CHAPTER 16

Access Management

16.0 GENERAL

A. Purpose

Access Management refers to the planning process whereby connection points to a roadway are managed to maximize safety and capacity as appropriate for the functional classification of the roadway.

The purpose of this chapter is to establish Access Management criteria that enhances highway safety, improves traffic flow, and preserves the functional capacity of roadways; while systematically providing connection points to adjacent property. Traffic analysis is required to determine the appropriate access management techniques for all proposed development.

1. Ideally, Access Management deals with the traffic problems caused by unmanaged development before they occur.

2. Access Management provides passage in a right-of-way while maintaining road characteristics such as design speed, capacity and safety considerations.

3. Access Management addresses how land is accessed along arterials.

4. Access Management focuses on mitigating traffic problems arising from development and increased traffic volume attempting to utilize these developments.

5. Access Management calls upon local planning and zoning to address overall patterns of growth and the aesthetic issues arising from development.

The lack of access management on the road system and the proliferation of driveways are major factors behind the functional deterioration of roads in the City. As new entrances are constructed and traffic signals erected, the speeds and capacity of the road decrease, and congestion hazards to the motorists increase.

Regulated limitation of access on arterials is necessary to enhance their primary function of mobility.

B. References

The requirements specified herein are based in part on the AASHTO Manual, the Highway Capacity Manual, ITE Transportation and Land Development Manual, VDOT Road Design Manual, VDOT Minimum Standards Of Entrances to State Highways, VDOT Land Development Manual, the Hampton Roads Access Management Model, the City of Chesapeake Public Facilities Manual, the City of Chesapeake Code, and other nationally recognized access management policies.

C. Variances

The City of Chesapeake has many locations where existing conditions may warrant consideration for variances to the design standards stated herein. The existing conditions may include limited lot frontage, non-standard crossover spacing and inadequate right of way. Variances will be carefully considered to ensure compliance to the greatest extent possible. In some cases safety mitigation may be appropriate.

16.1 DEFINITIONS

For any definitions not included herein, refer to Chapter Five of the Highway Capacity Manual.

A. Access Management – The process that provides (or manages) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed.

B. Capacity – the maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or road in one direction or in both directions for a multi-lane highway, during a given time period under prevailing road and traffic conditions.

C. Controlled access highways – highways that serve through traffic, have very few, predetermined access points, and may limit the location of access points or prohibit direct access from the highway to abutting land.

D. Corner Clearance – the minimum dimension between the center of the entrance and the center of the closest entrance.

E. Corner lot – a single lot with frontage on a road and an intersecting road.

F. Cross Access – a service drive providing vehicular access between two or more contiguous sites so the driver need not enter the public street system.

G. Crossover-Break in median to accommodate vehicles entering and/or exiting a roadway by making a left turn

H. Driveway/Entrance – an access used by vehicular traffic to enter property abutting a road. The term includes private as well as commercial and other non-residential entries.

I. Driveway Width – the narrowest width of the driveway, measured parallel to the highway right of way

J. Frontage – the width of a single lot measured parallel to the right of way.

K. Intersection – the general area where two or more roads join or cross, within which are included the road and roadside facilities for traffic movements within the area. Also included are multi-lane driveways (typically for large retail shopping centers) which usually provide signalized access to the road.

L. Joint Access (Shared Access) – an entrance connecting two or more contiguous sites to the public street system

M. Lane – the portion of a road for the movement of a single line of vehicles, not including the gutter or road shoulder.

1. Acceleration Lane – Acceleration lanes will be required when dictated by traffic conditions in accordance with VDOT and AASHTO criteria.

2. Acceptance Lane – the portion of an intersection which receives left turning vehicles.

3. Auxiliary Lane – the portion of the road adjoining the through lane for parking, speed changes, storage for turning, weaving, truck climbing or for other purposes supplementary to through traffic movement.

4. Deceleration/Storage Lane – that portion of the auxiliary lane that is full width. The length, excludes the taper, that is needed for a comfortable stop from a speed that is typical of the design speed on the main facility plus the component of a turn lane designed to accommodate the number of vehicles likely to accumulate during a critical time period. The length should be sufficiently long enough to avoid the possibility of turning vehicles stopping in the through lanes.

5. Speed Change Lane – an auxiliary lane, primarily for the acceleration or deceleration of vehicles entering or leaving the through traffic lanes

6. Turn Lane – an auxiliary lane to accommodate turning vehicles.

N. Level of Service – a qualitative rating of the effectiveness of a highway in serving traffic, measured in terms of operating conditions. Note: The Highway Capacity Manual identifies operating conditions ranging from an "A" for best operation (low volume, high speed) to "F" for poor operations where volumes are above capacity. General operating conditions for Level of

Service may be found in AASHTO's A Policy on Geometric Design of Highways and Streets.

O. Limited Access – the regulated limitation of public access rights to and from properties abutting a road facility. This limited access can either be "full" providing access to selected public roads and prohibiting crossings at grade and direct entrance connections or "partial" providing access to selected public roads, crossing at grade, and some private driveway connections.

P. Peak flow rate- equivalent hourly rate during the peak hour at which vehicles pass a point in a roadway; calculated as the number of vehicles divided by the time interval in which they pass (15 minutes), expressed as vehicles per hour (vph). The peak 15 minute flow rate =4x (peak 15 minute volume).

Q. Peak hour factor – peak hour volume divided by the peak ~~15 minute~~ flow rate from the same hour.

R. Peak hour volume – maximum number of vehicles that pass a point in a roadway in the course of one hour during a typical day.

S. Speed – the rate of vehicular movement, generally measured in miles per hour

1. Posted Speed – the maximum permissible speed allowed by the laws of the City and/or State government.

2. Design Speed – a speed used to design the horizontal and vertical alignments of a roadway. Generally, 5 mph over the posted speed of the road. If the design speed is not known, than in no case shall design speed be less that the operating speed.

3. Operating Speed (85^{th} percentile speed) – a speed value that is less than 15% of a set of field measured speeds at a free flow condition.

T. Taper Length - the component of a turn lane that allows for a transition from the through lane to the full width component of the turn lane.

U. Turning Movement Count (TMC) – tally of all vehicles passing through an intersection separated by approach direction and maneuver (left, thru, right, U turn). Typically performed in two hour blocks at peak times and broken into 15 minute intervals.

V. Volume (Traffic) – the number of vehicles passing a given point during a specified period of time.

1. Average Daily Traffic (ADT) – the average 24 hour volume, being the total volume during a stated period divided by the number of days in that period.

2. Design Volume (DV) – a volume determined for use in design, representing traffic expected to use the highway. Unless otherwise stated it is the peak hourly volume.

16.2 FUNCTIONAL CLASSIFICATION

A. Access Management treatment shall be based on the classification for the roadway being designed.

B. Functional Classification – a system used to group public roads into classes according to their purpose in moving vehicles and providing access, it includes design and operational standards.

1. Interstate Highway, Freeway and Expressway– A divided road for through traffic with limited access and generally with grade separations at major intersections.

2. Principal Arterial- serves to connect the urban centers of the City. Trip length and density are suitable for citywide travel.

3. Minor Arterial- Interconnects with and augments the urban principal arterial system. Minor Arterial – In conjunction with the rural principal arterial system, it forms a network that connects the major traffic generators over long distances.

4. Collector – serves to connect the arterials with local roads.

5. Local – roads that provide direct access to individual residences or other terminations.

C. Access Control Plans-Existing

1. Battlefield Boulevard-From I-64 to Kempsville Road-Approved November 1974.

2. Battlefield Boulevard-From Gallbush Road to the North Carolina state line approved September 1997.

3. Route 17

a. From the North Carolina state line to the steel bridge approved November 1963 and amended and adopted February 2003.

b. Dominion Boulevard limited access from Great Bridge Boulevard to Bainbridge Boulevard approved November 1963.

c. Cedar Road to Route 17 Business approved January 2003.

4. Volvo Parkway from Battlefield Boulevard to Greenbrier Parkway.

5. Military Highway from Interstate 64 to Deep Creek Boulevard approved June 1985.

6. Cedar Road from Dominion Boulevard to Shipyard Road.

D. Principal Arterials

1. Battlefield Boulevard between Campostella Road and Great Bridge Boulevard and Gallbush Road to the North Carolina State Line

2. Centerville Turnpike

3. Dominion Boulevard

4. Portsmouth Blvd. between 664 & City limits.

16.3 CROSSOVER CRITERIA

A. Spacing of crossovers shall conform to the following table. The Access Control Plan as determined by the Department of Development and Permits for specific roadways supercedes this table.

Functional Classification	**Design Speed (MPH)**				
	35	**40**	**45**	**50**	**55**
Principal Arterial	600’	700’	800’	900’	1000’
Minor Arterial	500’	600’	650’	700’	800’

Distances are from center of the entrance or ultimate right-of-way to the next entrance or roadway intersection (i.e. center to center)

B. Application for crossovers not meeting the above specifications will also be considered for approval provided unusual or unique circumstances are present which justify such conditions. A study shall be provided which will include, but not be limited to, operating speed, volume of traffic for the crossover and associated through street, signal operation/progression, accident rates with and without the crossover, number of U-turn violations, observations of weaving maneuvers, alternative solutions, capacity analysis, and type of vehicles that are involved.

C. Crossover spacing requirements may be increased to accommodate progression if signalization is anticipated. The minimum signal spacing along arterials is 1300’, but requirements may vary to optimize progression and to consider other existing urban characteristics.

D. All median breaks along principle & minor arterials shall be designed with left turn lanes regardless of turn lane warrants.

E. Left turn lanes will be provided for traffic in both directions where a median exists and a crossover is permitted. If the property opposite the crossover is

already developed, then the developer must install turn lanes in both directions.

F. The maximum desirable algebraic difference of a crossover crown line is 5%. The maximum algebraic difference shall never exceed 8%.

16.4 INTERSECTION/ENTRANCE LOCATION

The following applies only in those areas not governed by a specific access control plan.

A. Corner Lot Access

1. Corner clearances on arterial and collector roads shall be the same as entrance spacing requirements. When this cannot be achieved due to lack of frontage, the clearance should be maximized to the greatest extent possible and the entrances shall be designed as right-in/right-out only.

2. On corner lots that abut two different road classifications, each access shall meet the minimum corner clearance. In the event a corner lot does not meet the minimum corner lot clearance, then, the driveway shall be restricted to the road with the lower traffic volume.

3. Outparcels located on a corner lot shall have sufficient frontage to meet minimum corner clearances or utilize internal drive aisles for access.

B. Entrances shall be located to provide adequate intersection sight distance. Minimum intersection sight distance criteria are provided in section 16.8.

C. New intersections shall be located at an interval that accommodates alignment with existing or proposed crossovers. If this is not feasible, other provisions such as stub streets should be provided to accommodate new development.

D. Residential entrances shall not be permitted on arterials. Any variance to this requirement may require additional geometric improvements to reduce the effect of conflict points.

E. Intersections and entrances shall be located to align with existing or proposed entrances or intersections or shall be sufficiently separated to avoid adverse situations. Access connections on opposite sides of an undivided roadway or a roadway with a continuous two-way left-turn lane (TWLTL) that do no align shall meet the entrance spacing requirements listed in Table 16-2.

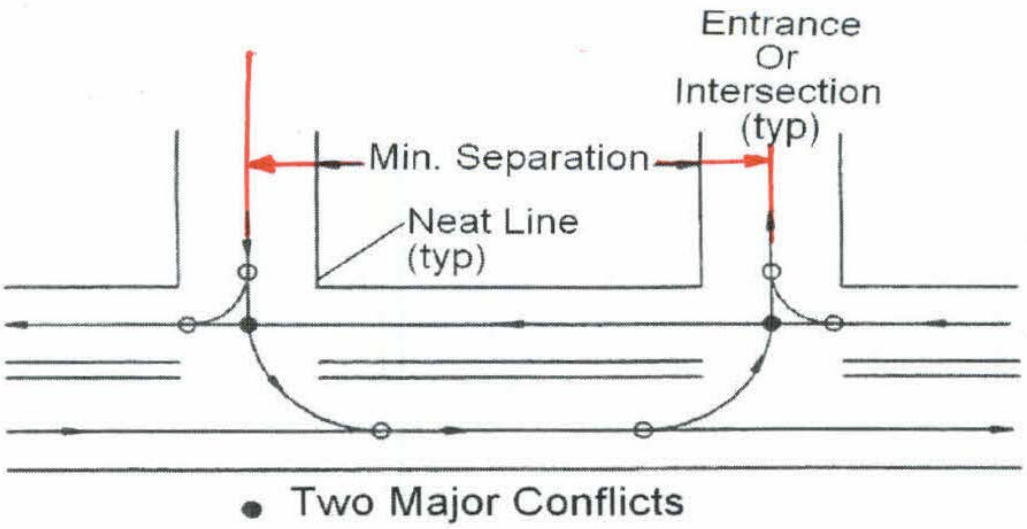

Figure 16-1
Entrance Spacing

F. The following table provides the guidelines for unsignalized access spacing along roadways. A determination will be made in the preliminary phase to determine if greater spacing is required.

TABLE 16.2 Unsignalized Access Spacing

Functional Classification	Design or Operating Speed (MPH)*					
	<35	**35**	**40**	**45**	**50**	**55**
Principal Arterial	XXX	300’	350’	400’	450’	500’
Minor Arterial	XXX	250’	300’	325’	350’	400’
Collector	200’	225’	250’	275’	300’	350’

* Whichever is greater

G. Entrances on streets which carry traffic volumes or are anticipated to carry volumes greater than 10,000 VPD, or with posted speeds greater than 45 mph, or are on the Master Transportation Plan, shall be kept to a minimum. Shared entrances between adjacent sites are generally preferred and shall be required to meet spacing requirements. This will generally be accomplished by joint access located within an ingress/egress easement.

H. Multiple access points for developments are desirable for traffic circulation and should be provided when access management criteria can be satisfied. Not less than two public street access points to subdivisions shall be provided when the number of units in accordance with subdivision or site plan exceeds 100 units. One of these points may be by “future connection” by way of a stub street when the number of lots is less than 150. When the number of lots exceeds 150, a minimum of two access points must be provided concurrent with development. A four lane divided entrance does not generally satisfy the requirement of a primary and secondary access.

I. Commercial entrances shall not be located in a turn lane taper. An entrance can be located in a storage lane in accordance with access spacing requirements. If the entrance volume warrants a right turn lane, a full length right turn lane shall be provided in advance of the proposed entrance. Other entrances within the turn lanes shall have a minimum deceleration length of 50’. The existing storage lane may require extending to provide adequate deceleration lane length for the proposed entrance. See Figure 16-2 below.

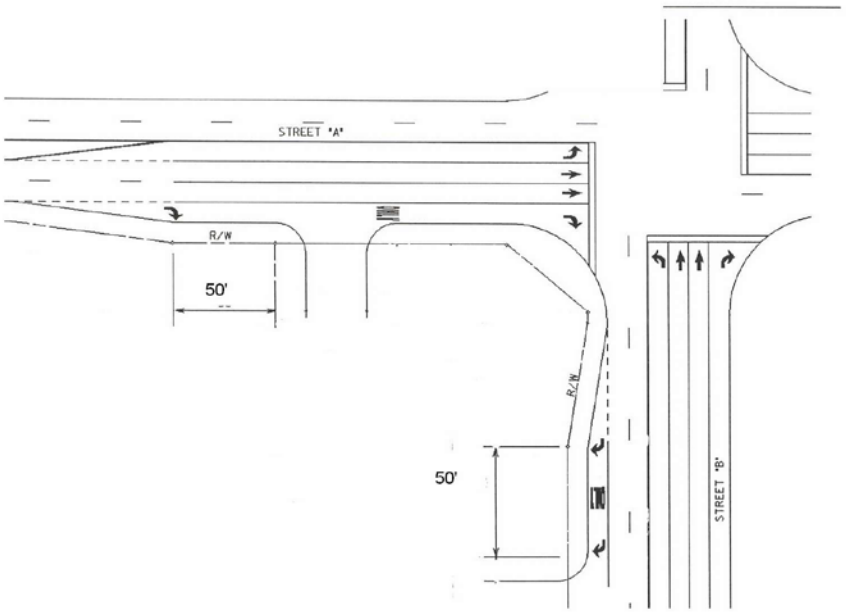

Figure 16-2
Entrance Location

16.5 INTERSECTION/ENTRANCE DESIGN REQUIREMENTS

A. The type of entrance shall conform to City standards and be designated on the plan, see PFM, Volume II.

B. Entrance improvements will be required when modifications are proposed to existing sites which will increase the traffic volume generated by the site or when the existing entrance presents undesirable traffic conditions.

C. Entrances shall tie into an existing paved, accepted road or one improved and bonded pending acceptance.

D. The minimum acceptable entrance width is 30' for two way traffic and 24’ for one way traffic.

E. Access connections shall be designed to safely and efficiently accommodate the largest vehicle expected to access the site on a regular basis. Entrances and intersections shall be designed such that the design vehicle will not encroach upon the outbound lane of a two-way entrance. Commercial areas shall accommodate a WB-67 vehicle. Geometric improvements must be provided to ensure exiting vehicles can be contained within the outside lane of the intended direction of travel. Anticipated volume of larger vehicles may be considered for small sites that have difficulty with full compliance.

F. Each acceptance lane installed with any new road project or development shall be 15’ wide minimum. As shown in Figure 16-3, the lane shall be tapered to 12’ using the ratios located in Table 16.3.

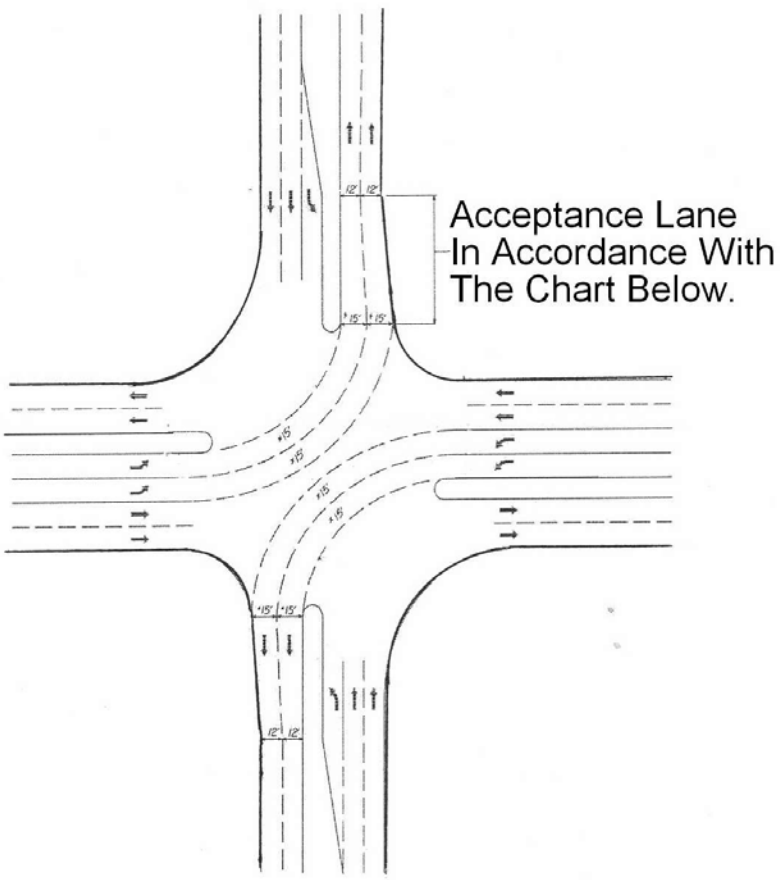

Figure 16-3
Acceptance Lanes

TABLE 16.3 Acceptance Taper Ratios

Design Speed (mph)	Taper Ratio
55	16:1
50	14:1
45	13:1
40	11:1

Wider acceptance lanes shall be required based on the design vehicle type and the percentage of that design vehicle.

G. Entrance/Intersection Profile

1. Entrance typical section must conform to the standard details in the Public Facilities Manual. An entrance profile and sufficient elevations shall be shown on a typical section to verify conformance. The maximum profile grade shall be 2.0% from the entrance flow line back into the site. The maximum difference between the pavement cross-slope and the approach grade shall not exceed 6% at right in/right out intersections and 4% at continuous movement intersections.

2. The location of the stop bar or stop sign indicator should be a maximum of 50’ from the edge of the nearest travel lane crossing the intersection.

3. It is preferable that the high point of the entrance be placed at the right of way line. Runoff from the roadway must be contained in the right-of-way or in a drainage easement. If the highpoint for the entrance is beyond the right of way, runoff shall be limited to the quantity specified in the drainage criteria.

4. Minimum concrete entrance flowline slope is 0.20%.

5. Intersecting street crowns shall be designed to maintain the typical section of the most heavily traveled through street. A minimum 1.0% intersection cross-slope shall be maintained. Asphalt street profiles shall be sloped downward from the centerline of the most heavily traveled street to where the curb return becomes tangent.

H. Entrance Throat Length

1. The entrance throat shall be of sufficient length to accommodate the length of queued vehicles outbound, free from any conflict points. There shall be at least a distance of 30' from the entrance right-of-way line to the beginning of first aisleway or the first parking stall.

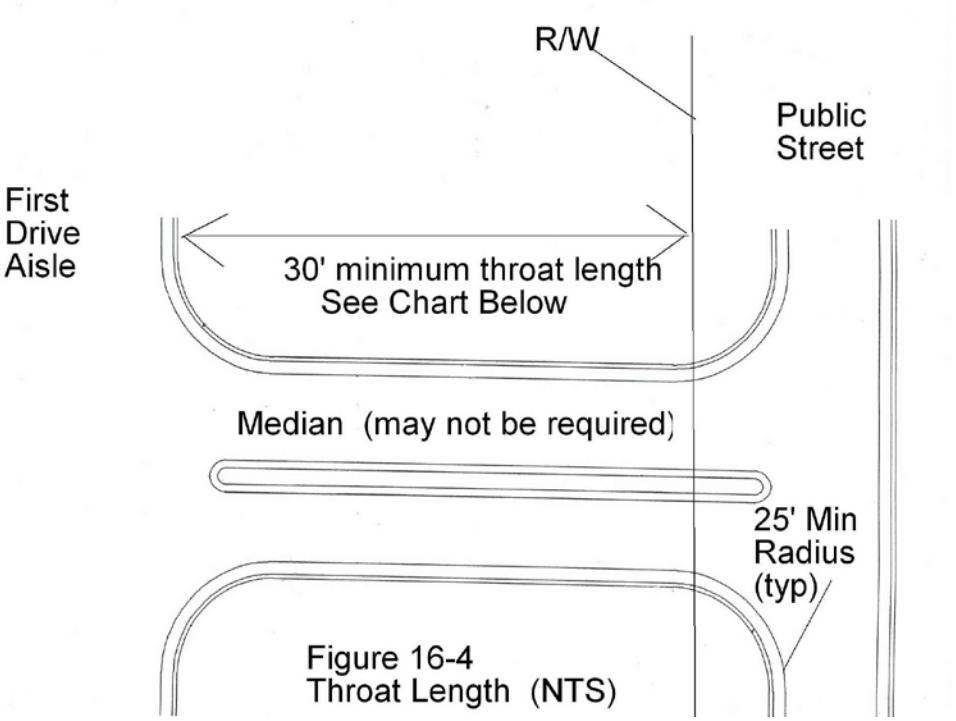

Figure 16-4
Throat Length (NTS)

2. Table 16.4 provides minimum driveway throat lengths for various sized retail establishments. Alternate throat lengths will be considered/required based on the review and approval of a traffic impact analysis that determines queuing requirements.

3. Adequate throat length is essential to allowing safe ingress into proposed entrances. Adequate throat length depends on many variables including, but not limited to, anticipated traffic generation (based on the size of the development), number of entrances, characteristics of the traffic flow on the adjacent roadway, and the site's proximity to a crossover. Throat length analysis may be required to determine the required throat length on major traffic generators. The Department of Development and Permits may require longer than the minimum criteria set forth in Table 16.4. The table is a guideline of throat length requirements.

TABLE 16.4 Commercial Entrance Throat Lengths

Land Use	Size (sf)	Minimum Throat Length (ft)	
		Collector	Arterial
Small Commercial Sites	ALL	30	50
Large Commercial & Industrial Shopping Centers	≤250,000 >250,000	100 T.I.A. Required	200

4. Throat lengths for signalized entrances shall be based on a signal analysis provided by the engineering consultant.

16.6 TURN LANES

A. Design volumes shall consider all currently approved plans and the five year growth projection. Use 5% or a growth rate based on historical data. The anticipated volume of trucks and/or buses may increase the length of the required turn length.

B. Left Turn Lanes

1. The VDOT Roadway Design Manual, Appendix C shall be utilized for left turn warrants only. If the left turn volume is greater than or equal to 10 vehicles per hour and less than 5% of the advancing volume (V_A), then the 5% chart shall be used. Signalized intersections shall require a left turn lane. The design shall be determined through signalized intersection analysis.

2. Left turn lanes will be provided for traffic in both directions where a median exists and a crossover is permitted. If the property opposite the crossover is already developed, then the developer must install turn lanes in both directions.

3. Single left turn lane lengths at intersections will consist of three two components: taper length, deceleration length, and deceleration/storage length. See Table 16.5 for single left turn lane design geometrics.

4. Dual left turn lanes are required when the peak hour volume exceeds 300 vehicles or the left turn peak 15 minute flow rate exceeds 350 vph. See Table 16.5 for dual left turn lane design geometrics.

Table 16.5 Single Left Turn Lane Design Geometrics

Dual left turn lanes are required when the peak hour volume exceeds 300 vehicles or the left turn peak 15 minute flow rate exceeds 350 vph.

Geometric Design	Speed (mph)	Unsignalized			Signalized			
		Principal Arterials	Minor Arterials	Collector	Principal Arterials	Minor Arterials		Collector
Taper *				To be built per PFM, Volume II, RW-3				To be built per PFM, Volume II, RW-3
	Less than 40	150	100	100	150	100		100
	40 or greater		150			150		
Deceleration/Storage *						Design shall include the greater of the two methods. (Length or Calculated Length)		
	40 or less	400	230	150' or greater; depending on the traffic impact analysis	400+ (Left Turn Vehicles per hour x 25-ft per Vehicle) / # of cycles per hour	Length 230	OR	Calculated Length: (Left Turn Vehicles per hour x 2 x 25-ft per Vehicle) / # of cycles per hour; 150' or greater; depending on the traffic impact analysis
	45		280			280		
	50		400			400		
	55 or greater	500			500+ (Left Turn Vehicles per hour X 25-ft per Vehicle) / # of cycles per hour			

* Other factors, such as analysis of accident history for the area, pedestrian conflicts, and the existing highway capacity must be considered to need for the installation of a right turn lane. A determination will be made by the Department of Development & Permits.

Table 16.6 Dual Left Turn Lane Design Geometrics

<table>
<tr><td colspan="6">Dual left turn lanes are required when the peak hour volume exceeds 300 vehicles or the left turn peak 15 minute flow rate exceeds 350 vph.</td></tr>
<tr><td>Geometric Design</td><td>Speed (mph)</td><td>Principal Arterials</td><td colspan="3">Minor Arterials</td></tr>
<tr><td rowspan="2">Taper *</td><td>Less than 40</td><td rowspan="2">300</td><td colspan="3">200</td></tr>
<tr><td>40 or Greater</td><td colspan="3">300</td></tr>
<tr><td rowspan="4">Deceleration/ Storage *</td><td></td><td rowspan="2">SL = <u>Left Turning Vehicles per hour</u> / # of cycles per hour x 1.8** X 25-ft per Vehicle</td><td colspan="3">Design shall include the greater of the two methods. (Length or Calculated Length)</td></tr>
<tr><td>Length</td><td rowspan="4">OR</td><td><u>Calculated Length</u>
<u>Left Turning Vehicles per hour</u> / # of cycles per hour x 1.8** X 25-ft per Vehicle</td></tr>
<tr><td>45 or Less</td><td>280 + SL</td><td>280</td><td rowspan="3">400</td></tr>
<tr><td>50</td><td>400 + SL</td></tr>
<tr><td>55 or Greater</td><td>500 + SL</td></tr>
<tr><td colspan="6">* Other factors, such as analysis of accident history for the area, pedestrian conflicts, and the existing highway capacity must be considered to evaluate the need for the installation of a right turn lane. A determination will be made by the Department of Public Works.
** Dividing by 1.8 Allows for unequal lane utilization</td></tr>
</table>

5. When a left turn lane is required in an area where there is no median, an approach taper transition must be installed. The length of the approach will be determined by using the following formulas:

Design Speed (mph)	Taper Transition Ratio
> 40	$L=(S)x(W)$
40 or less	$L=\frac{(W)x(S)^2}{60}$

'S' denotes operating speed, while 'W' denotes width of lane shift. In addition, the above formula shall be applied to transition lanes, acceptance lanes and other instances.

C. Right Turn Lane

1. Right turn lanes and tapers shall be provided as required by appendix F of the VDOT Road Design Manual, Figure 3-26 for two lane roads and Figure 3-27 for four lane roads. All volumes refer to the volumes on the approach under consideration for right turn treatments.

2. The minimum treatment for an entrance on a principal arterial is a taper. Traffic volumes may require a full width turn lane to facilitate right turn movements.

3. Right turn lengths will consist of two components: taper length, and deceleration/storage length.

   a. Principal Arterials shall have the following geometric design:

      Taper length: A minimum 150' taper shall be required. This length shall not be included in the deceleration length.

      Deceleration/Storage length: The following table shall be used to determine the minimum deceleration length.

Design Speed (mph)	Deceleration/Storage Length (ft)
45	400
50	400
55	500

   b. Minor Arterials shall have the following geometric design:

Taper length: For design speeds less than 35 mph, the minimum taper length shall be 100'. For speeds greater than 35 mph, the minimum taper length shall be 150'.

Deceleration/Storage length: For all right turn lanes, the deceleration/storage shall meet the requirements of the table below.

Design Speed (mph)	Deceleration/Storage Length (ft)
45 or less	280
50	400
55	400

c. Collector streets shall be designed and constructed in accordance with the Public Facilities Manual, Volume II, Page 20.1. Storage length shall be extended based on the right turn volumes in a traffic impact analysis. Storage length is determined by the design speed limit as outlined in the following table:

Design Speed (mph)	Storage/Taper Length (ft)
25	50/50
30 to 35	100/100
40	100/150
> 40	150/150

4. Other factors, such as analysis of accident history for the area, pedestrian conflicts, and the existing highway capacity must be considered to evaluate the need for the installation of a right turn lane. A determination will be made by the Department of Development & Permits.

C. Additional considerations

1. Turn Lanes may be required beyond these guidelines at the discretion of City. Conditions for providing an exclusive turn lane when the turn traffic volume projections don't exceed the above guidelines:
   a. Facilities having a high volume of buses, trucks or trailers.
   b. Poor internal site design of a entrance facility causing potential backups in the through lanes.
   c. Heavier than normal peak flows on the main roadway.
   d. High operating speeds (such as 55 mph) and in rural locations.
   e. Highways with curves or hills where sight distance is impacted.

D. Auxiliary Lanes

1. A City Standard CG-12 and a full depth pavement section shall be used on the following streets in lieu of matching the existing concrete section with an asphalt overlay:

   a. Military Highway

   b. Western Branch Boulevard

   c. North Battlefield Boulevard (Interstate 64 to Kempsville Road)

   d. Airline Boulevard

   e. Cedar Road (Battlefield Blvd to Dominion Blvd)

   f. George Washington Highway (Cedar Road to Canal Drive)

16.7 INTERNAL DESIGN AND CIRCULATION

Internal Circulation and ingress/egress easements may be required to accommodate adjoining properties to meet the access management requirements for the adjacent roadway. Entrance spacing and crossover access should be provided where possible for adjoining properties.

A. Parking areas and access lanes shall also be designed to accommodate the circulation of a single unit vehicle. Sites where tractor-trailers are anticipated shall be designed accordingly.

B. Truck loading/unloading operations, backing movements, etc. shall not block any public access to a commercial business.

C. Stub streets shall be provided to serve as circulation points with the development of adjacent parcels. Stub streets will also be required to facilitate appropriate access to arterials for adjoining properties. Stub streets will allow multiple parcels to share one or more points of access to an arterial.

D. "Drive thru" lanes shall have a bypass lane.

E. Drive-through facilities, such as fast-food restaurants, car washes, drive-through banks, and including day-care/private schools with drop-off/pick-up areas, shall be designed with adequate on-site stacking space to accommodate anticipated number of waiting vehicles. Waiting vehicles shall be stored on private property clear of driveways and circulation paths so that traffic back-up does not interfere with movement on adjacent street.

E. Curbing or wheel stops are to be a minimum 2.5' away from the property line where parking is permitted perpendicular to the property line.

F. Parking spaces and drive aisle widths shall be in accordance with Appendix #17.

16.8 SIGHT DISTANCE REQUIREMENTS

A. Intersection/Entrances shall be located to provide adequate intersection sight distance. Minimum intersection sight distance criteria are provided in Table 16.7 below. The line of sight established the boundary of a sight triangle within which there should be no sight obstruction. At any location where the sight triangle leaves the right-of-way, a visibility easement must be maintained and the area must be graded and landscaped such that the sight distance is not compromised. Sight distance determinations apply to both horizontal and vertical distances and are to be based on a height of driver's eye of 3'9" and a height of object of 3.5 feet measured each way from 14.5 feet behind the edge of pavement or stop bar. Removal of obstructions and dedication of visibility easements shall be required to preserve sight distances.

B. Sight distance requirements may be reduced at signalized intersections for projected movements. However, unprotected right and left turning movements shall meet the sight distance criteria.

C. The intersection sight distance is measured along the major roadway, based on the major roadway's design speed. Additional information regarding sight distance requirements is available in AASHTO's *Policy on Geometric Design of Highways and Streets.* The following table shall be used to determine the required intersection and entrance sight distance:

TABLE 16.7 Sight Distances at Intersections

Design Speed	25	30	35	40	45	50	55	60	65
Residential/Local Streets & Major 2-Lane Roads	280	335	390	445	500	555	610	665	720
4-Lane Undivided and 3-Lane Roads	300	350	425	475	525	600	650	700	750
4-Lane Divided or Larger	325	390	455	515	580	645	710	775	840

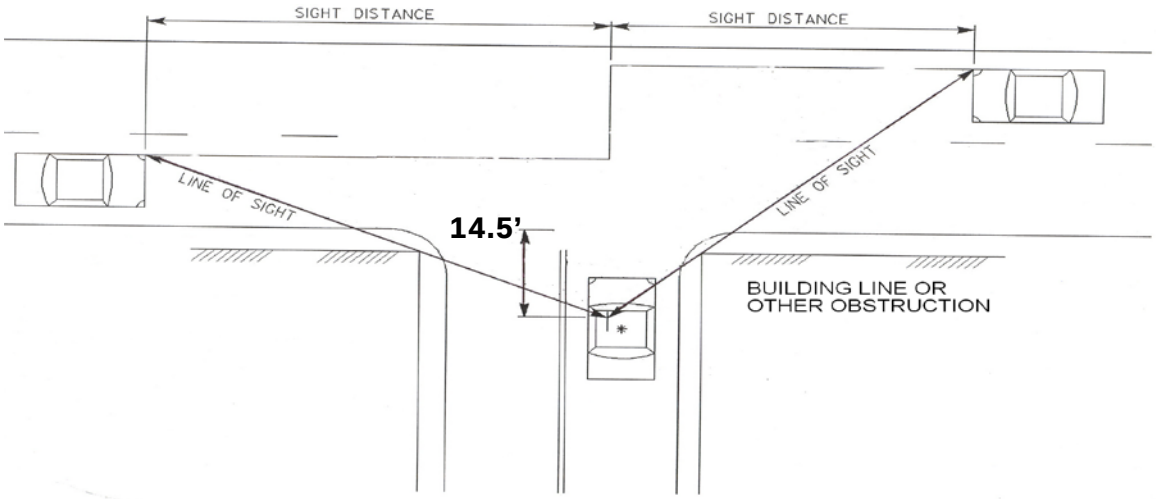

Figure 16-5
Sight Distances

16.9 TRAFFIC IMPACT ANALYSIS (TIA)

A. Traffic analysis may be required to determine the adequate access treatment and will normally by addressed as part of a complete Traffic Impact Analysis required for sites, subdivisions and rezoning depending on the nature of the anticipated traffic generation. The purpose of these studies will be available within a reasonable time period to safely and conveniently accommodate proposed uses permitted under the requested land use or zoning classification. It is suggested that the engineer confer with the Department of Development and Permits - Development Engineering Division and the City Traffic Engineer prior to beginning this type of study to address the limits of the study area, and any special conditions that may be present.

C. Methodology

1. All LOS and capacity analysis should be performed using the latest version of Highway Capacity Manual HCS 2000 software or other methods approved by the City

2. The most current version of the ITE Trip Generation Manuals will be used to determine the trip generation characteristics of the site. This will be based on the most intense development permitted under the proposed zoning classification. Less intensive land use shall be allowed if adequate assurance (PUD development proffers) is given.

3. Any ADT and TMC required for the study should be conducted over three consecutive days (usually Tuesday, Wednesday, and Thursday). The ADT duration should be 24 hours with the TMC intervals between the hours of 6:00 AM to 8:00 AM and 4:00 PM to 6:00 PM with possible weekend and midday counts as needed.

D. Existing traffic counts, both average daily trips (ADT) for roadway segments and turning movements counts (TMC) conducted at intersections, shall be based on data from counts collected or secured by the consultant that are no older than twelve (12) months. If such counts are unavailable, counts shall be performed by the consultant and prepared under the direction of a professional engineer registered in Virginia with expertise in traffic engineering. Collection of traffic counts shall meet the following guidelines.

1. ADT counts should be collected in one-hour increments or smaller and should be directional.

2. Peak hours turning movement counts should be collected on a Tuesday, Wednesday, or Thursday in a non-holiday week and counts should be collected in fair weather conditions. Peak hour turn movement counts should be collected and tabulated in 15-minute increments.

3. Turning movement counts shall be collected in the AM peak period (7 a.m. – 9 a.m.) and PM peak period (4 p.m. – 6 p.m.). Other time period may be required as directed by the City Traffic Engineer.

E. Proposed rezonings will be reviewed to determine the impact the land use change has on access management issues. The Department of Development and Permits will oppose any rezoning that creates a new hardship or that would later give rise to a variance to access management policies.

F. VDOT 527 TIAs

Developments proposed within 3,000 feet of a State-controlled highway (64, 664, 264, 464) may be required to submit a Traffic Impact Analysis to VDOT in accordance with State Code 24 VAC 30-155.

16.10 TRAFFIC SIGNALIZATION

A. All development that affects traffic flow in the public rights-of-way of the City are required to contribute their fair share for the improvements required to maintain adequate traffic flow and access management. Determination of the signal warrant shall be based on the Manual of Uniform Traffic Control Devices and locally applied City Council policy.

B. Where a traffic signal is anticipated upon future development, developer participation will be required for entrances that serve a contributing area on both sides of the road using a common connection. The contributing area is determined by including all property where at least one-third of the traffic will utilize the intersection. Interconnection shall be required if the City determines the signal will be part of a coordinated system. If the proposed site does not immediately generate a traffic signal warrant, than the developer must pay the share for future installation. The figure will be determined based on the sites traffic generation relative to the potential generation (taking into account the future land that remains undeveloped) of the contributing area on both sides of the road.

$$\text{Contribution Amount} = \frac{\text{Site Traffic Generation}}{\text{Anticipated Total Side Street Volume*}} \text{ X } \text{\$ Cost of Signalization}$$

* Includes site, future undeveloped area and any area that has already paid

C. Where the proposed development will generate sufficient traffic to warrant signalization, the design and construction shall be borne by the developer. The developer shall receive funds from previous pro rata contributions in addition to receiving future pro rata contributions from future developments.

D. Where an existing traffic signal must be modified to accommodate traffic movements to or from the development, the developer shall bear the total cost for any design materials, timing plans, installation, interconnect and relocation required to accommodate development traffic.