

Street and Grading Design Manual
City of Lancaster
Department of Engineering



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TABLE OF CONTENTS

TABLE OF CONTENTS2

PURPOSE4

POLICY4

 Street Design4

 Classification4

 Layout5

 Intersections6

 Site Distance6

 Street Grades7

 Horizontal Curves7

 Vertical Curves7

 Right of Way and Pavement Width8

 Pavement Design8

 Medians9

 Pavement Relief Joints9

 Street Names10

 Curbs, Gutters, and Sidewalks10

 Handicap Accessibility11

 Turnarounds11

 Temporary Barricades11

 Bridges11

 Guardrails12

 Driveways12

 Mailboxes15

 Street Trees15

 Traffic Study16

 Signage and Striping17

 Signalization17

 Frontage Improvements17

 Emergency Access18

Parking	18
Railroad Crossings	18
Fire Hydrants	18
Service Roads	19
Private Streets, Drives, and Fire Lanes	19
Utility Trenches	19
Coordination of Work with Other Jurisdictions	20
Grading and Sitework	20
Master Grading Plan	20
Easements	20
Drainage	21
Flood Routing	21
Flood Hazard Areas	21
Utilities	22
Buffers and Screening	22
Underground Utilities	22
General	22
Gas	22
Other Utilities	22
Utility Sleeves	23
Street Lighting	23
General	23
Design	23
Erosion and Sedimentation Control	24
Policy	24
Design Criteria	24
Maintenance During Construction	25
DESIGN SUBMISSION	26
APPENDIX	26
Department Contact Information	26

PURPOSE

This manual is to provide awareness to the designer of new developments in the City of Lancaster of acceptable local design standards. It is a supplement to standard design procedures. This manual is meant to be a guideline for development in the City and as a supplement to the Subdivision Regulations. The City understands that not all projects will conform to these standards and may require unique solutions suited for the individual site. These situations should be addressed early in the planning stages of the development. The latest edition of the City Zoning Ordinances, Subdivision Regulations, Construction and Materials Specifications of Lancaster (CMSL), Standard Drawings, and General Notes shall be followed in planning and designing the project.

The designer is referred to *A Policy on Geometric Design of Highways and Streets*, 6th Edition (2011) by the American Association of State Highway and Transportation Officials (AASHTO) and the Ohio Department of Transportation (ODOT) *Location and Design Manual* for further guidance.

POLICY

STREET DESIGN

The arrangement of streets shall generally conform to the Thoroughfare Plan for the City. For streets not indicated on the Thoroughfare Plan, the arrangements shall provide for the appropriate extensions of existing streets.

Streets in newly developed areas shall conform to the Thoroughfare Plan. The City Engineer shall make the final determination as to the classification of any new street based on the potential development of the site and its potential traffic volume (expressed in Average Daily Traffic), the character of the surrounding area, and the Thoroughfare Plan.

Classification

In accordance with the Thoroughfare Plan, streets shall be classified as follows:

- Freeway/Expressway
- Major Arterial (120 foot Right of Way)
- Major Arterial (100 foot Right of Way)
- Minor Arterials
- Collector
- Local

Where specific guidance is not provided, street design shall be based on the following classifications:

- Terrain
 - Level – grade range of 0-8 percent
 - Rolling – grade range of 8.1-15 percent
 - Hilly – grade over 15 percent
- Density
 - Low – 2 or less dwellings per acre
 - Medium – 2.1-6.0 dwellings per acre
 - High – over 6 dwellings per acre
- Speed Limits
 - Main Thoroughfare – 45 mph
 - Primary Arterial – 45 mph
 - Secondary Thoroughfare – 35 mph
 - Minor Arterials – 35 mph
 - Major Collector – 35 mph
 - Minor Collector – 25 mph
 - Local – 25 mph

Layout

Street layouts shall be designed to ensure the flow of traffic into and out of the area and for the passage of emergency vehicles. A clear circulation path for vehicles and pedestrians shall be established as part of the master plan. The street pattern shall make provisions for the continuance of streets into adjoining undeveloped areas and for the connection to existing right-of-ways in adjacent areas. Whenever possible, street layouts should be planned to avoid excessive stormwater runoff and the need for storm sewers and inlets. The amount of paved area should be kept at a minimum to reduce construction and maintenance costs. Topography, soil, and geologic conditions should also be considered. A minimum overhead clearance of 14 feet shall be provided at all times.

Developments with only one street access point shall provide a stub street to the property line at a location acceptable to the City Engineer. This stub shall be for the purpose of providing future access to the development. All other developments shall provide a dedicated right-of-way to undeveloped areas or existing right-of-ways in adjacent developments for the purpose of extending streets or other public utilities.

Developments adjoining or containing an existing or proposed arterial or major collector street shall minimize direct access to those streets. Reverse frontage lots shall have a planting strip of a minimum width of 20 feet on the rear of those lots abutting the arterial or major collector street, and no vehicular access shall be allowed across the strip.

Local streets shall be laid out so as to discourage use by through traffic. Blocks shall not exceed 1,200 feet in length, as measured between the centerlines of the intersecting streets, except where specific topographic conditions require a greater length. The maximum length of a cul-de-sac shall be 600 feet, as measured from the centerline of the intersecting street to the middle of the turnaround, except where additional right-of-way is provided to extend the cul-de-sac for future access. No islands will be allowed in cul-de-sacs.

Alleys shall not be permitted in residential areas. In commercial and industrial areas, alleys shall be required if no other provisions are made for adequate service access, such as off-street parking and loading. Dead-end alleys will not be permitted.

Reserve strips controlling access to streets shall be prohibited except where their control is placed under the jurisdiction of the City.

Intersections

Streets shall intersect one another at 90 degrees, or as near to 90 degrees as possible, but in no case less than 75 degrees. The intersection must remain within these degree parameters for a distance of not less than 100 feet from the intersection. Three-way intersections are encouraged. Intersections containing more than four streets shall not be allowed without the approval of the City Engineer.

Approaches to intersections shall be reduced to a grade not to exceed 3% for a minimum distance of 90 feet from the curb line of the intersecting street. Intersections shall be designed to match existing pavement elevations. Where site conditions warrant a change in elevation, the existing pavement shall be planed and overlaid to meet the new elevation. A minimum of 1¼" overlay will be required.

Street jogs shall be discouraged. Where such jogs are unavoidable, in no case shall the centerline be offset by less than 125 feet. No access shall normally be allowed on intersecting highways adjacent to highway interchanges for a minimum of 600 feet for diamond interchanges or 1000 feet for all other intersections.

Site Distance

Visibility shall be calculated for each existing street connection, at each bridge and at any other location designated by the City Engineer as a site distance visibility concern.

Site distance shall be calculated in accordance with the ODOT *Location and Manual* using the following criteria:

<u>Street Type</u>	<u>Horizontal Clearance</u>	<u>Vertical Clearance</u>
Arterial	300 feet	500 feet
Minor Arterials	200 feet	300 feet
Collector	200 feet	300 feet
Local	100 feet	200 feet

Horizontal visibility shall be measured on the centerline. Vertical visibility shall be measured 4½ feet from eye level to ground level from the stop bar or curb return.

An unobstructed sight distance extending back 25 feet from the curb line intersection of each street shall be maintained. The area shall be kept clear of all structures and vegetation exceeding a height of 2½ feet above the curb line.

Street Grades

The minimum street grade shall be 0.5% and the maximum street grade shall be 12%. The preferred maximum grade is 8% on streets and 5% on cul-de-sacs. Thoroughfare grades shall be as directed by the City Engineer.

Profile grade shall be the top of curb elevation for curbed streets and the proposed centerline elevation for uncurbed streets. Both top of curb profiles shall be shown for a curbed street; for uncurbed streets, a single profile shall be used. Grade breaks shall be stationed in the profile.

Horizontal Curves

The minimum radii for centerline curvature shall be as follows:

<u>Street Classification</u>	<u>Degree</u>	<u>Radius</u>
Major Arterial	12°	475 ft.
Minor Arterials	19°	300 ft.
Collector	19°	300 ft.
Local	28°	200 ft.

A minimum of 50 feet of tangent shall be introduced between reverse curves unless approved by the City Engineer.

Vertical Curves

Profile grades shall be connected by vertical curves of a minimum length in accordance with the following:

<u>Street Classification</u>	<u>Length of Curve</u>	<u>Minimum Length</u>
Arterial	30(g ₁ -g ₂)	135 feet
Minor Arterials	20(g ₁ -g ₂)	105 feet
Collector	20(g ₁ -g ₂)	105 feet
Local	20(g ₁ -g ₂)	75 feet
Alley	10(g ₁ -g ₂)	45 feet

where g₁ and g₂ are the street grades expressed in feet per 100 feet.

Right of Way and Pavement Width

Unless otherwise determined by the Thoroughfare Plan, right-of-way and pavement width shall be as follows:

<u>Street Classification</u>	<u>R/W Width</u>	<u>Pavement (Back of Curb)</u>
Major Arterial	120 feet	53 feet
Major Arterial	100 feet	65 feet
Minor Arterials	90 feet	65 feet
Collector	80 feet	45 feet
Local	70 feet	31 feet
Alley	20 feet	15 feet
Cross Walks	10 feet	5 feet

The entrance street to a subdivision shall be considered a collector street to the first intersection unless otherwise designated.

Half streets shall be prohibited except where a half street exists adjacent to the tract to be subdivided. The other half street shall be platted if deemed necessary.

Pavement Design

Pavement design shall be based on equivalent daily 18,000 pound single axle application. Actual or estimated traffic counts shall be required for each street in accordance with the “Traffic Study” section of this manual. A local street shall be designed using 5% trucks at full legal load per lane per day for a 30 year design period. A collector street shall be designed for no less than 5% trucks at full legal load per lane per day for a 30 year design period. An arterial street shall be designed based on an approved traffic that is to include the percentage of trucks for a 30 year design period. To account for design uncertainties, a Reliability factor of 85% ($Z_R = -1.037$) shall be used. In addition, the minimum allowable standard deviation (S_o) is 0.44 for flexible pavement and 0.34 for rigid pavement. Design calculations shall be based on the AASHTO design methods and submitted with a copy of the soil test for approval. The modulus of subgrade reaction shall be determined from the site soil evaluation or calculated from the California Bearing Ratio (CBR) for the site. The CBR used shall be the CBR for the poorest soil on site.

The following coefficients for various types of materials shall be used with the AASHTO design equations:

<u>Item</u>	<u>Material</u>	<u>Coefficient</u>
448	Asphalt Concrete	0.35
448	Asphalt Concrete	0.35
301	Asphalt Concrete	0.35
304	Aggregate Base	0.14

Streets may be either full depth asphalt or concrete base with an asphalt overlay. Concrete bases shall be designed with a modulus of rupture of 650 psi.

Public streets shall be designed as a crown pavement with a cross slope of one quarter of an inch (1/4") per foot. Crowns shall be located between lanes, with no more than 2 lanes draining in one direction. Undivided pavement sections are to be crowned at the middle when the number of lanes is even and at the edge of the center lane when there are an odd number of lanes. When possible the majority of the pavement shall drain to the outside and to the side that provides the best drainage.

The minimum width of all graded shoulders shall be 8 feet measured from the edge of pavement to the point where the shoulder meets the foreslope. 4-inch underdrains shall be provided under all shoulders. Aggregate drains will not be accepted.

All streets shall be graded to their full width, including side slopes. The subgrade shall be free of sod, vegetative, or organic matter. Soft clay and other objectionable materials shall be cleared to a depth as determined by the City Engineer. The subgrade shall be shaped and compacted subject to the requirements of ODOT Item 203. No fill shall be placed on the subgrade until said subgrade has been inspected and approved.

Medians

Medians may be provided where there are four or more lanes or where it is desirable to separate traffic or control access. Medians shall be concrete with 18-inch straight curb. The minimum median width shall be 16 feet.

Median landscaping may be approved by the City Engineer as long as maintenance of the landscaping is provided by an owners association and spelled out in the plat or deed restrictions. Median landscaping shall comply with the "Street Tree", "Clear Space", and "Sight Distance" sections of this manual.

Pavement Relief Joints

Pavement relief joints shall be constructed of Item 448 Asphalt Concrete. Pavement relief joints shall be installed on all rigid pavements at the following locations:

- P.C. and P.T. points of all curves with a centerline radius less than or equal to 500 feet and deltas greater than 50°.
- At least one between intersections, including T-type. Additional pavement relief joints shall be required when the distance within any one block exceeds 800 feet. These additional joints shall be spaced a minimum of 400 feet apart and are not to exceed 800 feet.
- Whenever a new roadway is to be constructed to adjoin an existing roadway, this work shall begin with a pavement relief joint.

Pavement relief joints shall be 4 feet long and extend between pavement edges, curbs or gutters. 2 inches of expansion joint material shall be placed in the curb or curb and gutter at and centered on the relief joint. The 448 material shall be placed in lifts no greater than the thickness of the pavement or base divided by 3, however no lift shall exceed 3 inches. The pavement relief joint shall be constructed flush to the top of the Portland cement pavement or base. The contractor shall plan pours of pavement or bases in such a manner so as to end a day's work at a pavement relief joint.

Street Names

The names of new streets shall not duplicate names of existing dedicated streets, except where those new streets are extensions of existing streets. All new roadways shall be named according to the following method:

<u>Direction</u>	<u>Short Streets/Cul-De-Sacs</u>	<u>Long Streets</u>
North/South	Place	Street
East/West	Court	Avenue
Diagonal	Way	Road
Curving	Lane/Circle	Drive

where short streets are those less than 1,000 feet in total length. The designer shall review proposed street names with the Post Office for approval.

Curbs, Gutters, and Sidewalks

Curbs, gutters, and sidewalks shall be required in all new subdivisions, except those within the Estate Residential (ER) District. In no case shall a certificate of occupancy be granted for a building in a new subdivision where sidewalks are required until such sidewalks on the lot are constructed and approved. All sidewalks within a subdivision shall be constructed not later than six months after such time when 80% of the lots in the subdivision have been developed.

Sidewalks in new developments shall be concrete and a minimum of five feet in width. An 8-foot asphalt walkway in a 10-foot right-of-way may be substituted with the approval of the City Engineer. Sidewalks shall extend the entire width of the lot.

Development on property with adjacent sidewalks within the block or within 100 feet of the property line shall include sidewalks as part of the development. Sidewalks shall match the existing alignment and width, but in no case shall the sidewalk be less than five feet wide. Sidewalk locations shall be coordinated to avoid conflicts with manholes, inlets, valve boxes, curb boxes, fire hydrants, utility poles, streetlights, and other on-site utilities. Frontage improvements shall include sidewalks unless otherwise directed by the City Engineer.

Curbs and gutters shall be concrete and constructed in accordance with the standard drawings. A 4-inch underdrain shall be provided under all curbs to allow subsurface drainage. The underdrain shall connect to the stormwater system. Each lot shall be provided with two (2) pipe roof drain outlets in all new curbs.

The minimum curb radius shall be 30 feet on local streets.

Handicap Accessibility

Handicap ramps shall be provided in conjunction with all sidewalks. Ramps shall be located at all intersections. Ramps shall be installed in pairs and generally located at the curb returns. Where sidewalks will be installed at a future date, curb drops shall be provided for the future ramps. Ramp locations shall be shown on the plans by station.

Ramps shall be designed to comply with the Americans with Disability Act as shown in the ODOT standard drawing BP-7.1. The maximum longitudinal slope is 8.33% and the maximum cross slope is 2%. A minimum 4-foot landing shall be provided at the ramp for maneuvering.

Handicap ramps shall be constructed with tactile indicators.

Turnarounds

Dead-end streets shall not be permitted without the approval of the City Engineer. Where a street terminates at a location other than an intersection a cul-de-sac or T-turnaround shall be provided. Cul-de-sac and T-turnaround dimensions shall be per City of Lancaster Standard Drawing P-30.

Temporary Barricades

Barricades shall be installed at the terminus of all temporary or permanent dead-end streets in accordance with the Standard Drawings.

Bridges

Development shall be designed to minimize bridges and other special structures. Where bridges or special structures are required in the public right-of-way, design shall conform to the ODOT *Bridge Design Manual*. The designer shall contact the City Engineer for bridge design requirements.

Guardrails

Guardrails or other barriers should be considered for the following locations

- Dead end Streets
- Bridges, Piers, and Abutments
- Culverts, Pipes, and Headwalls
- Non-breakaway signs and light supports
- Rough Slopes in cut sections
- Utility Poles that cannot be relocated
- Bodies of Water where the normal water level is more than 1 foot
- Transverse ditches with a high likelihood of head-on impact
- Retaining Walls with a maximum angle of impact of 15 degrees

Guardrails shall be designed in accordance with ODOT *Location and Design Manual*. Guardrail shall be located a minimum of 6 feet from the edge of pavement. Guardrail locations shall be taken into consideration when evaluating site distances.

Driveways

Driveways shall be located in accordance with the City’s *Access Management Guidelines*, based on the access level of the street. Turning movements shall be limited as determined in the guidelines.

No driveway shall be approved providing direct access to a street designated in the *Access Management Guidelines* as a Level 1 or Level 2 street, except with the approval of the City Engineer.

Driveway spacing shall be in accordance with Chapter 3 of the *Access Management Guidelines*, as follows:

Unsignalized Driveway Spacing (in feet) for Minimum–Use Generators

<u>Access Level</u>	<u>Speed in MPH</u>						
	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>	<u>50</u>	<u>55</u>
3, 4	100	120	140	160	180	200	220
5	75	90	105	130	145	160	175
6	50	60	70	80	90	100	100

Unsignalized Driveway Spacing (in feet) for Minor Generators

<u>Access Level</u>	<u>Speed in MPH</u>						
	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>	<u>50</u>	<u>55</u>
3, 4	130	160	190	220	250	280	310
5	100	120	140	160	180	200	220
6	75	90	105	130	145	160	175

Unsignalized Driveway Spacing (in feet) for Medium Generators

<u>Access Level</u>	<u>Speed in MPH</u>						
	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>	<u>50</u>	<u>55</u>
3, 4	175	210	245	280	315	350	385
5	125	150	175	200	225	250	275
6	100	120	140	160	180	200	220

Unsignalized Driveway Spacing (in feet) for Major Generators

<u>Access Level</u>	<u>Speed in MPH</u>						
	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>	<u>50</u>	<u>55</u>
3, 4	230	275	320	365	410	455	500
5	175	210	245	280	315	350	385
6	125	150	175	200	225	250	275

where generators are defined as:

Minimum – Developments that generate up to a total of 25 vehicle trips in the peak hour in both directions

Minor Generator – Developments that generate a total of 26–100 trips in the peak hour in both directions

Medium Generator – Developments that generate a total of 101–300 trips in the peak hour in both directions

Major Generator – Developments that generate a total of more than 300 trips in the peak hour in both directions.

In addition, corner lots shall meet lateral access clearance as follows:

Minimum Lateral Clearance (in feet) for Corner Lots

<u>Generator Type</u>	<u>Access Level of Cross Street</u>			
	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Minimum-Use	100	100	50	50
Minor	125	125	75	75
Medium	150	150	100	100
Major	330	330	150	150

On undivided roadways, access on both sides of the road should be aligned. Where this is not possible, driveways shall be off-set based upon the generator types on both sides of the road, as follows:

Minimum Off-sets between Opposing Driveways

<u>Generator Type</u>	<u>Opposite Generator Type</u>	<u>Minimum Off-set</u>
Minor	Minor	150-200 ft
Minor	Medium	150-200 ft
Minor	Major	300-400 ft
Medium	Minor	150-200 ft
Medium	Medium	150-200 ft
Medium	Major	300-400 ft
Major	Minor	300-400 ft
Major	Medium	300-400 ft
Major	Major	300-400 ft

When the generator type on either side is a Minimum-Use, there is no minimum required offset.

All driveways on public property where curbs and sidewalks exist shall be constructed of 6 inches of Portland cement or 2 inches of T-35 asphalt concrete on 6 inches of rolled stone or gravel base. The sidewalk area in driveways shall be constructed of Portland cement. All driveways shall be at least 3 feet from the side lot line. A curb cut or driveway permit will be required. The maximum commercial or industrial drive shall be 35 feet. Drives shall intersect the street at an angle as close to 90 degrees from the centerline as possible. On curves, the drive centerline shall be radial to the centerline.

Each approach shall have a flare or radius return. For residential drives, this flare shall be a minimum of 2 feet wide at the edge of pavement to a maximum of 5 feet. The flare shall transition from the edge of pavement to the driveway width no sooner than 10 feet or the right-of-way line. Radius returns shall be a minimum of 15 feet to a maximum of 20 feet for residential driveways. For commercial drives, the flare or radius shall be based on the type of vehicles that will be using the driveways. In no case shall the flare be less than 5 feet or the radius be less than 20 feet.

Where multiple drives are requested, an island at least 10 feet in length shall separate the driveways.

Driveways should be located and designed to enable vehicles traveling at or near legal highway speeds to see a driveway approach in time to safely reduce speed and enter the driveway approach. Conversely, the driveway approach should be placed in areas to allow vehicles, while within the approach area, to observe the through highway traffic for a distance sufficient to make a safe entry onto the highway. Pre-designed curb drops for drives shall not be permitted except where driveway locations are mandated by the PUD design or by safety issues. Where driveways are mandated, the drive shall be shown on the street plans and the centerline shall be stationed.

Driveway approaches with open ditches shall slope away from the edge of pavement to the centerline of the proposed drive pipe location. From the centerline of the pipe to the property, the drive profile shall slope upward, creating a V-channel in the drive approach. The center of this V-channel shall be a minimum of 10 feet from the edge of pavement unless approved by the City Engineer. Driveway grade within the right-of-way limits shall not exceed a grade of 8% for commercial drives and 15% for residential drives. When a driveway continuously slopes away from the pavement or there are other special terrain conditions, a drive approach design shall be required.

Driveway approaches on curb and gutter streets shall be constructed so the portion within the sidewalk slopes at a rate of 3/16" per foot (1.56%) to a point at least 1 foot behind the back of sidewalk. The approach apron shall slope from the gutter towards the front edge of sidewalk and have a 1" lip at the gutter. The profile of the driveway from the back of the sidewalk shall conform to the maximum profile grades stated above.

Mailboxes

Mailboxes located in the right-of-way shall be installed using breakaway type supports per the Standard Drawings. Where there is no curb and the shoulder is less than 6 feet wide, a mailbox turnout shall be installed.

Street Trees

Street trees shall not be planted in the right-of-way of any public street, unless specific approval is granted. Such approval shall be based on a master landscaping plan as reviewed and recommended by the Municipal Arborist.

Trees planted in the right-of-way of any street shall not be planted in any location where the City Engineer determines that such placement would create a safety hazard. In no case shall a street tree be planted within 50 feet from an intersection, within 30 feet of an alley approach, or within 10 feet from any driveway approach. Trees should be planted a minimum of 3 feet from the back of curb.

The following species of trees shall not be used for street trees in new subdivisions:

1. Silver Maple (*Acer saccharinum*)
2. Box Elder (*Acer negundo*)
3. Common and Red Horse Chestnut (*Aesculus hippocastanum* and *Aesculus x carnea*)
4. Tree of Heaven (*Ailanthus altissima*)
5. Birches (*Betula sp.*), except River Birch
6. Evergreen (Conifer)
7. Northern and Southern Catalpa (*Catalpa speciosa* and *Catalpa bignonioides*)
8. Mulberry (*Morus sp.*)
9. American Sycamore (*Platanus occidentalis*)
10. Poplar, Aspen, and Cottonwood (*Populus sp.*)
11. Bradford Pear (*Pyrus calleryana* "Bradford")
12. Black Locust (*Robinia psuedoacacia*)
13. Willows (*Salix sp.*)
14. European Mountain Ash (*Sorbus aucuparia*)
15. Siberian Elm (*Ulmas pumila*)

Any portion of any tree that extends over the curb line shall be maintained to a minimum of 15 feet from the top of limb to the lowest point on the curb under the tree and a minimum of 8 feet from the sidewalk to the lowest portion of the tree extending over such sidewalk.

Traffic Study

A traffic study shall be required for all developments that can be expected to generate more than 100 peak-hour vehicle trips on the adjacent street or for a lesser volume when the developments are in high accident locations, currently congested areas, or areas of critical local concern as determined by the City Engineer. Revised traffic studies may be required when the original traffic study is more than three years old, access decisions are still outstanding, and/or changes in development have occurred in the site environs.

The traffic study shall include the following items:

1. Projected Average Daily Trips (ADT)
2. Widths and Classifications for all proposed streets
3. Traffic volumes for turning movements at all major intersections and intersections with existing State County or Township roads. AM and PM peak hour counts shall be provided.
4. All traffic projections shall account for offsite traffic from stub streets into adjacent properties and cut through traffic from existing public roads.
5. Current and future ADT's on existing public roads from which the proposed project takes access.
6. An analysis of the impact on the existing public road system and the capacity of the existing roads and intersections affected by the proposed project.
7. Preliminary site distance exhibits

8. Recommendations and warrants for any traffic control devices, turn lanes, and acceleration/deceleration lanes.

The traffic study shall be based on a 20 year design period. A traffic expansion factor of 3.0% per year shall be used to calculate future traffic counts.

Signage & Striping

The Owner/Developer shall provide all traffic control, street name, and parking signage, as well as striping at intersections and other locations, as designated by the City Engineer or recommended in the approved traffic study. Signs shall be purchased from the City. The City shall be responsible for the installation and maintenance of all such signs.

Signage and striping shall be in conformance with the Ohio Manual of Uniform Traffic Control Devices. Signage exceeding three signs and striping shall be shown on a separate plan.

Signalization

Signalization shall be as recommended in the approved traffic study and shall be designed in conformance with the Ohio Manual of Uniform Traffic Control Devices. Signalization shall be shown on a separate plan.

Frontage Improvements

Frontage improvements shall be required for all developments. These improvements may include installation of sidewalks, curbs, stormwater management, pavement widening, turn lanes, signalization, streetlights, utility extension, and other improvements deemed necessary by Planning Commission. Additional right-of-way required for such improvements shall be dedicated to the widths set forth in the right-of-way section.

Sidewalks and curbs shall be in accordance with the requirements of new subdivisions. Stormwater management shall provide for the drainage of the pavement and right-of-way on the development side of the street. Stormwater management shall be designed in accordance with the *Stormwater Design Manual*.

Pavement widening shall conform to the standard pavement widths provided above or to the requirements of the approved traffic study, whichever is greater.

All frontage improvements shall be done as part of the first phase of the proposed development. No streets will be accepted until this work is completed.

Emergency Access

An emergency access drive shall be provided in developments where only one roadway access point is planned. This access drive shall be placed in an easement and designed to carry emergency vehicles. The access drive location shall be coordinated with the fire department. A boulevard type entrance with a median may be substituted for the emergency access drive. The boulevard shall have a 70-foot right of way with a minimum of 1 lane in each direction and a 10-foot median and shall extend to the first intersection.

Parking

Parking shall be provided in accordance with the appropriate zoning code.

When one side parking restrictions are required or planned, the parking restrictions shall occur on the same side as the fire hydrant locations.

Railroad Crossings

Proposed development shall be designed to avoid railroad crossings. Where a railroad crossing is involved, the plan of the development shall consider the relation to the probability of grade separation or other treatment, and it may be required to conform to certain conditions in anticipation of such treatment. Where the subdivision adjoins a railroad right-of-way, and zoning plans or other conditions indicate that such property will be used for industrial purposes, highways in the same general direction as the railroad shall be as nearly parallel to such railroad right-of-way as may be practicable. All road crossings shall be signalized.

The Owner/Developer shall be responsible for all railroad right-of-way permits.

Fire Hydrants

All fire hydrants shall be located at a distance of 2.5 feet behind the back of curb or 6 feet from the edge of pavement where there is no curb. Fire hydrant protection shall be provided when a hydrant is located within 6 feet of the edge of pavement of access roads and drives. No fire hydrant shall be located within 30 feet of the edge or pavement or curb line of the intersection of two public roads. Fire hydrants shall not be located in side ditches.

For large commercial and industrial sites, one public hydrant shall be located within 6 feet of the public roadway at a location approved by the Fire Chief.

Service Roads

In commercial and industrial areas, service roads may be required to minimize curb cuts on thoroughfares and arterial streets. Service roads shall be designed as local streets.

Private Streets, Drives, and Fire Lanes

All premises which the Fire Department may be called upon to protect in case of fire and which are not readily accessible from public streets shall be provided with suitable gates, access roads and fire lanes so that all buildings on the premises are accessible to fire apparatus.

All private streets shall be at least 20 feet wide. Private streets and drives in complexes or subdivisions that do not have adequate off-street parking shall be at least 26 feet wide. The Fire Chief shall determine whether or not there is adequate off-street parking.

The turning radius at intersections and angles in private streets and drives within complexes shall be a minimum of 30 feet to centerline of the street or drive.

Dead end streets and drives shall not exceed 600 feet in length unless otherwise approved by the Fire Chief. Dead end streets and drives in excess of 150 feet in length shall be either a paved circular turnaround or a T-turnaround as directed by the Fire Chief. Islands in cul-de-sacs are prohibited.

Streets, drives, fire lanes, or access roads shall be provided to within 150 feet of a doorway to each separate unit of an apartment or commercial building that does not have standpipes. This distance shall be measured vertically as well as horizontally. Fire lanes and access roads shall be at least 20 feet wide with the road edge closest to the building at least 10 feet from the building.

A visible hard surface, capable of supporting a fire apparatus, shall be provided to within a minimum of 8 feet to all fire hydrants. Fire lanes that provide access to fire hydrants shall extend a minimum of 15 feet past fire hydrants. Parking spaces shall be designated so as not to interfere with the accessibility of fire hydrants.

Utility Trenches

Open cutting of pavement for utility installation may be allowed depending on traffic considerations, utility depth, and pavement condition. The Service-Safety Director shall have the final determination on pavement cuts. Generally, open cutting will not be allowed on arterials or where pavement is less than three years old. Where open cutting is not allowed, the utility shall be inserted into a casing pipe bored under the pavement.

Pavement removed for trenches shall be replaced in accordance with Standard Drawing P-1.

Utility trenches located outside of the pavement but within the right-of-way shall be backfilled with granular backfill in accordance with CMSL 912.

Coordination of Work with Other Jurisdictions

In some cases, street and improvement work may cross-jurisdictional lines (County, Township, Special District, or State). Plans for this work will require approval of both the City of Lancaster and the other jurisdiction. Designs for this work shall meet the most stringent design criteria unless approved by both the City Engineer and the other jurisdiction. The designer shall coordinate the work between the jurisdictions.

GRADING AND SITEWORK

Site grading is integral to both the street and the stormwater design. Drainage and stormwater information shall be provided along with the street design. Stormwater design information is provided in the companion *Stormwater Design Manual*.

Master Grading Plan

A master grading plan shall be done. This plan shall reflect changes in before and after contours and provide for adequate drainage of on-site stormwater as well as any off site tributary areas. The City Engineer may require that individual Plot and Grading Plans be submitted for each lot prior to obtaining a building permit.

Easements

Easements, as required, shall be shown on the construction plans, including the volume and page number of the recorded easement.

Easements shall be provided for the following uses, as appropriate to the specific development:

- Stormwater and Drainage
- Utilities (Sanitary, Water, Gas, Telephone, Electric, Cable, etc.)
- Emergency Access
- Access to Recreation Areas, Reserves, or other Common areas
- Bike paths
- Alleys

At a minimum, a seven and a half foot (7.5') easement shall be required on all rear lot lines and a five foot (5') easement on all side lot lines.

Drainage

All surfaces not covered by impervious materials shall be seeded or sodded and sloped to drain away from buildings and to appropriate stormwater collection and management facilities. Low points in grass areas shall be provided with surface inlets to prevent standing water. Such surface inlets may be used as stormwater management storage facilities providing that the ponding elevation be at least one foot below the lowest adjacent finished floor and five linear feet from the nearest structure unless approved by the City Engineer

Grass areas shall have a minimum slope of 0.8%. Grass areas next to buildings shall slope away from the building at not less than 5% for a minimum of 10 feet.

The desired slope of swales and ditches in grass areas is 0.5%. Swale treatment shall depend on the bottom slope as follows:

<u>Slope</u>	<u>Treatment</u>
<0.5%	Paved Swale
<2.0%	Underdrains
<7.0%	Sodded
>7.0%	Paved channel for low flows

No natural drainage course shall be altered and no fill, buildings, or structures shall be located unless provision is made for the flow of surface water in a manner approved by the City Engineer. For subdivisions, all surface water shall be directed around the houses either to the street or to a rear yard catch basin. Parking lots shall be graded to provide a maximum of 12 inches of ponding at a catch basin.

Drain tiles and spring drains encountered during design or construction shall be connected to the stormwater management system in accordance with the Standard Drawings.

Flood Routing

Surface routing paths shall be provided to carry the stormwater runoff which exceeds the capacity of the storm sewer system. The system of surface routing paths shall have the capacity to carry runoff from a storm with a return period of not less than 100 years without causing significant threat to property or public safety. The elevation of the 100-year storm through the flood routing path shall be at least two feet below the lowest adjacent finished floor. Flood routing paths shall be located in an easement.

Flood Hazard Areas

Streets shall not be located in flood hazard areas unless they are providing a crossing of the flood hazard area. These crossings shall be minimized and shall be provided with a

structure designed to pass the 100-year flood. There shall be no work in the flood hazard area without the approval of the City.

Roads located in the floodplain shall be elevated to an elevation of 1 foot above the 100 year flood elevation as defined by the Federal Emergency Management Agency FIRM map.

Utilities

A minimum of 30 inches of cover shall be provided for all utilities in the right-of-way.

All existing utility manholes, valve boxes, curb boxes, and inlets shall be raised to grade as part of any improvement.

Buffers and Screening

Buffers and screening shall be provided in accordance with the appropriate zoning code, or as directed by Planning Commission. Grass buffer mounds shall have a maximum slope of 3:1. Steeper grades may be allowed where the slope is protected by ground cover or stone. Trees used in buffer areas shall comply with the street tree requirements.

UNDERGROUND UTILITIES

General

Underground utilities shall be required for subdivisions within the subdivision jurisdiction of the City of Lancaster. Because of the number of utilities involved in any development, it is important to coordinate locations to avoid interference.

The designer shall make every attempt to locate existing utilities and utility easements.

Gas

Gas service may be available from the City of Lancaster Gas Department. Gas mains for this utility shall be located as approved by the department. In general, the gas main shall be placed 30 inches behind the back of curb and 30 inches below the top of curb.

Gas mains may not be located in the same trench as water, storm, or sanitary sewer lines.

Other Utilities

All other utilities shall be located as approved by the utility. All utilities shall be buried. Coordination with the utility companies shall begin early in the design process to insure all easements are identified.

Utility Sleeves

Utility sleeves for future extensions may be installed during street construction as shown on the approved plans. Sleeves shall be sized to receive the proposed pipe. The minimum cover for the utility sleeve shall be 30 inches unless the sleeve is concrete encased. A temporary plug shall be installed at either end of the sleeve to keep water out.

STREET LIGHTING

General

Street lights shall be required for all subdivisions within the corporate boundaries of the City of Lancaster and for all subdivisions where the total number of residential lots exceed ten, or where the lots average 100 feet or less of frontage as shown on the preliminary plat. Streetlights shall also be installed as part of any required frontage improvements.

Design

Illumination for street lights and all appurtenances shall be installed by the Owner/Developer, and shall be of a type acceptable for cost effective service by the electric utility currently providing service to the City.

Illumination for street lights shall be uniform and shall follow the recommendations of the current Illuminating Engineering Society (IES) Handbook. Lighting shall be high-pressure sodium or the industrial equivalent with the same color output. The lighting shall provide a minimum of 100 watts and a maximum of 150 watts. Generally, street lights shall be located not less than 200 feet nor more than 350 feet apart. Lights shall be placed within 200 feet from the closed end of each cul-de-sac and at each intersection.

Street lights shall be located three feet behind the back of curb preferably on a lot line or return point of the curb at an intersection. Street light locations shall be coordinated with the handicap ramp locations. Underground feeders shall not exceed 240 vac to ground.

It is the responsibility of the developer to submit street lighting proposals to the appropriate power company and to coordinate the work. The Developer shall include all underground wiring, fixture, and pole improvements as part of the construction plans submitted to the City for approval prior to construction. Underground wiring and the related boxes shall not be located in a manner to impede the drainage swales.

EROSION AND SEDIMENTATION CONTROL

Construction activities required as part of land development necessitate the removal of natural ground cover, creating the potential for erosion to occur. Erosion, and the movement of the soil off the site and into the stormwater control system, can lead to water quality impacts. Excessive soil in the stormwater system can also cause the system to malfunction or require excessive maintenance to keep the system operational. Proper erosion control techniques can minimize the loss of soil on the site.

Street plans that are not part of an overall development that includes stormwater management shall be required to have an erosion and sedimentation control plan in accordance with City of Lancaster policies.

Policy

The policy of the City of Lancaster is that no person shall cause or allow earth-disturbing activities on a development prior to submittal and approval of an erosion and sediment control plan showing compliance with the City standards.

Design Criteria

Permanent control provisions shall be coordinated with the temporary erosion control to the maximum extent possible to assure economical, effective, and continuous erosion control throughout the construction and post-construction period.

Perimeter control and other sediment trapping measures shall be installed to stop the movement of sedimentation off the site. Such controls will include: stabilized construction entrances, straw bale dams and fabric fencing, temporary sediment traps, sediment basins, and diversions. Storm drains both on and off the site shall be protected from sedimentation. Stormwater retention or detention facilities shall not be used as sedimentation traps without the approval of the City Engineer. If such facilities are used as a sedimentation trap or sedimentation basin, the facility shall be thoroughly cleaned of all sedimentation and returned to full design capacity prior to the release on the construction bond.

Construction shall be scheduled to minimize the amount of area disturbed at any one time. Disturbed areas that are at finished grade shall be permanently seeded within 7 (seven) days of reaching final grade. Other areas of disturbed soil shall be rough graded to provide drainage and temporarily seeded if they are to remain dormant for more than 14 (fourteen) days.

Slope protection shall be provided by use of temporary and permanent diversion dikes, vegetative cover, and slope drains. Concentrated stormwater flows shall not be allowed to flow down cut or fill slopes without proper slope stabilization.

Concentrated stormwater runoff leaving a development site shall be outletted to an open channel, storm sewer inlet, or culvert that is capable of receiving the discharge. Runoff velocities shall be controlled to prevent erosion.

Appropriate measures shall be taken to minimize or eliminate wastes, unused building materials, and all pollutants from being carried from the site by runoff. Proper storage, handling, and use of all potentially polluting substances shall be employed.

Public and private roadways shall be kept cleared of accumulated sediment. Provisions for proper dust control may be required as deemed necessary.

Where construction crosses a stream or channel, a temporary stream crossing will be needed.

Erosion Control design shall meet the requirements of the City of Lancaster Standard Drawings and Standard Notes.

Maintenance During Construction

All disturbed areas that are exposed to precipitation, structural control measures, and locations of vehicle entrance and exit shall be inspected at least once every seven days and within 24 (twenty-four) hours of a storm event greater than 0.5 inches. Inspection shall be continued until all disturbed areas are stabilized and all structural controls are either removed or converted to stormwater management facilities. Corrective action will be taken for all noted deficiencies. Such actions shall be initiated within 24 (twenty-four) hours of inspection notification.

Sediment deposits shall be removed from straw bale and filter fence barriers upon reaching approximately one-half the height of the barrier at its lowest point, or if it causes a silt fence to bulge. All collected sediment shall be deposited at a controlled fill area.

Sediment deposits shall be removed from diversion channels, dikes, outlet channels, and stabilized areas after every rainfall. Any area damaged by erosion shall be repaired and reseeded within 24 (twenty-four) hours, or as soon as the soil dries sufficiently to allow work to proceed.

Temporary stream crossings shall be inspected after every rainfall and at least weekly for assessment of damage due to stormwater flows of construction equipment. Necessary repairs shall be made within 24 (twenty-four) hours, or as soon as the soil dries sufficiently to allow work to proceed.

The City maintains the right to inspect any site of land disturbance at any reasonable time and to require compliance with regulations and soil erosion control plan.

DESIGN SUBMISSION

For the City's design submission requirements related to plans and calculations, see the *Site Engineering Requirements* manual.

APPENDIX

Department Contact Information

Engineering Department
121 E. Chestnut Street, Suite 100 Phone: (740) 687-6614
Lancaster, Ohio 43130 Fax: (740) 681-5030

Certified Building Department
121 E. Chestnut Street, Suite 100 Phone: (740) 687-6649
Lancaster, Ohio 43130 Fax: (740) 681-5030

Lancaster Municipal Gas
1424 Campground Road Phone: (740) 687-6670
Lancaster, Ohio 43130 Fax: (740) 687-6672

Department of Transportation
815 Lawrence Street Phone: (740) 687-6668
Lancaster, Ohio 43130 Fax: (740) 687-6694

Division of Water
225 N. Memorial Drive Phone: (740) 687-6630
Lancaster, Ohio 43130 Fax: (740) 687-6638

Water Pollution Control Department
800 Lawrence Street Phone: (740) 687-6664
Lancaster, Ohio 43130 Fax: (740) 687-6667

City Website: www.ci.lancaster.oh.us