Standard Thread) nozzles.

99.4.7.4.3. The bottom stem threads of the main valve rod shall be fitted with an acorn nut or suitable means for sealing the threads away from the water.

99.4.7.4.4. Changes in size or shape of waterway shall be accomplished by means of easy curves. Exclusive of the main valve opening, the net area of the waterway of the barrel and the foot piece at the smallest part shall not be less than 120% of that of the new opening of the main valve.

99.4.7.4.5. Hose and steamer caps shall be individually chained to the hydrant.

99.4.7.4.6. The hydrant shall be so designed that when it is in place no excavation will be required to remove the main valve and movable parts of the drain valve. Further, the hydrant shall be of the type that can be extended without excavating.

99.4.7.4.7. Hydrants shall be traffic model type in which barrel and operating mechanism shall be so designed that in the event of an accident, or breaking of the hydrant above or near the grade level, the main valve will remain closed.

99.4.7.4.8. Main valve rod shall be made in 2 parts and fitted with breakable feature at the ground line flange.

99.4.7.4.9. The operating threads of the hydrant shall be so designed as to avoid the working of any iron or steel parts against either iron or steel. The operating stem and nut threads shall be square or acme type.

99.4.7.4.10. The operating threads shall be completely sealed away from the water at all times when valve is either open or closed. The operating rod shall be bronze sheathed when it passes through the stuffing box. Hydrants having operating threads located in the waterway will not be acceptable.

99.4.7.4.11. Bonnet shall be weatherproof free-draining and of a type that will maintain the operating mechanism in readiness to use under freezing conditions.

99.4.7.4.12. Operating nut shall be provided with convenient means to afford lubrication to insure ease of operating and the prevention of wear and corrosion.

99.4.7.4.13. Hydrants shall be furnished with an auxiliary gate valve having flange for bolting to flanged shoe on hydrant and other end to suit type of pipe being used.

99.4.7.4.14. Hydrant shall be the dry barrel type and hydrant shoe shall have positive acting non-corrodible drain valves that shall drain the hydrant completely by opening as soon as the main valve is closed, and also to close tightly when the main valve is open. Drain valve operating by springs or gravity will not be acceptable.

99.4.7.4.15. Packing gland located in bonnet shall be solid bronze and gland bolts shall be steel with bronze nuts. Double O-Ring seals may be used in lieu of conventional stuffing box.

99.4.7.4.16. All like parts of hydrant of the same size and model produced by the same manufacturer shall be interchangeable.

99.4.7.4.17. Hydrants shall open by turning to the left.

99.4.7.4.18. Threads on hose, steamer, operating nut, and cap nuts shall be in Pittsburgh Standard Thread. Threads as specified shall be factory installed. Hydrants shall be given a shop coat of chromate primer and two field coats of enamel. Private hydrants shall be red and public hydrants shall be yellow.

99.4.7.4.19. Hydrants shall be of a model currently listed by Underwriters Laboratories, Inc., or Factory Mutual research corporation at the time the application is submitted.

99.4.8. **Guide Rails** – All Guide Rails shall be designed and specified in accordance with the following Pennsylvania Department of Transportation Publications:

99.4.8.1. **Design Standards**

99.4.8.1.1. Publication 13M, Highway Design, Design Manual Part 2 (DM-2), Latest Edition, Chapter 12 Guide Rail, Median Barrier, and Roadside Safety Devices.

99.4.8.1.2. Publication 70M, Guidelines for the Design of Local Roads and Streets, Latest Edition, Chapter 2, 2.1.G. Guide Rails.

99.4.8.1.3. Publication 72M, Standards for Roadway Construction, Latest Edition, Standard Drawing Number RC-50 through RC-59M.

99.4.8.1.4. Publication 408M, Specifications, Latest Edition, Section 620, and Section 1109

99.4.8.2. **Impact Attenuating Devices** – All Impact Attenuating Devices shall be designed and specified in accordance with the following Pennsylvania Department of Transportation, Publications:

99.4.8.2.1. Publication 13M, Highway Design, Design Manual Part 2 (DM-2), Latest Edition, Chapter 12 Guide Rail, Median Barrier, and Roadside Safety Devices.

99.4.8.2.2. Publication 408M, Specifications, Latest Edition, Section 619, Section 620, Section 696, and Section 697.

99.4.9. **Cable TV** – reserved

99.4.10. **Electric** – reserved

99.4.11. **Gas** – reserved

99.4.12. **Water** – reserved

99.4.13. **Monuments and Markers**

99.4.13.1. **Location** – at least two monuments shall be placed on each STREET in subdivision and at the intersections of lines forming angles in the boundaries of subdivisions additional monuments may be requested by ENGINEER.

The STREET monuments shall be placed in the STREET right-of-way, five feet off the right-of-way line, at the beginning and ends of tangent sections. Additional monuments on line shall be placed for sighting when topographic conditions require.

The locations and tie-in dimensions of all monuments shall be shown on the plan for recording.

99.4.13.2. **Type, Material and Size** – monuments shall consist of a three foot length of six inch vitrified clay or PVC pipe, filled with concrete to within 3 ½” of the spigot end. A ½” diameter barbed bronze plug, 3 ½” in length shall be centered in a 1:2 cement mortar mix. The mortar shall be finished flush with the spigot end and the bronze plug shall project ¼”. The actual survey point shall be indicated by 1/16” hole drilled in the bronze plug. Monuments shall be set at finished grade by a Registered Surveyor after completion of the PUBLIC IMPROVEMENTS and site grading.

99.4.13.3. No PUBLIC IMPROVEMENTS shall be accepted by the TOWNSHIP until all required monuments have been set, and certified to, by a Registered Surveyor.

99.4.14. **Street Name Signs**

99.4.14.1. STREET name signs at the intersection of a STREET classification as a Local Residential STREET with another STREET shall meet the following construction standard:

99.4.14.1.1. **Material** – STREET name signs shall be constructed of Prime Corrosion - resistant Aluminum and made to fit 2” ID galvanized steel pipe.

99.4.14.1.2. **Lettering and Color** – letters and borders to be an integral part of the unit and raised approximately 1/8” from background.

MEASUREMENTS: Top unit 21” x 6” approximately, with lettering in top section in 1” script reading: TOWNSHIP of Upper St. Clair. Below this the name of the STREET in 3” block style series C lettering. Bottom Section 21” x 4” approximately with name of STREET in 3” Series C block style lettering. Signs shall be finished with black vinyl background with white beaded reflectorized letters and borders.

99.4.14.2. STREET name signs at an intersection where all the STREETS are classified as other than Local residential shall meet the CONSTRUCTION STANDARDS found in the Pennsylvania Department of Transportation Title 67, chapter 211.841 (23.741), STREET Name Sign, D3-1. However, the legend shall be white with a green background and the sign shall be reflectorized, not illuminated internally. Posts shall be green channel lock or equivalent.

99.4.15. **Street Lighting**

99.4.15.1. STREET lights at the intersection of STREETS classified as Local Residential shall meet the following construction standard:

99.4.15.1.1. **Luminaire** – J.H. Spalding - Yorkstown II - NY, with 100 watt High Pressure Sodium lamp. (Model YN11-NY-00HPS; Ordering # 39034-707). Frosted lens shall be installed to diffuse light away from residential uses or lots in residential zoning districts.

99.4.15.1.2. **Pole and Anchor Base** – Shakespeare low mount, post top fiberglass anchor base light pole 14 feet series AS, standard construction. (Ordering # AS14-02 N1AA 01) and anchor base shroud (Ordering # OPSH-1017-1)

99.4.15.2. **STREET** lights at other intersection shall meet the following standard:

99.4.15.2.1. **Luminaire** – standard West Penn Power Company Cobra head with 100 watt, high pressure sodium vapor fixture Cobra head will be mounted with appropriate length arm.

99.4.15.2.2. Pole and anchor base shall be constructed per UTILITY company specifications using a metal pole where there is option.

99.4.15.2.2. Pole and anchor base shall be constructed per UTILITY company specifications using a metal pole where there is option.

99.4.16. **Site Lighting**

99.4.16.1. Site lighting for all areas must be of the high pressure sodium type, unless a suitable substitute is approved by the ENGINEER pursuant to

a technical explanation of the on-site and off-site impacts of the proposed substitute.

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