Article VI
STREET & BRIDGE DESIGN STANDARDS

600 PURPOSE

These Standards shall be used as minimum standards for designing all streets, culverts, and bridges under the jurisdiction of the County Engineer. These standards shall not be reduced without written approval of the County Engineer.

601 STREET DESIGN

A. Arterial Streets

All design standards for arterial streets shall be based on the requirements of Article II, Section 203 (split into major and minor classifications). All arterial streets shall be designed using ODOT Standards (L & D Manual and CMS). ADT's are typically in excess of 3,500 vehicles per day. Arterials are further designated as major and minor arterials. The proposed arterial street shall conform to the higher standard of either the traffic study or as shown on the Delaware County Thoroughfare Plan current edition. The County Engineer shall determine these standards after a complete review of the project. Approval of the Preliminary Engineering plan (See Article III) will not be granted until a review of the proposed arterial street(s) is completed.

B. Collector Streets

Collector streets are designated as major collector, minor urban collector and minor rural collector. Design standards for collector streets shall be based on the requirements of Article II, Section 203. ADT's typically range from 1,500 to 3,500 vehicles per day in residential areas.

C. Local Streets

Design standards for local streets shall be based on the requirements of Article II, Section 203. Typical ADT's range from 100 to 1,500 vehicles per day.

The County Engineer shall consider the entrance street of subdivision a collector with respect to pavement width to the first intersection or a specified length as determined necessary. Left turn storage on all entrance streets shall be at least 100 feet with a 50-foot divergent taper. Longer storage length shall be as established by an analysis. A minimum pavement width of 36 feet to accommodate turn lanes is required for all entrance streets (Curbed and Non-curbed). The pavement length provided on the Final Engineering and Construction

Plan shall be approved by the County Engineer. Curb and gutter shall be provided for all entrance street intersections with existing County, Township or State Highways, if the entrance street is curbed. The curb shall terminate at the end of the radius and taper to 0" in height at both curb ends. The minimum taper length is 10-feet. For non-curbed streets, a modified shoulder section shall be used. Standard drawings showing these details are included in the Supplemental Specifications.

Local streets have been subdivided into four main sub-classifications: through, cul-de-sac, loop and low volume/low density streets.

1. Through and cul-de-sac standards: See Table 601-1 and 601-2.
2. Loop street standards: See Table 601-3 and Delaware County Engineer's Standard Drawing(s) in the Supplemental Specifications to these Standards. In addition the following requirements must be met.
    a) A maximum ADT of two hundred vehicles per day will be permitted when using the standard pavement thickness as noted in Article VII of these Standards. For ADT's greater than 200, the pavement thickness must be based on an analysis per Article VII.
    b) Used only with curb and gutter streets.
    c) Maximum parallel tangent or curved segment shall not exceed 500 feet in length.
    d) Maximum approach tangent or curved segment from a local, collector or arterial street shall not exceed 500 feet in length.
    e) Alternative loop shapes may be permitted provided the total length of the Loop Street does not exceed 1300 feet (measured along the centerline from centerline of the intersecting street).
    f) Approach or parallel centerline curves shall meet the minimum centerline radius as set forth in Table 601-2.

g) Minimum centerline radius for centerline curve between approach segment and parallel segment shall be 75 feet. The inside pavement edge and right-of-way line shall be concentric. The outside pavement and right-of-way radii shall be 35 feet and 46.5 feet respectively. The Township Fire Department must provide written approval of the proposed radii. Regardless of the radii chosen, a minimum pavement slope of 0.02 is required.

h) Minimum pavement width shall be 27 feet face-to-face of curb.

i) The waterline shall be located on the inside of the loop.

j) Only two intersecting points shall be permitted, no eyebrows or common access drives are allowed.

k) Minimum right-of-way width of 50 feet, additional utility and drainage easements shall be required along each side of the street.

l) Minimum centerline radius:

a. Angles between 80 and 100 degrees - 75-foot radius.

b. Angles less than 80 degrees or more than 100 degrees – See Table 601-3.

3. Low Volume/Low Density Local Streets:

a) A maximum ADT of 150 vehicles per day is permitted (15 lots maximum).

b) Lot size shall be restricted to 0.75 acres minimum and a 50–foot minimum building setback from the right-of-way line is required.

c) See Tables 601-1 and 601-2 for minimum pavement widths.

d) 8-foot graded shoulder (non-curbed streets only).

e) Used on a modified loop street or cul-de-sac with no extensions to adjacent parcels of undeveloped lands.

f) A minimum 50-foot right-of-way with required easements provided for drainage and utilities.

g) Written approval by the appropriate Township(s) Board of Trustees (with a copy sent to the County Engineer).

h) All other local street standards are applicable.

i) A permanent T-turnaround is acceptable. The T-turnaround may be used as a driveway access.

D. Parkways/Boulevards:

Designs for parkways and boulevards shall be submitted for County Engineer review and approval as part of the Preliminary Engineering Plan submittal. The Design Engineer is encouraged to contact the County Engineer during the preliminary design phase to discuss the design parameters for the proposed parkway or boulevard.

E. Traffic Expansion Factor

The traffic count on any street being designed within Delaware County, except local and permanent dead-end streets, shall be expanded to comply with the Delaware County Traffic Impact Standards (TIS), current edition. A copy of the TIS is included in the Supplemental Specifications of these Standards. The traffic count on any street being designed within Delaware County, except local and permanent dead-end streets, shall be expanded for a twenty (20) year growth period. Proposed traffic expansion factors must be submitted to the County Engineer for approval. An explanation of the assumptions used to establish the factors shall be provided. The County Engineer will review area growth with Delaware County RPC and advise the Owner if the proposed factors are acceptable.

The actual traffic expansion factor used shall be approved in writing by the County Engineer.

F. Residential Vehicle Demand Factor

An ADT demand for street design shall be taken to be ten (10) vehicles per dwelling unit per day in determining the street classification. Additional vehicles due to other related factors must also be taken into account when determining demands.

G. Terrain Classification

Article VI
STREET & BRIDGE DESIGN STANDARDS

The definitions of terrain classification within Delaware County are as follows:

1. Level: grade range of 0 to 8 percent, and
2. Rolling: grade of over 8 percent.

Notes to Design Engineers:

Terrain classifications pertain to the general character of the existing ground within the road right-of-way or that affects the proposed alignment and profile of the roadway.

When a proposed project has both level and rolling terrain classifications, the classification used for each street shall be consistent with the statement above. When in conflict the more restrictive classification shall be used. The terrain classification shall be clearly marked on the typical section. The County Engineer must approve the proposed terrain classification prior to Preliminary Engineering Plan approval.

H. Development Density

For the purposes of these Standards, development density is defined as the total number of dwelling units divided by total combined area of dwelling units and street right-of-way in acres. Reserves, open spaces and other non-building lots shall not be used in the calculation of development density. The development density shall be clearly shown on the title sheet.

1. Low Density: 2 or fewer dwelling units per acre (density is defined above)
2. Medium Density: 2.1 to 6.0 dwelling units per acre (density is defined above)
3. High Density: more than 6 dwelling units per acre (density is defined above)

Note to Design Engineer: The above development density is not gross zoning density.

I. Design Speeds

The design speeds shown in the tables of these Standards shall be used unless the County Engineer approves a variance.

J. Right-of-way Widths

The minimum right-of-way widths for all public streets are shown in Tables 601-1, 601-2, 601-3, 602-1, and 602-2. This minimum width shall be increased where and to the extent the County Engineer deems it necessary for topographical, construction and drainage features.

K. Right-of-way and Work Limit Clearing

The limits of the area to be cleared are to be clearly defined in the Final Engineering and Construction Plan. It is not the intention of this clearing requirement to cause the removal of trees or other natural features that do not impact the design and safety of the proposed street. Trees or other natural features that are to remain in the right-of-way or work limits shall be clearly identified in the Final Engineering and Construction Plan. Townships may enact their own standards for obstructions in the right-of-way of roads to be maintained by the township.

L. Vertical Alignment

The minimum length of curve shall conform to the requirements of the ODOT L&D Manual, current edition. A minimum profile grade of 0.5% is required for all curb and gutter streets.

M. Horizontal Alignment

A minimum tangent length of one hundred (100) feet is required between reverse curves on all arterial and collector streets. A minimum tangent length of fifty (50) feet is required on local, commercial and industrial streets. Minimum radii for horizontal curves are provided in Tables 601-1, 601-2, 601-3, 602-1, 602-2 and 603. The County Engineer reserves the right to increase the minimum tangent length between reverse curves, when necessary, in order to provide a safe and efficient roadway.

N. Pavement Width

The pavement widths for each type of street and type of use are shown in Tables 601-1, 601-2, 601-3, 602-1, 602-2 and 603. These widths shall be the minimum widths allowed. Pavement widths shall be increased where the County Engineer deems necessary in order to conform to the traffic and parking requirements of the area. Pavement width on curb and gutter type streets is measured from face to face of curb. Pavement widths for arterial streets shall be approved by the County Engineer.

O. Medians and Boulevards:

When medians are proposed, the minimum pavement widths do not include a curb offset for these medians. The County requires a minimum 2-foot offset from the face of curb or edge of median. This requirement is for any arterial, collector, commercial and industrial street. Minimum pavement widths for boulevard sections shall comply with current County Standards and township requirements for emergency vehicles. Parking limitations on boulevard sections is subject to County Engineer approval. ODOT Type 6 curb is not permitted.

P. Shoulders

The minimum width of all graded shoulders shall be eight (8) feet. Shoulder width is measured from the edge of the pavement to the point where the shoulder slope intersects the foreslope. When used, guardrail offset from the edge of pavement shall comply with the ODOT L&D Manual, current edition.
A two-foot paved shoulder (minimum) shall be required on all non-curbed arterial, industrial and commercial streets. A two-foot (minimum) treated aggregate shoulder may be required on non-curbed streets, as determined by the County Engineer. A two-foot treated aggregate shoulder shall be required on existing road system as determined necessary by the County Engineer. The County Engineer shall determine the composition of all paved or treated aggregate shoulders.

Q. Side and Ditch Slopes

Side and ditch slopes shall be shown on the typical sections. Side and ditch slopes shall conform to the requirements of the Delaware County Engineer's Standard Drawings as outlined in the Supplemental Specification of these Standards.

Modified ditch sections (using a perforated pipe and a ditch section) are required in some townships. The Owner must contact the Township regarding their requirements for open ditch roads. A copy of the modified ditch standard drawing is included with the Supplemental Specifications of these Standards. The County Engineer will encourage the use of a modified ditch section if site conditions indicate a typical ditch section would drain poorly.

R. Sidewalks, Bike Paths, Pedestrian Crossings & Handicap Ramps:

Sidewalks and/or bike paths are typically required as part of the Township Zoning, or in conjunction with Regional Planning Commission recommendations. The Owner shall check with the Township regarding their sidewalk requirements. Sidewalks or bike paths must be located a minimum of 1'-0" outside the point where the ditch backslope intersects the existing ground on open ditch roadways. All sidewalk or bike paths should be located within a dedicated easement and/or public right-of-way. Sidewalk locations for curb and gutter streets are outlined in Tables 601-2, 601-3 and 602-2.

For driveway location requirements with respect to curb ramps, please see Article VIII.

When sidewalks and/or bike paths are proposed as part of the subdivision the curbs shall be dropped or removed by a curb-cut method at the locations shown in the plans for the handicap ramps. The sidewalk, bike path, and/or handicap ramp adjacent to the curb shall comply with current Americans with Disabilities (ADA) requirements and these Standards, including the Supplemental Specifications. Six curb ramps are required for all 3-way (T-type) intersections, and 8 curb ramps are required for all 4-way intersections. Ramps shall be located perpendicular to the curb. If the ramp is located within a radial section, the ramp shall be located perpendicular to the tangent of the curve at that point. Ramps shall be located to prevent leading users into the intersection and oncoming vehicular traffic. The curb detailing shall be modified to accommodate a flush surface at the gutter pan near all handicap ramps, using a maximum slope of 1.38%. Sidewalks, bike paths and handicap ramps that are a part of a no load entrance street or in areas where access to the street is not permitted (e.g. open space areas, etc.) shall be constructed as part of the street improvements. All necessary sidewalk, bike path, handicap ramp and pedestrian crossing details (e.g., school crossing signs, crosswalk markings, signals, etc.) shall be included with the Final Engineering and Construction Plan.

S. Curb Drops:

Pre-designed curb drops for drives shall not be permitted. Curb-cut methods for establishing dropped curbs are permitted.

T. Street Access Restriction

When required by the County Engineer, based upon projected ADT's and other safety considerations, direct access to lots along a Collector or Arterial Street shall be prohibited.

As stated in Sections 601-A and 601-B, arterial and collector streets have a secondary function to service abutting land use. Therefore, the County Engineer has established a street access restriction to avoid direct access to abutting properties and lots from collector and, especially, arterial streets.

All access points to arterial and collector streets shall require the approval of the County Engineer. In addition, access points for local streets within high traffic volume areas (e.g., commercial, multi-family, industrial, etc.) shall be approved by the County Engineer.

U. Variances

These Standards have been developed based on the standard and/or traditional road, bridge and subdivision design. Variances may be granted when proven engineering practices show these Standards cannot be obtained. Intended variances shall be submitted during the Preliminary Engineering Phase as outlined in Article III, Section 302(B) 6. These variance requests shall be submitted in writing and, if approved by the County Engineer, documented (showing approval date) on the title sheet of the Final Engineering and Construction Plan. All variances must have the written approval of the County Engineer.

Variances are to be considered on a project-by-project basis. Any approved variances are not to be considered as precedent for future projects.

V. Parking Restrictions:

When one side parking restrictions are required or planned, the parking restriction shall occur on same side as the location of the fire hydrant(s).

W. Miscellaneous

Underdrains shall outlet into structures for curb and gutter streets, and at the low point of the roadway profile for all open ditch streets. Precast reinforced concrete outlets are required for all Type F outlets. The pipe material for Type F outlets must comply with the Supplemental Specifications of these Standards.

Profile grade is defined as the top of curb for all curb and gutter streets, and the top of centerline of pavement for all open ditch streets.

All arterial and major collector streets using curb and gutter sections shall comply with the ODOT L&D Manual, current edition (Type 2 Curb with a 9-inch thick gutter pan is required).

All minor rural and minor urban collector streets using a curb and gutter section shall use a 6-inch thick gutter pan.

For all open ditch streets the fire hydrant must be located 8-feet from the edge of pavement.

602 INTERSECTION DESIGN

A. Angle of Intersection

Streets should be laid out to intersect at right angles and no street shall intersect any other street at an angle of less than seventy-five (75) degrees. Current ADA requirements must be checked for all street intersections between 75 and 90 degrees to insure compliance.

B. Number of Allowable Intersecting Streets

Three-way (T-type) intersections are encouraged and in no event shall an intersection containing streets in excess of four (4) be approved.

C. Offset Intersections

Intersection offsets shall comply with the requirements of Table 605. These requirements apply to each subclassification of road (the same criteria applies for both a rural minor collector and an urban minor collector; minor arterial and major arterial, etc.).

D. Intersection Grades, Elevations, and Pavement Thickness

All intersections shall be designed to comply with current ADA requirements and these Standards, including but not limited to, minimum and maximum grades for all intersecting streets, location of curb ramps outside the midpoint of the intersection radius, and locations of all utilities so that they do not conflict with the curb ramp. Storm structures shall be offset a minimum of 4-feet from all ADA curb ramps.

Curb and gutter streets shall provide storm structures at all low points within the intersection. Elevations shall be provided at a 25' minimum spacing along the intersection radii. Pavement thickness at

all intersections shall use the thicker pavement section through the radius return point on all streets, including those streets where a thinner pavement section is permitted.

TABLE 601-1

LOCAL STREET DESIGN STANDARDS

FOR THROUGH STREETS & CUL-DE-SACS

(WITHOUT CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]	
Right-of Way Width (Art. 601-H)	Sixty feet (60') Preferred, mandatory for sites with Sidewalks, Bikepaths, etc. Fifty feet (50') Minimum (With drainage/utility easements)	
Minimum Cul-de-sac Radius (R/W)	Fifty-six feet six inches (56' –6") or Seventy five feet (75') with/island	
Terrain Classification (Art. 601-E)	**Level**	**Rolling**
Design Speed	30 MPH	25 MPH
Minimum Centerline Radius	250 feet	175 feet
Minimum Sight Distance	See Art. 602 E	See Art. 602 E
Maximum Grade	4 Percent	8 Percent
Maximum Grade of Cul-de-sac Bulb (along centerline of traveled lane)	3 Percent	3 Percent

TABLE 601-1 (continued)
LOCAL STREET DESIGN STANDARDS
FOR THROUGH STREETS & CUL-DE-SACS
(WITHOUT CURB)

Terrain Classification	**Level**			**Rolling**		
Development Density (Art. 601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Maximum Cul-de-sac Length [1]/Minimum Pavement Width	1500/ 20	1000/ 20	750/ 20	1500/ 20	1000/ 22	750/ 24
Minimum Cul-de-sac Bulb Radius	45					
Through Street - Minimum Pavement Width	20	N/A	N/A	20	N/A	N/A
Sidewalk Width (min.)	4’-0”	4’-0”	4’-0”	4’-0”	4’-0”	4’-0”
Sidewalk Location – Approval by County Engineer Required	*	*	*	*	*	*
Graded Shoulder Width[2]	8’-0”	8’-0”	8’-0”	8’-0”	8’-0”	8’-0”

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] Cul-de-sac length is measured along the centerline from the center of intersecting street to the center of the bulb

[2] 2’-0” of graded shoulder shall be sealed aggregate berm

TABLE 601-2
LOCAL STREET DESIGN STANDARDS
FOR THROUGH STREETS & CUL-DE-SACS
(WITH CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]	
Right-of Way Width (Art. 601-H)	Sixty feet (60') Preferred, Mandatory for sites with Sidewalks, bikepaths, etc. Fifty feet (50') Minimum (With drainage/utility easements)	
Minimum Cul-de-sac Radius (R/W)	Fifty-six feet six inches (56' –6") or Seventy five feet (75') with/island	
Terrain Classification (Art. 601-E)	**Level**	**Rolling**
Design Speed	30 MPH	25 MPH
Minimum Centerline Radius	250 feet	175 feet
Minimum Sight Distance	See Art. 602 E	See Art. 602 E
Maximum Grade	4 Percent	8 Percent
Maximum Grade of Cul-de-sac Bulb (along centerline of traveled lane)	3 Percent	3 Percent

TABLE 601-2 (continued)
LOCAL STREET DESIGN STANDARDS
FOR THROUGH STREETS & CUL-DE-SACS
(WITH CURB)

Terrain Classification	**Level**			**Rolling**		
Development Density (Art. 601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Maximum Cul-de-sac Length [1]/Minimum Pavement Width	1500 27	1000 32[2]	750 32[2]	1500 27	1000 32[2]	750 36
Minimum Cul-de-sac Bulb Radius (w/ island)	55					
Through Street - Minimum Pavement Width	27	32[2]	36	27	32[2]	36
Sidewalk Width (min)	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
Sidewalk Distance from Back of Curb	6-0"	6-0"	6-0"	6-0"	6-0"	6-0"
Type of Curb – Vertical face required for all densities	*	*	*	*	*	*

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

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[1] Cul-de-sac length is measured along the centerline from the center of intersecting street to the center of the bulb

[2] If parking is restricted on one side of street, pavement width may be reduced to 27 feet.

TABLE 601-3
LOCAL STREET DESIGN STANDARDS
FOR LOOP STREETS (CURB REQUIRED)
See Art. 601 C for additional requirements

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]					
Right-of Way Width (Art. 601-H)	Sixty feet (60') Preferred, Mandatory for sites with Sidewalks, Bikepaths, etc. Fifty feet (50') Minimum (With drainage/utility easements)					
Terrain Classification (Art. 601-E)	**Level**			**Rolling**		
Design Speed	30 MPH			25 MPH		
Minimum Centerline Radius – Loop Street	Angles between 80 and 100 degrees - 75-foot radius. For angles less than 80 or more than 100 degrees - 250-foot radius			Angles between 80 and 100 degrees - 75-foot radius. For angles less than 80 or more than 100 degrees - 175-foot radius		
Minimum Sight Distance	See Art. 602 E			See Art. 602 E		
Maximum Grade	4 Percent			8 Percent		
Minimum Pavement Width	27	32[1]	36	27	32[1]	36
Type of Curb – Vertical face required for all densities	*	*	*	*	*	*
Sidewalk Width	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
Sidewalk Distance from Back of Curb	6-0"	6-0"	6-0"	6-0"	6-0"	6-0"

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] If parking is restricted on one side of street, pavement width may be reduced to 27 feet.

TABLE 602-1
MINOR RURAL COLLECTOR STREET DESIGN STANDARDS
(WITHOUT CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]					
Right-of-way Width (Art. 601-H)	70 feet					
Sidewalk Width (min.)	5 feet (Location determined by County Engineer)					
Full Intersection Minimum Spacing Along Major Traffic Route	1300-feet					
Terrain Classification (Art. 601-E)	**Level**			**Rolling**		
Design Speed	35 MPH			30 MPH		
Minimum Centerline Radius (Radius may be increased by the County Engineer)	350			230		
Minimum Sight Distance	See Article 602 E			See Article 602 E		
Maximum Grade	4 percent			8 percent		
Development Density (Art. 601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Pavement Width	24	24	24	24	24	24
Graded Shoulder Width[1]	8'-0"	8'-0"	8'-0"	8'-0"	8'-0"	8'-0"

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] 2'-0" of graded shoulder shall be sealed aggregate berm

TABLE 602-2
MINOR URBAN COLLECTOR STREET DESIGN STANDARDS
(WITH CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]					
Right-of-way Width (601-H)	70 feet					
Sidewalk Width	5 feet					
Sidewalk Distance from Back of Curb	6 feet					
Type of Curb	Vertical Face with an 8-inch thick gutter pan					
Full Intersection Minimum Spacing Along Major Traffic Route	1300-feet					
Terrain Classification (Art. 601-E)	**Level**			**Rolling**		
Design Speed	35 MPH			30 MPH		
Minimum Centerline Radius (Radius may be increased by the County Engineer)	350			230		
Minimum Sight Distance	See Article 602 E			See Article 602 E		
Maximum Grade	4 percent			8 percent		
Development Density (601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Curbed Pavement Width	36	36	36	36	36	36

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

TABLE 603

COMMERCIAL AND INDUSTRIAL STREET DESIGN STANDARDS

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]	
Classification	**Curbed**	**Uncurbed**
Design Speed (Design Speed subject to approval of the County Engineer at the Preliminary Engineering Plan Phase)	25 MPH (min.) 35 MPH - Preferred	25 MPH (min.) 35 MPH - Preferred
Right-of-way width (These widths are guidelines. The design engineer is responsible to establish right-of-way adequate to construct and maintain the proposed typical section, including required bikepaths, etc.)	60 to 80 feet	70 to 90 feet
Number of Traffic Lanes – Total number of traffic lanes to be determined from approved traffic study	2 to 4	2 to 4
Width of Traffic Lanes (Minimum)	12 feet	12 feet
Curb offset- Curbed Streets Shoulder Width – Uncurbed Streets	0-feet – 25 mph 2-foot – 35 mph	2-foot paved – 25 mph 4-foot paved – 35 mph
Width of Curb Parking Lane, Safety Shoulder or Turning Lane	10 feet	10 feet (includes paved shoulder)
Type of Curb	Vertical Face with a 2-0” wide gutter pan (8” thick)	N/A

Note to designer: Center line and edge line shall be striped on all commercial and industrial streets.

Source: U.S. Department of Transportation, U.S. National Highway Functional Classification and Needs Study Manual, 1970

E. Sight Distances

1. Intersection Sight Distance (ISD): Intersection sight distance shall be in accordance with ODOT's Location and Design Manual, current edition. In order to maintain the required "clear" sight distance free of obstacles, the County Engineer shall restrict the height of embankments, locations of buildings, landscaping and screen fencing in this area.

   At an intersection with a collector, arterial or existing County/Township road, a 90-foot clear sight distance triangle shall be provided. No landscaping, embankment, or feature greater than 24-inches in height shall be permitted within this triangle. An exhibit showing this clear sight distance triangle shall be included as part of the Final Engineering and Construction Plan and certified by a Registered Professional Engineer prior to the acceptance of the street onto the public system.

2. Stopping Sight Distance (SSD): Stopping sight distance shall be in accordance with ODOT's Location and Design Manual, current edition.

3. Sight Distance Requirements: The controlling sight distance requirement shall be as set forth in the table below. The classification of the intersecting streets shall be as determined by the County Engineer. These requirements apply to each subclassification of road (the same criteria applies for both a rural minor collector and an urban minor collector; minor arterial and major arterial, etc.). Intersections within the subdivision that access an existing County or Township road shall be designed to meet the intersection stopping distance as established in ODOT's Location and Design Manual, current edition. In no case shall an intersection be designed to less than the minimum requirements.

4. Roadway Profile/Height of Object: The height of object shall be determined for the current roadway profile, and for a future roadway profile assuming a profile increase

of 6-inches, to account for future overlay(s). All necessary modifications shall be made to the plans in order to provide the required sight distance. These modifications shall include, but not be limited to, profile changes on the existing County/Township Road, removal of obstructions within the R/W to provide adequate sight distance triangle, etc. The County Engineer must approve in writing any proposed modifications as part of the Preliminary Engineering Plan approval. These modifications shall be incorporated into the Final Engineering and Construction Plans.

INTERSECTING STREET Classification/Classification	CONTROLLING SIGHT DISTANCE
Local/Local	SSD
Local/Collector	ISD / SSD*
Local/Arterial	ISD
Collector/Collector	ISD
Collector/Arterial	ISD
Arterial/Arterial	ISD

*A minimum of a 35 mph design speed shall be used for SSD for the collector street.

603 TEMPORARY AND PERMANENT TURN-AROUND

A. A temporary turn-around shall be required when the end of the road in question is greater than 250 feet from the nearest intersection. No portion of the temporary turn-around shall be used as a driveway for any of the lots on the stub street. Language to this effect shall be listed on the plat for the subdivision. For the minimum turn-around design standards, see the Supplemental Specifications of these Standards.

B. Where a temporary turn-around is used, it shall be provided with a temporary easement covering the portion of the turn-around that extends beyond the normal right-of-way limits. Such temporary easements shall be automatically vacated for the use of the abutting property owner when said temporary turn-around is no longer needed for public use.

C. Permanent turn-arounds will not be permitted without written approval by the County Engineer except for low-volume/low-

density roads. All permanent turn-arounds must be approved at the Preliminary Engineering Phase.

TABLE 604
INTERSECTION DESIGN GUIDELINES

ITEM (Reference)	STANDARDS [in feet, unless otherwise shown]	
Approach Speed	25 M.P.H.	
Sight Distance (602-E)	ODOT L&D Manual Current Edition	
Intersection Angle (602-A)	75 Degrees – Minimum 90 Degrees – Preferred	
Minimum Curb Radius Local –Local	30 feet (35 feet without curb)	
Local – Collector	35 feet	
Collector- Arterial	40 feet	
Arterial – Arterial	50 feet	
Commercial & Industrial	50 feet	
Median Nose – Distance from the Intersection	Shall not extend beyond the radius return of the approach to the intersection.	
Minimum Centerline Offset of Adjacent T type Intersections*		
Local – Local	150 feet	
Local – Collector	200 feet	
Collector – Collector	350 feet	
Intersection on Arterials	Based on a detailed traffic study and current County Traffic Impact Standards	
Terrain Classification (601-E)	**Level**	**Rolling**
Vertical Alignment within intersection Area (602-D)	Must comply with current ADA Requirements	Must comply with current ADA Requirements
Minimum Tangent Length Approaching Intersection (Each leg)	50 feet	30 feet

*Note to designer: For signalized intersections, roundabouts, etc., other design solutions beyond the above minimum centerline offset standards may be required.

604 BRIDGES, CULVERTS OVER 6-FOOT SPAN AND SPECIAL STRUCTURES

All bridges, culverts over 6-foot span and special structures shall be designed using current AASHTO specifications and the current ODOT Bridge Design Manual, ODOT Location and Design Manual, associated standard drawings, Supplemental Specifications, etc. The County Engineer shall determine the types of special structures that need to be designed to these standards. A minimum of an HS25-44 loading shall be used for all structures, unless a special loading (for example, Permit Loading) is required by the County Engineer. Pedestrian traffic, bicycle traffic and other safety considerations shall be considered in the design.

605 STREET LIGHTING

The County Engineer shall approve all street lighting details (e.g., poles, luminaries, conduit, etc.). These details shall be included in the Final Engineering and Construction Plan.

The appropriate Township shall be contacted to determine if street lighting is required and who will be responsible for future maintenance including energy cost.

606 STREET SIGNS

All necessary street name signs and locations are to be included in the Final Engineering and Construction Plan. These details shall be provided on the same plan sheet as the traffic control devices, pavement markings, etc. (see Section 607). The street name signs are to be installed prior to opening any street to traffic, before approving the subdivision for maintenance by the Owner and releasing the subdivision for Building Permits. Written approval by the township trustees is required for all special street name signs before building permits will be issued. The standards for the street name signs shall be in accordance with the requirements of the County Engineer. All special street sign installations are to be maintained by the Owner or the property owners' (homeowners) association. All street name signs to be used shall be approved for use by the County Engineer and/or Township. Street signs (including bases) at the entrance to a subdivision from a county,

township, or state highway (within County or State right of way) shall be designed to current FHWA and ODOT standards.

607 TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS

The Final Engineering and Construction Plan shall include all necessary traffic control signs, devices and pavement markings, etc. These items shall be designed to meet the requirements of the current edition of the ODOT Manual of Uniform Traffic Control Devices (MUTCD). These details shall be provided on a separate plan sheets in the Final Engineering and Construction Plan.

All striping shall comply with these Standards and Supplemental Specifications, using ODOT specifications for all arterial, major and minor rural collector roads. City of Columbus specifications shall be used for all minor urban collector and local (residential, commercial, industrial, etc.) roads. Thermoplastic striping shall be used for all minor urban collector and local (residential, commercial, industrial, etc.) roads. Pavement striping for existing County/Township road widenings must match the existing striping at the project limits.

The Owner is required to provide speed limit signs on existing County, Township or State Highways where the proposed subdivision entrance street(s) intersects the public highway. These signs shall state the posted speed limit for the intersecting County, Township, or State Highway.

Speed limit signs shall be placed on all subdivision streets. Spacing of signs shall comply with the ODOT MUTCD, current edition. School zone signs (e.g., pavement markings, cross walks. signs, etc.) shall be provided for all subdivision streets located within school zone limits as defined in the ODOT MUTCD. No parking signs shall be provided, if required based on street width.

A concrete right-in/right-out island (pork chop) shall be included with the Final Engineering and Construction Plan if required as part of the approved traffic study. Details for the island shall comply with current Delaware County Standard Drawings.

These traffic control signs, devices and pavement markings shall be installed prior to approving the subdivision to maintenance by the Owner or releasing the subdivision for building permits.

The County Engineer shall approve the final stop sign locations. Stop signs shall not be located on any street signs.