



*City of Annapolis*

**DEPARTMENT OF PLANNING AND ZONING**

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June 11, 2019

**MEMORANDUM**

**To:** Planning Commission  
**From:** Sally Nash, Ph.D., AICP, Acting Director of Planning and Zoning  
**Re:** Ordinance O-19-19: Adequate Public Facilities (APF) –  
Auto Transportation Facilities  
**Encl:** O-19-19  
*Policies and Guidelines for Traffic Impact Analysis for Proposed  
Development in the City of Annapolis (Existing)*

APW

**Purpose**

This legislation proposes to set in the City Code explicit standards for determining adequacy of existing roads and intersections within a certain distance from a proposed development project. The traffic impact analysis shall show that the roads can accommodate traffic generated by the project, and it requires road improvements if necessary to meet an acceptable level of service.

**Analysis**

This ordinance:

- Defines the review criteria for determining the adequacy of roads and intersections in the City Code.
- Assigns to the Director of Planning and Zoning the responsibility to review and assess the adequacy of roads and intersections and provides that the Director of Planning and Zoning shall consider the recommendations of the Director of Public Works in making the assessment.
- States that the goal of APF for auto transportation facilities is to ensure that all projects generating traffic onto public roads mitigate the impact of their proposed development on those roads and intersections.
- Modifies the provisions for when a traffic impact study is required.

In determining the adequacy of roads and intersections, a traffic impact analysis, paid for by the developer and done in accordance with “Policies and Guidelines for Traffic Impact Analysis for Proposed Project in the City of Annapolis” (see enclosed) is required when:

1. The proposed project is projected to generate 250 net additional trips or more daily as determined using the trip generation rates in the Trip Generation Manual published by the Institute of Transportation Engineers; or
2. The “frequency of accidents or other traffic issues within the 150 distance” described in #3 below have been identified”; or
3. The entrances or exits from the proposed development are within 150 feet of a local road or a higher functional classification as shown on the functional classification map in the City’s Comprehensive Plan.

*It is not clear how criteria #2 will be applied or interpreted. Who will identify whether this is a "frequency of accidents" or "other traffic issues," and what criteria will they use? What does "within the 150 distance" described in criteria #3 mean? Does it mean a traffic impact analysis is required when there is some unspecified frequency of accidents or other traffic issues within 150 feet of a local road or a higher functional classification? Does it mean a traffic impact analysis is required when there is some unspecified frequency of accidents or other traffic issues within 150 feet of the entrance or exit of the proposed development?*

*Staff recommends amending the language in #2 for clarity, identifying who is responsible for identifying the frequency of accidents or other traffic issues, the geographical area to be considered, and the criteria that will be used.*

If a project is not required to have a traffic impact analysis under one of the three criteria above, city, county, and state roads are considered adequate, regardless of the existing level of service of the roads or intersections. Consequently, multiple single developments, each of which generates fewer than 250 trips daily, will be deemed to meet adequacy of public facilities for roads with no mitigation required, even if the roads and intersections are already failing.

When a project generates "between 250 and 400" trips per day, intersections within a quarter mile of each point of entrance of the proposed development are considered adequate if the intersections will operate at a level of service "D." When a proposed project generates more than 400 trips per day, intersections within a half mile of each point of entrance of the proposed development are considered adequate if the intersections will operate at a level of service "D."

*Staff recommends amending "between 250 and 400 trips" (which means 251-399 trips) to "at least 250, but not more than 400" trips daily." We also recommend adding "or exit" to the criteria since all access points from a development may not be entrances to the development.*

If the affected intersections will operate at a level of service "D" or below, the developer is required to bring the level of service up to at least "D," and if the existing or background level of service is "E" or lower, the applicant is required to mitigate "the portion of the trips generated from the proposed project" and construct improvements as required by the Department of Public Works "or the operating agency."

*Staff recommend deleting the words "the portion of." All trips generated by the proposed project should be mitigated. Also, it is not clear who "the operating agency" is or why this language is in the ordinance.*

If the roadway or intersection that requires mitigation is owned by the county or the state or "another jurisdiction," the other jurisdiction shall "decide matters pertaining to the impact of a proposed project on public roads and intersections." The City will then make a determination as to whether the decision of the other jurisdiction concurs with the mitigating improvements proposed by the applicant.

*Staff does not know what other jurisdiction besides Anne Arundel County or the State of*

*Maryland would own a road within the city limits. Also, it is not clear what "matters" another jurisdiction would decide pertaining to the impact of a proposed project on roads and intersections. Is the other jurisdiction making a determination as to whether the roads or intersections are adequate? If so, according to whose standards? Is the other jurisdiction deciding what improvements the developer is required to construct?*

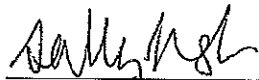
*Also, the parenthesis around the "s" in "improvement(s)" are superfluous and should be deleted.*

The ordinance also provides that capital projects with 100% of the construction costs "allocated in the City or the County's current year adopted capital improvement program or approved for construction in the current year State Consolidated Construction Program may be utilized in the traffic analysis."

*The intent of this provision is to allow the applicant to include in the traffic analysis projects road improvements for which funds have been appropriated in the City or Anne Arundel County's capital budgets. Staff recommends amending this ordinance to use the term "appropriated," not allocated, and to use the term "capital budget" (which is the current year's budget), not "capital improvement program," (which is the five years following the current fiscal year). This will ensure a road with funding programmed, but not yet appropriated, in an outyear is not considered in determining APF for roads.*

Once this ordinance is passed by City Council, staff will need to revise and update the *Policies and Guidelines for Traffic Impact Analysis for Proposed Development in the City of Annapolis.*

Report Prepared by



Sally Nast, Ph.D., AICP  
Chief of Comprehensive Planning

1 **..Title**

2 **Adequate Public Facilities - Auto transportation facilities** – For the purpose of  
3 clarifying the circumstances that would require a traffic impact analysis for a proposed  
4 project; clarifying the standards to be used to determine adequacy; and generally relating  
5 to the adequacy of auto transportation facilities.

6 **..Body**

7  
8 **CITY COUNCIL OF THE**  
9 *City of Annapolis*

10  
11 **Ordinance 19-19**

12  
13 **Introduced by: Alderman Arnett**

14  
15 **Referred to**

16 Planning Commission  
17 Rules and City Government Committee  
18 Transportation Committee

19  
20 **AN ORDINANCE** concerning

21  
22 **Adequate Public Facilities - Auto transportation facilities**

23  
24 **FOR** The purpose of clarifying the circumstances that would require a traffic impact  
25 analysis for a proposed project; clarifying the standards to be used to determine adequacy;  
26 and generally relating to the adequacy of auto transportation facilities.

27  
28 **BY** repealing and re-enacting with amendments the following portions of the Code of  
29 the City of Annapolis, 2019 Edition  
30 22.21.010

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32 **BY** adding the following portions to the Code of the City of Annapolis, 2019 Edition  
33 22.21.020  
34 22.21.030  
35 22.21.040  
36 22.21.050

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38  
39 **SECTION I: BE IT ESTABLISHED AND ORDAINED BY THE ANNAPOLIS**  
40 **CITY COUNCIL** that the Code of the City of Annapolis shall be amended to read as  
41 follows:

42  
43 **TITLE 22 – ADEQUATE PUBLIC FACILITIES**

44  
45 **Chapter 22.21 - TRAFFIC IMPACT ANALYSES REVIEW CRITERIA AND**  
46 **CERTIFICATION FOR AUTO TRANSPORTATION FACILITIES**

1  
2 **22.21.010 - Traffic impact analyses. RESPONSIBILITY**  
3

4 THE DIRECTOR OF PLANNING AND ZONING SHALL BE RESPONSIBLE FOR  
5 REVIEW AND ASSESSMENT OF A PROPOSED PROJECT WITH REGARD TO THE  
6 ADEQUACY OF AUTO TRANSPORTATION FACILITIES. THE REVIEW AND  
7 ASSESSMENT SHALL CONSIDER RECOMMENDATIONS OF THE DIRECTOR OF  
8 PUBLIC WORKS.  
9

10 ~~A. Applicability. Notwithstanding any other provisions of this title, a traffic impact~~  
11 ~~analysis shall be required for:~~

12 ~~1. A project must have a traffic impact study if:~~

13 ~~a. The proposed development and/or additions to existing structure is expected~~  
14 ~~to generate two hundred fifty daily trips or more based upon trip generation~~  
15 ~~rates published in the latest edition of the Trip Generation Manual, published~~  
16 ~~by the Institute of Transportation Engineers (ITE); or~~

17 ~~b. There are current traffic problems or issues in the project area, e.g. high~~  
18 ~~traffic accident frequency; or~~

19 ~~c. The proposed entrances and exits from the site are too close to an intersection.~~

20 ~~2. Exceptions. There are no exceptions to the criteria above.~~

21 ~~B. Procedures for the preparation of traffic impact analyses~~

22 ~~1. The traffic impact analysis will be prepared based upon a uniform scope of work~~  
23 ~~and methodology for traffic impact analyses entitled Traffic Impact Analysis for~~  
24 ~~Proposed Development, City of Annapolis, Maryland, maintained by the~~  
25 ~~Department of Planning and Zoning.~~

26 ~~2. The traffic impact analysis will be performed under the oversight of the~~  
27 ~~Department of Planning and Zoning as follows:~~

28 ~~a. Upon a determination that a development will require a Traffic Impact~~  
29 ~~Analysis, the applicant will be notified of such.~~

30 ~~b. The Department of Planning and Zoning will prepare a scope of services for~~  
31 ~~the traffic impact analysis and solicit a cost estimate(s) from a competent~~  
32 ~~consulting firm(s) for the preparation of the analysis.~~

33 ~~c. The applicant will remit to the Department of Planning and Zoning sufficient~~  
34 ~~funds for the completion of the analysis plus an administrative fee not to~~  
35 ~~exceed ten percent of the projected cost of the analysis. If the completion of~~  
36 ~~the analysis exceeds the funds applicant remitted to the Department of~~  
37 ~~Planning and Zoning, the Department may withhold approval until full~~  
38 ~~payment is remitted.~~

39 ~~d. The Department of Planning and Zoning will contract directly with the~~  
40 ~~consulting firm and oversee the preparation of the traffic impact analysis.~~

41 ~~e. All traffic analysis results will be incorporated into any Adequate Public~~  
42 ~~Facilities Ordinance considerations.~~

43 ~~3. The Department of Planning and Zoning shall be a party to all communications~~  
44 ~~between the project developer and the consultant performing the Traffic Impact~~  
45 ~~Analysis. Should communication occur, to which the Department of Planning~~  
46 ~~and Zoning is not a party, the consultant may not be utilized again by the City~~

1 of Annapolis, or the Department may, at its sole discretion, stop the Analysis  
2 and reinitiate a Traffic Impact Analysis with an alternative consultant at  
3 applicant expense.  
4

5 **22.21.020 - GOAL.**

6  
7 THE GOAL OF ADEQUATE AUTO TRANSPORTATION FACILITIES IS TO  
8 ENSURE THAT ALL PROJECTS GENERATING TRAFFIC ONTO PUBLIC ROADS  
9 AND INTERSECTIONS MITIGATE THE PROPOSED PROJECTS' IMPACT ON  
10 THOSE PUBLIC ROADS AND INTERSECTION FACILITIES.  
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12 **22.21.030 - EXEMPTIONS.**

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14 THERE ARE NO EXEMPTIONS UNDER THIS CHAPTER FOR ANY PROPOSED  
15 PROJECTS.  
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17 **22.21.040 – APPLICABILITY.**

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19 A. NOTWITHSTANDING ANY OTHER PROVISIONS OF THIS TITLE, A  
20 TRAFFIC IMPACT ANALYSIS SHALL BE REQUIRED WHEN:  
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- 22 1. A PROPOSED PROJECT IS EXPECTED TO GENERATE A NET OF  
23 TWO HUNDRED AND FIFTY ADDITIONAL DAILY TRIPS OR MORE  
24 AS DETERMINED USING THE TRIP GENERATION RATES SET  
25 FORTH IN THE EDITION OF THE TRIP GENERATION MANUAL,  
26 PUBLISHED BY THE INSTITUTE OF TRANSPORTATION  
27 ENGINEERS (ITE), IN EFFECT AT THE TIME OF THE FINAL  
28 ADMINISTRATIVE APPROVAL OF THE PROJECT APPLICATION;  
29 OR  
30 2. THE FREQUENCY OF ACCIDENTS OR OTHER TRAFFIC SAFETY  
31 ISSUES WITHIN THE 150 FEET DISTANCE DESCRIBED IN  
32 22.21.040A3 HAVE BEEN IDENTIFIED; OR  
33 3. THE PROPOSED ENTRANCES OR EXITS FROM THE PROPOSED  
34 PROJECT ARE WITHIN 150 FEET FROM A STREET CLASSIFIED AS  
35 A LOCAL ROAD OR A HIGHER FUNCTIONAL CLASSIFICATION  
36 ON THE FUNCTIONAL CLASSIFICATION MAP AS SHOWN IN THE  
37 CITY'S COMPREHENSIVE PLAN IN EFFECT AT THE TIME OF THE  
38 FINAL ADMINISTRATIVE APPROVAL OF THE PROJECT  
39 APPLICATION.  
40

41 B. THE APPLICANT FOR A PROPOSED PROJECT THAT MEETS ANY OF THE  
42 REQUIREMENTS IN 22.21.040(A) SHALL SUBMIT A TRAFFIC IMPACT  
43 ANALYSIS (TIA) IN ACCORDANCE WITH "POLICIES AND GUIDELINES  
44 FOR TRAFFIC IMPACT ANALYSIS FOR PROPOSED PROJECT IN THE  
45 CITY OF ANNAPOLIS" IN EFFECT OF THE DATE OF THE SUBMISSION  
46 OF THE APPLICATION.

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**22.21.050- STANDARDS.**

- A. EXISTING CITY, COUNTY AND STATE ROADS SHALL BE CONSIDERED ADEQUATE TO ACCOMMODATE THE TRAFFIC PROJECTED TO BE GENERATED BY THE PROPOSED PROJECT IF:
  - 1. A PROPOSED PROJECT THAT GENERATES BETWEEN 250 AND 400 TRIPS PER DAY ON THE EXISTING AND PROPOSED CITY, COUNTY AND STATE INTERSECTIONS IN ALL DIRECTIONS WITHIN ONE QUARTER OF A MILE FROM EACH POINT OF ENTRANCE OF THE PROPOSED PROJECT ARE CAPABLE OF ACCOMMODATING A PROJECTED LEVEL OF SERVICE "D" AS DEFINED BY THE HIGHWAY CAPACITY MANUAL PUBLISHED BY THE TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMY OF SCIENCES AND AS AMENDED FROM TIME TO TIME.
  - 2. A PROPOSED PROJECT THAT GENERATES OVER 400 TRIPS PER DAY ON THE EXISTING AND PROPOSED CITY, COUNTY AND STATE INTERSECTIONS IN ALL DIRECTIONS WITHIN ONE HALF OF A MILE FROM EACH POINT OF ENTRANCE OF THE PROPOSED PROJECT ARE CAPABLE OF ACCOMMODATING A PROJECTED LEVEL OF SERVICE "D" AS DEFINED BY THE HIGHWAY CAPACITY MANUAL PUBLISHED BY THE TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMY OF SCIENCES AND AS AMENDED FROM TIME TO TIME.
- B. IF THE RESULTS OF THE TIA ARE THAT THE INTERSECTIONS IN THE STUDY AREA WILL OPERATE BELOW LOS D WITH THE PROPOSED PROJECT IN THE TOTAL TRAFFIC SCENARIO, THE REQUIRED ROADWAY AND/OR INTERSECTION IMPROVEMENTS SHALL BRING THE LEVEL OF SERVICE TO AT LEAST LOS D.
- C. IF THE RESULTS OF THE TIA ARE THAT THE EXISTING OR BACKGROUND LEVEL OF SERVICE IS "E" OR LOWER, THEN THE APPLICANT SHALL MITIGATE THE PORTION OF TRIPS GENERATED FROM THE PROPOSED PROJECT.
- D. IF THE RESULTS OF THE TIA ARE THAT A PROJECT PROPOSAL IS SUBJECT TO MITIGATE ITS PORTION OF TRIPS GENERATED FROM THE SITE, THEN THE APPLICANT SHALL CONSTRUCT THE IMPROVEMENTS AS REQUIRED BY THE DEPARTMENT OF PUBLIC WORKS OR THE OPERATING AGENCY.
- E. THE DEPARTMENT OF PLANNING AND ZONING SHALL PREPARE A SCOPE OF SERVICES FOR THE TRAFFIC IMPACT ANALYSIS.
- F. THE APPLICANT SHALL REMIT TO THE DIRECTOR OF THE DEPARTMENT OF PLANNING AND ZONING SUFFICIENT FUNDS FOR THE COMPLETION OF THE TRAFFIC IMPACT ANALYSIS PLUS AN ADMINISTRATIVE FEE NOT TO EXCEED TEN PERCENT OF THE

1 PROJECTED COST OF THE TRAFFIC IMPACT ANALYSIS. IF THE COST  
2 OF THE COMPLETION OF THE TRAFFIC IMPACT ANALYSIS EXCEEDS  
3 THE FUNDS THAT THE APPLICANT HAS REMITTED TO THE  
4 DEPARTMENT OF PLANNING AND ZONING, THE DIRECTOR SHALL  
5 WITHHOLD APPROVAL UNTIL THE APPLICANT REMITS FULL  
6 PAYMENT.

7 G. IF THE ROADWAY OR INTERSECTION THAT IS BEING CONSIDERED  
8 FOR MITIGATION IS OWNED BY ANOTHER JURISDICTION SUCH AS  
9 STATE HIGHWAY ADMINISTRATION OR ANNE ARUNDEL COUNTY,  
10 THE OTHER JURISDICTION SHALL DECIDE MATTERS PERTAINING TO  
11 THE IMPACT OF A PROPOSED PROJECT ON PUBLIC ROADS AND  
12 INTERSECTION FACILITIES. THE CITY OF ANNAPOLIS SHALL MAKE A  
13 FINDING AS TO WHETHER THE DECISION OF THE OTHER  
14 JURISDICTION CONCURS WITH THE MITIGATING IMPROVEMENT(S)  
15 THAT ARE PROPOSED BY THE APPLICANT.

16 H. CAPITAL PROJECTS WITH 100% OF THE CONSTRUCTION COSTS  
17 ALLOCATED IN THE CITY OR COUNTY'S CURRENT YEAR ADOPTED  
18 CAPITAL IMPROVEMENT PROGRAM OR APPROVED FOR  
19 CONSTRUCTION IN THE CURRENT YEAR STATE CONSOLIDATED  
20 TRANSPORTATION PROGRAM MAY BE UTILIZED IN THE TRAFFIC  
21 ANALYSIS. NECESSARY IMPROVEMENTS IDENTIFIED IN THE TIA TO  
22 MEET THE LEVEL OF SERVICE STANDARDS IN 22.21.050A SHALL BE  
23 PROVIDED BY THE APPLICANT  
24

25  
26 **SECTION II: AND BE IT FURTHER ESTABLISHED AND ORDAINED BY**  
27 **THE ANNAPOLIS CITY COUNCIL** that this ordinance shall take effect from the date  
28 of its passage.  
29

30  
31 **EXPLANATION**

32 UPPERCASE indicates matter added to existing law.

33 ~~Strikethrough~~ indicates matter stricken from existing law.

34 Underlining indicates amendments.  
35





## STAFF REPORT AND FISCAL IMPACT NOTE

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**Ordinance:** O-19-19

**Title:** Adequate Public Facilities (APF) -- Auto Transportation Facilities (i.e. Roads and Intersections)

**Date:** April 27, 2019

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### LEGISLATIVE SUMMARY

This legislation proposes to redefine more specifically when a traffic impact analysis is required in the consideration by the Planning and Zoning Department of adequacy of public facilities in connection with an application to approve a development project. It requires that a traffic impact analysis be performed in accordance with the City's "Policies and Guidelines for Traffic Impact Analysis for proposed projects in the City of Annapolis." It sets forth standards for determining adequacy of existing roads and intersections within a certain distance from the proposed development project to handle traffic generated by the project, and it requires road improvements if necessary to meet the level of service that the project would require. Additionally, the legislation requires that the Planning and Zoning Department retain the firm to perform the traffic impact analysis at the exclusive expense of the applicant, and determine the scope of services that would be performed.

*Prepared by Gary Elson, Assistant City Attorney*

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### STAFF REPORT

This ordinance:

- Defines the review criteria for determining the adequacy of roads and intersections.
- Assigns to the Director of Planning and Zoning the responsibility to review and assess the adequacy of roads and intersections and provides that the Director of Planning and Zoning shall consider the recommendations of the Director of Public Works in making the assessment.
- States that the goal of APF for auto transportation facilities is to ensure that all projects generating traffic onto public roads mitigate the impact of their proposed development on those roads and intersections.
- Modifies the provisions for when a traffic impact study is required.

- Defines the standard for when city, county, and state roads are considered adequate.

In determining the adequacy of roads and intersections, a traffic impact analysis, paid for by the developer and done in accordance with “Policies and Guidelines for Traffic Impact Analysis for Proposed Project in the City of Annapolis,” is required when:

1. The proposed project is projected to generate 250 net additional trips or more daily as determined using the trip generation rates in the Trip Generation Manual published by the Institute of Transportation Engineers; or
2. The “frequency of accidents or other traffic issues within the 150 distance” described in #3 below have been identified”; or
3. The entrances or exits from the proposed development are within 150 feet of a local road or a higher functional classification as shown on the functional classification map in the City’s Comprehensive Plan.

*Comment: It is not clear how criteria #2 will be applied or interpreted. Who will identify whether this is a “frequency of accidents” or “other traffic issues,” and what criteria will they use? What does “within the 150 distance” described in criteria #3 mean? Does it mean a traffic impact analysis is required when there is some unspecified frequency of accidents or other traffic issues within 150 feet of a local road or a higher functional classification? Does it mean a traffic impact analysis is required when there is some unspecified frequency of accidents or other traffic issues within 150 feet of the entrance or exit of the proposed development? I recommend amending the language in #2 for clarity, identifying who is responsible for identifying the frequency of accidents or other traffic issues, the geographical area to be considered, and the criteria that will be used.*

If a project is not required to have a traffic impact analysis under one of the three criteria above, city, county, and state roads are considered adequate, regardless of the existing level of service of the roads or intersections. Consequently, multiple single developments, each of which generates fewer than 250 trips daily, will be deemed to meet adequacy of public facilities for roads with no mitigation required, even if the roads and intersections are already failing.

When a project generates “between 250 and 400” trips per day, intersections within a quarter mile of each point of entrance of the proposed development are considered adequate if the intersections will operate at a level of service “D.” When a proposed project generates more than 400 trips per day, intersections within a half mile of each point of entrance of the proposed development are considered adequate if the intersections will operate at a level of service “D.”

*Comment: I recommend amending “between 250 and 400 trips” (which means 251-399 trips) to “at least 250, but not more than 400” trips daily.” I also recommend adding “or exit” to the criteria since all access points from a development may not be entrances to the development.*

If the affected intersections will operate at a level of service “D” or below, the developer is required to bring the level of service up to at least “D,” and if the existing or background level of service is “E” or lower, the applicant is required to mitigate “the portion of the trips generated

from the proposed project” and construct improvements as required by the Department of Public Works “or the operating agency.”

*Comment: I recommend deleting the words “the portion of.” All trips generated by the proposed project should be mitigated. Also, it is not clear who “the operating agency” is or why this language is in the ordinance.*

If the roadway or intersection that requires mitigation is owned by the county or the state or “another jurisdiction,” the other jurisdiction shall “decide matters pertaining to the impact of a proposed project on public roads and intersections.” The City will then make a determination as to whether the decision of the other jurisdiction concurs with the mitigating improvements proposed by the applicant.

*Comment: I do not know what other jurisdiction besides Anne Arundel County or the State of Maryland would own a road within the city limits. Also, it is not clear to me what “matters” another jurisdiction would decide pertaining to the impact of a proposed project on roads and intersections. Is the other jurisdiction making a determination as to whether the roads or intersections are adequate? If so, according to whose standards? Is the other jurisdiction deciding what improvements the developer is required to construct? Also, the parenthesis around the “s” in “improvement(s)” are superfluous and should be deleted.*

The ordinance also provides that capital projects with 100% of the construction costs “allocated in the City or the County’s current year adopted capital improvement program or approved for construction in the current year State Consolidated Construction Program may be utilized in the traffic analysis.”

*Comment: According to Director Gutwald, the intent of this provision is to allow the applicant to include in the traffic analysis projects road improvements for which funds have been appropriated in the City or Anne Arundel County’s capital budgets. I recommend amending this ordinance to use the term “appropriated,” not allocated, and to use the term “capital budget” (which is the current year’s budget), not “capital improvement program,” (which is the five years following the current fiscal year). This will ensure a road with funding programmed, but not yet appropriated, in an outyear is not considered in determining APF for roads.*

*Prepared by Teresa Sutherland, City Manager*

**FISCAL IMPACT**

This ordinance has no direct impact on City revenues and expenses.

*Prepared by Jodee Dickinson, Finance Director*

# POLICIES AND GUIDELINES FOR TRAFFIC IMPACT ANALYSIS FOR PROPOSED DEVELOPMENT IN THE CITY OF ANNAPOLIS

## INTRODUCTION

The purpose of this document is to establish uniform guidelines for evaluating traffic impacts as part of the development review process for proposed new or an expansion of an existing development requesting access, directly or indirectly or modification of access to the road system in the City. The two main objectives of the Traffic Impact Analysis guidelines are:

- to provide information to potential developers in the City on specific requirements of a traffic impact analysis, and
- to ensure consistency in the preparation and review of such an analysis.

It is believed that such guidelines will help preserve the character and integrity of the road system that are used by vehicles, bicyclists and pedestrians; improve public safety; and maintain the quality of life enjoyed by City residents.

The guidelines outlined in this document are the minimum requirements when a traffic impact analysis is conducted for any proposed development in the City.

Prior to beginning a traffic study, the applicant or designee may submit a Scoping Letter and request the concurrence of the Department of Planning & Zoning. The Scoping Letter specifies the study area, methodology, waiver(s), level of details required for a particular project and other relevant assumptions. Should a scoping meeting be requested, the developer or his/her representative(s) shall submit in writing all issues/concerns to be discussed at the meeting to the Department of Planning & Zoning at least two (2) weeks before the meeting.

There are a number of reasons why traffic impact studies are needed. Traffic impact studies help to:

- to forecast the traffic impacts created by a new development based on accepted practices, not perception.
- to determine improvements needed to accommodate new development
- relate land use decisions with traffic conditions
- identify traffic problems which could affect a developer's decision on pursuing a proposed project

## DEFINITIONS

**Average day:** A Tuesday, Wednesday or Thursday for most uses. The average day may be a Saturday for uses that have higher peak hour traffic volumes on Saturday rather than mid-week.

**Average Daily Traffic:** The total traffic volume passing a point or segment of a roadway in both directions during an average 24-hour period.

**Capacity:** On a roadway link, the maximum number of vehicles which can pass a given point during one hour under prevailing roadway and traffic conditions.

**Existing Traffic:** In a traffic analysis, current traffic in accordance with recent traffic counts on the current road network.

**Gap (critical gap):** The median time headway (in seconds) between vehicles in a major traffic stream which will permit side-street vehicles at STOP or YIELD controlled approach to cross through or merge with major traffic stream under prevailing traffic and roadway conditions

**Level of service:** A qualitative measure describing operational conditions within a traffic stream: generally described in terms of such factors as speed and travel time, delay, freedom to maneuver, traffic interruptions, comfort and convenience, and safety

**Mode choice:** Estimation of the number of trips made by each possible mode such as auto, transit, walking, etc. to make a trip.

**Peak hour:** The one-hour period of greatest utilization of a transportation facility; weekdays normally have two peaks, one in the morning and one in the afternoon. It represents the most critical period of operation and the highest typical capacity requirements.

**Peak Period:** A three-hour or more period during which the transportation facility has significantly increase levels of use, includes the peak hour

**Peak Hour of Generator:** The single hour of highest volume of traffic entering and exiting a site.

**Traffic mitigation:** Reduction of traffic impacts on intersections and/or roadways to an acceptable level of service through the modification of the site plan, roadway construction improvements or improvements in the existing traffic control devices.

**Traffic Impact:** The effect of site traffic on the operations and safety of the road network

**Traffic Impact Analysis:** A traffic engineering study which determines the potential traffic impacts of a proposed traffic generator. A complete traffic impact analysis will include an estimation of future traffic with and without the proposed generator, analysis of traffic impacts and recommended roadway improvements which may be necessary to accommodate the expected traffic.

**Traffic generator:** a designated land use (commercial, industrial, residential, office, etc.) or a change in land use that generates pedestrian and/or vehicular traffic to and from the site.

Trip: A one-way movement by a person or a vehicle having an origin and a destination

Trip assignment: Determination of site and non-site traffic that will use each access point and route

Trip distribution: Allocation of the site generated trips to all possible routes to and from the site.

Trip generation: The process of estimating the number of vehicle trips originating from or destined for the uses on a land parcel

Volume-to-Capacity Ration (V/C): A performance measure computed using the ratio of an actual roadway volume to the capacity of a roadway link.

#### WARRANT FOR A TRAFFIC IMPACT STUDY

A key trigger for conducting a traffic impact study is "trip generation." The trip generation of a proposed development is the number of inbound and outbound vehicle trips expected to be generated by the proposed development during an average day or during a peak period. Per Annapolis City Code Section 22.21.010, a project must have a traffic impact study if:

- The proposed development and/or additions to existing structure is expected to generate two hundred fifty daily trips or more based upon trip generation rates published in the latest edition of the *Trip Generation Manual*, published by the Institute of Transportation Engineers (ITE); or
- There are current traffic problems or issues in the project area, e.g. high traffic accident frequency; or
- The proposed entrances and exits from the site are too close to an intersection

#### STUDY AND REPORT FORMAT

- 1) Introduction and Summary
  - a) Purpose of report and study objectives
  - b) Executive summary—site location and study area, description of the proposed development, major findings, conclusions and recommendations
- 2) Proposed Development
  - a) Site Location
  - b) Land use and intensity
  - c) Site plan of appropriate scale (readable version with access geometries)
  - d) Development phasing and timing (if applicable)
- 3) Study Area
  - a) Size of the geographic area of the study
  - b) Site accessibility
  - c) Land use—existing, approved and anticipated future development

- 4) Existing Conditions Analysis
  - a) Physical characteristics—roadway characteristics, traffic control devices, transit services, pedestrian and bicycle facilities,
  - b) Traffic Volume—daily, morning and afternoon peak periods and others as required (including bicycle and pedestrian volume)
  - c) Existing Level of service—daily, morning and afternoon peak periods and others as required for each movement
    - i) Base roadway and intersection conditions with existing traffic
    - ii) Base roadway and intersection conditions with existing and background traffic
  - d) Critical Gap in Traffic Flow
  - e) Safety
  
- 5) Site Generated Traffic
  - a) Site Trip Generation
  - b) Mode Choice (if applicable)
  - c) Trip Distribution
  - d) Site Traffic Assignment
  
- 6) Total Traffic Analysis
  - a) Site access driveways
  - b) Future Level of Service Analysis and other Measures of Effectiveness
    - i) roadway and intersections with total traffic (existing, background, growth and site generated traffic)
    - ii) there should be tables showing existing traffic, future traffic without the proposed development, and future traffic with the proposed development.
    - iii) roadway and intersections with total traffic and all programmed improvements and/or proposed improvements, if any
  - c) Queue analysis
  - d) Traffic control needs, if any
  
- 7) Roadway and Intersection Improvements
  - a) Site plan/land use techniques
  - b) Roadway improvements
  - c) Operational improvements
  - d) Access management techniques
  - e) Transportation demand management actions
  
- 8) Conclusions
  
- 9) Recommendations
  
- 10) Appendices
  - a) Traffic counts
  - b) Capacity analyses worksheets
  - c) Traffic signal warrant studies, if applicable



## TRAFFIC IMPACT ANALYSIS PROCEDURAL GUIDELINES

### 1. EXECUTIVE SUMMARY AND INTRODUCTION

An executive summary shall be provided at the front of the report. The purpose of the executive summary is to provide a short synopsis of the important findings and conclusions. The executive summary shall be understandable as a stand-alone document and shall include the following information:

- a description of the site location of the proposed development with regard to the area road network
- a description of the proposed development with respect to the types and sizes of all proposed land uses, construction phasing (where applicable) and proposed access points and their relationship to the areas roadway system
- a discussion of all major findings including existing traffic conditions, programmed roadway/transportation improvements (where applicable), site generated traffic volume, background traffic volume and total traffic volume (site and background)
- Levels of service with and without the proposed development
- any roadway and/or intersection improvements that may be proposed to mitigate any potential negative impacts of the proposed development

The traffic impact analysis report shall begin with a brief introduction and an executive summary. The introductory section shall include:

- state the purpose of the report (who conducted the report and why).
- a discussion of the study objectives.

### 2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The description of the proposed development/project must include the following:

- site location
- land use
- site plan
- phasing (where applicable) and timing

#### SITE LOCATION (VICINITY MAP)

A map showing the project location and the study area in relation to all surrounding roads shall be provided. The map shall show the size of the site (in acres) and the amount of frontage available on all adjacent streets.

#### LAND USE

All land uses being proposed for the site shall be described in details. All known tenants and types of uses (e.g. medical offices, banks, fast food restaurants, etc) that will be attracted by the development shall be detailed out. The size or intensity of each specific land use must be stated in the

appropriate units, for example dwelling units for residential development, square feet of gross building area for commercial uses, etc.

#### SITE PLAN

The proposed development drawn to an appropriate scale with the following shall be provided:

- site boundary
- location and size of all land uses within the development, if applicable
- adjacent streets
- existing rights-of-way
- pavement cross sections on all adjacent streets
- location and design of all nearby driveways/street intersections
- location and design of all proposed driveways
- parking layout and internal circulation
- building configurations

#### PHASING AND TIMING

The developer shall provide the expected opening date of the proposed development. If a project is to be built over a period of 5 years or more, a phasing schedule shall also be provided. The phasing schedule shall detail the specific land use; type and size; and expected date of completion of each phase.

### 3. THE STUDY AREA

This section provides some guidelines regarding the determination of the geographic area (size) of the study. The following shall be described in detail in the report: the existing and future land uses in the study area and the transportation system to the site of the proposed development.

#### SIZE OF THE GEOGRAPHIC AREA OF THE STUDY

Table 1 defines the general geographic area of the traffic impact for proposed development of various scales. The final size and shape of the study area is dependent on the size and type of the proposed development, the existing and planned roadway system, adjacent and proposed land uses and the presence of natural and/or man-made barriers.

At the request of the developer (with written justification submitted by the developer), the Department of Planning & Zoning may recommend reduction or elimination of roadway(s) or intersection(s) from the study based on minimal impact and/or excessive distance. Distance is considered relative to the impact (size) of the proposed development.

#### SITE ACCESSIBILITY

The traffic impact report shall contain a description of existing roadway/transportation system in the vicinity of the study area. A special consideration shall be given to all major roads/streets to and from the site. The description must include the following:

- existing traffic volume
- existing operations

- roadway cross sections
- any travel restrictions such as one-way streets, left turn prohibitions
- programmed or planned changes to existing transportation system (new traffic signals, roadway widening and/or extension, bicycle and pedestrian facilities)

**LAND USE IN THE STUDY AREA**

All current land uses and anticipated future development in the vicinity of the proposed development area shall be described in detail in the report. Any planned project that, due to its location and/or size, will significantly impact future traffic conditions shall be noted. Information on current land uses and future development may be obtained from the Planning & Zoning Office and other City departments.

Table 1. Criteria for Determining the Minimum Study Area

Size of development and phase	Average Daily Trips Generated	Years of Completion (build-out)	Minimum Study Area Size
Small, single Phase	less than 200*	1 year	Site access driveways, adjacent signalized intersections and/or major unsignalized intersections within 1,000 ft
Moderate, single Phase	200-399*	1 year	Site access driveways, adjacent signalized and/or major unsignalized intersections within one-quarter (1/4) miles (minimum)
Large, single phase	400 and greater	1 year	Site access driveways, adjacent signalized and/or major unsignalized intersections within one-quarter (1/4) mile (minimum)
Moderate or large, multi-phase	400 and greater	open year of each phase	Site access driveways, adjacent signalized and/or major unsignalized intersections within one-half (1/2) mile (minimum)

\*If a traffic impact study is required by the Director of Planning and Zoning

#### 4. EXISTING CONDITIONS ANALYSIS

The existing conditions provide the basis for comparing traffic impacts of the proposed development. The following must be covered in the analysis of existing conditions: physical characteristics of the existing transportation system, traffic volume counts, level of service, safety, etc.

##### PHYSICAL CHARACTERISTICS

The analysis of the physical characteristics of the existing transportation system shall include the following:

- location of nearby driveways
- roadway geometric—horizontal and vertical alignments sight distances
- lane configurations at each intersection to be analyzed
- traffic control devices, their locations, types, phasing and time (where applicable)—traffic signals, stop signs etc.
- posted speed limit
- bicycle and pedestrian facilities—bike paths/lanes, sidewalks, transit services—passenger shelters, bus stops, etc.

##### TRAFFIC VOLUME COUNTS

Existing traffic volume should be based on current count information. Average three- to seven-day machine counts should be used to determine daily and peak volumes along roadway segments and peak hour turning movement counts should be used to determine peak intersection volumes. Counts that are one to three years old must be increased by 4% per year. Counts that are older than three years should not be used. When traffic counts are conducted when schools are not in session (e.g. during the summer months); the AM and PM peak period traffic volume must be increased by 4% and 5% respectively.

Three-day counts should be taken on Tuesdays, Wednesdays and Thursdays. Peak hour turning movement counts should be based on the highest four 15-minute intervals for AM and PM from a 72-hour period of counts. Where the AM and PM peak periods are well-established for a particular intersection(s) as a result of regular traffic volume counts, a 72-hour period of traffic counts may not be required.

Other peak periods may be specified in addition to, or in place of, the morning/evening peak periods under the following conditions:

- peak period traffic in the study area occurs at different time of the day (noon time, weekdays)
- unusual peaking characteristics of the proposed development (e.g. theater).

Where appropriate, seasonal factors may be used to adjust actual traffic counts with the approval of the Department of Planning & Zoning.

##### CRITICAL GAP IN TRAFFIC FLOW

The median time headway (in seconds) between vehicles in a traffic stream that determines how difficult or easy side-street vehicles cross through or merge with the main traffic stream must be analyzed for all unsignalized intersections in the study area.

## TRANSIT

If vehicle trip reductions are being assumed because of transit services, the following shall be documented: location of bus routes, accessibility to bus stops, frequency of service and hours of operation.

## BIKEWAY AND PEDESTRIAN FACILITIES

If vehicle trip reductions are being assumed because of these facilities, the following must be provided: pedestrian/bikeway facilities that connect or are proposed to connect the proposed development to adjacent trip-generation uses. Proximity to these adjacent uses should be within a 10-minute walk or bike ride.

## BACKGROUND TRAFFIC

Also called non-site traffic, background traffic volume refers to the amount of traffic that will be on the roadway network in the project area without the proposed development. Graphic illustrations of background traffic shall be provided. Sources of background traffic include:

- a 4% annual growth in traffic to build year, if applicable
- traffic generated by other approved developments
- traffic generated from subdivisions with approved final plats
- traffic generated from subdivisions with approved sketch plans
- existing traffic

## EXISTING LEVEL OF SERVICE ANALYSIS

Level of service or capacity analysis shall be done for signalized and unsignalized intersections. The techniques outlined in the latest edition of *Highway Capacity Manual* shall be used.

If a traffic signal is recommended by the study, a warrant study based on the procedures outlined in the latest edition of the *Manual on Uniform Traffic Control Devices (MUTCD)* shall be used.

Computer software that is based on the computational procedures in the HCM may be used. There are two methods of analysis for signalized intersections in HCM: (a) Operational Analysis Method and (b) Planning Analysis Method. Operational Analysis method provides for a full analysis of capacity and the LOS for each lane as well as the intersection as a whole. The Operational Analysis Method shall be used for horizon years up to and including five (5) years. The Planning Analysis Method addresses the status of the intersection with respect to its capacity and it is useful for longer horizon years, six (6) or more years.

A table showing the results of capacity analyses should be included in the report. For signalized intersections, levels of service should be shown with their corresponding control delays for each of the turning movements as well as the weighted average for the intersection as a whole. In the case of unsignalized intersections, the table shall contain levels of service and corresponding control delays in seconds.

A LOS analysis shall be conducted for the following conditions:

- base roadway and intersection conditions with existing traffic
- base roadway and intersection conditions with existing and background traffic

Base roadway and intersections means the existing roadway and intersections conditions and any programmed improvements that will be completed by the end of the horizon year of the proposed development. LOS worksheets shall be provided for the two (2) conditions described above.

## 5 SITE GENERATED TRAFFIC

Site generated traffic analysis involves the estimation of the general characteristics of the additional traffic that will be generated by the proposed development. In addition to trip generation analysis, other analyses that shall be performed are mode choice, trip distribution and trip assignments.

### SITE TRIP GENERATION

Where available, local trip generation rates shall be used. If local trip rates cannot be obtained, the recommended source for site trip generation is the Institute of Traffic Engineers (ITE) Trip Generation. The latest ITE trip generation rates shall be used.

Note that for some land uses, ITE Trip Generation does not have any information, or ITE trip rate is based on limited sample size. In such a situation, other sources may be used. These sources must be justified and documented. The preferred sources include:

- state or county data from comparable development
- other published references
- other trip generation studies for similar developments on similar site

ITE Trip Generation provides data in two forms: the average trip rate, a regression equation. The following steps are recommended for identifying the most correct trip generation estimation:

- Calculate trips based upon both the average rate and equation. If results are close, the question of which to use is irrelevant. If not, go to 2.
- Use equation if there are at least 20 well-distributed data points and the "Y" intercept is near zero. If not, go to 3
- If the correlation coefficient (TV) is 0.75 or higher, use the equation. If not, use the average rate.

Irrespective of the source of trip generation rate, the traffic report shall indicate the sources of trip generation data, including the page number(s), tables, rates/equations used, etc. Any trip generation data used must be reasonable and defensible.

### Trip Reduction Factors

#### Pass-by Trips

The City will allow the assumption of pass-by trips for certain retail and service uses. The recommended allowable percentages outlined in Table 2 are based on data summarized

in ITE publications and other sources. It is important to note that pass-by trips do not affect driveway volumes derived from trip generation rates; it affects only the adjacent street traffic volume. Any other pass-by percentage(s) used and/or any assumption regarding pass-by trips shall be justified and documented.

Table 2. Examples of Recommended Pass-by Percentages

Land Use	Maximum Pass-by %
Service Station	60
Convenience Store	60
Fast Food Restaurant with Drive-through	50
Shopping Center	
Smaller than 100,000 Sq. Ft. GFA	50
Larger than 100,000 Sq. Ft. GFA	25

Diverted Trips

Trips that will be diverted from other roadways because of the proposed development shall be considered as new trips.

Multi-use Development

Total trip generation in a multi-use development may be reduced according to the procedures set forth in the latest ITE Trip Generation Handbook. Multi-use development that may qualify for trip generation reduction must have the following characteristics:

- a. Must have been planned as a single project
- b. Must be at least 100,000 square feet of gross floor area in size
- c. Must contain two or more land uses
- d. Some trips are between on-site land uses
- e. These trips must travel on internal street system to the development
- f. A central business district, a shopping center, an office park with retail, and office building with retail, or a hotel with limited retail and restaurant space are not considered multi-use development.

**MODE CHOICE**

In the ITE Trip Generation, almost all trips are auto-trips since the trip generation data were primarily collected at developments where auto was the primary mode choice. In some cases such as high population density areas, some percentage of trips to and from the proposed development may be made by modes other than auto—on foot, by bicycle or transit. If the assumption is made regarding other mode choices, the report shall indicate the reasonableness of the assumption regarding non-auto trips. Additionally, the report shall document the current travel behavior, availability of transit service and any other relevant data.

## TRIP DISTRIBUTION

Trip distribution analysis is concerned with the flow of traffic between trip origins and destinations within the influence area of the proposed development. Trip distribution analysis provides the spatial dimension to trip generation estimates and thereby permits policy analysis with respect to the planning of the transportation networks.

Any one of the following methods may be used for trip distributions of new trips. The method used and the data source(s) must be documented in the report.

- based on the proximity of trip generators and attractions and on existing travel patterns.
- Any trip distribution model of travel behavior—the gravity models, growth factor models, etc.

In cases where the proposed development has several components, the trip distribution analysis shall be completed for each land use. Site trip distribution shall be expressed in percentage for each direction of travel. Graphic representations showing the directional distribution and the percent of turning vehicles shall be provided.

## SITE TRAFFIC ASSIGNMENT

This involves the assignment of the projected site traffic onto the area roadway network using the estimated directional distributions estimated. This could be done by multiplying the projected site traffic volume by the percent directional distributions on a particular route. Where less than 100 percent auto usage and/or pass-by trips are assumed, these must be deducted before assigning the estimated traffic onto the road network. A diagram illustrating the site traffic assignments shall be provided.

## 6. TOTAL TRAFFIC ANALYSIS

Total traffic consists of existing traffic, growth in existing traffic, background traffic, and site generated traffic. Total traffic analysis involves the analysis of the future roadway and intersection traffic conditions, and any roadway improvements and/or traffic management. Total traffic shall be analyzed with respect to the following:

- site access driveway(s)
- level of service and other measures of effectiveness
- traffic safety
- bicycle/pedestrian considerations
- traffic control needs
- roadway improvements/traffic management

Graphical representations showing the assignment of total traffic volume shall be provided.

## SITE ACCESS DRIVEWAY(S)

Site access driveway(s) to City, County and/or State road is an intersection and therefore shall be analyzed with respect to traffic operations, capacity and safety. Site access driveway analysis shall be based on total traffic volume including pass-by trips.



The location and design of the site access driveway shall be in accordance to the following guidelines (consult Public Works)

- joint access of adjacent properties shall be considered where adjacent frontages are short (150 ft or less)
- adequate spacing from adjacent street and driveway intersections two-way driveways shall intersect the adjacent roadway at a minimum of 75 to a preferred 90 degree angles
- adequate sight distance, safe, etc.

#### FUTURE LEVEL OF SERVICE (LOS) ANALYSIS

The future LOS analysis shall be done for signalized and unsignalized intersections. If state and/or county roads are to be impacted by the proposed development, the developer shall satisfy the requirements by the state and/or the county.

A table showing the results of capacity analyses should be included in the report. Within this table, levels of service should be shown with their corresponding delays and reserved capacities for each of the turning movements as well as the weighted average for the intersection as a whole. There should be tables showing existing traffic, future traffic without the proposed development, and future traffic with the proposed development. An additional table is needed if road improvements are required to show the effect of proposed improvements.

The purpose of the future LOS analysis is to relate the roadway geometrics to traffic operations, identify needs and identify alternatives improvements (if necessary) as a result of the proposed development.

Levels of service and capacity analyses shall be done using the procedures described in Section 4.

#### QUEUE ANALYSIS

Queue analysis is required for all turn lanes for the purpose of estimating queue lengths that need to be accommodated at intersections. Various methods for queue analysis may be used.

#### TRAFFIC SAFETY

Various elements of the site plan and any recommended improvements must be reviewed in relation to pedestrian, bicycle and vehicular safety. Attention must be given to elements such as sight distance; length of turning lanes; and the location, alignment, width and radii of access driveways.

#### PEDESTRIAN SAFETY

The design of access driveways and/or intersections must ensure that pedestrian traffic can be accommodated safely and efficiently, especially in developed areas and/or locations near schools. Pedestrian considerations may include crosswalks if warranted, raised median island and pedestrian display and actuation at signalized intersections.

## TRAFFIC CONTROL NEEDS

If there is a need for traffic control(s) such as signal or other traffic controls, the appropriate type and location of the needed traffic control(s) shall be described in the report. Any proposed stop-controlled intersection must operate at a satisfactory level of service and be designed to operate in a safe manner. If a new traffic control signal is proposed, the location must meet the signal warrants as described in the latest edition of the *Manual on Uniform Traffic Control Devices (MUTCD)*.

## 7. ROADWAY AND INTERSECTION MITIGATION OR IMPROVEMENTS

Mitigation means the construction and/or funding of roadway and/or improvements to off-site road facilities by the developer. Any mitigation plans shall be developed in consultation with the Director of Planning & Zoning and shall be reviewed by the Planning Commission.

Improvements are required if the roadway, the intersection and/or a particular movement will operate below LOS D or worse with the proposed development. Under this condition, the roadway and/or intersection improvements shall bring the level-of-service to at least LOS D.

Improvements will be required if the roadway and/or intersection will operate at LOS E or F for the horizon year(s) without the proposed development, and will be even worse with the proposed development. In this case, the proposed mitigation shall aim to maintain the same level of delay and ensure safety.

In circumstances where mitigation would have a negative impact on the characteristics (historical, environmental or unique urban) which served as the basis for declaring an intersection (s) constrained, mitigation needed to pass the test for adequate road facilities on a constrained road facility shall increase the capacity on the constrained facility to the fullest extent possible without negatively impacting the characteristic(s) which caused the road facility to be constrained.

If the roadway and/or intersection being considered for mitigation is owned by another jurisdiction such as State Highway Administration or Anne Arundel County, the operating agency will be the deciding agent in this procedure. The City of Annapolis will offer a finding that the operating agency concurs with the mitigating improvement(s) being proposed by the applicant.

Mitigation measures may include any roadway and/or intersection capacity improvements except grade separation of the roadways and ramps within the intersection or improvements to through lanes of intermediate arterials and higher classified roads. Under certain circumstances, mitigation measures may include Transportation Demand Management (TDM) strategies to reduce vehicle trips.

Mitigation techniques may include, but are not limited to the following:

- 1) Transportation Demand Management (TDM) strategies

- carpools
- vanpools
- transit services
- shuttle system
- pedestrian/bicycle systems within mixed use developments
- modified work schedules
- employee transportation coordinator

2) Site Plan/Land Use Techniques

- reduce project size
- modify project phasing, if any
- increase driveway queuing
- revise internal circulation
- pedestrian and /or bicycle circulation
- revise vehicle/truck access or circulation

3) Roadway Improvements

- construct a by-pass lane
- pave roadway
- realign street
- improve sight distance
- intersection improvements
- add deceleration/acceleration lanes
- add a traffic signal if warrants/spacing criteria are met
- add a median crossover

4) Operational Improvements

- change signal timing or phasing
- improve signal progression
- reduce peak hour trips through use of transit
- off-peak shift changes (demand management)
- time of day lane changes

5) Access Management Techniques

- increase driveway spacing from intersections relocate driveway(s) or intersection(s)
- reduce number of driveways
- install a median
- develop a service road system
- share access with adjacent land

8. CONCLUSIONS

The report shall include conclusions for the analysis of existing and future conditions and road improvements to mitigate any negative impacts of the proposed development.

## 9. APPENDICES, TABLES

The following materials in the appendices must be included in the report:

- traffic counts
- unsignalized and signalized intersection analysis
- traffic signal warrant studies (if applicable)

All tables and figures must be legible. The following figures and table may be included in the report.

### Suggested Tables and Figures

Table or Figure	Description
Site Location	A map showing site location of the proposed development
Site Plan	A map of the site showing all access points
Existing transportation system	A map of the existing roadway network servicing the site. The map shall show all streets/roads adjacent to the site and site boundaries
Existing and background development	A map showing all existing and background development
Existing peak period turning volumes	A map showing current peak period turning movements
Future transportation system	A map showing anticipated transportation network
Accident collision diagram(s)	Diagram(s) showing historical patterns of accidents
Estimated site traffic generation	A table of estimated site trip generation by each land use component with inbound and outbound traffic
Directional distribution of site traffic	Map or table showing the percentage distribution of site traffic approaching and departing the area on each roadway
Site traffic	A map showing the peak period turning traffic volumes generated by the proposed development in the study.
Background traffic	A map or table showing the peak period turning traffic volumes for background traffic without the proposed development within the study area
Total traffic	A map or table showing total traffic (site and background traffic) within the study area
Levels of service analysis	Figures or tables showing levels of service with their corresponding delays and reserved capacity for intersections, roadway sections and/or individual
Recommended improvements	A map or table showing all recommended mitigation measures for roadway and/or intersection improvements.

## LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS) at signalized intersections are defined in terms of average control delay per vehicle, (also called signal delay). Control delay includes initial deceleration delay, queue move-up time, stopped delay and final acceleration delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost of travel time. Delay is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio (the amount of green time given to an approach) and the v/c ratio for the lane group.

- LOS A: Describes operations with very low average control delay, up to 10 sec. per vehicle. This occurs when progression is very extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
- LOS B: Describes operations with control delay greater than 10 seconds and up to 20 seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.
- LOS C: Describes operations with control delay greater than 20 seconds and up to 35 seconds per vehicle. This higher delays may result from fair progression, longer cycle lengths or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though may still pass through the intersection without stopping.
- LOS D: Describes operations with control delay greater than 35 and up to 55 seconds per vehicle. At level D, the influence on congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratio. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
- LOS E: Describes operations with control delay of greater than 55 and up to 80 seconds per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
- LOS F: Describes operations with control delay in excess of 80 seconds per vehicle. This level, considered to be unacceptable to most drivers, often occurs when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delay levels.