

SECTION 5

5.0 ROADWAY DESIGN

5.1 INTRODUCTION

In the design of roadways, it is essential to account for all the components that may affect the efficiency and safety of the roadway network. The four (4) main elements are the vehicle/driver, the pedestrian, the bicyclist and the road. This section of the Manual is intended to address the roadway design elements necessary for the construction of streets within the City.

In cases where the City has adopted an improvements plan, the elements of the plan will supersede the requirements outlined in this section.

5.2 ROADWAY DESIGN ELEMENTS

Roadways shall be designed in accordance with the Manual, City Standard Drawings and Specifications, the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highway and Streets* (Green Book), the Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD), the 2012 International Fire Code (IFC) and all other State and Federal applicable standards. The accepted standards used for design in the City are presented below.

5.2.1 Design Controls and Criteria

The design controls and criteria as established by the City are provided to optimize the design of streets within the City.

5.2.1.1 Street and Road Classifications

Street classifications for the City are currently reflected in the Major Street Plan, which defines existing and proposed arterial, collector, residential collector and local commercial streets. All other streets are classified as local streets. The listing of the City's streets, by classification, is included in Appendix K-M of this document; whereas, Appendix K "Arterial Road List", Appendix L "Collector and Residential Road List", and Appendix M "Local Commercial / Local Street / Cul-de-Sacs / Alleys List".

Streets in a subdivision shall be classified according to the Major Street Plan. Modifications of the City's roadway classification system will occur as the City develops in the future and land use conditions change. The City Engineer will approve any changes to the roadway classification listing and will require the listing outlined in Appendix K through M of this Manual as well as the Major Street Plan to be amended.

Streets within the City shall be limited to the maximum traffic volumes shown in Table 5.1 as being those levels beyond which additional traffic volume would unacceptably degrade the quality of life throughout the community. Table 5.1 is a compilation of roadway daily and peak hour volumes established for the City based on previous ordinances, experience of the City and the ALDOT accepted volumes for roadways.

TABLE 5.1
Maximum Roadway Volumes by Classification

Classification	Two-Lane		Three-Lane		Four-Lane		Four-Lane Divided (5-Lane)		Six Lane	
	Maximum Volumes									
	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)	Daily (vpd)
Arterial*	1,300	13,300	1,570	15,700	2,050	20,500	2,540	25,400	3,750	37,500
Collector*	1,030	10,300	1,290	12,900	1,620	16,200	1,770	17,700	2,600	26,000
Residential Collector**	500	5,000	630	6,300	790	7,900	860	8,600	N/A	N/A
Local Commercial*	1,030	10,300	1,290	12,900	1,620	16,200	1,770	17,700	N/A	N/A
Local Residential/ Cul-de-sac***	200	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alley***	30	300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* Developed by Skipper Consulting, Inc. and approved by the Alabama Department of Transportation

** Based on trip generation for 500 detached residential dwelling units from ITE

*** Based on maximum daily volumes from standards of other communities in Southeast

Daily and peak hour traffic volumes on all streets designated as a collector, residential collector, local commercial, local residential or alley shall not have a LOS below a "C". Arterials shall not have a daily or peak hour LOS below a "D". If in the opinion of the City Engineer, in those cases where property is proposed for redevelopment or rezoning and development generated would cause the traffic volume to exceed the limits outlined in Table 5.1, a TIS would be required to be conducted by the developer of the property. Requirements for TIS are outlined in this Manual in Section 4.0 "Traffic Impact Studies".

5.2.1.2 Design Vehicles

The largest design vehicle likely to frequent the roadway (or parking facility) shall be considered during design of critical features, such as radii at intersections and radii of turning roadways. Where a roadway is identified as a fire access road/lane, radii shall be designed to handle the largest fire apparatus with minimum difficulty. The school bus shall also be considered for the design of some subdivision street intersections. In some cases, larger radii may be required and will be noted during the DRT process.

TABLE 5.2
Roadway Design Vehicles

Classification	Design Vehicle
Arterial	WB-50
Collector	WB-40
Residential Collector	WB-40
Local Commercial	WB-40
Local Residential/Cul-de-Sac	S-BUS-35
Alley	SU

5.2.1.3 Design Speed

The following design speeds shall be used when determining horizontal and vertical alignment on City streets.

TABLE 5.3
Roadway Design Speeds

Classification	Design Speed
Arterial	50 mph
Collector	35 mph
Residential Collector	25 mph
Local Commercial	25 mph
Local Residential/Cul-de-Sac	25 mph
Alley	15 mph

5.2.2 Horizontal Alignment

The minimum radius of curvature of streets on the center line shall be as identified in the AASHTO Green Book, latest edition. The minimum radius will be based on the roadway design speed and applicable super elevation rates and side friction factors.

A clear line of sight is required across the inside of all horizontal curves. The stopping sight distance is measured along the centerline of the inside lane around the curve. The area bounded by the stopping sight distance and the sight line shall be clear of all sight obstructions, including walls, buildings, signs, and vegetation.

5.2.3 Vertical Alignment

The design of the vertical alignment involves the selection of suitable grades to provide minimum stopping sight distance and ensure adequate drainage.

5.2.3.1 Sight Distance

All changes in street grades shall be connected by vertical curves of a minimum length equivalent to that distance necessary to maintain a safe stopping sight distance in accordance with the current standards established by the AASHTO Green Book.

5.2.3.2 Vertical Grade

In general, streets shall be designed to conform to the topographical conditions of the site and to provide adequate surface drainage. The maximum grade for streets shall be identified in the AASHTO Green Book, latest edition. The maximum street grade from the center line intersection of two (2) streets shall be five (5%) percent for a minimum distance of 100 feet. Street grades shall be a minimum of one (1%) percent.

5.2.4 Typical Street Section

Minimum right-of-way widths, measured from property line to property line; and minimum street widths, measured from back-of-curb to back-of-curb; and sidewalks, shall be as follows:

TABLE 5.4
Street and Sidewalk Configurations

Classification	Sidewalk	B/C to B/C Width	Pavement Width	ROW Width
Arterial	Both sides	52'	48'	80'
Collector	Both sides	31'	27'	60'
	1 side*	35'	31'	60'
Residential Collector	Both sides	31'	27'	60'
Collector at Intersection	Both sides	40'	36'	60'
Local Commercial	1 side**	28'	24'	50'
Local Residential	Both sides	26'	22'	50'
	1 side	28'	24'	50'
Cul-de-sac	1 side**	26'	22'	50'
Alleys (One-way)	Not Required	Not Required	11'	25'
Alleys (Two-way)	Not Required	Not Required	20'	30'

* Permitted at option of City Engineer

** City Engineer shall determine location of sidewalk.

5.2.4.1 Streets

All roadway pavements shall be constructed to meet the specifications of the City, and shall be approved by the City Engineer. All such roadways shall be surfaced for their entire width with curb and gutter at each edge, except as provided in this Manual; and shall be provided with all necessary catch basins and storm sewer collection system. Surface layer placement rates and thicknesses must be in accordance with the ALDOT Guidelines for Operation, latest edition.

Design and construction of improvements on roadways controlled by ALDOT shall be in accordance with applicable ALDOT requirements and permitted prior to construction.

All streets within a subdivision shall be provided with a paved roadway by the developer. The construction of streets to arterial standards shall be a shared responsibility of the developer and the City. The developer will only be responsible for construction of the standard local, residential collector or collector street. The City will be responsible for the additional construction needed for the roadway to meet arterial standards.

Street layouts shall be provided for the continuation and connection of streets between adjacent properties whenever such continuation and connection is necessary for the convenient movement and circulation of traffic, effective police and fire protection, access by public service vehicles, and efficient provision of utilities and consistent with the Major Street Plan. The engineer is encouraged to coordinate roadway layouts with the Fire Chief prior to the DRT submittal to ensure compliance with the IFC.

Existing streets that abut a subdivision shall be continued and the continuation shall be at least as wide as the existing streets unless a reduction in width is approved by the City Engineer, and in alignment with the existing street. Street layouts in subdivisions shall provide right-of-way stub-outs paved to the property line for the future continuation into unsubdivided lands adjoining a sufficient number of streets to meet the purpose previously outlined. A temporary turnaround, or a T or L shaped turnabout, shall be provided, with a notation on the subdivision plat that land outside the normal right-of-way shall revert to

the abutting properties whenever the street is continued and connected to the adjacent property.

5.2.4.2 Non-Curb and Gutter

The requirements for curb may be waived for local streets if the gradient of the street does not exceed five (5%) percent, the street serves lots which have a minimum area of three (3) acres, and the traffic potential is less than one thousand five hundred (1,500) Average Daily Traffic (ADT). Where roadways are allowed to be constructed without curb and gutter, the following requirements must be met:

- The roadway pavement shall be a minimum of twenty-two (22) feet in width.
- Graded shoulders of at least six (6) feet width shall be provided on each side.
- All driveway turnouts shall be paved and sloped away from the roadway.
- A paved turnout shall be provided for access of mail trucks to mailboxes.
- If necessary, as determined by the City Engineer, additional right-of-way may be required.
- If considered appropriate, and approved by the City Engineer, a street consisting of a twenty (20) foot wide paved roadway with a two (2) foot valley curb on each side may be installed in lieu of the above items.

5.2.4.3 Sidewalks

This Manual shall govern the requirements for construction, improvement, and repair of sidewalks. Construction of compliant sidewalks shall be required when a property is either first developed or redeveloped. In cases of lesser scales of property development or redevelopment, the City Engineer shall require compliance commensurate with the amount of development.

All sidewalks constructed within the City right of way must comply with 'Public Rights-of-Way Accessibility Guidelines' (PROWAG) issued by the United States Access Board (Proposed Guidelines July 26, 2011 version with 2/13/13 "shared use path" supplement).

Design Criteria

Sidewalks shall be a minimum of four (4) feet wide on local and cul-de-sac streets. Sidewalks shall be a minimum of five (5) feet wide on arterials, collectors, local commercial, and residential collectors. If the distance between the back of curb and the edge of sidewalk is less than two (2) feet, sidewalk must be a minimum of five (5) feet wide. The cross slope of the pedestrian access route shall be two (2) percent maximum.

Requirements for construction of new sidewalks at corners shall include the requirement to construct accessible curb ramps pursuant to City standards as part of the new sidewalk if:

- there are no existing curb ramps at the location;
- the existing curb ramps do not meet current City standards; or
- the existing curb ramps are in poor condition, as determined by the City.

Sidewalk Location

Sidewalks are to be located on both sides of arterials and residential collectors within the City. Sidewalk on local residential, local commercial and cul-de-sacs may be located on one (1) or both sides of the roadway. Any sidewalk on a cul-de-sac street may terminate at the

beginning of the radius. Roadway classified as alleys do not require sidewalk construction. Where sidewalk is permitted on only one side of the roadway, the City Engineer shall designate which side of the roadway the sidewalk shall be constructed.

All developments that abut an existing arterial or collector facility without sidewalk infrastructure will be required to install sidewalk within the existing right-of-way as part of the development. Within the Downtown Area, developments may be required to install a wider sidewalk within the existing right-of-way as part of the development. The street frontage requirements may also include street trees and decorative lighting. As part of the development review, requirements for street trees may be used to offset front bufferyard requirements. Subdivision developments that have road frontage on an arterial or collector facility will be required to install sidewalk within the existing right-of-way for the entire arterial or collector frontage where none exists. If the existing right-of-way is not of sufficient width to construct the sidewalk additional right-of-way or sidewalk easement must be provided. If a development abuts a collector that was designed and approved by the City with sidewalk on the opposite side of the roadway the development is exempt from this requirement. If a development abuts a collector without a continuous sidewalk on either side of the right-of-way and it is determined by the City Engineer that sidewalk will not be required on each side of the roadway, the location of the sidewalk will be determined by the City Engineer.

Sidewalk Installation

Sidewalks shall be installed in all new subdivisions prior to the expiration of bonding.

Sidewalk shall be installed abutting properties occupied by new residential or commercial construction along any street prior to completion of its construction and/or the issuance of a Certificate of Occupancy (CO). When sidewalk is installed along a development frontage, the sidewalk should terminate with a smooth transition with the adjacent grade. If additional grading is needed along the right of way, the plans should reflect the extent of the work.

Whenever a street is designated for reconstruction or a new section is being completed, installation of sidewalk will be considered where none exists and sidewalk repaired or replaced where the existing sidewalk is unsafe, defective or insufficient, and/or where sidewalk grades no longer match new street grades.

Inspections

New sidewalk installed within the right of way shall be inspected based on the following guidelines:

- Running slope: Shall not exceed the general grade established for the adjacent street or highway
- Measuring device: Two (2) foot Smarttool digital level or approved equal
- Cross slope: Two (2) percent maximum, checked at ten (10) foot intervals along the centerline of the path of travel.

Exceptions

The City Engineer may determine that sidewalk is not required when any one (1) or more of the following conditions apply:

- there is insufficient right-of-way;
- the installation encourages pedestrian traffic in an otherwise dangerous area;
- the installation abuts industrial zoned lands, unless situated between other pedestrian generating areas; or
- there is engineering justification determining that sidewalks are not required based on special circumstances.

Right-of-Way Trees

Trees located within the right-of-way either causing upheaval of sidewalk sections or otherwise compromised by sidewalk installation, repair or replacement shall be evaluated by the City Arborist who shall make a recommendation as to the health and life expectancy of said trees. Trees within the right-of-way that are determined to be unhealthy and/or near term shall be removed by the City, at no expense to the property owner.

New trees installed within the right of way as part of a development shall be installed per the City's detail, including a tree well, grate, and brick color to match the Toomer's Corner color Pine Hall Brick English Edge Full Range, or approved equal. Tree locations and species shall be coordinated with City staff during the DRT process. Silva Cells will be required as part of the tree installation along College Street from Glenn Avenue to Magnolia Avenue and along Magnolia Avenue from Wright Street to Gay Street.

Requests for Sidewalks

Requests for sidewalk construction may be submitted on the "Request for Sidewalk Construction Form" provided in Appendix N.

A request for sidewalk construction may originate with an individual, a neighborhood association or the City Council. Petitions from multiple individuals are encouraged to show neighborhood support but are not required. Requests from citizens should be submitted to the Public Works Department. The request should specify the street(s) on which sidewalk construction is requested and state the reason(s) for requesting sidewalk construction. Any existing roadway conditions which support sidewalk installation should be noted, including, but not limited to, the following:

- provide access for walking to schools;
- provide access to pedestrian destinations, such as transit stops, parks, places of worship, places of work and commercial areas;
- provide access for the disabled;
- connect to an existing network of sidewalks;
- show evidence of a worn path; and/or
- history of vehicular/pedestrian crashes.

The Public Works Department will evaluate each request to determine if it should be recommended to City Council for budget consideration. If the Public Works Department

determines that a sidewalk may be warranted, the engineering staff will evaluate the feasibility of construction, considering factors such as:

- available right-of-way or easement for installation;
- terrain;
- existing obstructions, utility poles, landscaping, etc.;
- existing trees and the impact on trees;
- drainage conditions; and/or
- cost estimates.

The results of the evaluation will be available to the public.

If the engineering evaluation concludes that construction of the requested sidewalk is feasible, it is added to the list of proposed construction projects and forwarded to the City Council for inclusion in its budget hearing to be considered for funding. Any resident may attend the budget hearing and provide input. If the project is funded, the Public Works Department will schedule construction.

5.2.4.4 Irrigation

All irrigation installed within right of way shall be in accordance with the Irrigation Policy in Appendix P-1.

5.2.5 Clear Zone

The AASHTO *Roadside Design Guide* shall be used to determine clear zone widths for all streets within the City. Most curbs do not have the capability to redirect vehicles, therefore minimum clear zone distances should be provided where practical. The AASHTO *Roadside Design Guide* and the Green Book require a minimum offset distance be provided beyond the face of curb, with wider offsets provided where practical.

5.2.6 Driveways

A proposed driveway shall not connect to a public street or road, without first receiving approval of the location and cross-section specifications from the City, as applicable. When a driveway is proposed to tie to a state route within the City of Auburn, the developer must receive approval from the City prior to submitting plans to ALDOT. Any modifications to the driveway location or configuration during the ALDOT permitting process should be reviewed with the City to ensure compliance with these regulations. A proposed driveway shall not connect to a private road unless approved by the City and by the parties with an ownership interest in the private road. A representative of the City shall inspect the driveway(s) as constructed for conformance with the standards of this Manual and any approval granted under it, prior to issuing a certificate of occupancy.

5.2.6.1 Design Criteria

Driveway turnouts shall be a minimum of ten (10) feet wide and a maximum of fifty (50) feet wide measured at the right-of-way. In cases where the radius on either side of the driveway causes the fifty (50) foot requirement to be exceeded at the right of way, the width will be determined at the tangent of the throat. A drawing will be required to illustrate the width. The fifty (50) foot wide driveway is reserved for commercial and multi unit residential developments. All driveway curb cuts shall be constructed in accordance with

standards approved by the City Engineer and ALDOT where applicable. Driveway turnouts shall meet the City standard or be designed to meet specific site conditions. If a driveway turnout varies from the standard, appropriate design data should be included with the DRT submittal. The City Engineer may require wider driveway radii to avoid lane encroachment by entering or exiting vehicles where narrow street widths exist.

Driveway width and return radius or flare shall be adequate to serve the volume of traffic and provide for efficient movement of vehicles onto and off of the roadway. However, the width of driveways shall not be so excessive as to pose safety hazards for pedestrians and bicycles. In areas where significant pedestrian and/or bicycle travel is expected, as determined by either the City or the ALDOT, the ingress and egress lanes should be separated by a four (4) foot to ten (10) foot wide median with a pedestrian refuge area.

Driveways with more than two (2) lanes should incorporate channelization features, appropriately marked to accommodate ingress and egress traffic.

There should be one hundred twenty-five (125) feet of stacking for entering and exiting vehicles at the intersection of an arterial roadway measured from the pavement edge where practical. On collector roadways, the minimum vehicle stack distance shall be seventy-five (75) feet for entering and exiting vehicles measured from the pavement edge where practical. Vehicle stacking distances are illustrated in Figure 5.1a.

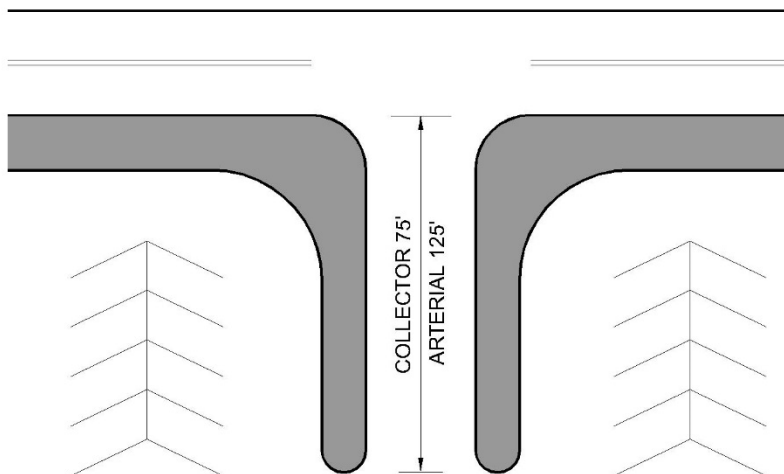


FIGURE 5.1a
Driveway Stack Length

5.2.6.2 Driveway Location

Corner and double frontage lots in residential development shall take access from the minor streets unless otherwise approved by the City Engineer. Approved access points shall be clearly noted on the Final Plat.

Construction of driveways along acceleration or deceleration lanes, left turn storage lanes, and tapers should be avoided, unless no other reasonable access to the property is available.

If no other reasonable access can be provided, then the use of right-in/right-out accesses will be considered by the City Engineer.

Driveways shall not be permitted for parking or loading areas that require backing maneuvers in a public street right-of-way or onto a public or private service drive. Such restrictions will be applicable for roadways classified as collectors and arterials in the City.

Direct access for single family residential lots or parcels shall be strongly discouraged on arterial roadways in the City.

Upon approval of a new means of access, a closed driveway shall be graded and landscaped to conform to adjacent land and any curb cut shall be filled in with curb and gutter per the City standards.

When a property is proposed for development or redevelopment, existing driveways that do not comply with the requirements of this Manual may be utilized under the following provisions:

- a. The driveway(s) must have been in use for similar purpose within the past three years.
- b. No significant accidents have occurred that could be attributed to the driveway(s).

Driveways that have not been utilized in the past three years or where the use is significantly more intense based on trip generations may be required to conform to the current standards. Consideration may be given to allowing the driveways if there are no present or future congestion or other safety concerns with the existing driveways.

5.2.6.3 Driveway Spacing

The minimum spacing between un-signalized driveways shall be as outlined in Table 5.5. The minimum spacing shall be measured as illustrated in Figure 5.1b.

TABLE 5.5
Driveway Spacing Standards

Classification	Posted Speed Limit (mph)					
	55	50	45	40	35	< 30
Minimum Driveway Spacing (ft)						
Arterial	500	450	400	350	300	300
Collector	350	300	250	200	150	150
Residential Collector	-	-	-	-	125' Average	

Note: Classifications not listed above are not subject to curb cut restrictions.

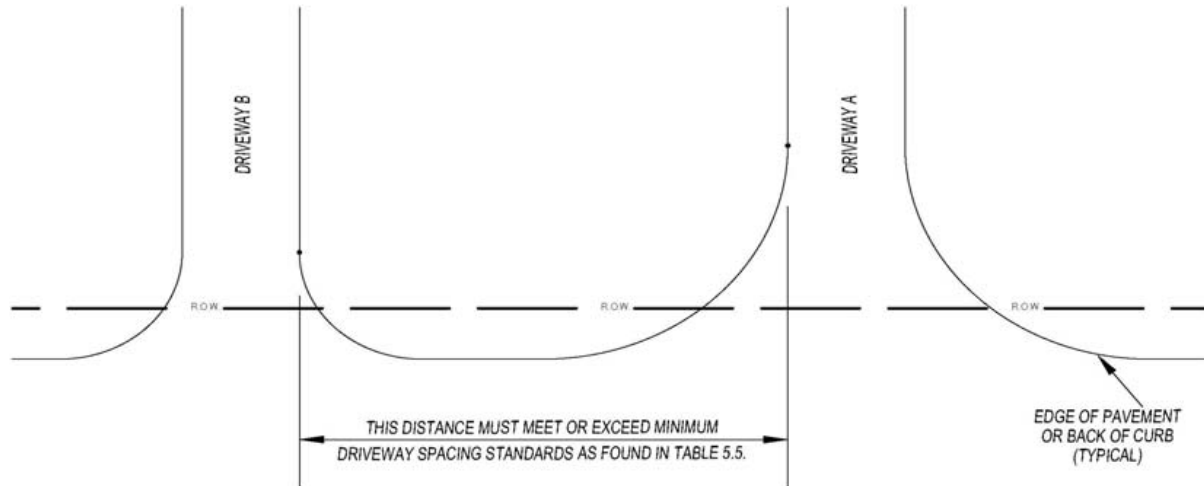


FIGURE
5.1b
Driveway Spacing Illustration

In areas where single-family detached homes abut residential collector streets, an average distance of one hundred twenty-five (125) feet shall be allowed between curb cuts. To compute the number of driveways allowed on residential collectors, divide the length of the residential collector intersecting segments by one hundred twenty-five (125). This figure rounded down to the nearest whole number will be the number of driveways permitted to take access on the residential collector. Corner and double frontage lots that abut a residential collector and local street will be required to take access from the local street.

In the case of expansion, alteration, or redesign of an existing development where the Applicant can demonstrate that pre-existing conditions prohibit adherence to the minimum driveway spacing standards, the City shall have the authority to modify the driveway spacing requirements or grant approval of a temporary driveway until such time that minimum spacing requirements can be met or an alternative driveway meeting the requirements of Table 5.5 is approved. Such modifications shall be of the minimum amount necessary.

Driveways allowed along arterial and collector roadways in the City shall be separated from their edge to the corner property lines of an intersecting street a distance equal to the minimum access spacing criteria as outlined in Table 5.6. Driveway spacing from intersections shall be measured along the right-of-way from the edge of the driveway to the right-of-way of the intersecting street.

TABLE 5.6
Curb Cut Distance from Street Corner Property Lines

Development Type	Street Type (All districts except Urban Core)					Urban Core District
	Arterial	Collector	Residential Collector	Local Commercial	Local Residential	
Non-Residential	125'	100'	100'	100'	100'	25'
Multiple Unit Development	125'	100'	100'	100'	100'	25'
All Other Residential	125'	100'	100'	25'	25'	25'
Shug Jordan/EUD				300'		
Auburn Outer Loop				300'		

No part of a driveway shall be located closer than a distance equal to the flare radius of the driveway from a lot line unless it is a common or shared driveway and/or approval is granted by the City Engineer and/or adjacent property owners as necessary.

5.2.6.4 Driveway Alignment

Driveways shall be perpendicular to the existing public street or approved private road and are required to align with existing or planned driveways on the opposite side of the road, wherever frontage is not separated by a median. Offset or skewed driveways create the potential for conflicting left turns or jog maneuvers, resulting in safety or operational problems, and may only be used if a professional engineer demonstrates a perpendicular and/or aligned driveway to be unsafe.

5.2.6.5 Shared Driveways

Common/shared driveways are encouraged to reduce impervious surface and the number of conflict points and should be used where practical. All shared driveways must be constructed in accordance with standards approved by the City Engineer, and described herein. In cases where single access driveways are restricted by the spacing requirements outlined in this Manual, a shared driveway may be the only design allowed.

The shared driveway shall be constructed along the common property line between the two (2) properties unless a written easement is provided which allows traffic to travel across one (1) parcel to access another parcel and/or access the public street. Shared driveways, cross access driveways, connected parking lots, and service drives shall be recorded as an access easement and shall constitute a covenant running with the land. Operating and maintenance agreements for these facilities should be recorded with the deed. Shared driveways utilized for single family residential lots shall not exceed twenty (20) feet in width.

Where a proposed parking lot is adjacent to an existing parking lot of a similar use, there shall be a vehicular connection between the two (2) parking lots where physically feasible, as determined by the City and/or ALDOT. For developments adjacent to vacant properties, the site shall be designed and constructed to provide for a future connection.

5.2.7 Bicycle and Pedestrian Facilities

All bicycle and pedestrian facilities constructed within the City shall be constructed under the guidance of the AASHTO *Guide for the Development of Bicycle Facilities* and the MUTCD.

Bicycle parking is required in accordance with the Zoning Ordinance.

The following types of facilities shall be considered for construction within the City.

5.2.7.1 Shared Use Paths

A shared use path is a facility used by pedestrians, bicyclists and other non-motorized users and is detached or separate from the roadway. A shared use path may be within public right-of-way or within an independent right-of-way (i.e. homeowner's association).

The minimum width of a two-way shared use path is eight (8) feet, however ten (10) feet is recommended. The minimum width of a one-way shared use path is six (6) feet, and requires signing and pavement markings to ensure proper use as a one-way facility. A ten (10) foot minimum vertical clearance is required.

Additional guidance for design speed, horizontal alignment, vertical grades and sight distance can be obtained from the *AASHTO Guide for the Development of Bicycle Facilities*.

Unpaved shared use paths are generally referred to as trails. To the extent possible, trails shall provide for pedestrian, bicycle and/or other non-motorized uses. Trails shall be planned, designed and constructed to avoid or minimize degradation of natural resources. Trails shall be soft-surface (crushed aggregate, clay or stabilized earth) except where necessary to prevent erosion and/or resource damage.

Shared use paths may be constructed of pervious concrete and other porous materials provided the runoff through the material will not be directed towards the subgrade of the traveled lane portion of the roadway.

The City may consider the installation of an alternating sidewalk/shared use path system in lieu of sidewalks. Such system must incorporate well-connected sidewalks and paths/trails that link each residential lot with on-site open space, recreational facilities and other amenities within the development site. A sidewalk/shared use plan for the entire development must be submitted to the City Engineer for approval. The plan shall include a map depicting the proposed location of all sidewalks and paths/trails through the development site.

5.2.7.2 Bicycle Lanes

A bicycle lane is a portion of the roadway, designated by signing and/or pavement markings for exclusive use by bicyclists. Bicycle lanes are typically one-way in the same direction as the adjacent vehicular traffic. The MUTCD contains signing and striping requirements for use in designating a bicycle lane.

The *AASHTO Guide for the Development of Bicycle Facilities*, Fourth Edition, contains guidelines for the minimum width of bike lanes.

To ensure bicyclists' safety, drainage grates must be bicycle-safe and manhole covers shall be at grade. Bicycle lane widths may need to be adjusted to avoid potential safety hazards.

5.2.7.3 Shared Roadway

Roadways without alternate bicycle facilities may be signed as a “Shared Roadway” to alert drivers that the roadway is utilized by both motor vehicle and bicycle traffic. Bicyclists may be accommodated through the use of the through travel lane, a wider travel lane [fourteen (14)+ feet] or paved shoulders. Signs and pavement markings such as “Sharrows” may be used to alert motorists of the shared use. The AASHTO Guide for the Development of Bicycle Facilities, Fourth Edition, contains guidelines for shared roadways. Most roadways are shared routes even when not signed or marked.

5.2.8 Cul-De-Sacs

Cul-de-sacs shall be permitted where topographic features or configuration of property boundaries prevent street connections.

A cul-de-sac street shall have a maximum length of seven hundred (700) feet, measured from the center line of the street from which the cul-de-sac takes access to the center of the turnaround at the end of the cul-de-sac. A maximum length of one thousand (1,000) feet shall be allowed where there are no more than twenty (20) lots and the net density does not exceed two (2) lots per acre. All cul-de-sac streets shall be provided at the closed end with a turnaround with a minimum right-of-way radius of fifty-five (55) feet, and a minimum roadway radius of forty-four (44) feet.

A planter island may be incorporated in the center of the terminus of a cul-de-sac. The planter island shall have a radius of twenty (20) feet and shall be reinforced with a mountable rolled curb.

5.2.9 Frontage Road/ Service Drive

In cases where a frontage road exists, property access should be provided via such frontage road, rather than by direct connection to the abutting arterial or collector street. Rear service drives shall be encouraged, especially for locations where connection to a side street is available. In addition to access along the rear service drive, direct connection(s) to the arterial or collector street may be allowed, provided that the driveways meet the requirements.

In areas where frontage roads or rear service drives are recommended, but adjacent properties have not yet been developed, the site shall be designed to accommodate a future road/facility designed according to the standards of the City and/or ALDOT. The City and/or ALDOT may approve temporary access points where a continuous service drive is not yet available and a Performance Bond or escrow is accepted to assure elimination of temporary access when the service road is constructed.

Frontage road and service drive intersections at the collector or arterial streets shall be designed according to the same minimum standards as described for driveways in Table 5.5 and Table 5.6.

The service drive is intended to be used exclusively for circulation, not as a parking, loading, or unloading aisle. Parking shall be prohibited along two-way frontage roads and service drives. One-way or two-way service drives designed with additional width for parallel

parking may be allowed if it can be demonstrated through traffic studies that on-street parking will not significantly affect the capacity, safety, or operation of the frontage road or service drive. Perpendicular or angle parking along either side of a designated frontage road or service drive is prohibited.

5.2.10 Median Openings

The type, location, and length of medians on roadways shall be determined by the City and/or ALDOT, depending on the jurisdiction. This determination will be based on existing and projected traffic conditions; the type, size, and extent of existing and projected development and traffic generated by development; traffic control needs; and other factors. Median openings on South College Street and West Glenn Avenue are subject to approval by the City Council.

Median openings intended to serve development must be justified by a traffic impact analysis approved by the City and/or ALDOT. The cost for preparation of the traffic impact analysis and construction of the median opening or openings, including installation and operation of signals and other improvements where warranted, shall be borne by the Applicant.

5.3 INTERSECTION DESIGN ELEMENTS

Intersections vary in complexity from a simple 4-leg intersection to a more complex intersection at which three (3) or more roads cross within the same area. Various elements and distractions at an intersection may prohibit a driver from safely and efficiently moving through the area. The following guidelines and standards have been established to minimize the severity of potential conflicts between vehicles, pedestrians and bicyclists, while maintaining the smooth flow of traffic across the intersection.

Street jogs with centerline offsets of less than one hundred twenty five (125) feet shall not be permitted.

5.3.1 Angle of Intersection

Street intersections shall be at right angles, or as close to ninety (90°) degrees as possible. Where, for topographic or other reasons acceptable to the City Engineer, an intersection cannot be at right angles, such intersection shall be so designed to ensure safety, shall be as close to right angles as possible, and in no case shall be less than sixty (60°) degrees. Intersections at angles less than sixty (60°) degrees are not permitted.

5.3.2 Development Entrances

In order to ensure smooth traffic circulation on the site, directional signs and pavement markings shall be installed as outlined in the MUTCD, latest edition, in conjunction with the City and/or ALDOT.

5.3.2.1 Signs

No signs shall be placed within the right-of-way. All signs shall be installed in accordance with the Zoning Ordinance. The Planning Department shall review the application, plans and specifications to determine whether the proposed sign conforms to all applicable requirements. The Codes Enforcement Division must pre-approve structural drawings for all freestanding signs prior to issuance of a Sign Permit by the Planning Department. Freestanding signs will also require a footing inspection by the Codes Enforcement Division.

Section 5.7 "Signing and Pavement Markings" contains additional information on street name signs and regulatory signs at development intersections.

5.3.2.2 Landscaping

All landscaping shall be installed in accordance with the Zoning Ordinance and the requirements of this Manual and the WRM Manual.

5.3.2.3 Islands

Development entrance islands are to be constructed in a manner as to not protrude into the right-of-way. A set back of ten (10) feet from the right-of-way is desired. Islands should not be installed to contain existing infrastructure, i.e. power poles, signal poles.

An island width of four (4) feet to ten (10) feet is recommended, which should provide adequate refuge area for pedestrian and bicyclists. Median widths in excess of twenty (20)

feet may encourage wrong way traffic entering or exiting the development and increase the overall width of the intersection, which negatively impacts safety.

A mountable nose with a roll curb is required on all development entrance islands. A detail is provided in the standard drawings in Appendix O of this document

All landscaping within development entrance islands shall be installed in accordance with the Zoning Ordinance. Irrigation equipment is prohibited from the right-of-way and must be screened in accordance with the Zoning Ordinance. Landscaping irrigation systems shall be installed with under drains to limit the impact on the adjacent street drainage system.

5.3.2.4 Irrigation

All irrigation installed within right of way shall be in accordance with the Irrigation Policy in Appendix P-1.

5.3.2.5 Gates

Gates are permitted on private development entrances; however, the location and type must be approved by the Fire Chief prior to installation. The gate(s) location and relevant operational material must be provided during the DRT process.

5.3.3 Sight Distance

To provide a clear view of intersection streets to the motorist, there shall be a triangular area of clear vision formed by two (2) intersecting streets. The sight triangle for intersecting streets shall be as identified in the AASHTO Green Book, latest edition. The size of this sight triangle is a function of maneuver, traffic control, speed and design vehicle.

Figure 5.2 “Intersection Sight Triangles” illustrates the sight triangles required for a stopped vehicle on a minor road to turn left, turn right or cross the intersection. The sight triangle for viewing traffic approaching from the left is required for all three (3) movements; the sight triangle for viewing traffic approaching from the right is required for left turn and crossing movements.

The length of the sight triangle along the minor road (distance A in Figure 5.2) is the sum of the distance from the major street plus one half (0.5) lane width for vehicles approaching from the left, or one and one half (1.5) lane width for vehicles approaching from the right. A distance of fourteen and one half (14.5) feet from the major road is recommended, as it represents the position of the driver on the minor road. The distance A for vehicles approaching from the left should be fourteen and one half (14.5) feet plus one half (0.5) lane width, regardless of the number of lanes. For vehicles approaching from the right on multilane roadways, the distance A should be measured to the center of the inside travel lane.

The length of the sight triangle on the major road (distance B & C in Figure 5.2) is provided in Table 5.7 “Design Intersection Sight Distance”. These distances are based on the sight distance required for a stopped passenger car to either turn left, turn right or cross a two-lane highway with no median with a grade of three (3%) percent or less on the minor approach. If there are any variations to this condition, the time gap will be modified and the required sight distance must be recalculated as per AASHTO. The design speed used to determine the

required intersection sight distance should be based upon the prevailing posted speed plus ten (10) miles per hour or the 85th percentile speed. The sight distance triangle shall also apply to development entrances and driveways.

FIGURE 5.2
Intersection Sight Triangles

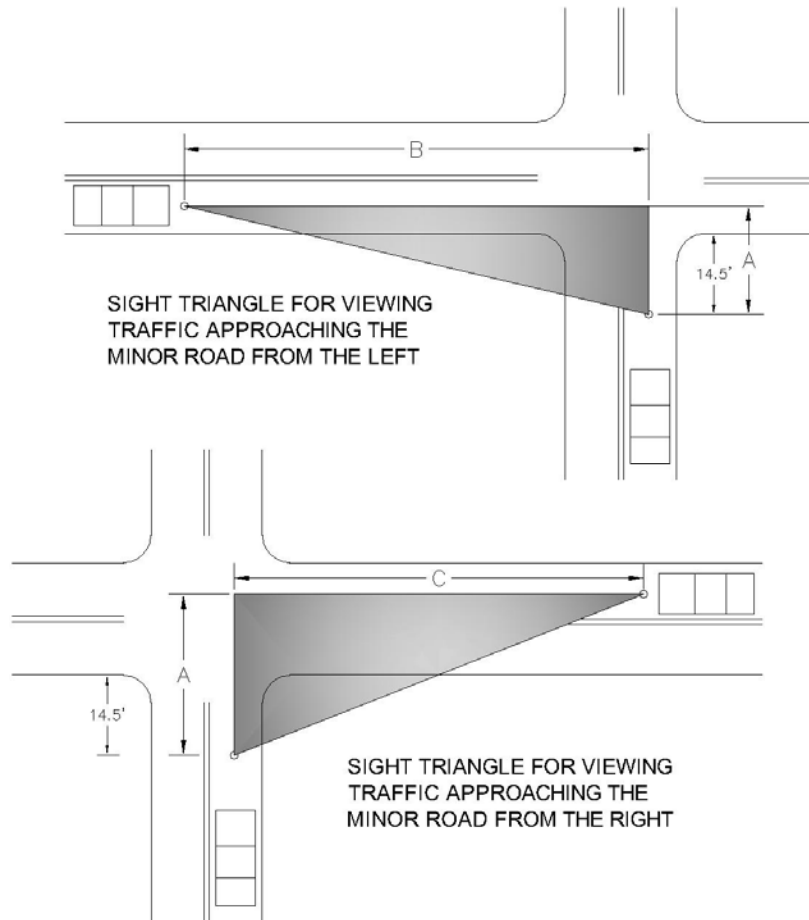


TABLE 5.7
Design Intersection Sight Distance

Design Speed (mph)	Design Intersection Sight Distance (ft)	
	Left Turn from Stop (B)	Right Turn from Stop/ Crossing Maneuver (C)
15	170	145
20	225	195
25	280	240
30	335	290
35	390	335
40	445	385
45	500	430
50	555	480
55	610	530
60	665	575
65	720	625
70	775	670

Source: AASHTO *Geometric Design of Highways and Streets*, 2004

Where there are unusual and/or specific circumstances relating to a street intersection such that the application of Table 5.7 may not be appropriate, the intersection shall be referred to the City Engineer who shall recommend a triangular area of clear vision using the standards contained in the AASHTO Green Book, latest edition.

At signalized intersections or at intersections with all-way stop control, the first stopped vehicle on one approach should be visible to the stopped drivers at each of the other approaches.

5.3.4 Roundabouts

Roundabouts shall be designed in accordance with the latest guidelines from FHWA. The following table describes the basic design elements by roundabout categories that are acceptable for use within the City. In some cases, larger radii and roadway turning widths may be required and will be noted during the DRT process.

TABLE 5.8
Roundabout Design Elements

Category	Recommended Maximum Entry Design Speed	Typical Inscribed Circle Diameter*	Typical Design Vehicle
Urban Compact	15 mph	80 – 100 ft	Single-unit truck/Bus
Urban Single-Lane	20 mph	100 – 130 ft	WB-50 (42.5' trailer)
Urban Double-Lane	25 mph	150 – 180 ft	WB-50 (42.5' trailer)

* Assumes 90° angles between entries and no more than four legs.

Source: FHWA Publication No. FHWA-RD-00-067 *Roundabouts: An Informational Guide*, 2000

5.3.4.1 Geometric Characteristics

The inscribed circle diameter is the distance across the roundabout, from outside edge of pavement to outside edge of pavement. The diameter must be wide enough to accommodate the design vehicle while maintaining adequate curvature to deflect a passenger car and ensure a safe traveling speed. In general, the inscribed circle diameter of one hundred (100) feet is the minimum to accommodate a WB-50 design vehicle. Smaller roundabouts can be used on some local and collector streets where the design vehicle may only be a single-unit truck or a bus.

Entry and exit curves are dependent on the maximum design speed. The objective is to create speed consistency to reduce the crash severity and simplify the task of merging. Exit curve usually have larger radii than entry curves to minimize congestion at the exits.

5.3.4.2 Sight Triangle

The site triangle for a roundabout should be assumed to follow the curvature of the roadway, and should be measured as distances along the vehicular path of the conflicting approaches. The sight distance “triangle” has two (2) conflicting approaches that must be checked independently. The entering stream is comprised of vehicles from the immediate upstream entry. The circulating stream is comprised of vehicles that entered the roundabout prior to the immediate upstream entry. Values from Table 5.7, “Right Turn from Stop”, should be used for the entering and circulating stream distances. It is recommended to provide no more than the minimum required intersection sight distance on each approach.

5.3.4.3 Landscaping

A standard roundabout may contain drought tolerant landscaping or hardscape. A tree may be positioned in the center as necessary for visibility concerns. Vegetation will be installed as designated by the City Arborist. A water spigot may be included as standard landscaping for maintenance of vegetation. Any necessary property dedication or landscape maintenance agreement shall be completed prior to final project design.

5.3.5 Left Turn Lane Warrants at Unsignalized Intersections

High volumes of left turns may warrant construction of left turn lanes on two-lane and four-lane roadways. Left turn lane warrants are governed by the volume of opposing traffic, the volume of advancing traffic, the percentage of left turns in the advancing volume and the speed of the roadway. The warrants for the recommended installation of a left turn lane on a two-lane roadway are illustrated in Figure 5.3, 5.4 and 5.5 for forty (40) mph, fifty (50) mph and sixty (60), mph respectively. For speeds of forty-five (45) mph use the warrant for fifty (50) mph and for speeds of fifty-five (55) mph use the warrant for sixty (60) mph. For speeds less than forty (40) mph, use the warrant for forty (40) mph (Figure 5.3). The warrant for the installation of a left turn lane on a four-lane undivided roadway is illustrated in Figure 5.6. Left turn lanes are recommended at all signalized intersections in the City.

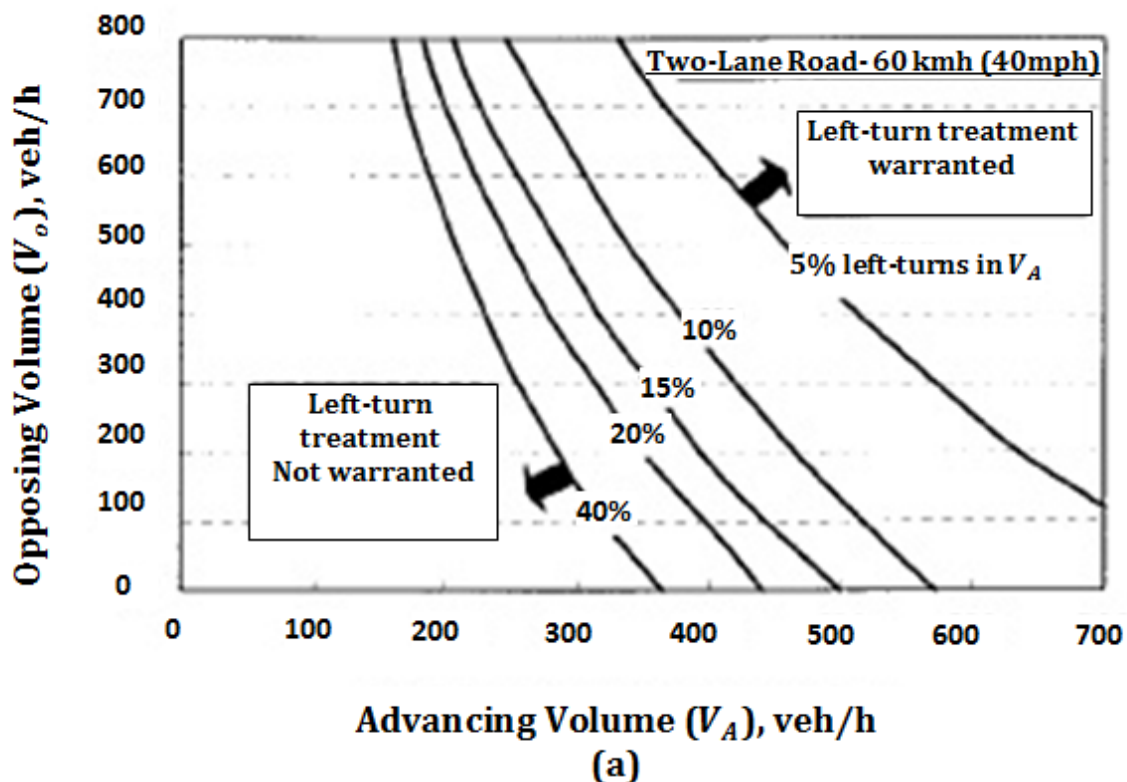


FIGURE 5.3

Left Turn Lane Warrants on Two-Lane Roadways (40 mph)

Source: National Cooperative Highway Research Program (NCHRP) Report 457 *Intersection Channelization Design Guide*, 2001

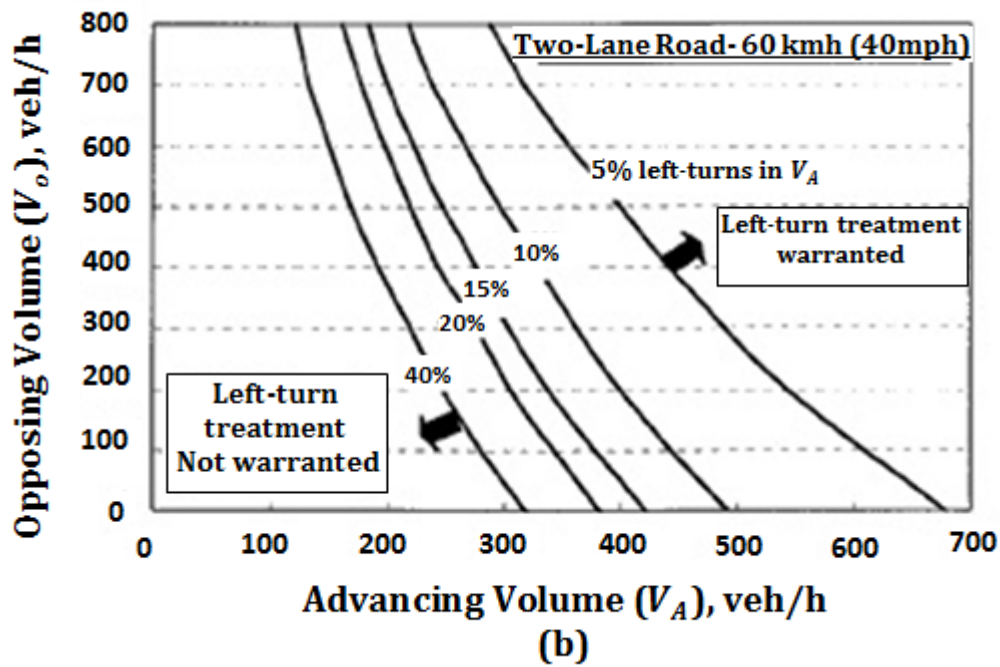


FIGURE 5.4
Left Turn Lane Warrants on Two-Lane Roadways (50 mph)
Source: NCHRP Report 457 *Intersection Channelization Design Guide*, 2001

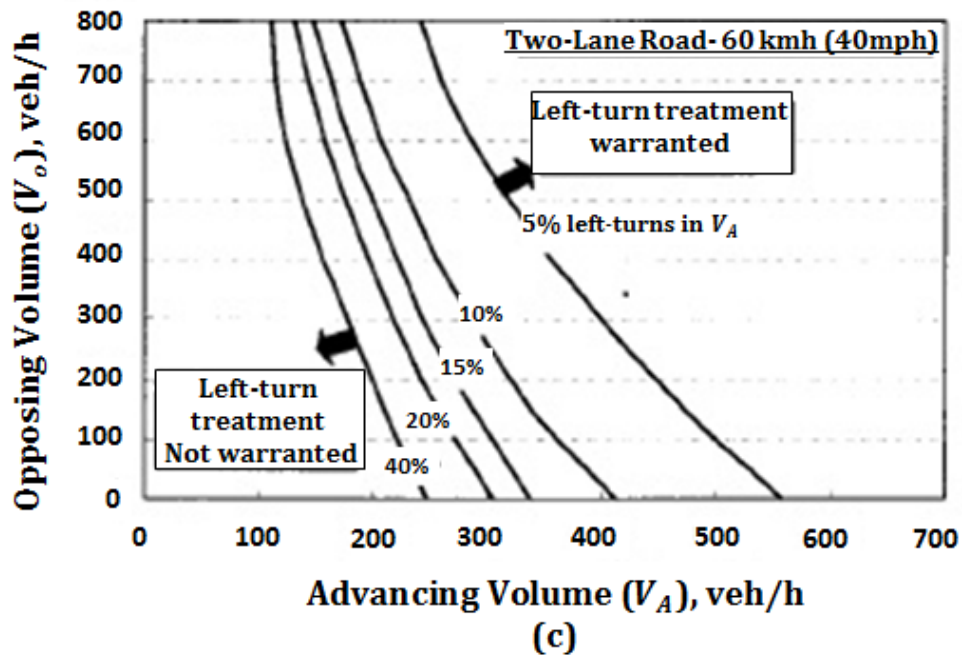


FIGURE 5.5
Left Turn Lane Warrants on Two-Lane Roadways (60 mph)
Source: NCHRP Report 457 *Intersection Channelization Design Guide*, 2001

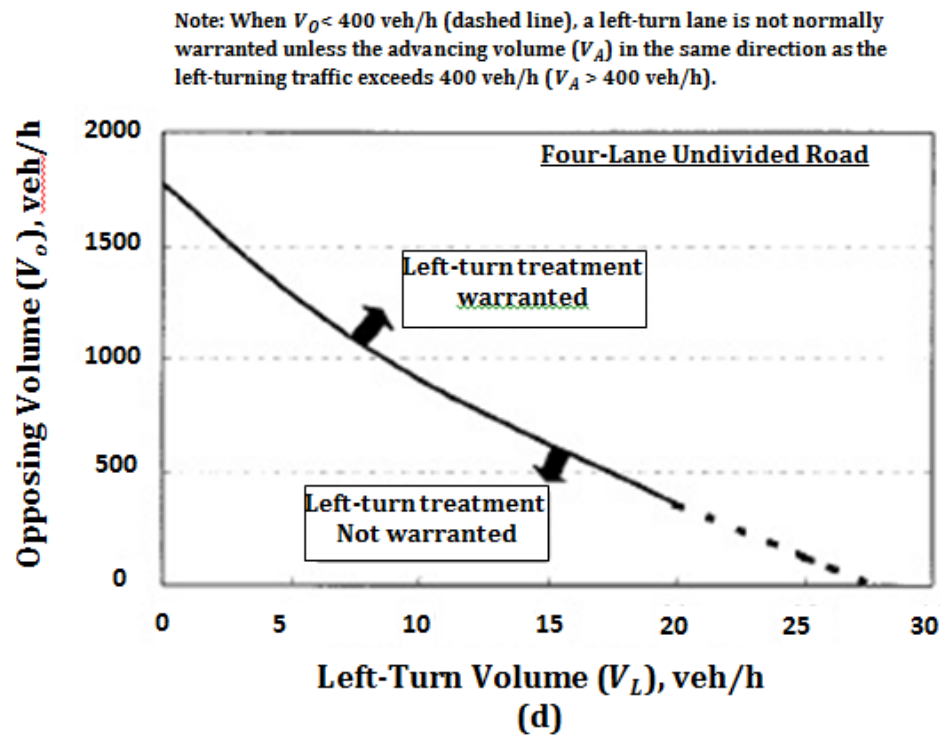


FIGURE 5.6
Left Turn Lane Warrants on Four-Lane Undivided Roadways
Source: NCHRP Report 457 *Intersection Channelization Design Guide*, 2001

5.3.6 Right Turn Lane Warrants

High volumes of right turns generated by developments may warrant construction of right turn lanes on two-lane and multi-lane roadways. Figure 5.7 and 5.8, published in the NCHRP Report 457 *Intersection Channelization Design Guide* can be consulted to provide guidance for including right turn lanes.

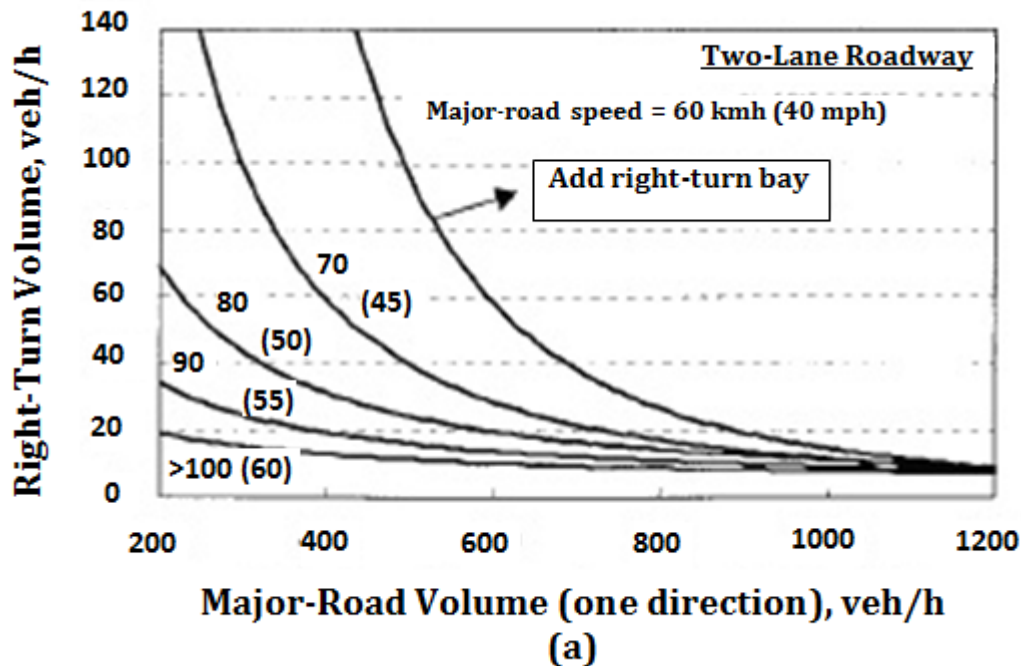


FIGURE 5.7

Right Turn Lane Warrants on Two-Lane Roadways

Source: National Cooperative Highway Research Program (NCHRP) Report 457 *Intersection Channelization Design Guide*, 2001

Design requirements for full-width right turn lanes are discussed in Section 5.3.7 “Deceleration Lanes and Tapers”. Where tapers are warranted, the following lengths are desired to provide sufficient length for a vehicle to decelerate and brake entirely outside the through travel lanes.

TABLE 5.9

Length of Taper for Right Turn Warrant

Design Speed	Length of Taper
30 mph	235'
40 mph	315'
50 mph	435'
60 mph	530'
65 mph	570'
70 mph	615'

Source: NCHRP Report 279 *Intersection Channelization Design Guide*, 1985

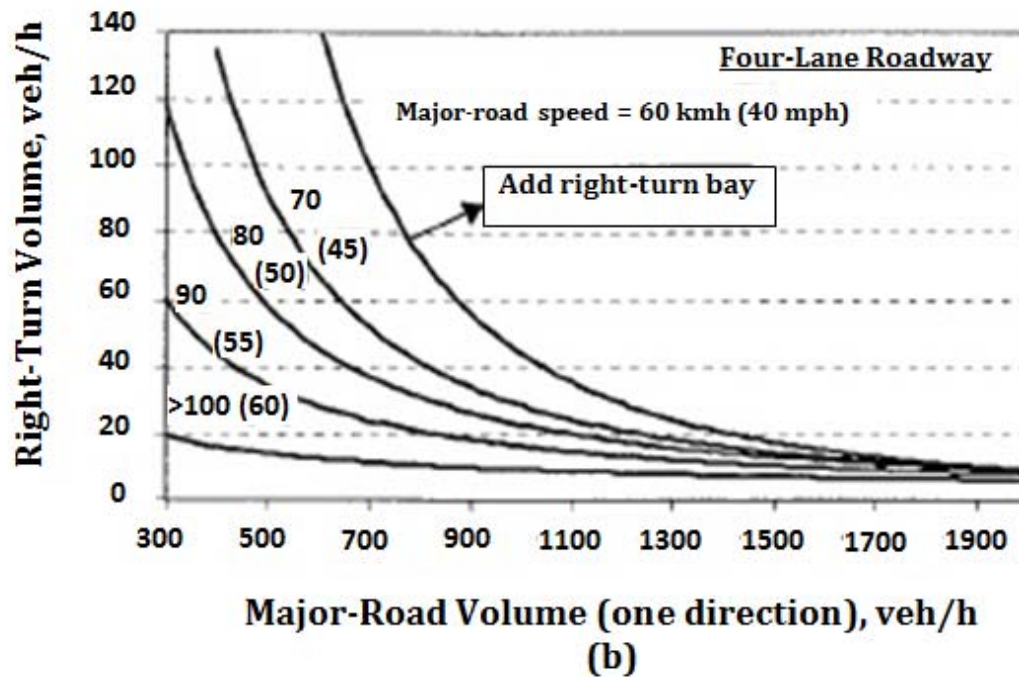


FIGURE 5.8

Right Turn Lane Warrants on Four-Lane Roadways

Source: National Cooperative Highway Research Program (NCHRP) Report 457 *Intersection Channelization Design Guide*, 2001

5.3.7 Deceleration Lanes and Tapers

Deceleration lanes shall be required at all permitted access points along an arterial roadway in the City as specified in Appendix K, unless a right turn warrant or traffic impact study determines the deceleration lane is not needed. Additionally, deceleration lanes may be required on collector roadways in those areas where congestion is anticipated and the capacity of the roadway would be impacted. Deceleration lane and taper lengths for both right and left turn lanes shall be constructed in accordance with the following table, as illustrated in Figure 5.9.

TABLE 5.10

Deceleration Lane Standards

Posted Speed (mph)	Taper Length d_1 (ft)	Deceleration Length d_2 (ft)	Storage Length* d_3 (ft)	Minimum Total Length (ft)
25	75	35	25	135
30	95	65	25	185
35	110	100	25	235
40	130	140	25	295
45	150	195	25	370
50	165	255	25	445
55	185	320	25	530
60	205	395	25	625
65	225	480	25	730

* Storage Length determined by Traffic Impact Study – Minimum 25 ft.

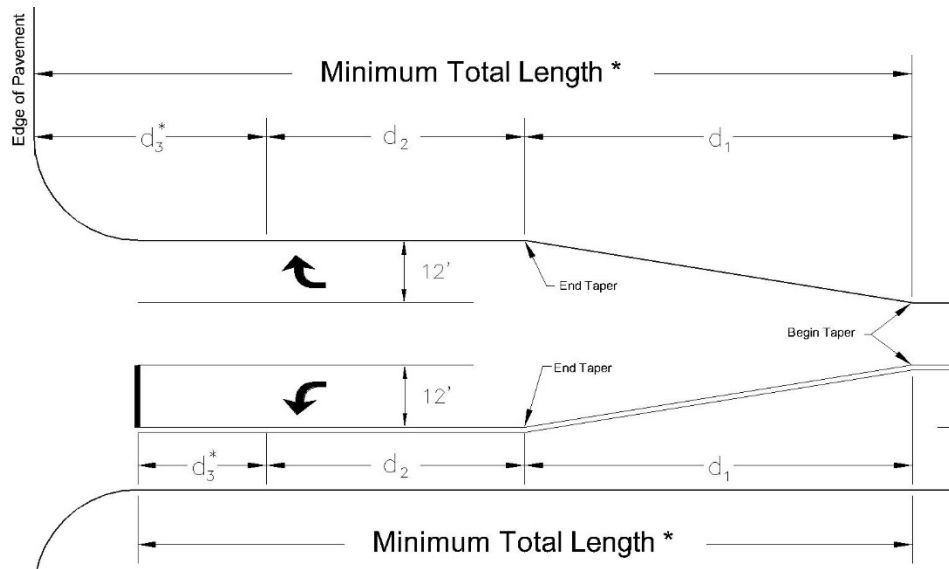


FIGURE 5.9
Deceleration Lane Standards

A continuous right-turn lane may be required where driveway spacing requirements restrict the use of consecutive turn bays and tapers and where it is determined by the City and/or ALDOT that the lane would not be used as a through lane.

When a development warrants the widening of the roadway that will alter the current pavement markings, the developer, at his or her expense, shall provide a three-quarter (0.75) inch overlay. The limits of the overlay shall cover all travel lanes and will begin and end at the limits of the all roadway improvements.

5.3.8 Left Turn Lanes on Divided Roadways

On roadways where medians currently exist, the construction of a median opening at a private access point will require approval of the City Council prior to construction. Construction of a left turn lane at a new median opening shall be done so in accordance with Table 5.10 and Figure 5.9.

Left turn lanes, if not present on divided roadways at current median openings, will be constructed by entities requesting permits for private driveways and/or public streets that align with such driveways. Left turn lanes are required on the City's over capacity roadways as shown in Table 5.1 unless unusual circumstances exist as justified by the Applicant's engineer and approved by the City Engineer.

5.4 DESIGN OF UTILITIES ON STREET RIGHT-OF-WAY

The design of new or relocated utilities is the responsibility of the utility owner, ensuring that the design is in compliance with the codes and standards of appropriate technical organizations and jurisdictions. The City Engineer shall be notified of any utility installations or repairs (underground or overhead facilities) in which the work will affect the flow of traffic. The ALDOT District Engineer shall be notified of any utility work affecting traffic on state roadways in the City.

Developers shall coordinate all utilities necessary for a development site with the appropriate utility provider.

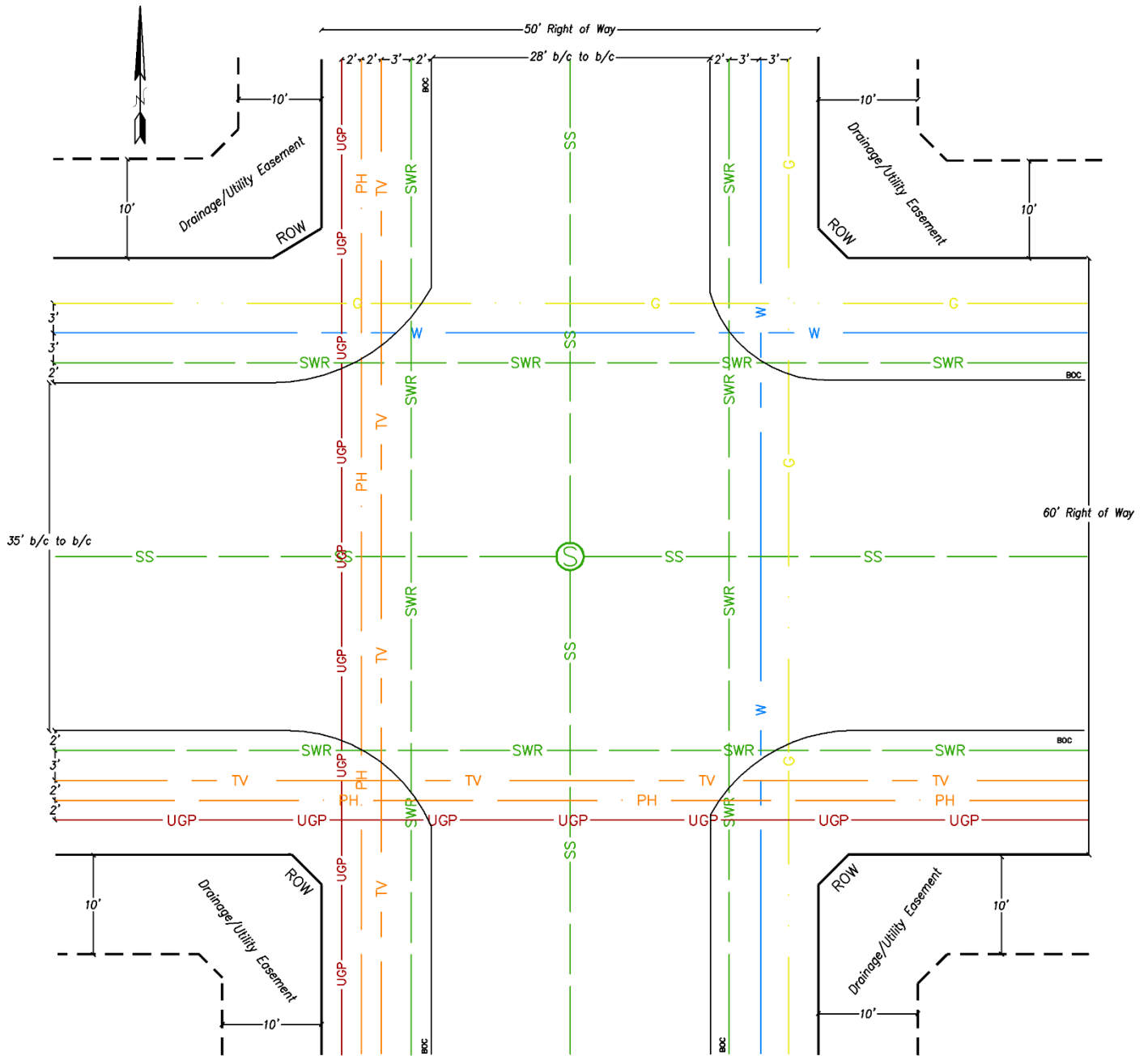
5.4.1 General Locations

Utilities shall be located within the right-of-way in accordance with the preferences defined by the City, as illustrated in Figure 5.10. A ten (10) foot drainage and utility easement shall be provided along all right-of-way within the City, as shown in the figure.

The preferred location for the water main is on the north and east sides of the streets. The preferred location for sanitary sewers is beneath the roadway, located in the middle of the street or in low-lying areas where the maximum surrounding area can be served. Water lines generally should be installed so that they cross over the top of the sanitary and storm sewers. Refer to the WRM Manual for further guidance.

Utility markings should be placed on curb face and gutter, per the City's Standard Street Details.

Easements are required in situations where utilities cannot be placed within the right-of-way, or covered by an existing easement, and must be installed on private property. The standard easement width is based on two (2) times the depth of cover, rounded up to the nearest multiple of ten (10) feet, with a minimum width of twenty (20) feet wide centered on the utility. The width of the easements shall be increased or extended, where necessary, to provide spaces for utility pole bracing or other construction and maintenance. All water and sewer utility easements shall be dedicated to the City as Drainage and Utility Easements unless otherwise approved and shall not be combined with any other utility easements (i.e., gas, electric, communications, etc.). Water and sewer easements are exclusive and are not to be used to install any other non-City owned and maintained utility. Utility easements can be combined with drainage easements subject to approval by the City Engineer. Where other utilities must be installed inside a water or sewer easement, and where approved by the WRM Department, an Easement Encroachment Agreement will be required with the encroaching utility, as defined in Section 1.7.2 "Easement Encroachment".



UTILITY LEGEND

CABLE TV	— TV —
POWER LINE	— UGP —
GAS LINE	— G —
PHONE LINE	— PH —
SEWER LINE	— SS —
WATER LINE	— W —
STORM SEWER	— SWR —

FIGURE 5.10
General Utility Locations

5.4.2 General Requirements

The integrity of the roadway pavement structure and side slopes is the primary concern for utility construction within the City's right-of-way. The following guidelines have been prepared to address this concern for all utilities contained within the City's right of way.

5.4.2.1 Excavation and Backfill Requirements

Excavation and backfill activities shall be conducted in accordance with the City Standard Specifications, as applicable.

Excavated material shall be placed in an area to maintain access to both public and private property. If deposited along open trenches, material shall be placed such that in the event of rain there is no damage to the work or the property adjacent to the project. Depending on the duration of the work, a temporary crossing may be required to maintain vehicular or pedestrian traffic.

The width of the trench shall be as wide as deemed necessary by the contractor to assure safe working conditions.

5.4.2.2 Open Cut Installation

Utilities under an unpaved street may be installed by open cut and backfill in accordance with the City standards. Private driveways may be open cut with the approval of the City Engineer provided that access is maintained to the property during the work. The City will consider open cut installation on local roadways or cul-de-sacs that have not been paved or resurfaced within the last five (5) years and access can be maintained during the entire installation process. All other street classifications will require trenchless utility installation.

5.4.2.3 Bore Installation

The City will require that installation of utilities under paved roadways be installed using trenchless installation methods. In cases where the utility service will be provided from existing infrastructure on the opposite side of the roadway, and the utility is located beyond the existing pavement, the installation shall follow the Jack and Bore Detail in Appendix O.

In cases where the utility service will be provided from existing infrastructure that is located under existing pavement, the new infrastructure shall be bored to the travel lane under which the utility is located and an open cut in that lane will be allowed in order to make the connection. All applicable components of the Jack and Bore Detail in Appendix O will apply. The limits of the open cut for the connection shall be minimized to one (1) travel lane to facilitate traffic flow and to reduce the area required to be reconstructed. Open cuts for utility connections shall follow the Utility Patch Detail in Appendix O.

In cases where the utility service will be provided from existing infrastructure that is located under existing pavement and the utility is located under the nearest travel lane, open cut installation will be allowed. Open cuts for utility connections shall follow the Utility Patch Detail in Appendix O.

Potholing should be used to verify the depth and location to ensure the bore can meet the specifications outlined in the City's Standard Drawings (Jack & Bore Detail and Utility Patch

Detail). If the pavement is compromised, the City will expect full repair at the developer's expense.

5.4.2.4 Utility Patch Repairs

All roadway pavements shall be repaired in accordance with the design guidelines provided in the City's Standard Drawings. The patch must be placed immediately following work and the wearing surface shall include the trench width plus an additional twelve (12) inches on either side to provide a smooth tie in. The temporary patch must be in place at least eight (8) weeks prior to placing the final wearing surface. Following the eight (8) week time, a permanent patch must be constructed twenty-five (25) feet each side of the trench. The extents of required milling are shown on the standard details.

5.5 DESIGN OF PAVEMENTS

The pavement design criteria are intended to supplement the City Standard Drawings. The design criteria outlined in the City's Standard Drawings and Specifications shall take precedence over the ALDOT standard specifications except on State routes. For items not covered by these criteria, the ALDOT standard specifications shall apply.

5.5.1 New Construction

All roadway pavements shall be constructed to meet the specifications of the City, and shall be approved by the City Engineer.

5.5.1.1 Asphalt

All roadway pavements shall be constructed in accordance with the design guidelines provided in the City's Standard Drawings. Alternatives to the full depth pavements or variance to the listed thickness will be considered on a case by case basis, based on subgrade soils and/or expected truck traffic.

5.5.1.2 Concrete

For Portland cement concrete pavements, the typical cross section shall be designed on a case by case basis as approved by the City Engineer. Expected truck traffic and soil conditions shall be considered in the design and depth of concrete pavement.

5.5.2 Pavement Repairs/ Retrofit

All roadway pavements shall be repaired in accordance with the design guidelines provided in the City's standard drawings. A temporary patch must be placed immediately following the work and be in place at least eight (8) weeks prior to placing the final wearing surface. The temporary patch width includes twelve (12) inches either side of the trench and the permanent patch must be twenty-five (25) feet each side of the trench as shown on the standard details.

For resurfacing of streets, a minimum of thirty (30) foot milled area is required at the extents of paving on each street.

5.5.2.1 Asphalt

Permanent repairs to asphalt pavement remove deep patches at least four (4) inches in depth, to a depth at which firm support is reached. It may be necessary to remove some of the subgrade to reach this depth. The width should extend at least one (1) foot beyond the affected pavement area. Edges shall be vertical and smooth. A tack coat should be applied to the vertical face of the patch.

The wearing surface repair shall include the trench width plus an additional twelve (12) inches on either side to provide a smooth tie in.

Hairline cracks and minor surface distortions are repaired with a surface or "skin" patch. Removal of existing pavement is not required. Typically a layer of hot-mix asphalt is spread over the affected area. An alternative treatment is sprayed emulsified asphalt with an aggregate mixed immediately spread over the area and compacted.

5.5.2.2 Portland Cement Concrete

Where concrete pavements are to be repaired, replacement shall be of the same type and thickness as that removed. Minor repairs may be saw cut and removed. Permanent repairs shall involve the replacement of the entire concrete panel. Low severity cracking may not require the removal of the entire panel; cracks can be routed and sealed. Medium severity cracking may require saw cut, removal and replacement of the damaged portion of the concrete panel. If the concrete panel is cracked in more than three (3) or more pieces the entire panel should be considered for replacement.

The contractor shall not saw cut a panel within two (2) feet of another saw cut or any other of joint.

The concrete slab shall be poured in accordance with the provisions in ALDOT's standard specifications.

Concrete panels shall be removed and replaced within the same day. Initial prep work, such as sawing the panel into smaller pieces, may be done the day before removal, but traffic shall be maintained on the roadway overnight. The sections of pavement to be removed shall be removed in such a manner as to not damage the underlying base layer, adjacent concrete slabs, or the joint steel.

The surface finish and slope of the new concrete panel/repair shall be the same as the adjoining concrete panels.

Reinforced Concrete Cement

Joint steel shall be cleaned and reconditioned to maintain the same load transfer as in the original pavement design. Any damaged or destroyed steel, which in the opinion of the City Engineer would not function properly, shall be replaced in kind and retied to the old pavement by drilling an appropriate size hole of the proper depth and anchoring the new bar with an ALDOT approved adhesive material. All tie bars and dowel bars tied to the old pavement shall be anchored into place with an approved adhesive material in such a manner as to meet the pull-out requirement as specified by the ALDOT standard specifications.

Upon removal of the existing concrete panel, all reinforcing steel shall be reconditioned (clean and straighten the steel bars and clean, paint, grease, replace, etc.) or replaced, new tie bars placed, and base cleaned and repaired. After the dowels or tie bars are anchored in place, allow time for the adhesive to set and then allow sufficient time for any required pull-out tests to be performed prior to pouring the replacement slab.

Non-Reinforced Concrete Cement

Pavement repairs for non-reinforced concrete shall include installation of smooth dowel bars, epoxy coated, aligned with the pavement direction and parallel to the plane of surface. Saw cut surfaces shall be sealed with a non-shrinking adhesive material.

5.6 STREET LIGHTING

The City is serviced by three (3) electric service providers: Alabama Power Company, Tallapoosa River Electric Cooperative and Dixie Electric Power Association. Each service provider maintains all street lighting within their respective service areas within the City.

All new subdivisions shall have street lighting installed with the subdivision infrastructure in accordance with these guidelines. Lamp sources shall be a minimum one hundred fifty (150) watt HPS at unsignalized intersections and one hundred (100) watt HPS at midblock locations and in cul-de-sacs.

Standard spacing of street lights is as follows:

Midblock lights are to be located no closer than two hundred (200) feet apart and not to exceed five hundred (500) feet apart. Spacing for poles sixteen (16) or twenty (20) feet in height with decorative fixtures is recommended to be two hundred (200) to three hundred fifty (350) feet apart. Spacing for poles thirty (30) feet in height with cobra head fixtures is recommended to be spaced three hundred (300) to five hundred (500) feet apart.

Generally, there are three (3) alternatives for the selection of lighting fixtures to be installed. All lighting plans must be submitted and approved by the City prior to the installation of any conduit or wiring associated with the fixtures. The cost of the street lighting should be included in the engineering estimate submitted for the subdivision completion bond.

5.6.1 Standard Cobra Head Fixture

The standard lighting assembly provided by the various service providers is a wood pole with a cobra head fixture. This light is provided at no cost to the citizen if it can be placed on an existing pole and meets the recommended spacing requirements. When installed in a new subdivision, the developer will be responsible for costs associated with installation of the lights. The City will incur the energy usage cost for approved lights that meet the City's standard spacing requirements.

5.6.2 Standard Decorative Fixtures

This alternative allows the option of a combination of decorative lighting assemblies provided by the service provider. The fixtures are installed by the servicing authority and the cost for this installation is the responsibility of the developer. The City will incur the energy usage cost for approved lights that meet the City's standard spacing requirements. The developer must submit lighting plans to the power company for review.

5.6.3 Specialized Decorative Fixtures

This alternative allows the developer to select lighting fixtures other than the options provided by the servicing authority. The servicing authority requires that any specialized decorative fixture be comprised of a bulb and photo cell that are compatible with the fixtures the service provider currently maintains, if the roadway lighting is to be maintained by the servicing authority.

Lighting plans must be submitted and approved by the power company to ensure that the desired fixture is compatible with the standard fixtures for maintenance purposes. Plans shall be stamped, signed, and submitted by an electrical engineer to the Codes Enforcement Division for inspection, and layout shall be approved by City Engineer or designee. A Hold Harmless Agreement is required to be signed by the responsible party for lights located within the right-of-way.

5.6.4 Decorative Pedestrian Lighting

In an effort to enhance the City's rights of way within the Downtown area, decorative pedestrian lighting shall be installed with all new development plans, unless otherwise determined by the City. The lighting shall be designed by an Electrical Engineer and be part of the development review and approval process. Lighting and panel locations shall generally be in accordance with the Downtown Decorative Pedestrian Lighting Master Plan based on 100-foot spacing and be in accordance with the City's standard details.

Guidelines for installation of Holophane lighting in the right of way are the following:

1. DRT plans shall include preliminary spacing and service point location.
2. Building plans shall include full electrical lighting plans signed and stamped by an Electrical Engineer. Lighting plans shall be submitted on their own sheet, not on the overall electrical sheets. Lighting sheets shall be reviewed and approved by PW Traffic and Codes Enforcement.
3. All power services shall be underground.
4. Power services are unmetered services. Receptacles, where required shall have a metered service to be paid by the City of Auburn. Any service connection fees shall be borne by the Developer.
5. Plans need to include:
 - a. Foundation details for height above grade in both cut and fill scenarios
 - b. Recommended placement locations based on edge of pavement or sidewalk location
 - c. Minimum wire burial depth of 36" in conduit (not direct bury)
 - d. Orientation of poles
 - e. In some cases the panel location may be adjusted to accommodate future lighting adjacent to a proposed development.
 - f. Easement requirements for panels and wire not located within the right of way
 - g. A note that electrical wiring to be installed in accordance with latest edition of the NEC
 - h. A note that power services shall be exclusive for lighting and not facilitated through the building power.
 - i. Junction boxes or hand holes, when used, shall be rated to a minimum Tier 15.
 - j. Junction boxes and future conduit extensions to property lines shall be required.
6. The contractor is required to call for an inspection from Codes Enforcement for the following.
 - a. Prior to pouring concrete foundations
 - b. All conduit prior to cover

- c. All electrical wiring
 - d. Before permanent power can be supplied
 - e. Codes will coordinate the final inspection with Traffic Engineering prior to issuing the Certificate of Occupancy.
7. During installation, if any changes are made to the panel location, wiring, or other appurtenances that affect service line size or the overall design, as built are required. The Electrical Engineer must submit a revised design to the Traffic Engineer prior to the issuance of a Certificate of Occupancy.

5.7 SIGNING AND PAVEMENT MARKINGS

Signs shall be installed on all City streets as required by the MUTCD, latest edition. Signs required on development sites must also be in accordance with the MUTCD. Plans must include sign locations and notes describing sign sizes, reflectivity, etc., per the MUTCD.

Pavement markings and markers are required on all residential collectors, collectors and arterials in accordance with the MUTCD, latest edition. Plans must include striping and notes relative to the placement of temporary and permanent striping. Temporary striping must be in place immediately. Asphalt must cure at least two (2) weeks before the placement of permanent markings.

Solar-powered pavement markers are required at all mid-block crossings permitted during the development review phase. The solar markers must be a double-sided LED, non-flashing, with a white high intensity emitting diode. A submittal will be required prior to ordering and installation.

5.7.1 Street Name Signs

The Traffic Engineering Division of the Public Works Department receives many requests each year to provide street name signs and regulatory signs within the City. The City bills the developer/owner a one (1) time charge of one hundred twenty-five (\$125.00) dollars per intersection upon installation of City standard street name signs. Please see Appendix P-2 Decorative Street Signs Policy. The standard street name sign is City of Auburn retroreflective blue background with retroreflective white lettering.

Many developers request the use of decorative signs and posts that are unique to their subdivision. Developers may elect to use their own standard sign provided it meets the following criteria set by the City.

1. The Traffic Engineer or City Engineer must approve the sign and signpost.
2. The background and lettering must be retroreflective.
3. The sign must be mounted on a breakaway post in accordance with the MUTCD, latest edition.
4. The sign shall have a dark background with white lettering (all reflective).
5. The sign shall meet minimum letter size requirements established by the MUTCD, latest edition.
6. The lettering font must be similar to a block style.
7. The sign must be installed at a location identified by the MUTCD, latest edition, (The Traffic Engineer will be available for consultation prior to sign installation if necessary).
8. Special insignia for the subdivision may be used if approved by the Traffic Engineer or City Engineer.

5.7.2 Regulatory Signs

Regulatory signs are traffic signs intended to instruct road users on what they must or should do (or not do) under a given set of circumstances. The term regulatory sign describes a range

of signs that are used to indicate or reinforce traffic laws, regulations or requirements which apply either at all times or at specified times or places upon a street or highway, the disregard of which may constitute a violation. These criteria are set out in the MUTCD, which specifies conditions for the installation as well as requirements of maintenance.

Developers may elect to use their own standard sign provided it meets the following criteria set by the City.

1. The Traffic Engineer or City Engineer must approve the sign and signpost.
2. The sign must be mounted on a breakaway post in accordance with the MUTCD, latest edition.
3. The sign must meet minimum requirements established by the MUTCD, latest edition, including size and color.
4. The sign shall be fabricated from high intensity prismatic material that satisfies the requirements set forth in the MUTCD.
5. The sign must be installed at a location identified by the MUTCD, latest edition. (The Traffic Engineer will be available for consultation prior to sign installation if necessary).

5.7.3 Application for Signs (New Development)

Developers should make application for street name signs and regulatory signs for new developments at the earliest possible date. The application must be received by the Public Works Department and the name must be approved by the Planning Commission before a development is advertised. The City will not be responsible for problems that result if the development is advertised prior to approval of the development/street name or if the application is rejected.

The request form is available in Appendix P of this Manual.

When a sign request is received, the necessary studies and reviews will be completed to determine whether or not a sign will be approved for installation. If the Traffic Engineer recommends installing the sign, installation of the sign will be approved and cost allocations for the installation will be set. If it is determined that the sign not be installed, a representative of the Public Works Department will send a letter explaining the decision to the Applicant, including available informational materials.

All signs approved for installation shall be installed by the Public Works Department or under the Department's supervision. The Traffic Engineer will establish the ultimate location of approved signs.

5.7.4 Replacement for Decorative Signs

The City will not be responsible for replacement of decorative signs and signposts. If a decorative sign or signpost is damaged, the developer/owner is responsible for replacing and or repairing the sign in a timely manner. If necessary, the City will install a temporary replacement sign until a new sign is obtained. Upon installation of the new decorative sign, the temporary signs and signposts must be returned to the City. If sign is not returned, the City will bill the developer or homeowners association for the cost of the temporary sign.

5.8 RIGHT-OF-WAY PLANTING

All plantings within the right-of-way must be approved by the City Arborist prior to installation. Trees placed within the public right-of-way shall not be of a low, bushy species that might obstruct sight distance. No such trees shall be planted unless approved by the City Arborist, who shall determine whether they pose a threat to public safety of the efficient use of public facilities. Trees shall not be placed in any location where they may damage or impede access to buried utility lines, sidewalks or streets. Canopy trees shall not be planted within ten (10) feet of water or sanitary sewer utilities.

New trees installed within the right of way as part of a development shall be installed per the City's detail, including a tree well, grate, and brick color to match the Toomer's Corner color Pine Hall Brick English Edge Full Range, or approved equal. Tree locations and species shall be coordinated with City staff during the DRT process. Silva Cells will be required as part of the tree installation along College Street from Glenn Avenue to Magnolia Avenue and along Magnolia Avenue from Wright Street to Gay Street.

5.9 ACCESS MANAGEMENT AND COORDINATION

The purpose of this section is to establish minimum regulations for access to property. Standards are established for new roads, driveways, shared access, parking lot cross access, and service roads throughout the City. When access management standards are implemented there are many potential benefits.

- Promote safe and efficient travel within the City
- Minimize disruptive and potentially hazardous traffic conflicts
- Ensure safe access by emergency vehicles
- Protect the public investment in the street system by preserving capacity and avoiding the need for unnecessary and costly reconstruction
- Separate traffic conflict areas by reducing the number of driveways
- Provide safe spacing standards between driveways and between driveways and intersections
- Provide for shared access between abutting properties
- Ensure reasonable access to properties (not necessarily the most direct access)
- Coordinate access decisions with the Planning Commission and City Council

The access management standards in this Manual shall be applied in addition to the requirements of the Zoning Ordinance, the Subdivision Regulations and the Major Street Plan.

ALDOT is responsible for access permits along State and Federal routes. The City oversees land use, subdivision, and site design decisions that affect access needs. State and local coordination is essential to effective access management. Lack of coordination can undermine the effectiveness of regulatory programs and cause unnecessary frustration for permit applicants.

Timely communications are essential to an effective review procedure, and it begins with a coordinated process for review of access permits along State routes. Applicants should send completed permit applications for access to State controlled roadways to the appropriate ALDOT office with copies being transmitted to the City Engineer. Prior to any decision or recommendation concerning permitting of access, the local reviewing official and the State permitting official should discuss the application.

Property owners will be required to submit the necessary certificates of approval from other affected regulatory agencies, before a Building Permit is issued. An effective method of coordinating review and approval between developers and various government agencies is through a tiered process. The first stage is an informal meeting and “concept review” period, which allows officials to advise the developer about information needed to process a development application. This includes information on required State and local permits, and any special considerations for the development site. The concept review provides the developer with early feedback on a proposal, before the Preliminary Plat or site plan has been drafted. Once the preliminary plan is drafted, it can be checked to determine if additional conditions are required for approval. The final plan that is formally submitted should then require only an administrative review.

An Applicant of an access permit on a State controlled roadway should request a response be transmitted to the City from ALDOT prior to approval of plats on the State highway system. Applicants are required to send a copy of the application to the State access permitting official. This shall occur early in the plat review process, preferably during conceptual review. Early monitoring of platting activity would allow ALDOT an opportunity to identify problems and develop acceptable alternatives.

5.9.1 Transit Stops

Purpose built student housing constructed along an arterial or collector outside of the Urban Core (UC) shall install a transit bus stop in accordance with the City's standard details. In some cases, purpose built student housing constructed along an arterial or collector in other zones may also be required to install a transit bus stop. The location shall be coordinated with Auburn University Parking Services during the DRT process and be shown on the final plans. All transit stops must be completed prior to the issuance of Certificate of Occupancy.

5.10 CONSTRUCTION

The developer and/or contractor is responsible for subsurface investigation, construction, testing, coordinating inspections, etc. and performing all work required to complete a project. Refer to the City Standard Specifications, Section 10, which applies to the construction and installation of streets, including excavation, backfill, materials and testing.

In residential subdivisions, the final wearing surface shall not be applied for one (1) year after the placement of the asphalt base and binder or until seventy-five (75%) percent build-out of the subdivision, whichever comes first. No phase of a subdivision will be permitted to carryover outstanding improvements for more than two (2) years after the placement of the binder.

5.11 PRIVATE STREETS

Private streets and driveways must be constructed to the City's buildup standards for public street and alley construction. The plans for private street construction must be reviewed and approved by the Development Review Team. The private street or driveway should commence as part of the overall development, but the construction shall be inspected and certified by a qualified geotechnical company. The construction certification shall be submitted to the City prior to the Certificate of Occupancy being issued. Private streets can be constructed on a separate lot or within a common ingress/egress easement. The lot or easement covering the street shall grant the City unrestricted use of the property for emergency access, solid waste collection, and utilities and maintenance of same, if applicable.

Private streets shall be a minimum of twenty (20) feet wide to meet the International Fire Code as adopted by the City of Auburn. Private streets must also be sized to accommodate the traffic generated by the development per the traffic study approved by the City.

5.12 GREENWAYS

As Auburn has grown, community leaders have recognized the benefits of combining recreational uses, greenspace conservation goals and multimodal transportation projects by aggressively pursuing shared use off-road paths for pedestrians and bicyclists. These concepts were institutionalized in the Auburn 2020 Plan, through the Bicycle Plan, which defined the supporting strategies as promoting greenways with bikeway components and requiring recreational bikeways within greenbelts, as well as the Family and Community recommendations to develop bicycle and walking trails to provide connectivity to various recreation, neighborhood and activity centers. There are economic, social and environmental benefits of greenways and their use is recommended to buffer between competing land uses, soften the urban landscape and provide connectivity between parks and activity centers. Additionally, greenways can protect key watersheds and preserve riparian buffers along the creeks and waterways.

Five greenways have been identified as priorities for the City. Conceptually, a trail system will be most feasible and economical if it follows the creek in some areas, and in others,

parallels, or “piggy-backs” on, existing sewer easements. The use of sewer easements for trail systems is common in that it allows for the expanded community use of existing undevelopable land, and often property owners are amenable to amending the existing easements as connection to a trail network can be a valuable amenity to new and existing developments. Second, easements are typically already well maintained, and of sufficient width and topography to allow more economical trail constructions. Lastly, by improving the easements, access to sanitary sewer lines is enhanced for maintenance purposes and the increased presence of joggers, cyclists and walkers increases the overall security of those assets. Incidentally, since the improvements are a significant benefit to sewer operations, some improvements can be justifiably funded with current sewer rate revenues.

If required, greenways shall be constructed in accordance with the Greenspace Map and be identified during the Preliminary Plat process. As part of the Development Review, the type of greenway to be constructed shall be identified.