CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
DIVISION OF TRANSPORTATION

ACCESS MANAGEMENT GUIDELINES

Director of Public Works

June 12, 2002
Date

NORFOLK

CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
ACCESS MANAGEMENT MANUAL

FINAL

Access Management
Quick Sheet Check List
(Final)

Use the Quick Sheet Check List for minor projects or if you submit a preliminary plan to the Division of Transportation for initial comments and feedback.

<u>If a site plan meets all of these criteria, approval will be expedited by the Transportation Division.</u> These are the City of Norfolk standards. Variances are possible but must be separately justified and approved.

1. **Driveway width: 20 ft.- Residential; 30 ft.-Commercial (per Ordinance)**

2. **Angle of driveway entrance, 90°; _____ YES, _____ NO**

3. **Driveway Entrance: _____ Existing/Modified Entrance, _____New Entrance**

4. **Number of Driveways: See Section IIIa; (Shared access encouraged)** (1 access per 100 ft. of street frontage; 2 accesses with 200 ft. of frontage at 50 foot (minimum) spacing)

   Number of proposed driveway(s) _____ ; Lot frontage _____ ft.

5. **Driveway Spacing: 150 ft. between driveways; _____YES, _____NO**

6. **Corner Clearance: See Section IIIa – Minimum of 150 ft. on arterials; _____ YES, _____ NO**

7. **Sight Distance: 30 ft. sight triangle at access points (Section IIIa) _____ YES, _____ NO**

8. **Driveway Throat: _____ 60 ft. off of collectors; _____ 100 ft. off of arterials.**

9. **Median Opening Desired? _____Yes, _____ No; (if Yes, then recommended spacing 1200 feet; 600 feet min. from closest opening based upon traffic impact analysis)**

10. **Signal Impact: _____ Yes, _____ No; (If Yes, then what are the recommended mitigation alternatives as determined from Traffic Impact Analysis, Section II, page 4)**

An engineering analysis by a Professional Engineer is required to support variances and to quantify need for median opening, signal changes, etc.

I. General

a. Access management:

Access management is the planning, design, and implementation of land use and transportation strategies that preserve the flow of traffic on the surrounding road system in terms of safety and capacity.

Access management brings significant benefits to the community, such as:

- Improving safety conditions along highways
- Reducing congestion and delays
- Providing property owners with safe access to highways
- Promoting desirable land use patterns

b. Land use and Transportation:

Highways provide access to land, which enables the development of that land. Land uses generate vehicle, pedestrian, bicycle, and transit trips. In order to manage traffic along a highway, both land use and transportation strategies are necessary. To manage one without the other will result in congestion, deterioration of the highway corridor, and resident, business and landowner dissatisfaction.

The construction of a new road, or an improvement of an existing one, results in improved accessibility in the area. This leads to higher land values and drives additional development.

Additional development results in additional traffic and reduced quality of traffic flow. This results in demands for further transportation improvements. Poorly planned development and poorly designed facilities can result in rapid deterioration of traffic service and increase in conflicts and accidents.

c. Roadway Classifications:

Each roadway classification has design criteria, which maintains and protects the primary purpose of the roadway. A roadway, once functionally classified, maintains that classification over the entire length of roadway. The function of each street will dictate structural, geometric, and operational standards. The roadways are classified as determined by the City's General Plan in conjunction

with State and Federal definitions and designations. Direct access onto all classifications shall be regulated.

The main characteristics and functions are detailed in Attachment 1.

II. Traffic Impact Analysis (TIA)

Transportation impact analysis may be required by the City in order to adequately assess the impacts of a development proposal on the existing and/or planned street system. The analysis shall also recommend how to best mitigate those impacts. Adverse impacts include reductions in roadway capacity, level of service, and/or potential safety problems. Types of mitigation may include off-site roadway improvements to the surrounding street network as determined by the traffic impact analysis.

The primary responsibility for assessing the traffic impacts associated with a proposed development will rest with the developer, with the City serving in a review capacity. This study will be the responsibility of the applicant and shall be prepared by a licensed professional engineer, who has specific training in traffic and transportation.

Developers, owners, or agents representing the proposed development, along with the qualified transportation consultant are required to discuss projects with the City prior to starting any analysis. As a minimum, topics for possible discussion at such meetings will include trip generation, directional distribution of traffic, trip assignment, definition of the study area, intersections and roadway corridors requiring critical lane analysis, and methods for projecting build-out volume. This will provide a firm base of cooperation and communication between the City, the owner or developer and the project's consultants in creating future traffic characteristics which realistically define traffic movement associated with the proposed development. Specific requirements will vary depending on the site location. (Ref. 14)

General criteria that require a **Phase One Traffic Impact Analysis**:

a. Development sites/subdivisions that generate an increase of twenty percent(20%) or greater in peak hour trips or 150 vehicle trips per hour in the peak hour.
b. Land Use – any rezoning, including conditional use changes that ALSO requires an amendment to the City's General Plan.

Additional requirements for projects that may not require a phase one traffic impact analysis but may require an engineering analysis justifying the need for site access.

General criteria that require a **Phase Two Traffic Impact Analysis**:

a. When a project impacts an existing congested or high-accident location, or where specific site access and safety issues are of concern.
b. When an additional access from a City roadway to an existing use is being requested and the City does not consider the access necessary for safe and efficient movement of traffic.
c. Request for turn lanes and median breaks.

A sample phase one traffic impact analysis report table of contents as well as the minimum phase one traffic impact analysis requirements are attached for your reference. (Attachment 2)

For phase two analysis situations the guidelines under Section III, Access Management Guidelines, should be adhered to based upon discussions with the City Transportation Engineer. All primary aspects under this section shall be addressed under a minor TIA.

All previous traffic studies relating to the development that are more than two years old, will have to be updated, unless the City determines that conditions have not changed significantly.

The proposed site plan shall provide internal circulation patterns of proposed site build-out and its potential impacts to the right-of-way access.

Upon submission of a draft traffic analysis, the City will review the analysis data sources, methods, and findings. Comments will be provided in a written form. The developer and the project engineer will then have an opportunity to incorporate necessary revisions prior to submitting a final report. All reports shall be approved by the City before acceptance.

For additional site plan criteria, minimum requirements for the City's Site Plan review process as related to transportation issues, please refer to The City of Norfolk, Division of Transportation's Site Plan Criteria.

III. Access Management Guidelines

There are four primary aspects of access management:

a. Driveway access management
b. Median openings
c. Provision of turn lanes – acceleration/deceleration
d. Traffic signal spacing/design

These techniques are integral to the main goal of reducing conflicts. Using these tools can effectively limit the number of conflict points a driver experiences during travel; separate the conflict points that can not be eliminated; and remove slower, turning vehicles from the travel lanes.

These techniques include proper design for the minimum radius into sites, driveways, or street entrances. These will also require that all proposed site designs be able to accommodate their traffic circulation needs onsite so as to not rely on multiple access points to the City roadway system.

IIIa. Driveway Access management

Engineer/developer/owner shall perform an access analysis under the following criteria to ensure the safety and feasibility of the site can be attained:

General:

Driveway Access Criteria:

Although driveways are essential to providing vehicular access to property, they can seriously affect the safety and quality of operation of the adjacent roadway. The safety and efficiency of a roadway depends on the amount and type of interference to vehicles using it. Vehicles entering, exiting, and crossing at driveways cause a significant level of interference. In order to preserve roadway safety and capacity, it is necessary to regulate vehicular movements in and out of driveways.

The presence of preexisting driveway or redevelopment sites does not necessitate the right to the same access after the site is redeveloped. Although all properties have rights of access from the adjacent street, each site must be reviewed with respect to having the minimum interference to the roadway. When conflicts between the two cannot be resolved, preference should be given to the safety of the roadway.

Driveways will meet the street at an angle of 90 degrees whenever possible. Side street access, when available is preferred.

Driveway location:

It is necessary to coordinate the location of access for properties on the opposite sides of the roadway so that they do not interfere with each other.

Driveways directly opposite each other are generally beneficial, for they share a single access location. If this is not possible, it is necessary to provide adequate

left turn storage capacity in advance of each driveway and avoid the overlap of vehicles waiting to turn left into the driveways.

Driveway types:

1. Residential - providing access to single- family or duplex residence
2. Non-residential/Commercial/Industrial - providing access to office, retail or institutional building, or to a hotel, motel, condominium, multi-family/apartment dwelling or an industrial facility.

Typical Driveway widths:

	Residential	Commercial	Industrial
Width	20’	30’	30’

Normal driveway widths are per existing City ordinance.

The width and return radius of driveways and curb cuts will be adequate to accommodate the type and volume of traffic proposed for specific sites. The need for oversized driveways or curb cuts will need to be justified in the traffic impact analysis. Oversized driveways will not exceed 50 feet in width and shall be approved by the City Transportation Engineer.

Number of Driveways:

Residential: Every residential/single family parcel shall have only one driveway/access for each 100 feet frontage or portion thereof for each zoning lot. (Refer to Zoning Ordinance section 15-5 for access to residential properties, Attachment 3)

Horse-shoe driveways may be approved when in compliance with the zoning ordinance, should their use be deemed appropriate by the City Transportation Engineer when in the best interest of safety and all other options have been exhausted.

Additional driveways may be appropriate if the daily traffic volume on the adjacent roadway is 5,000 or more and/or the traffic analysis shows the need based upon volume or operation and the City Transportation Engineer approves.

Non-residential: In non-residential, driveways parcels may have more than one driveway per public street frontage if the total volume to and from the parcel is greater than 500 vehicles-per-day, based on latest Institute of Transportation Engineers Trip Generation figures or actual usage and the parcel has at least 200 feet of frontage on a roadway. The spacing between driveways is recommended to be a minimum of 50 feet measured at the right-of-way line. (Ref 11) The spacing between each driveway and respective property line must be

able to accommodate the applicable radius curb return so as to not interfere with the adjacent property owners potential driveway curb return.

Shared Access:

A joint private access and/or cross access easement may be required and is encouraged by the City between adjacent lots fronting on arterial and collector streets. The use of shared driveways are in order to minimize the total number of access points along those streets and to facilitate safe traffic flow between lots. The location and dimensions of said easement shall be determined on a case by case situation.

The City encourages joint or shared driveway usage. Where implemented, the number of driveways allowed to the parcel is not increased. Legal document giving perpetual easement by adjoining parties rights across each property for use of the shared or joint driveway is required.

In an attempt to promote shared access and circulation systems, development sites under the same ownership or consolidated for the purposes of development and comprised of more than one building site shall be considered unified parcels. Out parcels access shall be internalized using the shared circulation system and designed to avoid excessive movement across parking aisles or queuing across surrounding parking and driving aisles.

Driveway Spacing:

This spacing is the distance between adjacent driveways and should be adequate to allow driveway vehicles to safely queue, accelerate, decelerate, and cross opposing traffic streams without excessive interference with through traffic or traffic using adjacent driveways. The degree of spacing control should be consistent with through traffic speeds and intensity of land development.

For arterial streets, desirable driveway spacing is 150 feet or more. The minimum spacing between driveways is recommended to be 50 feet depending on functionality of the roadway. This will apply to the distance between driveways on the same property and driveways on adjoining properties. Joint driveway access is preferred whenever the 50-foot minimum spacing cannot be met.

Driveway Corner Clearance:

Driveways located in proximity to a major intersection may adversely affect traffic operations. Vehicles exiting the driveways close to intersections may have unexpected conflicts with vehicles turning at the intersection.(Ref. 4)

Driveways are recommended to not be within an intersections functional area – (That area comprised of the perception-reaction time, the maneuver distance, plus the vehicle storage length) (See Figure 3)

Corner clearance for driveway access shall meet or exceed the minimum driveway spacing requirements for that roadway. Corner clearance of 150 feet on arterials is desirable. When minimum spacing requirements cannot be met due to lack of frontage and all means to acquire shared access drives or cross access easements have been exhausted, the developer and/or engineer shall meet with the City Transportation Engineer.

The purpose of the meeting is to review the proposed site circulation pattern and driveway location, and discuss design elements that will minimize impacts and conflicts to the roadway network. This driveway location may be required to have only directional connections (right-in/right-out) and consideration should be given to prohibiting left turns into and out of the driveways. These driveway locations shall be located using best engineering practices.

Driveways located near signalized intersections should also be checked to determine whether signal queues would block the driveway in the traffic impact analysis. Attachment 5, Table 2, (Ref 5), in the appendix, gives the percentage of cycles that the driveway will be blocked at least some time during the cycle. This table assumes random arrivals of through vehicles at the signal.

Sight Distance:

The site plan will be reviewed for any obstructions that interfere with the vision of drivers entering or exiting the property with regard to pedestrians or traffic movements on the right-of-way. A minimum 30' sight triangle is required at all entrances or other sight obstructions, i.e. building, fences, poles, etc. Nothing in this triangle may be higher than 24" at maturity. A larger sight triangle may be required in some cases by the City Transportation Engineer if deemed necessary by traffic volumes or speeds. All designs shall be in accordance with these access guidelines.

Driveway Throat Length:

Commercial driveway entrances should be designed with adequate on-site storage of entering and exiting vehicles to reduce unsafe conflicts with through traffic or on-site traffic and to avoid congestion at the entrance. Throat length should be determined on a case-by-case basis, but generally varies according to the number of trips generated by the land use. A traffic impact analysis based on peak hour demand should be performed to determine the extent of potential queuing problems and how best to resolve them.

A minimum driveway throat length of 60’ for collector streets and 100’ for major arterials may be required. The driveway throat length shall be defined as the distance from the street to the first point of conflict in the driveway. (See Figure 1 below)

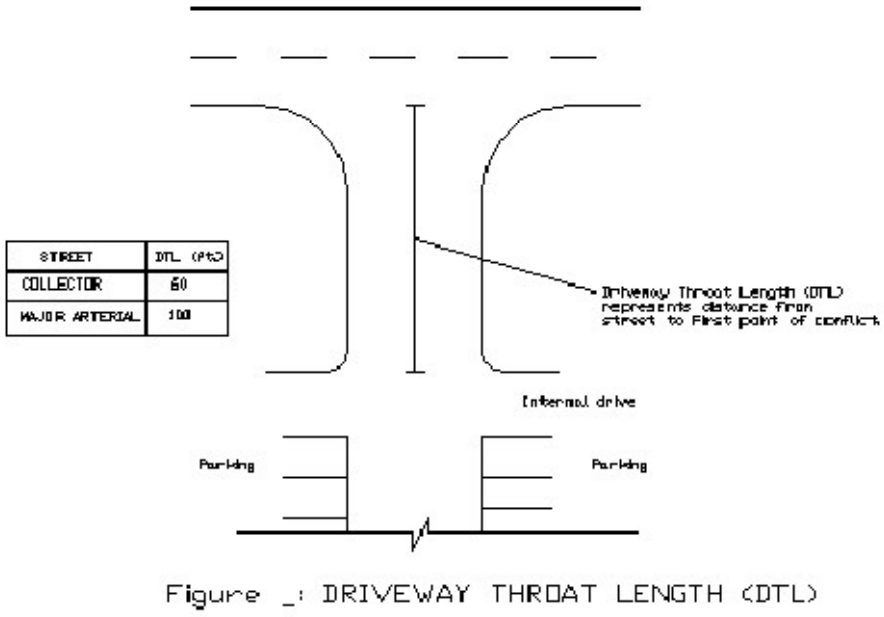


Figure _: DRIVEWAY THROAT LENGTH (DTL)

Figure 1: Driveway Throat Length (DTL)

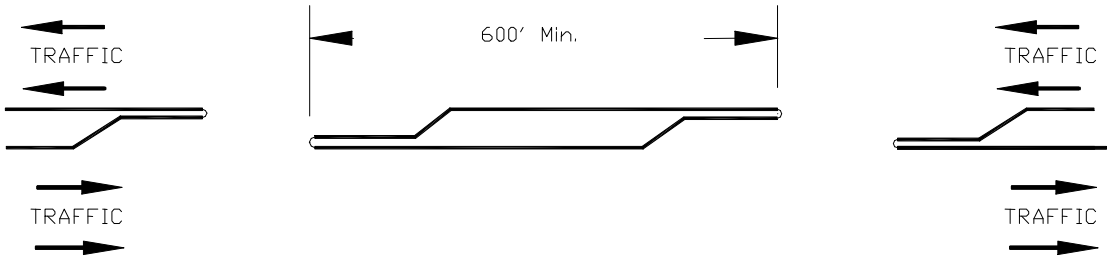
IIIb. Median Openings

Median openings shall be justified based upon the results from a traffic impact analysis of the location. The minimum distance between median breaks or openings shall be 600 feet for arterials. The optimal distance is 1,200 feet. The distance will be measured from the median nose point of curvature to the upstream/downstream median nose point of curvature as shown in Figure 2. The distance can be reduced if a traffic study indicates improved traffic flow can occur or is needed for safety. One-way or directional median breaks will be required in these instances.

The following pertain to median openings:

- No median openings across left turn lanes
- Avoid median openings across right turn lanes
- No median openings in intersection functional area (See figure 3)

Figure 2. Median Opening Spacing Requirements (Ref)



As illustrated in Figure 3, the functional area of an intersection consists of distance traveled during perception-reaction time of approaching an intersection, plus a maneuvering distance traveled while driver decelerates, plus the queue storage distance. The functional area will vary along roadways with different classifications with their associated speed limits.

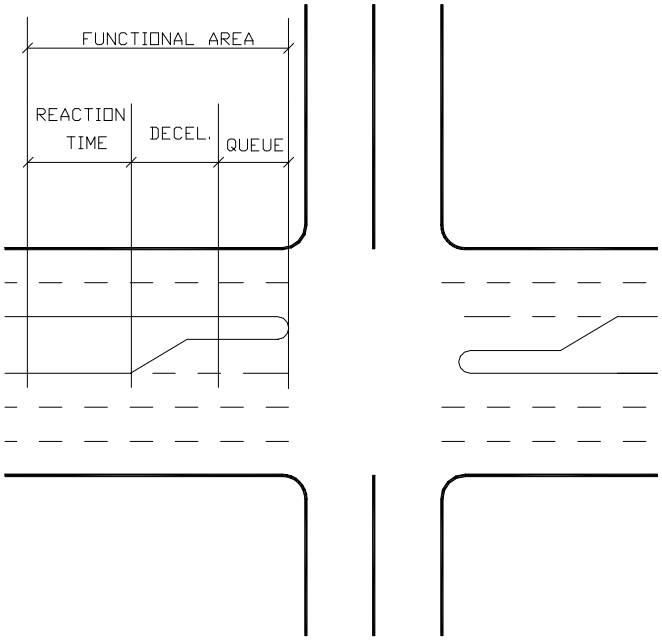


Figure 3. Functional Area Diagram (Ref 7)

General guidelines for median opening spacing that are based upon safety and roadway efficiency considerations are as follows: (Ref 7)

- Stopping sight distance
- Intersection sight distance
- Length of turn lanes, and transitions

IIIc. Acceleration/Deceleration Lanes

The need for acceleration/deceleration lanes will be determined and presented in the traffic analysis.

The conditions under which traffic management techniques, such as a left-turn or a right-turn lane, are justified are based upon volume warrants. For example, the need for a left-turn lane will vary according to the volumes of advancing and opposing traffic, sight distance, and the percentages of traffic turning left.

The required storage lengths and taper lengths for acceleration/deceleration lanes required is dependent on the traffic impact analysis. The minimum storage length is recommended to be 150 feet for a left turn lane on an arterial. (Ref 1)

IIId. Traffic Control Signals

When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.

The need for new traffic signals will be based on warrants contained in the Manual on Uniform Traffic Control Devices (MUTCD), latest edition. In determining the location of a new signal, traffic progression is of paramount importance. Generally a spacing of one-half mile for all signalized intersections should be maintained. This spacing is usually desirable to achieve good speed, capacity, and optimum signal progression. Pedestrian movements shall be considered in the evaluation and adequate pedestrian clearance provided in the signal cycle split assumptions.

An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location. The investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the MUTCD warrants and other factors related to existing operation and safety at the study location.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. A traffic control signal should not be

installed unless an engineering analysis indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.

III. Variance Process

The purpose of a variance procedure is to provide consistent application of engineering decisions involving deviations from adopted access standards. The variance procedures are intended to provide a means by which relief may be granted from unforeseen particular applications of these guidelines that create unnecessary hardships.

All requests for deviations from the standards shall be in writing to the City Transportation Engineer. See Figure 4, A flowchart of the Access Management Variance Process.

Guidelines for Deviations from Standards:

Consideration of individual requests from a specific access management standard should be guided by guidelines such as the following:

1. Approval of deviations shall be in harmony with the purpose and intent of protecting public safety, providing mobility, and preserving the functional integrity of the City of Norfolk transportation network.

2. Deviations shall not be considered until the feasible options for meeting access management standards are explored.

3. Requests for deviation from median opening standards must :
   a. provide documentation of unique or special conditions based upon established engineering principles that make strict application of spacing impractical or unsafe; and
   b. provide document as to how the deviation would affect the traffic efficiency and safety of the street network

4. A deviation shall not be considered under any of the following conditions:
   a. sight distances for the proposed traffic movements would jeopardize safety;
   b. where the provision of the median opening would cause any safety hazard, such as queuing on railroad tracks, school pedestrian crossings, freeway ramps or the functional area of the intersection;
   c. the hardship is self-created by the landowner or business;
   d. any other deviation that would negatively impact safety

5. A complete analysis of the proposed deviation should include the following:
   a. alternatives to safely reroute traffic including “U” turns;

b. adequacy of maneuvering distances;
c. gap availability in the opposing traffic stream
d. any adopted plans to change the roadway design including adopted long range plans or classifications;
e. ability to accommodate future growth and increasing traffic volumes;
f. the potential for relieving neighborhood 'cut through' traffic or the potential for increasing traffic through established residential areas; and
g. ability to maintaining traffic progression during peak and off-peak periods (cycle length, speed, and bandwidth).

6. Conditions that may be viewed favorably in evaluating deviations for a proposed median access opening include:
   a. opportunities to alleviate significant traffic congestion existing or planned signalized intersections;
   b. opportunities to alleviate significant traffic congestion at existing or planned signalized intersections;
   c. opportunities to accommodate a joint access serving two or more traffic generators;
   d. existence of un-relocatiable control points such as bridges, waterways, parks, historic or archaeological areas, cemeteries, and unique natural features; and
   e. where strict application of the standards would result in a safety, maneuvering or traffic operational problem.
   f. restricted driveway design.

Approval of a deviation from engineering standards is an engineering decision and shall be made by the City Transportation Engineer.

The Access Management Variance Process for any submission shall be handled by a panel board of, but not limited to, qualified representatives from the major departments involved with site plan reviews; Public Works, Planning, and Development as shown in Figure 4.

Access Management
Variance Process
Flowchart

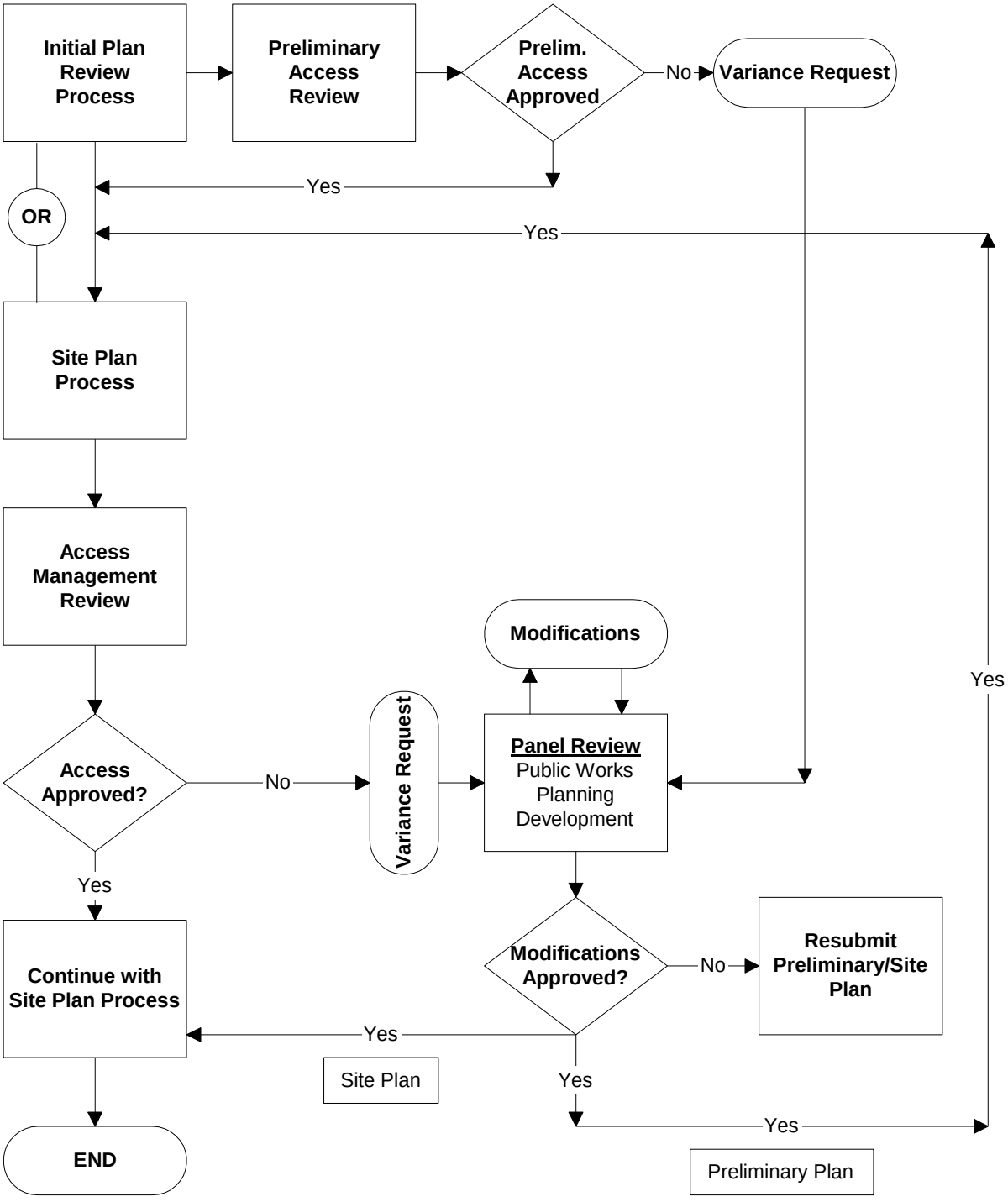


Figure 4

V. References

1. Second National Access Management Conference, FHWA, 1996
2. City Code of Ordinances, Zoning Ordiance,1992, Section 15-5
3. Adapted from Access Management for Streets and Highways, Report IP-82-3, Federal Highway Administration, Washington, D.C., June, 1982.)
4. Stover, Adkins, and Goodknight, "Guidelines for Medial and Marginal Access control on Major Roadways," NCHRP report 93, 1970
5. Stover, V.G., and Koepke, F.J., Transportation and Land Development, ITE, 1998
6. Traffic Management of Land Development course materials, The Traffic Institute of Northwestern University, Evanston, Illinois, January, 1987
7. Adapted from State of Florida Department of Transportation, Access Management and Median Opening Decision Principles (1998) & from Minnesota Department of Transportation Access Management Initiative Technical Study #4, 1999
8. Midwest Research Institute, "Guidelines for the control of direct access to arterial highways" Federal highway Administration, 1975
9. American association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 1990.
10. Traffic Access Impact Studies for Site Development (A proposed recommendation practice), Institute of Transportation Engineers, 1988.
11. Driveway access policy for City of Newport News, Virginia, adopted by City Council May 15, 1990, revised June 14, 1994.
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13. Iowa Department of Transportation's Access Management Handbook, October 2000.
14. City of Huntsville, Alabama; Urban Development; Department of Engineering Traffic Engineering Section: Traffic Engineering Standards 2000.

VI. Attachments

1. Roadway Classifications
2. Traffic Impact Analysis table of contents example & Traffic Impact Analysis Requirements
3. City of Norfolk Appendix A of the Zoning Ordinance Section 15-5
4. Table 2: Percentage of Signal Cycles During Which Queues Will Block Driveway

ATTACHMENTS

Roadway Classifications

1. **Primary Arterial Streets –** an arterial street system serves as a principle network for high volume traffic flow. They should connect areas of principle traffic generation with the following preferred characteristics:

    - Primary purpose of arterial streets is the efficient continuous movement of through-traffic.
    - Posted speed limit will usually be 35 mph or greater with a minimum design speed of 5 mph greater that the posted speed limit.
    - An average daily traffic of 20,000 or more vehicles-per-day projected traffic volume when the land that the arterial serves is fully developed.
    - Arterials are designed for the safety of pedestrians and bicyclists and ease of access to adjacent parcels of land.
    - Traffic control is provided by traffic signals at ¼ mile to ½ mile spacing. Closer spacing will be considered only if traffic study for the length of the arterial shows that the signal progression at the desired speed can be accomplished.

2. **Minor Arterial Streets –** streets that feed the primary arterial system, support moderate length trips, and serve activity centers with the following preferred characteristics:

    - Primary purpose of arterial streets is the efficient continuous movement of through-traffic.
    - Posted speed limit will usually be 30 mph or greater with a minimum design speed of 5 mph greater that the posted speed limit.
    - An average daily traffic of 15,000 or more vehicles-per-day projected traffic volume when the land that the arterial serves is fully developed.
    - Arterials are designed for the safety of pedestrians and bicyclists and ease of access to adjacent parcels of land.
    - Traffic control is provided by traffic signals at ¼ mile to ½ mile spacing. Closer spacing will be considered only if traffic study for the length of the arterial shows that the signal progression at the desired speed can be accomplished.

3. **Collectors –** collectors function to direct traffic from local streets to arterials with the following preferred characteristics:

Attachment 1

3a. Residential Collectors:

- Only allowed within residential subdivisions. Primary purpose to move traffic to arterials and provide access to parks, schools, and shopping centers serving residential neighborhoods.
- Posted speed limit will be between 25mph and 30 mph with a minimum design speed of 5 mph greater that the posted speed limit.
- An average daily traffic from 5,000 to 15,000 vehicles-per-day projected traffic volume when the land that the collector serves is fully developed.
- Collector roads are designed for the safety of pedestrians and bicyclists and ease of access to adjacent parcels of land.
- Parking is not preferred on collectors, especially at intersections
- Traffic control is provided by intersection signing.

3b. Non-residential Collector:

- Primary purpose to channel traffic to arterials with the secondary purpose to provide access to large sections of adjacent properties.
- Posted speed limit will be between 25mph and 35mph with a minimum design speed of 5 mph greater that the posted speed limit.
- An average daily traffic from 5,000 to 15,000 vehicles-per-day projected traffic volume when the land that the collector serves is fully developed.
- Collector roads are designed for the safety of pedestrians and bicyclists and ease of access to adjacent parcels of land.
- Parking is not preferred on non-residential collectors, especially at intersections
- Traffic control is provided by traffic signals at ¼ mile to 1/2 mile spacing.

4. **Local/Neighborhood Streets –** both non-residential and residential local streets have the following preferred characteristics:

    - Primary purpose of local streets is to provide vehicular access to adjacent properties and connect with collector streets.
    - Posted speed limit of 25 mph with a design speed of 5 mph greater that the posted speed limit.
    - Projected average daily traffic volumes of less that 5,000 vehicles-per-day
    - Local roads are designed for the safety of pedestrians and bicyclists and ease of access to adjacent parcels of land
    - Parking typically is allowed on local streets
    - Traffic control is by intersection signing

Attachment 1

Traffic Impact Analysis Table of Contents Example (Ref. 10)

As a guide for the organization of the report, the following sample table of contents is offered:

I. Introduction and Summary

A. Purpose of Report and Study Objectives
B. Executive Summary
   1. Site location and study area
   2. Development description
   3. Principle findings
   4. Conclusion
   5. Recommendations

II. Proposed Development (Site and Nearby)

Summary of Development
1. Land use and intensity
2. Location
3. Site plan
4. Zoning
5. Phasing and timing

III. Area Conditions

A. Study Area
   1. Area of influence
   2. Area of significant traffic impact (may also be part of Chapter IV)
B. Study Area Land Use
   1. Existing land uses
   2. Existing zoning
   3. Anticipated future development
C. Site Accessibility
   1. Area roadway system
      a. existing
      b. future
   2. Traffic volumes and conditions
   3. Transit service
   4. Existing relevant transportation system management programs
   5. Other as applicable

IV. Projected Traffic

A. Site Traffic (each horizon year)
   1. Trip generation
   2. Trip distribution
   3. Modal split
   4. Trip assignment
B. Through Traffic (each horizon year)
   1. Method of projection
   2. Non-site traffic for in study area
      a. Method of projection
      b. Trip generation
      c. Trip distribution
      d. Modal split
      e. Trip assignment
   3. Through traffic
   4. Estimated volumes
C. Total Traffic (each horizon year)

V. Traffic Analysis

A. Site access
B. Capacity and LOS
C. Traffic safety
D. Traffic signals
E. Site circulation and parking

VI. Improvement Analysis

A. Improvement to accommodate base traffic
B. Additional improvements to accommodate site traffic
C. Alternative improvements
D. Status of improvements already funded, programmed, or planned
E. Evaluation

VII. Findings

A. Site accessibility
B. Traffic Impacts
C. Need for any improvements
D. Compliance with applicable local codes

VIII. Recommendations

A. Site Access/Circulation Plan
B. Roadway Improvements
   1. On-site
   2. Off-site
   3. Phasing, if appropriate
C. Transportation System Management Actions
   1. Off-site
   2. On-site operational
   3. On-site
D. Other

IX. Conclusions

Attachment 2

Traffic Impact Analysis Requirements

The following is a comprehensive criteria for a traffic impact analysis. The level of requirement may vary based upon the project as directed by the City Transportation Engineer.

1. A summary table listing each type of land use, the units involved, the general trip generation rates used (daily and AM/PM peaks), the source of the rates used, and the resultant trip generation.

2. Shall show all out parcel developments.

3. The proposed site plan shall provide internal circulation patterns of proposed site build-out and its potential impacts to the right-of-way access.

4. A map that shows the location of each type of land use within the site.

5. Traffic analysis will show the following for existing conditions and the proposed design year (current and with a fully developed site):
   - AM Peak-Hour Proposed Site Traffic (in and out)
   - PM Peak-Hour Proposed Site Traffic (in and out)
   - AM Peak-Hour Background Traffic
   - PM Peak-Hour Background Traffic
   - AM Peak-Hour Total Traffic (in and out)
   - PM Peak-Hour Total Traffic (in and out)
   - Total Daily Traffic
   - Possibly Midday analysis to be required dependant on site location

6. All project-generated traffic will be assigned to existing and planned facilities in a manner consistent with accepted traffic patterns and approved by the City Transportation Engineer.

7. An operational analysis will be conducted for major driveways that intersect collector or arterial streets and at all adjacent arterial-arterial, arterial-collector, or collector-collector intersections. Both peak hours will be tested to determine the critical movements. Pedestrian movements will also be considered in the evaluation.

8. The latest version of Synchro and/or other approved software based on the *Highway Capacity Manual* will be used to evaluate signalized intersections. If necessary, traffic simulations may be required by the City Transportation Engineer.

9. The operational analysis will show impacts on the existing roadway

Attachment 2

system, the expected future roadway system, and any interim roadway system phases that may correspond to expected development phases.

10. Traffic progression on City streets is of paramount importance. Consequently, potential signalized intersections should be placed ½-mile intervals on arterials and at ¼-mile intervals on collectors. Other locations will be considered based on the following criteria:
    a. Existing progression band widths shall be maintained both ways
    b. Cycle lengths shall be less than 120 seconds
    c. Progression speed shall be the posted speed limit
    d. Remaining time for side street traffic must be sufficient for side street volumes

11. Existing Level of Service (LOS) will be the highway and intersection design objective and LOS D will be the minimum for site and non-site traffic operations.

12. Trip generation will be based on average rates contained within the most recent Institute of Transportation Engineers' Trip Generation Guide. The City Transportation Engineer will approve any estimated rates in the event that data is not available for the proposed land use.

13. Internal trips will not exceed 10 percent. Nongenerated passerby traffic reductions in generation volumes may be considered, if applicable. All estimates of trip distribution, assignment, and modal split are subject to review and approval by the City Transportation Engineer.

14. An analysis will be completed that identifies where speed change lanes are needed. Findings will be included in the traffic study report.

15. The analysis will summarize expected project traffic impacts on existing and future (built-out) traffic conditions and state improvements proposed to mitigate those impacts. The developer shall be responsible for the cost of any mitigation plan for that development's onsite and offsite impacts. The City Transportation Engineer shall approve the mitigation plans.

16. All traffic data analysis shall be submitted to the Department of Public Works, Division of Transportation in bound printed form and on 3.5" disk or other approved method. The traffic data should follow the standard Traffic Data Format.

17. Need to show/incorporate all planned, future City/Virginia Department of Transportation (VDOT) right of way projects within the analysis.

18. City will provide any data that we have on file pertaining to analysis.

Attachment 2

City of Norfolk
Appendix A of the Zoning Ordinance
Section 15-5

CODE OF ORDINANCES City of NORFOLK, VIRGINIA Codified through Ord. No. 39,207, adapted June 9, 1998. (Supplement No. 61)\APPENDIX A ZONING DISTRICTS\CHAPTER 15: OFF-STREET PARKING AND LOADING\15-5 OFF-street parking.

(i) Access. All off-street parking facilities shall be designed with appropriate means of vehicular access to a public street or alley in a manner satisfactory to the chief traffic engineer of the department of public works.
In conjunction with the provision of required parking spaces for residential uses, there shall be permitted only one such access for each 100 foot of street frontage or portion thereof for each zoning lot. The size of such access shall be limited as follows:

(1) One-family residences with attached garages:
  (a) Detached dwellings: 20 feet in width.
  (b) Townhouse/Attached dwellings: Ten feet in width.
(2) Two-family residences: Two with a maximum width of ten feet each.
(3) Multiple-family residences: 20 feet in width.
(4) Detached garages: Ten feet in width.

Attachment 3

Table 2. Percentage of Signal Cycles During Which Queues Will Block Driveway (Ref 5)

Percentage of Signal Cycles During Which Queues Will Block Driveway											
Flow in Lane adjacent to Driveway	Duration of Red Phase	Percentage of Cycles During Which Blocking Occurs (Corner Clearance in Number of Autos)									
(vph)	(sec)	1	2	3	4	5	6	7	8	9	10
200	15	20	5	1							
	25	40	16	5							
	35	58	31	13	5	2					
	45	71	46	24	11	4	1				
400	15	50	23	9	3	1					
	25	77	53	30	15	6	2	1			
	35	90	75	55	35	20	10	5	2	1	
	45	96	88	74	56	38	24	13	7	3	2
600	15	71	46	24	11	4	1				
	25	92	79	60	40	24	13	6	3	1	
	35	98	93	83	69	53	37	23	14	7	4
	45	100	98	94	87	76	62	48	34	22	14
800	15	85	65	43	24	12	5	2	1		
	25	98	92	81	65	49	32	20	11	6	3
	35	100	98	95	89	79	66	52	38	26	16
	45	100	100	99	97	93	87	78	67	54	42

Driveways located near signalized intersections should also be checked to determine whether signal queues would block the driveway in the traffic impact analysis. Table 2 gives the percentage of cycles that the driveway will be blocked at least some time during the cycle. This table assumes random arrivals of through vehicles at the signal.

Attachment 4