SECTION 5 - ROADWAY

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5.1. PURPOSE

5.1.1. The purpose of this Section is to specify the methods for the design of roadways and pavements for public roadway improvements.

5.2. DESIGN REQUIREMENTS

5.2.1. Due to the abundance of poor soil types found in the City of Lebanon, pavement designs are necessary for each new development within the City. The design shall be based upon the requirements set forth in the Ohio Department of Transportation Pavement Design and Rehabilitation Manual.

5.2.1.1. Design calculations, including boring logs shall be submitted to the City Engineer. All calculations shall be signed and stamped by a Professional Engineer registered in the State of Ohio.

5.2.2. If a developer elects to non perform a geotechnical subsurface investigation and pavement design calculations, the pavement shall be installed as per the minimum standard found in the Standard Drawings in the Appendix and as described in Paragraph 5.5.

5.3. ROADWAY DESIGN

5.3.1. Conformity to the Thoroughfare Plan

5.3.1.1. The arrangement, character, extent, width, grade and location of all streets shall conform to the Official Thoroughfare Plan and shall be considered in their relation to existing and planned streets, to topographical conditions, to public convenience and safety, and in their appropriate relation to the proposed uses of the land to be served by such streets. Where not shown on the Official Thoroughfare Plan, the arrangement and other design standards of streets shall conform to the provisions found herein and shall be subject to the approval of the Planning Commission.

5.3.2. Arrangement not under thoroughfare plan.

5.3.2.1. Where such is not shown in The Thoroughfare Plan, the arrangement of streets in a subdivision shall either:

5.3.2.1.1. Provide for the continuation or appropriate projection of existing streets in surrounding areas; or

5.3.2.1.2. Conform to a plan for the neighborhood to meet a particular situation where topographical or other conditions make continuance or conformance to existing streets impracticable.

5.3.3. Street Arrangement

5.3.3.1. Unless approved otherwise by the City Engineer, when subdivisions and/or PUDs have appropriate frontage to separate access points by the distances provided in the Access Management section of the City of Lebanon Zoning Code, two entrances, which are remotely located, shall be provided.

5.3.3.1.1. Where a subdivision and/or PUD is able to provide access on the frontage road and with an established subdivision, the subdivision and/or PUD will be considered to have met this requirement.

5.3.3.1.2. Smaller developments and/or oddly-configured developments will be evaluated on a case-by-case basis.

5.3.3.2. Street layouts for subdivisions/PUDs shall incorporate effective traffic calming measures to prohibit excessive speed on the streets. Lengthy straight-aways shall be avoided and the streets shall be in general conformity with a plan for the most advantageous development of adjoining areas and the neighborhood.

5.3.3.3. Where appropriate, proposed streets shall be continuous and in alignment with existing, planned or platted streets with which they are to connect.

5.3.3.4. Proposed streets shall be extended to the boundary lines of the tract to be subdivided, unless prevented from topography or other physical conditions, or if such extension is not necessary for the coordination of the layout of the subdivision, with the existing layout, or the most advantageous future development of adjacent tracts.

5.3.3.5. Minor streets shall be so laid out that their use by through traffic will be discouraged.

5.3.4. Driveway and Curb Cut Access Conditions

5.3.4.1. The City Engineer may impose conditions in the permit upon the construction of the driveway approach/curb cut/sidewalks, which conditions are designed to facilitate the safe movement of pedestrian traffic and the safe and expeditious movement of motor vehicles on the public streets or ways affected by the driveway approaches/curb cuts. The conditions imposed upon driveway approaches/curb cuts/sidewalks under this section shall take into consideration the design speed limit and sight distance at the location and may include, but are not limited to, the following:

5.3.4.1.1. Limitations of the number, size and location of driveway approaches/curb cuts for any premises to which the permit applies.

5.3.4.1.2. Requiring the use of alternative means of access such as service or private drives or frontage roads, to run parallel to the public street or way, rather than direct connection to the public street or way where such alternate means are accessible to the premises to which the permit applies and/or requiring that direct connection of driveway approaches/curb cuts to the public street or way be limited and used only until alternative means of access such as service or private drives or frontage roads are made accessible to the permit premises.

5.3.4.1.3. Limiting the construction of driveway approaches/curb cuts to only one Public Street or way where the premises to which the permit applies abuts more than one Public Street or way.

5.3.4.1.4. Requiring that driveway approaches/curb cuts be marked and/or constructed to allow only entrance to or only exit from the permit premises.

5.3.4.1.5. Requiring the construction of safety islands to separate two driveway approaches/curb cuts.

5.3.4.1.6. Requiring the construction of right hand and/or left hand deceleration/acceleration and/or storage lanes which shall be required to be a minimum of a length in feet of double the speed limit (ex. 70 feet for a 35 MPH roadway) each way with a one hundred (100) foot taper, or as determined by the most current edition of the Ohio Department of

Transportation's Location and Design Manual. Such lanes may be permitted to be decreased, based on the physical conditions, characteristics and use of the property. Such lanes shall meet the requirements of the City Engineer and include the appropriate traffic control devices, including, but not limited to yield signs, stop signs, or traffic signals, as necessary.

5.3.4.1.7. Requiring the construction of driveway turnaround facilities so that vehicular traffic can change direction on the permit premises and enter the roadway in a forward direction.

5.3.4.1.8. Requiring the consolidation of access points. Major access points on opposite sides of roadways shall be located opposite each other. If not so located, turning movement restrictions may be imposed as determined necessary by the City Engineer. In addition, in order to maximize the efficient utilization of access points, access drives shall be designed, located, and constructed in a manner to provide and make possible the coordination of access with and between adjacent properties developed (present or future) for similar or compatible uses. As a condition of approval for construction, use, or reuse of any access point, the City Engineer may require that unobstructed and unencumbered access, in accordance with the provisions of these regulations, be provided from any such access point to adjacent properties.

5.3.4.1.9. Requiring the consolidation of existing access points. Whenever the use of a parcel of land changes, or two or more parcels of land are assembled under one purpose, plan, entity, or usage, the existing driveway permits shall become void and the new permit shall be based upon the owner/developer's plans to use some existing driveways and/or close or relocate other driveways. Any such new or reauthorized access point must be in compliance with all applicable sections of this regulation.

5.3.5. Required Existing Roadway Improvements

5.3.5.1. Where a proposed development abuts an existing non-improved roadway (any roadway not meeting current City of Lebanon standards regarding width and/or does not have curb & gutter, storm sewer, and/or sidewalks), the roadway will need to be brought up to City standards by the Owner/Developer. The improvements shall include, at a minimum:

5.3.5.1.1. Roadway widening

5.3.5.1.1.1. The minimum width of the roadway pavement shall be based upon the widths found in Table 8.

5.3.5.1.1.1.1. Additional turning and/or deceleration/acceleration lanes may be required by the TIS or the City Engineer.

5.3.5.1.1.2. A minimum of one foot of pavement from the existing roadway edge shall be saw cut and removed to provide a solid butt joint. The saw-cut pavement shall be inspected by the City of Lebanon to determine if a solid cross-section has been obtained. Additional pavement removal may be required if existing pavement is in poor condition.

5.3.5.1.2. Any required pavement repairs to the centerline of the Public Right-of-Way,

5.3.5.1.3. Curb and gutter

5.3.5.1.4. Storm sewer

5.3.5.1.5. Any required turning lanes

5.3.5.1.6. Public sidewalk

5.3.5.1.7. Any other improvements required by the City Engineer.

5.3.6. Curb and Gutter

5.3.6.1. All streets shall have curb and gutter. Curb and gutter is not included in the pavement width.

5.3.6.1.1. Collectors and arterial streets shall have chairback or barrier curb, as determined by the City Engineer.

5.3.6.1.2. Local streets shall have rollback curb.

5.3.6.2. All curb and gutter shall conform to SECTION 6 of this manual.

5.3.7. Sidewalks

5.3.7.1. All streets shall be provided with sidewalks on both sides of the street. All sidewalks shall conform to the requirements found in SECTION 6 of this manual.

5.3.8. Reverse Curves

5.3.8.1. A tangent at least 100 feet long or suitable transition curves shall be introduced between reverse curves on arterial and collector streets.

5.3.9. Street Surfaces

5.3.9.1. All streets shall be surfaced with asphaltic concrete.

5.3.9.1.1. Under special circumstances, Portland Concrete pavement will be reviewed for heavy industrial usages.

5.3.10. Angle of Intersection

5.3.10.1. Streets shall be laid out so as to intersect as nearly as possible at right angles and no street shall intersect any other at less than 80 degrees. Any proposed intersection that is not at right angles is subject to approval by the City Engineer.

5.3.11. Radius of intersection

5.3.11.1. Street intersections shall be rounded with the radius found in Table 7, based upon street classifications, measured at curb lines when the intersection occurs at right angles. Where two roads of different classifications meet, the larger radius shall be used. If an intersection occurs at an angle other than a right angle, it shall be rounded with a curve of a radius acceptable to the City Engineer.

5.3.12. Radius of property corner lines

5.3.12.1. The corner of property lines at all street intersections shall be rounded with the minimum radius as found in Table 7, based upon the street classification. Where two roadways of different classifications meet, the larger radius shall be used.

5.3.13. Dead-End Streets

5.3.13.1. Dead end streets shall not be permitted in any case.

5.3.13.2. In the case of a temporary dead-end street for phasing of a development, a temporary turnaround shall be installed for all temporary dead end streets greater than one lot in length. The temporary turnaround shall be installed as per the Standard Drawing found in the Appendix.

5.3.14. Cul-De-Sac Streets

5.3.14.1. Cul-de-sacs shall not be longer than 900 feet, measured from the center line of the intersecting street to the center point of the cul-de-sac and serve no more than 25 lots. The closed end of a cul-de-sac shall be provided with a turn around which has a minimum Right-of-Way radius of 60 feet and a minimum radius to the back of curb of 50 feet. Larger diameter turnarounds may be required in special traffic areas, as deemed necessary by the City Engineer. Cul-de-sacs longer than 900 feet may be approved by the City Engineer only

when extreme geographic and topographic conditions exist and feasible alternatives are not possible. Mid-block turnaround may be required where cul-de-sacs exceed 900 feet.

5.3.15. Temporary Turn-Around

5.3.15.1. A temporary paved turn around shall be required for streets with temporary dead-ends that are greater than one lot in depth.

5.3.16. Street Jogs

5.3.16.1. Street jogs shall not be allowed unless permitted in writing by the City Engineer.

5.3.17. Street Names

5.3.17.1. No street names shall be used which will duplicate or be confused with the names of existing streets. Street names shall be subject to approval of the City of Lebanon Planning Commission and/or the City Engineer.

5.3.18. Grading and Paving

5.3.18.1. All streets shall be graded to their full right-of-way widths so as to provide adequate shoulders and pedestrian walkways. All streets shall be paved and drainage courses and other structures installed according to City standards. Driveways shall meet the sidewalk grade at the property line.

5.3.19. Street Name Signs

5.3.19.1. Reflectorized street name signs shall be provided at all street intersections or where a change of direction of a street requires a street name sign. The signs shall be of a size and type approved for use by the City Engineer. Normally, one sign will be required at each residential intersection. However, more may be required, dependent upon the character and/or width of streets. Refer to the standard street sign detail found in the Appendix.

5.3.20. No Parking Signs

5.3.20.1. Where required, reflectorized No Parking signs shall be on every third shared lot line, however, more may be required, dependent upon the character and/or width of streets. The signs shall be of a size and type approved for use by the City Engineer. Refer to the standard street sign detail found in the Appendix.

5.3.21. Traffic Control Signs

5.3.21.1. Traffic control signs shall be installed along all roadway improvements. All signs and sign locations shall be consistent with the latest edition of the Ohio Department of Transportation *Manual of Uniform Traffic Control Devices.*

5.3.22. Underdrains

5.3.22.1. Underdrain systems shall be provided for all roadways unless otherwise approved by the City Engineer. The underdrain system design shall be indicated on the plans and shall be approved by the City Engineer.

5.3.23. Alleys:

5.3.23.1. Alleys shall be provided in commercial and industrial districts, except that the City Engineer may waive this requirement where other definite and assured provisions are made for services access, such as off-street loading, unloading and parking consistent with and adequate for the uses proposed.

5.3.23.2. Alley intersections and sharp changes in alignment shall be avoided; but, where necessary, corners shall be cut off sufficiently to permit safe vehicular movement. Dead-end alleys shall not be permitted.

5.3.24. City of Lebanon Roadways are broken down into the following classifications with the design characteristics shown in Table 7 and Table 8:

Table 7 - Minimum Roadway Design Standards

Type Of Street	Major Arterial	Minor Arterial(U.S. and State Highways Commercial and Industrial Streets)	Minor/Major Collector (Commercial and Industrial Streets)	Local Streets	Alleys
Curbing	Yes	Yes	Yes	Yes	No
Sidewalks	Both Sides	Both Sides	Both Sides	Both Sides	No
Minimum Sight Distance (Feet)	500	500	300	200	N/A
Minimum Curb Return Radius (Feet)	45	40	35	30	N/A
Minimum Property Corner Radius (Feet)	30	30	25	20	N/A
Minimum Public Utility Easement Width (Each Side)	20	20	20	15	5
Maximum Grade (%)	6.00	6.00	8.00	10.00	N/A
Minimum Grade (%)	0.75	0.75	0.75	0.75	N/A
Minimum rate of Vertical Curvature (K)	50	50	50	20	15
Minimum Radius of Horizontal Curvature Along Centerline (Feet)	475	475	300	100	N/A
Minimum Design ADT	As Determined by TIS	As Determined by TIS	As Determined by TIS	2000	N/A

Table 8 - Minimum Right-Of-Way and Pavement Width Standards

Type Of Street	Major Arterial	Minor Arterial	Collector	Local Streets	Alleys
Minimum Right-of-Way Width (Feet)	120	100	70 (Minor) 120 (Major)	50	20
Minimum Number of Lanes	5	4	3	2	1
Minimum Pavement Width (Feet)	60	48	36	24	20

5.3.25. All the design criteria shown in Table 7 and Table 8 are subject to the discretion and approval of the City Engineer. Improvements in addition to the above criteria may be required depending on the situation.

5.3.26. Vertical Curves

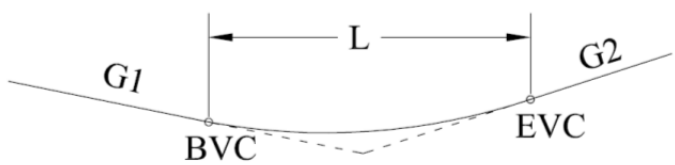
5.3.26.1. All changes in street grade in excess of 1.00% shall be connected by vertical curves. Vertical curve lengths shall be determined using Equation 3:

Equation 3 - Vertical Curve Length

$$L = K * AD$$

Where:
L is the curve length
K is the rate of vertical curvature as found in Table 7
AD is the algebraic difference in grades
$|G1-G2|$ (absolute value)

Figure 1 - Length of Vertical Curve



5.4. PAVEMENT DESIGN

5.4.1. Pavement design shall be carried out for each development in the following manner:

5.4.1.1. Geotechnical investigations shall be conducted in all areas where roadways are to be placed. Geotechnical investigations are to be conducted as instructed in the latest edition of the Ohio Department of Transportation *Specifications for Subsurface Investigation* manual. Borings shall be taken at a maximum interval of 500 feet. The data retrieved is to be used in determining the Liquid Limit (LL), Plasticity Index (PI), California Bearing Ratio (CBR) and the percentage of the sample passing a No. 200 sieve. A copy of the completed geotechnical investigation shall be provided to the City Engineer.

5.4.1.2. Using the data from the geotechnical investigations, the structural number required based upon the soils in the area of the roadway is to be determined using the methods set forth in the latest edition of the Ohio Department of Transportation *Pavement Design and Rehabilitation Manual*. Copies of all calculations shall be provided to the City Engineer.

5.4.2. Pavement designs shall be performed in accordance with current ODOT guidelines. Minimum and maximum course thicknesses for various materials shall be observed.

5.4.3. In subdivisions that will have future sections, the City Engineer may require a stronger pavement section on entrance roads and main thoroughfares through the subdivision to help prevent damage to the roadway by heavy loads and construction traffic.

5.4.4. In no case will less than four inches (4”) of ODOT Item 304 be permissible in any pavement section.

5.5. MINIMUM PAVEMENT SECTIONS

5.5.1. For a complete asphalt pavement section, refer to the City of Lebanon minimum street sections standard drawing found in the Appendix.

5.5.2. The following pavement sections shall be used unless a thorough pavement design in accordance with current ODOT standards, procedures and regulations is carried out based upon a thorough geotechnical investigation:

5.5.2.1. Local Streets (SN= 4.145)

5.5.2.1.1. 1-1/2" ODOT Item 448 Asphalt Concrete Surface Course, Type 1, PG64-22

5.5.2.1.2. 2" ODOT Item 448 Asphalt Concrete Intermediate Course, Type 2, PG64-22

5.5.2.1.3. 5" ODOT Item 301 Bituminous Aggregate Base

5.5.2.1.4. 6" ODOT Item 304 Aggregate Base (crushed limestone only)

5.5.2.2. Minor/Major Collector (SN=5.285)

5.5.2.2.1. 1-1/2" ODOT Item 448 Asphalt Concrete Surface Course, Type 1, PG64-22

5.5.2.2.2. 2" ODOT Item 448 Asphalt Concrete Intermediate Course, Type 2, PG64-22

5.5.2.2.3. 7" ODOT Item 301 Bituminous Aggregate Base

5.5.2.2.4. 9" ODOT Item 304 Aggregate Base (crushed limestone only)

5.5.2.3. Minor/Major Arterial (SN=6.280)

5.5.2.3.1. 1-1/2" ODOT Item 442 Asphalt Concrete Surface Course, 12.5mm, Type A (448)

5.5.2.3.2. 2-1/2" ODOT Item 442 Asphalt Concrete Intermediate Course, 19mm, Type A (448)

5.5.2.3.3. 8" ODOT Item 302 Bituminous Aggregate Base

5.5.2.3.4. 12" ODOT Item 304 Aggregate Base (crushed limestone only)

5.6. PLACEMENT OF ASPHALT

5.6.1. The placement of asphalt shall be in accordance with the provisions found in ODOT Item 401 as found in the *Ohio Department of Transportation Construction and Material Specifications* (latest edition) with the following exceptions:

5.6.1.1. The City of Lebanon will not participate in Asphalt Binder Price Adjustment.

5.6.1.2. Slag shall not be permitted in any asphaltic concrete mix.

5.6.2. In addition to the provisions found in ODOT Item 401, the following shall apply:

5.6.2.1. Asphalt shall not be placed unless all curbing has cured and has been sufficiently backfilled with compacted material.

5.6.2.2. Minimum and maximum lift thicknesses for various materials shall be observed. Minimum and maximum lift thicknesses shall be as defined by the Ohio Department of Transportation.

5.6.2.3. Asphalt shall not be placed during a rain event, nor shall placement activities be started when rain is eminent.

5.6.2.4. Copies of all load tickets shall be provided to the office of the City Engineer at the time of asphalt delivery.

5.6.3. In no case shall asphalt be placed unless the following conditions are met:

5.6.3.1. The ambient air temperature shall be a minimum of 40 degrees Fahrenheit and shall be rising.

5.6.3.2. The receiving surface temperature shall be in accordance with Table 9:

Table 9 - Minimum Receiving Surface Temperatures

Course Thickness	Minimum Surface Temperature
3.0” and over	36 °F and Rising
1.5” to 2.9”	40 °F and Rising
1.0” to 1.4”	50 °F and Rising
Less than 1.0”	60 °F and Rising

5.7. TRAFFIC IMPACT STUDIES

5.7.1. Purpose and Intent

5.7.1.1. Traffic access and impact studies are intended to determine the need for any improvements to the adjacent and nearby roadway system to maintain a satisfactory level of service and the appropriate access provisions for a proposed development.

5.7.1.2. The primary objectives of a traffic study are as follows:

5.7.1.2.1. Provide a basis for assessing the transportation impacts of a new development or expansion of an existing development; identify the need for any improvements to the supporting roadway system to provide satisfactory levels of service; and, to address safety issues.

5.7.1.2.2. Address relevant transportation issues associated with development proposals that may be of concern to neighboring residents, businesses, and property owners.

5.7.1.2.3. Determine the appropriate location, spacing, and design of the access system for the proposed development in compliance with City standards.

5.7.1.2.4. Evaluate the internal circulation and connectivity systems of the proposed development to provide safe and efficient internal traffic flow and access to/from the adjacent and nearby roadway system.

5.7.1.2.5. Allow compliance with the most current edition of the City’s Thoroughfare Plan (or other applicable thoroughfare plans).

5.7.1.2.6. Provide a basis for improvement and funding discussions in conjunction with zoning, special permit, and subdivision plat approvals.

5.7.1.3. The guidelines found in Sections 5.7.2. through 5.7.8. establish the requirements and guidelines for achieving responsive and consistent traffic impact and access studies for proposed developments. The City Engineer has determined it to be befitting to require the submission of an appropriate traffic study for all planned/proposed development.

5.7.2. Traffic Study Warrants

5.7.2.1.1. The need for either a detailed traffic impact study or a limited traffic operations analysis will be identified when rezoning, variance, or plan approval petitions are filed (or discussed with public officials). The City Engineer may also identify the need for a traffic impact study or operations analysis in response to an access permit application.

5.7.2.1.2. Study Warrants for a Traffic Impact Study

5.7.2.1.2.1. A complete traffic impact study (TIS) will be requested for any proposed development or redevelopment that meets one or more of the following criteria:

5.7.2.1.2.1.1. Significantly-sized project. A development meets this criterion if it generates more than 100 trip ends (i.e., two-way vehicle-trips) during any one hour of an average weekday. These trip ends shall be calculated using the latest edition of *Trip Generation* as published by the Institute of Transportation Engineers (or upon special studies of unique land-uses as approved by the reviewers).

5.7.2.1.2.1.2. Modifications to roadways. This criterion is met when the proposed development is expected by the reviewers to significantly impact a roadway segment, or roadway segments, identified in thoroughfare plans and/or improvement programs of the City, County, State, or other jurisdictions. This criterion is also met when access for the proposed development occurs on a public road that may be widened or improved in accordance with adopted thoroughfare plans.

5.7.2.1.2.1.3. Nearby congestion. A development meets this criterion if the proposed development is expected, in the opinion of City staff, to significantly impact surrounding roadways, intersections, or sets of intersections which are already operating at level of service "D" or worse during any hour (on a design day, or days, selected for analysis purposes). The level of service will be determined by an analysis prescribed in the current edition of the *Highway Capacity Manual* (Transportation Research Board) using data that reflects the current traffic conditions.

5.7.2.1.2.1.4. High traffic impact area. This criterion is met when, in the opinion of City staff, the proposed development is located in a high traffic impact area. Such reflects special sensitivity to traffic condition changes due to existing congestion, problematic circulation patterns, burgeoning traffic operations problems, or other traffic conditions of special concern. A traffic impact study will be requested for any proposed new development or modifications to existing development within a high traffic impact area

5.7.2.1.3. Study Warrants for a Traffic Operations Analysis

5.7.2.1.3.1. A traffic operations analysis may be requested for petitions which do not meet the warrants for a detailed traffic impact study. A traffic operations analysis will be requested for any one of the following conditions:

5.7.2.1.3.1.1. Requests for a driveway (or driveway modification) on any public road.

5.7.2.1.3.1.2. Existing sight distance limitations or high accident experience adjacent to the subject site.

5.7.2.1.3.1.3. Modifications to a site plan for an existing development where the parking layout and/or internal circulation system could affect traffic operations on the external roadway system.

5.7.2.1.3.1.4. Requests or probable need for a new traffic signal to control driveways serving a proposed or existing development.

5.7.2.1.3.2. Examples of traffic operations analyses include studies of proposed driveway locations, resulting sight distances, driveway and intersection geometry and control, turn lane needs and design, accommodation of projected queuing conditions, accident experience and safety, and traffic signal warrant and progression analysis.

5.7.3. Pre-Meeting and Memorandum of Understanding

5.7.3.1. Prior to commencing the preparation of a Traffic Impact Study, the preparer shall schedule a meeting with appropriate City staff. Other participants in this pre-meeting shall be representatives of other jurisdictions and agencies as deemed appropriate by City personnel. The participants at the meeting shall identify and agree upon the following issues and needs prior to the preparation of the TIS:

5.7.3.1.1. Study area

5.7.3.1.2. Study years

5.7.3.1.3. Development phasing, if applicable

5.7.3.1.4. Field data collection requirements

5.7.3.1.5. Acceptable data associated with traffic volumes, accident history, and signal operations

5.7.3.1.6. Peak traffic hours (analysis hours)

5.7.3.1.7. Trip generation, trip distribution, and assignment methods

5.7.3.1.8. Applicable planning documents (including the City's Thoroughfare Plan and Access Management Plan)

5.7.3.1.9. Other traffic impact studies prepared for developments in the study area

5.7.3.1.10. Utilization of travel demand models

5.7.3.1.11. Background traffic and growth factors

5.7.3.1.12. Acceptable levels of service (LOS)

5.7.3.1.13. Analyses methodology and software (capacity, signal warrants, etc.)

5.7.3.1.14. Cycle lengths at signalized intersections

5.7.3.1.15. Safety issues (sight distances, accident data, etc.)

5.7.3.1.16. Committed and planned roadway improvements and schedule

5.7.3.1.17. TIS submittal date

5.7.3.2. The preparer shall submit a Memorandum of Understanding (MOU) which details the assumptions and methodologies agreed upon regarding the items above – and the preparer shall request City staff concurrence with the contents of the MOU. The MOU shall be submitted to the City within one week subsequent to the pre-meeting. The MOU will be approved by City staff within one week of receipt – assuming that all items are properly addressed.

5.7.3.3. If not addressed in the MOU, the preparer shall make a separate submission regarding traffic growth rates, vehicle-trip generation rates, and directional distributions of site generated traffic to the City for concurrence and City staff will respond to the preparer on these items within one week of receipt.

5.7.4. Preparer Qualifications

5.7.4.1. Traffic Impact Studies shall be prepared by professionals with training and experience in traffic engineering/transportation planning and under the supervision of a registered professional engineer in Ohio with training and experience in traffic engineering (operations and safety analysis experience). The preparer shall not be a member of the TIS review team; neither shall the preparer be related to a review team member nor hold a financial interest in the project under study. The final document shall be signed and stamped by a Professional Engineer registered in the State of Ohio.

5.7.5. Study Guidelines

5.7.5.1. Study Areas

5.7.5.1.1. Any complete transportation study analyzing off-site access needs and impacts will include at least all site access points and major intersections (signalized and unsignalized) adjacent to the site. Beyond this area, the review team will determine any additional area to be included based on local or site specific deficiencies, development size, traffic conditions, or local policy potentially affected by the proposed development. The study area will also encompass vacant parcels of land believed to impact the intersections being analyzed so as to analyze the proposed project in the context of other previously approved or anticipated developments in the surrounding area. Generally, the study area must be large enough to

encompass the critical intersections to be analyzed. In high traffic impact areas, the study area may include the entire zone in order to capture the cumulative impact of future development within the area.

5.7.5.1.2. The following shall be included in the study area conditions section of the report:

5.7.5.1.2.1. Study area boundaries.

5.7.5.1.2.2. Study area land-uses (existing and anticipated future development).

5.7.5.1.2.3. Site accessibility (existing and future roadway system; document basic features to include jurisdiction, functional classification, pavement widths, lane usages, traffic control devices, speed limits, etc.).

5.7.5.1.2.4. TIS intersections (defined in the Memorandum of Understanding):

5.7.5.1.2.4.1. Lane usages and traffic control devices.

5.7.5.1.2.4.2. Sight distances (compare existing distances with established criteria).

5.7.5.1.2.4.3. Accident experience (if requested).

5.7.5.2. Study Years

5.7.5.2.1. Beyond the assessment of current conditions, traffic impact studies are to address conditions in the anticipated build-out year of the proposed development and the design year – which is 20 years beyond the anticipated build-out year. Some general guidelines are as follows:

5.7.5.2.1.1. All the study intersections shall be analyzed with respect to existing conditions.

5.7.5.2.1.2. For site access points (and immediately adjacent intersections as appropriate), analyses shall be performed for both build-out and design year conditions. Such driveways and intersections shall be configured to meet design year requirements. Analyses of build-out conditions shall define what elements of the long-term configuration need to be made to yield acceptable conditions in the build-out year.

5.7.5.2.1.3. For all other study intersections, analyses shall be performed (with and without the proposed development) for the build-out year. The impacts associated with site generated traffic must be appropriately mitigated at these intersections.

5.7.5.2.1.4. If the proposed development is to be implemented in phases, it may be appropriate to analyze each major phase (e.g., initial phase, an intermediate phase, and full project build-out) in order to define the potential for staging defined roadway improvements/modifications.

5.7.5.3. Study Days and Hours

5.7.5.3.1. For each defined horizon year, specific time periods are to be analyzed. In most cases, only analyses of weekday street peak hours will be required. However, land-use classifications which experience their highest trip generation levels during periods other than street peak hours may require analyses for such periods to determine proper site access and turn lane storage requirements. Examples of land-use classifications which typically have substantially higher site trip generation peaks at times other than weekday street peak hours are: shopping centers, discount stores, recreational uses (e.g., theaters, zoos, theme parks, stadiums, and arenas), restaurants, schools, churches, and garden centers.

5.7.5.3.2. The analysis time period (and condition) shall be discussed and designated by the reviewers at the initial meeting. The objective is to designate the design day(s) and time period(s) so as to cause evaluation of conditions during the design hour or design hours. The selection of the proper design day and hour is particularly important for a development which exhibits significant seasonal variations in trip generation (such as shopping centers).

Special consideration must also be given to a development located in a zone that experiences (or will experience) significant seasonal variations in traffic volumes due to unique land-uses.

5.7.5.3.3. The design hour(s) to be used in a TIS will be discussed and designated by the reviewers at the initial meeting. At a minimum, all studies must include assessments of conditions during both the AM and PM peak commuter hours (unless otherwise directed by City staff).

5.7.5.4. Traffic Counts

5.7.5.4.1. Unless otherwise approved, traffic counts shall be conducted for a minimum of seven days.

5.7.5.5. Traffic Volume Projections

5.7.5.5.1. The total anticipated transportation infrastructure requirements in the study horizon year(s) depend on traffic projections and are needed so that the City can accurately evaluate implications associated with the applicant's request for development approval. However, the impacts and infrastructure needs will be assessed separately for the baseline condition (horizon year development excluding site) and total development (horizon year development including site).

5.7.5.5.1.1. Non-Site Traffic

5.7.5.5.1.1.1. Non-Site (background) traffic volumes are composed of existing volumes, accepted general growth of traffic, and traffic generated by previously-approved new developments in the study area.

5.7.5.5.1.1.2. *Non-Site Development within Study Area.* The impacts of the anticipated non-site development shall be assessed to aid both the City and the applicant in the determination of sources of transportation infrastructure needs. All significant developments within the study area that have been approved or are likely to occur by the specific horizon years shall be identified and incorporated into the study. The land-use type and magnitude of the probable future developments in the horizon years shall be identified in conversations with staff of the City and other relevant public agencies.

5.7.5.5.1.1.3. *Non-Site Development Outside Study Area.* In some cases, the City may request the applicant to specifically consider and include traffic generated by large developments located outside the defined study area. In such cases, a TIS prepared for the identified development will be provided to the applicant by the City to permit the inclusion of relevant traffic volumes within the subject TIS. The applicant will not be required to undertake vehicle-trip generation and trip distribution for developments outside the study area.

5.7.5.5.1.2. Site Traffic

5.7.5.5.1.2.1. *Site Development.* Development proposed to be located on the site under study shall be categorized by specific land-use type consistent with classifications contained in the latest edition of *Trip Generation* (Institute of Transportation Engineers). The proposed number of development (building) units (e.g., gross square feet of building area, dwelling units, hotel rooms, etc.) shall be provided. Land area is insufficient to provide a basis for analysis. If the proposed land-use or density is inconsistent with the current land-use plan, comparison of the proposed land-use and the land-use plan recommendation shall be made using classifications contained in the *Trip Generation* report.

5.7.5.5.1.2.2. Trips generated by the proposed development shall be calculated using the most current edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*. Methodologies contained in the ITE *Trip Generation Handbook* shall be

used for internal trips and pass-by trips calculations.

5.7.5.5.1.2.3. Distribution and assignment of site traffic shall be based on engineering judgment and the method shall be pre-approved by the City. The directions from which traffic will access the site will depend on various factors, including:

5.7.5.5.1.2.3.1. Type of proposed development and the area from which it will attract traffic,

5.7.5.5.1.2.3.2. Size of proposed development,

5.7.5.5.1.2.3.3. Competing developments (if applicable),

5.7.5.5.1.2.3.4. Surrounding land uses and population, and

5.7.5.5.1.2.3.5. Conditions on surrounding roadway system.

5.7.5.6. Capacity Analysis

5.7.5.6.1. Level of Service

5.7.5.6.1.1. The standard criterion used to define quality of traffic flow is "level of service" (LOS). This is a qualitative assessment of factors such as speed, volume, geometry, delays, and ease of maneuvering. All analysis techniques specify the quality of operations as a letter (such as those shown in Table 1) – with 'A' representing the best operating condition and 'F' representing the worst.

Table 10 - LOS Criteria for Intersections

	Control Delay per Vehicle (Seconds)	
Level of Service	**Unsignalized Intersections**	**Signalized Intersections**
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 15.0	> 10.0 and ≤ 20.0
C	> 15.0 and	> 20.0
D	> 25.0 and	> 35.0
E	> 35.0 and	> 55.0
F	>50.0	>80.0

Source: Transportation Research Board, *Highway Capacity Manual*, Special Report 209, Third Edition, National Research Council, Washington, DC, 2000.

5.7.5.6.1.2. The minimum acceptable design level of service (LOS) in the City is 'C'. At intersections, analyses should show an overall LOS of 'C' with no individual movement operating at less than 'D' to be acceptable. Where unacceptable levels of service are calculated for background or "no-build" conditions, the applicant is responsible for only maintaining the same level of service when site traffic is added to the roadway element.

5.7.5.6.2. Methodology

5.7.5.6.2.1. The use of HCS or Synchro software is acceptable for capacity analyses. When using Synchro, reports from HCM module shall be used.

5.7.5.6.2.2. In general, a Peak Hour Factor (PHF) of 0.90 shall be used for horizon year analyses. (A different PHF may be more appropriate for certain land uses (e.g., a school); such conditions will be discussed at the initial meeting.)

5.7.5.6.2.3. Capacity and level of service calculations shall be performed for each site drive intersection for build-out year and design year conditions. Site driveway intersections shall be configured for design year conditions.

5.7.5.6.2.4. Capacity and level of service calculations shall be performed for all other study intersections for:

5.7.5.6.2.4.1. Existing conditions (i.e., current volumes on existing roadway system).

5.7.5.6.2.4.2. Build-out year 'No-build' (non-site) traffic volumes on existing (or planned and programmed) roadway system.

5.7.5.6.2.4.2.1. If improvements/modifications to the existing roadway system are planned and programmed, City staff will provide this information to the applicant and the improved roadway system will be used as a base for testing horizon year traffic conditions – as appropriate.

5.7.5.6.2.4.2.2. If roadway improvements or modifications beyond those formally planned or programmed are assumed in the 'no-build' analysis, then these improvements or modifications will be considered to be the responsibility of the applicant. If this is not the case, then the rationale for considering such improvements must be clearly described.

5.7.5.6.2.4.3. Build-out year 'Build' (i.e., non-site plus site) traffic volumes on existing (or planned and programmed) roadway system.

5.7.5.6.2.4.4. Build-out year 'Build' traffic volumes on improved/modified roadway system that mitigates the traffic impacts of the proposed development.

5.7.5.6.2.4.4.1. Produce a table for each intersection, study period, and study horizon year listing the level of service and delay (or v/c ratio) by (1) individual movement, and (2) overall intersection for:

5.7.5.6.2.4.4.1.1. Existing conditions.

5.7.5.6.2.4.4.1.2. No-Build conditions.

5.7.5.6.2.4.4.1.3. Build conditions on existing roadway system.

5.7.5.6.2.4.4.1.4. Build conditions on proposed roadway system.

5.7.5.6.3. Mitigation

5.7.5.6.3.1. Recommendations shall be made in the TIS for the site access points and external roadway improvements (such as additional through lanes, turn lanes, and traffic control devices) necessitated as a result of the proposed development. The traffic impacts of the proposed/planned development must be properly mitigated.

5.7.5.6.3.2. Suggested improvements/modifications must be practical and acceptable to the appropriate agency/jurisdiction.

5.7.5.6.3.3. A scaled concept sketch or (at least a schematic figure) shall be provided illustrating the improvements/modifications that properly mitigate the traffic impacts of the proposed development.

5.7.5.7. Turn Lane Criteria

5.7.5.7.1. Turn lanes at signalized intersections (existing or warranted upon on build-out day) and at off-site unsignalized intersections shall be provided based on capacity analyses (as part of mitigation).

5.7.5.7.2. Left turn lanes shall be provided at site access points under the following conditions:

5.7.5.7.2.1. On major and minor arterial roadways with speed limits greater than 40 mph, or

5.7.5.7.2.2. On major and minor collector roadways with speed limits greater than 40 mph and more than 10 left turning vehicles during the peak hour of the development, or

5.7.5.7.2.3. Per graphs 401-5aE, 401-5bE and 401-5cE, which are the left turn lane warrants contained in the ODOT *Location and Design Manual Volume I.* (These are Graphs 1, 2, and 3 in the ODOT State Highway Access Management Manual.)

5.7.5.7.2.3.1. Note that the warrants apply <u>only to the free flow approach</u> of the unsignalized intersection. Turn lanes on the minor approach (under stop-sign control) shall be provided based on capacity analyses.

5.7.5.7.3. Right turn lanes shall be provided at site access points per graphs 401-6aE, 401-6bE, 401-6cE and 401-6dE, which are the right turn lane warrants contained in ODOT *Location and Design Manual Volume I.* (These are Graphs 4, 5, 6 and 7 in the ODOT *State Highway Access Management Manual*.)

5.7.5.7.4. Left or right turn lanes may also be required when deemed necessary for safety purposes by the City Engineer.

5.7.5.7.5. The length of left and right turn lanes shall be based on the criteria contained in the *ODOT Location and Design Manual Volume I* Section 401-9E and 401-10E or, where appropriate, on the results of queuing analyses associated with the capacity calculations. The length of turn lanes shall be based on a design speed five miles per hour above the posted speed limit. For roadways with an unposted speed limit, a design speed of 55 MPH shall be used.

5.7.5.8. Traffic Signal Warrant Criteria

5.7.5.8.1. Warrant analyses for the installation of a traffic signal shall be required if a signal is recommended as a mitigating measure.

5.7.5.8.2. Signal warrants, as contained in the latest edition of the Ohio Manual of Traffic Control Devices (OMUTCD), shall be used for any formal request associated with the installation of a traffic signal.

5.7.5.8.3. In general, the City does not permit the installation of a traffic signal unless the criteria specified in Warrant 1 (Eight-Hour Vehicular Volume) are met.

5.7.5.8.4. Table 11 provides a general guideline derived from this warrant.

5.7.5.8.5. If a signal is shown to be warranted in a horizon year, but is not warranted in the build-out year, estimates shall be made regarding the year that the signal may become warranted.

5.7.5.8.6. Signal warrant analyses may be conducted using projected traffic volumes to identify the potential need for the installation of traffic signals. However, traffic signals will not be installed unless: (1) the subject intersection is unquestionably projected to meet warrants on build-out day of the development, or (2) actual counts at the intersection meet warrant thresholds.

5.7.5.8.7. Any intersection that meets signal warrant thresholds must also be evaluated in terms of location and spacing based on the standards noted in the City's Access Management Regulations or in the ODOT State Access Management Manual (if applicable) for the access category assigned by the City's Thoroughfare Plan.

Table 11 - General Guidelines for Warranting a Traffic Signal based on Average Daily Traffic Volumes as Derived from Warrant 1 (Eight-Hour Vehicular Volume)

Condition A: Minimum Vehicular Volume			
Number of Approach Lanes		**Average Daily Traffic**	
MAJOR	**MINOR**	**MAJOR**	**MINOR[1]**
1	1	8,300	5,000
2 or more	1	10,000	5,000
2 or more	2 or more	10,000	6,700
1	2 or more	8,300	6,700
Condition B: Interruption of Continuous Traffic			
Number of Approach Lanes		**Average Daily Traffic**	
MAJOR	**MINOR**	**MAJOR**	**MINOR[1]**
1	1	12,500	2,500
2 or more	1	15,000	2,500
2 or more	2 or more	15,000	3,300
1	2 or more	12,500	3,300

[1] For 'T' intersections, the required ADT values on the minor approach are 50% of the values listed.
Note: When the 85th percentile speed of major street traffic exceeds 40 mph in either an urban or rural area, or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the warrants are 70% of the guidelines above.

5.7.5.9. Site Access, Circulation, Parking and Roadway Plans

5.7.5.9.1. The following shall also be addressed in the TIS:

5.7.5.9.1.1. On-site parking needs.

5.7.5.9.1.2. Ease of internal circulation.

5.7.5.9.1.3. On-site queuing provisions.

5.7.5.9.1.4. On-site traffic operations and control(as they may affect traffic operations on the external roadway system).

5.7.5.9.1.5. Design of site driveways to include pavement widths, lane usages, proposed median widths, traffic control devices, etc.

5.7.5.9.2. Plans showing site access and any roadway improvements/modifications shall be submitted with all requested traffic impact studies and/or traffic operations analyses. These plans shall be to a practical scale.

5.7.5.9.3. The site access and roadway plan(s) shall be of sufficient detail to show:

5.7.5.9.3.1. Location and spacing of all site access points and driveways (including relationships to other nearby roadways, intersections, and driveways),

5.7.5.9.3.2. External roadway improvements/modifications,

5.7.5.9.3.3. Lane configurations and control,

5.7.5.9.3.4. Queuing and vehicle storage distances,

5.7.5.9.3.5. Spacing of traffic signals to permit proper traffic progression on the adjacent roadway system,

5.7.5.9.3.6. Sight distances,

5.7.5.9.3.7. Adequate pedestrian, bicycle, and public transit provisions (if applicable),

5.7.5.9.3.8. Sufficient emergency and service/delivery access, and

5.7.5.9.3.9. Proper on-site circulation and parking layout so as not to affect traffic flow and operations on the external street system.

5.7.6. Report Contents

5.7.6.1. All traffic impact studies and traffic operations analyses must be documented in a report. The results of traffic operations analyses can be summarized in a memorandum type report – while the results of traffic impact studies must be submitted in standard report formats. Such traffic impact reports shall be complete and concise and shall include the following:

5.7.6.1.1. Cover

5.7.6.1.1.1. Development name and location

5.7.6.1.1.2. Applicant's name

5.7.6.1.1.3. Preparer's name

5.7.6.1.1.4. Report date

5.7.6.1.2. Title Page

5.7.6.1.2.1. Development name and locations

5.7.6.1.2.2. Applicant's name, address, and telephone number

5.7.6.1.2.3. Preparer's name, address, and telephone number, engineering registration seal and signature

5.7.6.1.2.4. Report date

5.7.6.1.3. Table of Contents

5.7.6.1.4. List of Figures

5.7.6.1.5. List of Tables

5.7.6.1.6. List of Appendices

5.7.6.1.7. Executive Summary

5.7.6.1.7.1. Site location and study area

5.7.6.1.7.2. Development description

5.7.6.1.7.3. Types of studies undertaken (impacts, signal warrants, site access, etc.)

5.7.6.1.7.4. Principal findings

5.7.6.1.7.5. Conclusions and Recommendations

5.7.6.1.8. Summary of Revisions (for revised reports)

5.7.6.1.9. Introduction

5.7.6.1.9.1. Site Description

5.7.6.1.9.2. Study Area Conditions

5.7.6.1.9.3. Study Hours and Study Years

5.7.6.1.10. Traffic Volumes

5.7.6.1.10.1. Existing Traffic Volumes

5.7.6.1.10.2. No-Build Traffic Volumes

5.7.6.1.10.3. Site-Generated Traffic Volumes

5.7.6.1.10.4. Build Traffic Volumes

5.7.6.1.11. Traffic Analyses

5.7.6.1.11.1. Site Access Point(s) Evaluation

5.7.6.1.11.1.1. Signal warrant analyses

5.7.6.1.11.1.2. Turn lane warrants

5.7.6.1.11.1.3. Turn lane length computations

5.7.6.1.11.1.4. Capacity Analyses

5.7.6.1.11.1.5. Sight distances

5.7.6.1.11.2. Off-Site Public Road Intersection Analyses

5.7.6.1.11.2.1. Signal warrant analyses

5.7.6.1.11.2.2. Accident analyses (if requested)

5.7.6.1.11.2.3. Capacity analyses

5.7.6.1.11.2.3.1. Existing conditions (current volumes)

5.7.6.1.11.2.3.2. No-Build conditions (build-out year)

5.7.6.1.11.2.3.3. Build Conditions (build-out year)

5.7.6.1.11.2.3.4. Mitigation (build-out year)

5.7.6.1.12. Conclusions and Recommendations

5.7.6.1.13. Appendix

5.7.6.1.13.1. Memorandum of Understanding

5.7.6.1.13.2. Site Plan

5.7.6.1.13.3. Traffic Count Data

5.7.6.1.13.4. Traffic Analyses/Worksheets (capacity analyses, signal warrants, turn lane warrants and length) Worksheets

5.7.6.1.14. Additional Information

5.7.6.1.14.1. The following exhibits shall be included in reports (where applicable)

5.7.6.1.14.1.1. Site Location Map

5.7.6.1.14.1.2. Existing Conditions (current lanes and traffic control at study intersections)

5.7.6.1.14.1.3. Existing Traffic Volumes

5.7.6.1.14.1.4. No-Build Traffic Volumes

5.7.6.1.14.1.5. Directional Distribution of Site Traffic

5.7.6.1.14.1.6. Site Generated Traffic Volumes

5.7.6.1.14.1.7. Build Traffic Volumes

5.7.6.1.14.1.8. Proposed Traffic Control and Lane Usages

5.7.6.1.14.2. The following tables shall be included in reports (where applicable)

5.7.6.1.14.2.1. Site Trip Generation Factors

5.7.6.1.14.2.2. Site Trip Generation Volumes

5.7.6.1.14.2.3. Level of Service Summary

5.7.7. Submittal Requirements

5.7.7.1. All reports will be reviewed by City staff and those requiring additional information or revision will be discussed with the preparer and returned for revisions.

5.7.7.2. Four copies of the report shall be submitted to the City.

5.7.8. Public Record

5.7.8.1. All submitted documents, including both reports and data, become public record upon submittal. Information contained in these submittals may be used by agency staff or other study preparers in subsequent studies. The original sources of data and information shall be cited when taken from prior submittals.

5.8. ACCESS MANAGEMENT STANDARDS AND GUIDELINES

5.8.1. Purpose and Intent

5.8.1.1. Access Management is an efficient way of dealing with the problems associated with traffic congestion and safety caused by motorists turning at driveways and intersections. Congestion and the threat of accidents become greater as the number of driveways and intersections increase and the distance between them decreases. Without Access Management, roadways and intersections can become dangerous.

5.8.1.2. The City of Lebanon has adopted an Access Control Code based on the following principles:

5.8.1.2.1. To promote public safety by minimizing accidents.

5.8.1.2.2. To improve the driving experience by increasing mobility and decreasing delay.

5.8.1.2.3. To provide necessary and safe access to property.

5.8.1.2.4. To minimize costs by making more efficient use of existing and proposed roads.

5.8.1.3. All highways, roads and streets form a hierarchy according to the function they theoretically should serve. They serve traffic mobility, land access, or some combination of these two. Interstates and expressways are at the highest level; their primary function is mobility, so they have the strictest access controls. At the other end of the scale are local streets serving low traffic volumes at low speeds over short distances. Their primary purpose is to give frequent, direct access to adjacent land, so restrictions are minimal.

5.8.1.4. Between these extremes are the classes of arterials and collectors that make up the bulk of the system. They include many of the most important roadways in the Lebanon area -- and they are often expected to perform multiple and conflicting traffic services. They must serve both the demand for mobility and the demand for land access.

5.8.1.5. The City Access Control Code considers: (1) modifications to existing roadways to provide better access management, (2) proper access management along all new roadways, and (3) proper management and design of the site access and circulation systems associated with planned new developments. The following sets forth the guidelines associated with the location and design of access points.

5.8.2. Road Access Categories and Characteristics

5.8.2.1. The roadways located in Lebanon have been categorized according to their functional and operational intent. The categories are based on maintaining the roadway's function in terms of capacity, traffic flow, property access, and safety. The functional descriptions of the six basic categories are as follows:

5.8.2.1.1. Category I: Designed and intended to provide mobility for high volumes of traffic at high speeds over long distances. Highways in this category are typically designed and intended to achieve a minimum posted speed of 55 mph. All interstate and freeway facilities are included in this category.

5.8.2.1.2. Category II: Designed and intended to provide mobility for relatively high speed, high volume, and long distance through traffic. Highways in this category are typically designed and intended to achieve a minimum posted speed of 50 mph in areas without signals and 45 mph in areas with signals. This category includes arterials of state-wide significance and this is the highest category allowing at-grade intersections.

5.8.2.1.3. Category III: Designed to provide mobility at moderate to high speeds and volumes. Typically, Category III highways provide for a minimum posted speed of 45 mph in areas without signals and a minimum of 35 mph in areas with signals. Arterials outside the urbanized area are included in this category.

5.8.2.1.4. Category IV: Designed and intended to provide access and mobility at moderate to high speeds and volumes for moderate to short distances in rural areas and low to medium speeds and volumes in urban areas. Low to moderate speed arterials within the urbanized area and major collectors are included in this category. Typically, Category IV highways provide for a minimum posted speed of 35 to 55 mph in undeveloped areas and 25 to 45 mph in developed areas.

5.8.2.1.5. Category V: This category applies to roads and streets designed and intended to take traffic from local roads, carry it a short distance, and distribute it to higher category roadways. Minor collectors are included in this category. Typical posted speeds are 25 to 35 mph.

5.8.2.1.6. Category VI: This category applies to local streets that provide access to individual properties that abut the street.

5.8.2.2. The following table provides the general assignment of the functional classifications depicted in the City's Thoroughfare Plan to the access management categories.

Table 12 - Roadway Functional Classifications

Access Management Category	Road Functional Classification	Examples
Category I	Freeway	I-71
Category II	Major Arterial of State-wide Significance	State Route 48
Category III	Major and Minor Arterials outside the urbanized area of Lebanon	US Route 42, State Routes 63 and 123
Category IV	Major Collectors as well as Major and Minor Arterials within the urbanized area of Lebanon	
Category V	Minor Collectors	
Category VI	Local Roads	

5.8.3. Driveway Types

5.8.3.1. A driveway is a point of access connecting an adjacent property to a public roadway. There are five types of driveways, as follows:

5.8.3.1.1. Farm or Field Drives: A driveway providing access to an agricultural tract of land.

5.8.3.1.2. SF Residential: A driveway providing access to a single-family residence.

5.8.3.1.3. Residential: A driveway providing access to multiple single-family residences or to multi-family dwelling units.

5.8.3.1.4. Commercial: A driveway providing access to an office, business, commercial, or institutional building or buildings, or to an industrial facility (that services fewer than ten trucks per day).

5.8.3.1.5. Industrial/Retail: A driveway serving a retail center (such as a community shopping center) or an industrial facility (that services ten or more trucks per day).

5.8.3.2. For Access Management purposes, driveways are also classified by traffic volumes as follows:

5.8.3.2.1. Low Volume Driveway (LVD): greater than 5 and up to 100 two-way vehicle-trips in one or more 60-minute periods of a day.

5.8.3.2.2. Medium Volume Driveway (MVD): greater than 100 and up to 200 two-way vehicle-trips in one or more 60-minute periods of a day.

5.8.3.2.3. High Volume Driveway (HVD): greater than 200 two-way vehicle-trips in one or more 60-minute periods of a day.

5.8.4. Driveway Location and Spacing

5.8.4.1. The number of driveways afforded any one site shall be minimized. (The need for more than one driveway must be substantiated by a Traffic Impact Study.)

5.8.4.2. Access for multiple properties shall be combined, where feasible.

5.8.4.3. Driveways shall be located in accordance with applicable sight distance requirements (Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD) as contained in Section 200 of the ODOT Location and Design Manual).

5.8.4.4. Minimum driveway spacing (centerline to centerline) which is based on posted speed limits, shall be determined using the values for high speed roadways (greater than 40 mph) and low speed roadways (equal to or less than 40 mph) as follows:

Table 13 - Minimum Driveway Spacing

High Speed Road		Low Speed Road	
Posted Speed (MPH)	**Minimum Distance (Ft.)**	**Posted Speed (MPH)**	**Minimum Distance (Ft.)**
45	500	25	150
50	550	30	200
55	600	35	250
		40	325

5.8.4.5. Driveway spacing shall consider the location of driveways on both sides of a roadway.

5.8.4.6. Driveways shall be located where they will not cause problems with movements to and from an existing or planned street, highway, or driveway on the opposite side of the roadway.

5.8.4.7. Driveways shall be located a sufficient distance from an adjacent public road intersection so as not to interfere with the traffic operations at the intersection. The following table provides the minimum acceptable distances between drive locations and adjacent intersections. For all access categories, where two roads of different access levels intersect, the restrictions and distances of the higher level roadway will apply along the lower classified roadway. (The defined distances are measured from the centerline of the intersecting road to the centerline of the proposed driveway.)

Table 14 - Recommended Drive Distances from Intersection By Classification

Higher Roadway Classification	Distance from Intersection
Intersecting Category I, II, or III Roadway	600 feet
Intersecting Category IV or V Roadway	300 feet

5.8.5. Access Management Standards

5.8.5.1. This section defines the standards and specifications to be used in conjunction with the access categories and driveway types to protect the functional integrity of roads in and near the City. The following describes the access standards to be applied for each access category.

5.8.5.1.1. *Category I and II Roadways*: Reference the latest version of the ODOT State Highway Access Management Manual.

5.8.5.1.2. Category III, IV, and V Roadways: Refer to the following table.

5.8.5.1.3. *Category VI Roadways*: Full access permitted per parcel or lot.

Table 15 - Access Standards for Category III, IV, and V Roadways

Roadway	Driveway	Permitted?	Minimum Spacing *(a)(b)*	Traffic Control	Movements
Category III					
	HVD	Yes *(c)*	½ mile *(d)*	Signal if warranted	All *(e)*
	MVD	Yes *(c)*	SSD/ISD & Table *(f)*	Stop	All *(e)*
	LVD	Yes *(c)(g)*	SSD/ISD & Table *(f)*	Stop	All *(e)*
Category IV					
	HVD	Yes *(c)*	¼ mile *(h)*	Signal if warranted	All *(e)*
	MVD	Yes *(c)*	SSD/ISD & Table *(f)*	Stop	All *(e)*
	LVD	Yes *(c)(g)*	SSD/ISD & Table *(f)*	Stop	All *(e)*
Category V					
	HVD	Yes *(c)*	¼ mile *(h)*	Signal if warranted	All *(e)*
	MVD	Yes *(c)*	SSD/ISD	Stop	All *(e)*
	LVD	Yes *(c)*	SSD/ISD	Stop	All *(e)*

Where:
HVD = High Volume Drive,
MVD = Medium Volume Drive,
LVD = Low Volume Drive
SSD/ISD = Stopping Sight Distance and Intersection Sight Distance

(a) These are desirable minimum distances. It is recognized that site frontage and property limits may, by necessity, alter these dimensions. At the same time, the City reserves the right to call for greater spacing distances.

(b) Spacing requirements shall properly consider driveways on both sides of the highway.

(c) One direct private access shall be permitted per parcel or contiguous parcels under common ownership. Additional access may be permitted if: (1) the access will not adversely affect the safety and operation of the highway, (2) such access is necessary for the safe and efficient use of the property, and (3) such access will not adversely affect access to adjacent or nearby properties.

(d) ½ mile is recommended, however, ¼ mile may be allowed when there is no reasonable alternative access to the general street system. If these cannot be achieved, then the restrictions of SSD, ISD, and minimum spacing based on posted speed limit shall apply

(e) All movements permitted if not deemed detrimental; certain movements may be restricted due to operational and safety considerations.

(f) Spacing shall be determined using the greatest value identified for SSD, ISD, and minimum driveway spacing based on posted speed limit (reference table in Section 5.8.4.4.).

(g) Low volume driveways shall be discouraged on roadways with speed limits greater than 50 mph. Where there is an opportunity, low volume drives should be consolidated and combined using appropriate means such as service roads, cross easements, and joint access to reduce the number of access points.

(h) ¼ mile is recommended, however, one-eighth mile may be allowed when there is no reasonable alternative access to the general street system. If these cannot be achieved, then the restrictions of SSD, ISD, and minimum spacing based on posted speed limit shall apply.

5.8.6. Driveway Geometrics and Design

5.8.6.1. Driveway widths and turning radii are determined by the number and use of lanes on the driveway and the design vehicle chosen for the driveway. The width and radii of the driveway shall permit vehicles to enter and exit with a minimum of interference to through traffic, yet be restrictive enough to discourage erratic maneuvers. The following table provides guidelines for driveway dimensions based on driveway type and design vehicle.

Table 16 - Driveway Design Standards

Driveway Type	**Residential**		**Commercial**		**Industrial/Retail**	
Design Vehicle	P		SU-30		WB-50/WB-67	
Nominal Width 1/	Min. (feet)	Max. (feet)	Min. (feet)	Max. (feet)	Min. (feet)	Max. (feet)
One-way Drive	10	14	14	20	14	26
Two-way Drive	20	24	26	32	26	38
Corresponding RT Radius	25	15	35	25	75	50

Where:
1/Driveway throat width measured parallel to highway and clear of the turn radii.
P: Passenger car
SU-30: Single-unit truck; 30 feet in length
WB-50: Large semi-trailer truck; 55 feet in length
WB-67: Interstate semi-trailer truck; 74 feet in length
RT Radius: Right turn radius (Note: the smaller the drive width, the larger turn radius required to accommodate the path of the vehicle.)

5.8.6.2. Driveways or other access points that enter a public roadway at traffic signals shall have the number of lanes as determined by a capacity analysis. In this case, 12-foot wide lanes shall be utilized and turn templates shall be used to ensure adequate radius-throat width combinations.

5.8.6.3. Two-way driveways shall intersect the highway at an intersection angle between 80º and 90º. An angle less than 80º will not be permitted on new two-way driveways. One-way operation driveways (right in only or right out only) shall not have an angle less than 45º

5.8.6.4. Driveway radii may be reduced on a roadway with on-street parking. The turn radius, in such a case, is measured from the edge of the through lane.

5.8.6.5. The profile of a driveway shall be designed to provide a smooth transition for its users.

5.8.6.6. Drives shall not be obstructed within the right-of-way by gates, or similar obstacles. Any access with a gate shall be designed so that the longest vehicle can completely clear the traveled way when the gate is closed and as it is opened.

5.8.6.7. The need for traffic signals shall be determined by warrant analyses using the Ohio Manual of Uniform Traffic Control Devices.

5.8.6.8. High volume driveways that do not meet signal warrants may be denied certain traffic movements if traffic volumes and conditions on the highway would make the full movement operation unsafe.

5.8.7. Driveway Islands

5.8.7.1. In some situations, it is desirable to prohibit certain movements through the use of median or channelizing islands. Median islands can be used to separate inbound and outbound traffic. It is a curbed island which prevents egressing traffic from encroaching on the side of the drive used by ingress traffic. Channelizing islands further designate the correct turning path

and define the merge area thus reducing conflicting movements. The geometry shall physically define the permitted movements and block the prohibited movements.

5.8.7.1.1. Median islands shall be at least 4 feet wide -- with a maximum of 6 feet at the intersection. Median widths exceeding 6 feet are undesirable because they create turning problems, expand the intersection, and make it difficult to provide proper lane alignments with opposing existing or future driveways or roadways.

5.8.7.1.2. Median islands shall be at least 25 feet in length.

5.8.7.1.3. An island median shall be used to prevent encroachment on other driveway lanes whenever any combination of egress and ingress lanes exceeds three lanes.

5.8.7.1.4. A median island shall be offset at least 12 feet from the edge of the traveled lane on the main road.

5.8.7.1.5. The nose of a median island shall taper in height from 2” to 6” over a distance of 4 feet.

5.8.7.1.6. Standard yellow edge lines shall be used at the divisional island. Also, white pavement markings shall be used to delineate traffic lanes when there are two or more lanes in the same direction. At high volume driveways, reflectorized pavement markers shall be used to provide greater delineation.

5.8.7.1.7. Channelizing islands shall be used on arterials and network collectors without a median where left turns are restricted and on one-way streets to discourage wrong way turns.

5.8.7.1.8. Channelizing islands shall have a surface area of at least 75 square feet.

5.8.7.1.9. All channelizing islands shall be offset at least 4 feet from the edge of the traveled lane to the face of curb or the width of the paved curbed shoulder whichever is greater on high-speed roadways or where the approach roadway is uncurbed. A mountable curb, no more than 4 inches high, shall be used on the channelizing island if approach roadways are uncurbed.

5.8.7.1.10. A turning radius of between 75 feet and 100 feet shall be used for channelizing islands in order to make it more difficult for a driver to make a maneuver which the design is intended to discourage. (Radii larger than 100 feet shall not be used on egress unless an acceleration lane is provided because of the large angle a driver must rotate in order to see vehicles approaching from the left; the acceleration lane allows the driver to use the rear view mirror to select a gap).

5.8.7.1.11. Applicable driveway widths and turning radii shall be determined based on the number and use of lanes on the driveway and the design vehicle chosen for the driveway. Signage shall be based upon the regulatory signs defined in the Ohio Manual of Uniform Traffic Control Devices (OMUTCD).

5.8.8. Auxiliary Turn Lanes

5.8.8.1. The requirement for separate left and/or right turn lanes on the main roadway at site access points shall be based on the guidelines defined in Section 5.7. associated with Traffic Impact Studies.

5.8.9. Exceptions for Access Requests

5.8.9.1. Exceptions will grant permission to depart from the standards and requirements of the Access Control Code based on unique circumstances or existing special conditions.

5.8.9.1.1. The request for an exception shall specify, in writing, why the exception is appropriate and necessary and shall document the unique conditions or special circumstances that make it impractical and infeasible to comply with the applicable standards and/or requirements of the Access Control Code. The documentation shall show that the applicant has considered

all practical and reasonable alternatives to mitigate the unique conditions or special circumstances, that the alternatives are not feasible or practical, and that, without the exception, the applicant will be deprived of reasonable access.

5.8.9.1.2. In considering a request for an exception, the City shall determine if:

5.8.9.1.2.1. The exception meets minimum applicable City standards including geometric design, operation, and safety elements – and if the exception is shown to be beneficial to the traveling public.

5.8.9.1.2.2. The exception is not detrimental to the public health, safety, and welfare.

5.8.9.1.2.3. The exception does not degrade the planned or intended operation of the roadway system.

5.8.9.1.3. A exception approval shall be consistent with the guiding principles of the Access Control Code and Section 5.8 herein.

5.8.9.1.4. When an exception is granted, the documentation of the reason(s) for approving the exception shall be included in the records and files pertaining to the permit.

5.8.10. Use of Access

5.8.10.1. It is the responsibility of the property owner to ensure that the use of the access to the property is not in violation of the permit terms and conditions. The terms and conditions of any permit are binding upon all assigns, successors-in-interest, heirs, and occupants. If any changes are made or will be made in the use of the property, which will affect access operation, traffic volume, or vehicle type, the applicant or property owner shall contact the City to determine if a new access permit and modifications to the access point are required.

5.9. ON-STREET PARKING GUIDELINES

5.9.1. On-street parking in residential areas will be permitted under the conditions found in Table 17.

Table 17 – On-Street Parking Standards

Pavement Width (Face of Curb to Face of Curb)	Allowable Parking	Minimum R/W Required for Residential Street
<26 feet	No on-street parking	50 feet
≥26 feet but <34'	One side of roadway (opposite of fire hydrants)	50 feet
≥34 feet	Both sides of roadway	60 Feet

5.9.2. On streets with parking on only one side of the street, parking shall be prohibited on the side of the street with fire hydrants.

5.10. MISCELLANEOUS REQUIREMENTS

5.10.1. Plating

5.10.1.1. All road plates shall be recessed so as to be flush with the existing road surface. Wedging of plates shall not be permitted unless otherwise approved by the City Engineer

5.10.2. Pavement Markings

5.10.2.1. All pavement markings shall be ODOT Item 644 thermoplastic with glass beads.

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