A POLICY FOR DETERMINING ADEQUACY OF EXISTING HIGHWAYS

PREPARED BY:
THE WASHINGTON COUNTY DIVISION OF PUBLIC WORKS
ENGINEERING DEPARTMENT
FOR THE
BOARD OF COUNTY COMMISSIONERS
WASHINGTON COUNTY, MARYLAND

EFFECTIVE APRIL 28, 1992
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TABLE OF CONTENTS

I. PURPOSE

A. The purpose of this policy is to establish the criteria for assessing the adequacy of existing highways and their ability to handle existing as well as additional traffic anticipated by development. This policy is intended to define adequacy as used by and to be used in conjunction with the Adequate Public Facilities Ordinance (APFO) of Washington County adopted October 16, 1990, effective December 1, 1990 and latest revision. The application of this policy shall be subject to interpretation by and initial appeal to the Director of Public Works for Washington County.

B. This policy establishes the minimum requirements for highway elements, pavement conditions and traffic operations prior to approval of development activity. These minimum requirements shall also apply to public or private property incorporating private roads and/or road networks that may become eligible for County acceptance and maintenance.

C. This policy is generic in scope. Because of widely varying roadway configurations and the inability to speculate the type of development proposed, the County has issued this Policy only as a guide. The Division of Public Works, with the Chief Engineer acting as its principal agent, reserves the right to evaluate each road network on an individual basis to determine adequacy or level of study required prior to development approval.

D. Nothing in this policy shall prohibit or prevent the Division of Public Works from evaluating each development on an individual basis or in combination with others to determine total impacts on the road network or from the County reaching an agreement with a developer concerning remedial corrections of existing conditions or to address projected conditions for the purpose of ensuring that public facilities are adequate.

E. Nothing in this policy shall prevent a development from being developed in phases (sections). Road adequacy determinations shall be binding for all phases submitted for final approval.

II. DEFINITIONS

A. GENERAL

For the purpose of this Policy, the following terms, phrases, words and their derivations shall have the meanings given herein. Words in the present tense include the future, the singular number includes the plural, and the plural includes the singular. The word "shall" is mandatory and the word "may" is permissive. The words "used for" shall include "arranged for," "designed for," intended for," "maintained for," constructed for," or "occupied for." The word "individual" shall mean natural person, joint venture, Joint Stock Company, partnership, association, club, company, corporation, business trust or the manager, lessee, agent, servant, officer or employee of any of them. The word "land" shall include water surface and land under water. The term "Policy" shall refer to this Policy and all subsequent additions or amendments thereto.

B. DEFINITIONS

1. Adequate Road – A road segment determined by the Division of Public Works to be adequate for the traffic condition studied based on actual measurements and engineering studies.

2. ADT – Average Daily Traffic, two-way volume.

3. APFO – The Adopted and revised Adequate Public Facilities Ordinance for Washington County, Adopted October 16, 1990, effective December 1, 1990, and latest revision.

4. Background Growth Traffic – Additional traffic to be used in engineering studies consisting of annual growth of existing traffic and anticipated new traffic from specifically identified sources.

5. Board of County Commissioners – The legislative body of Washington County, Maryland.

6. Bridge – A structure without a man-made invert that spans a stream, swale, roadway or railroad together with roadside protective barriers such as parapet walls, traffic barriers, posts, etc. which restrict the clear width of the road or roadside.

7. Capacity – The theoretically calculated maximum number of vehicles that can pass a given point during a one-hour period under the studied conditions

8. Chief Engineer – The duly designated principal agent for the Washington County Division of Public Works or his/her designee.

9. Commercial Development – All development not meeting the definition of Residential Development.

10. Consultant – Civil Engineer, Traffic Engineer, Land Surveyor or other Maryland licensed professional retained by the developer to act on behalf of or perform various professional assignments to obtain development approval.

11. County – Washington County, Maryland.

12. Culvert – A structure which with a man-made invert that spans a stream, swale, roadway or railroad including together with roadside

protective barriers such as parapet walls, guard rail/traffic barriers, posts, etc. which restrict the clear width of the road or roadside.

13. Design Volume – Traffic volumes determined by the Chief Engineer for use in traffic analysis. Volumes shall include existing traffic plus a forecasted increase, typically for a 20-year design period. The volumes can be either design hourly volumes (DHV) or vehicles/day.

14. Developer – Any individual commencing proceedings to effect a development of land for himself or another.

15. Development – Any activity other than normal agricultural activity, that materially affects the existing condition or use of any land or structure including activities requiring subdivision plat, site plan, building permits, and/or zoning certification.

16. DHV – Design Hourly Volume of traffic.

17. Director – The Director of Public Works for Washington County, MD.

18. Division – The Division of Public Works for Washington County, authorized representative for Washington County, MD insofar as it pertains to this policy.

19. Existing Traffic – Traffic volumes to be used in engineering studies representing conditions at the time the study was performed based on actual traffic counts.

20. Highway – (See “Road”)

21. Horizontal Sight Distance – The length of roadway ahead of an object in the roadway, having a specified height, visible to the driver when negotiating a horizontal curve.

22. Intersection – The crossing of two or more roads at the same elevation. For the purpose of this Policy, driveway entrances onto roads are included in this definition.

23. Level of Service, (LOS) – A set of rating conditions describing the efficiency of traffic movement along a road network.

24. Mitigation of Impacts – Steps taken to correct adverse effects of proposed development to the levels or requirements established in the Policy.

25. Original Tract of Land – A parcel of real estate that existed prior to December 1, 1990.

26. Pavement – Shall include but not limited to the road surface materials (including bituminous/asphalt concrete, Portland cement and bituminous surface treatment), the stone sub-base and the earth sub-grade below the road.

27. Planning Commission – The Washington County Planning Commission.

28. Preliminary Consultation – A meeting with either the Planning Staff and/or the Chief Engineer, prior to submittal of a subdivision plat or site plan to determine preliminary requirements and development criteria required by the County.

29. Residential Development – Any development pertaining to any lot, building or portion thereof used exclusively for dwelling units and/or rental sleeping unit occupancy, exclusive of hotels, motels or similar type uses.

30. Road – Public or private rights-of-way or routes intended for vehicular traffic, including highways, freeways, expressways, arterials, parkways, thoroughfares, collector streets, local streets, cul-de-sacs, marginal access roads, avenues, boulevards, lanes and other public or private ways.

31. Road Link – Section of road between intersecting roads that have traffic control devices that interrupt traffic flow.

32. Road Network – The combination of road Segments, Road Links, and Intersections impacted by the Development as determined by the Division.

33. Road Segment – Section of road identified for specific study.

34. Road Width – Measured width of a road from edge of usable hard surface of pavement to edge of usable hard surface of pavement.

35. SHA – Maryland Department of Transportation, State Highway Administration.

36. Structurally Adequate – Determination by the Division that the pavement, bridge or culvert is of sufficient strength to carry the traffic generated by the studied conditions without causing undue failure of the infrastructure.

37. Threshold DHV – Maximum allowable design hourly volume permitted of a given roadway link or intersection based on studied conditions.

38. Town Growth Area – (See "Urban Growth Area")

39. Trip Distribution – Method of assigning trips to road network based on projected travel origins and destinations.

40. Trip Generation – Analytical process that provides the relationship between land use and vehicle trip production.

41. Urban Growth Area – A planning sector designated by a city/town or composition of attractions suited for urbanized growth; established by the Washington County Planning Commission. Urban growth areas are determined from the latest revision of the County Planning Department "GROWTH AREAS" Map.

42. Vertical Sight Distance – The length of roadway ahead of an object in the roadway, having a specified height, visible to the driver when traversing a vertical curve.

III. ROADWAY ELEMENTS

A. DETERMINING ADEQUACY – The affected road network shall be studied using the method and procedures described herein for the following conditions: existing traffic; existing traffic plus background growth traffic; and existing traffic plus background growth traffic plus subject development traffic.

B. EXISTING ROADS DETERMINED INADEQUATE – If existing roads are determined by the Division to be inadequate to handle the traffic volume from any of the studied conditions, the Chief Engineer shall not recommend development approval until the inadequacies are corrected to the satisfaction of the Division or alternative measures are agreed to by the County.

The construction necessary to correct all inadequacies shall result in uniform looking pavement caused by hot mix asphalt overlays with minimal paving joints. Numerous small isolated repairs will require a single overlay extending at a minimum 25' beyond the outermost repair for the full width of pavement as directed in the field by the Division. For those road segments that have only a section considered inadequate, only that section needs to be repaired, complete with overlay, as opposed to the entire segment.

C. ROAD NETWORK – The portion of the overall County road network requiring adequacy for a subject development shall be determined by the Chief Engineer. He will do so on a case-by-case basis and will take into account, among other things, existing traffic conditions in the development area and traffic generated by the subject development.

D. STATE AND MUNICIPAL ROUTES – All routes under the jurisdiction of and/or maintained by the Maryland State Highway Administration (SHA) and incorporated municipalities may be exempt from the requirements of this policy. The Chief Engineer may require analysis of SHA/municipal intersections for the benefit of SHA/municipality to determine operational conditions and need for improvements; however, actual improvements may not be a condition of development approval.

E. CONSULTANT MEASUREMENT AND REPORTING – Consultants shall follow the measurement and reporting procedures contained in **APPENDIX A** when preparing highway adequacy determinations.

F. MINIMUM REQUIREMENTS – The following are specific minimum requirements and considered as an aggregate total, unless otherwise specified.

1. Pavement Width

a. The County requires a minimum pavement width of twenty (20) feet, for all road segments within the road network.

b. Roadways and road segments with less than twenty (20) feet of width must be widened to a minimum of twenty (20) feet and resurfaced in accordance with County standards to obtain an adequacy rating.

c. The Developer shall provide all rights-of-way necessary to accommodate all infrastructure improvements required to address identified inadequacies in accordance with this Policy. The specific limits of rights-of-way required will be determined by the Division.

d. Pavement width requirements in excess of the minimum stated herein shall be based on the capacity analysis procedures cited in this Policy.

2. Sight Distance

a. General.

The road network shall not have any conditions that restrict sight distance below the values set forth in this Policy.

b. Safe Stopping Sight Distance.

The minimum safe stopping sight distance shall be based on the posted regulatory speed limit for the respective road segment. Advisory speeds used with warning signs shall not be used in the determination of safe stopping sight distance. For roadways that are not posted, the design speed based on the functional classification of the road shall be used. Refer to the Comprehensive Plan for the County (2002) and the County Highway Standards to determine the appropriate design speed.

TABLE III-A – SAFE STOPPING SIGHT DISTANCE*

POSTED ROAD SPEED (MPH)*	REGULAR (Feet)	LOW VOLUME (Feet)
25 MPH	155	125
30 MPH	200	165
35 MPH	250	205
40 MPH	305	250
45 MPH	360	300
50 MPH	425	350

*If no posting exists, the road speed shall be based upon the design speed for the functional classification.

c. Horizontal Curvature**.**

The safe stopping sight distance around horizontal curves shall comply with **TABLE III-A**. For roads classified as “local roads and

streets" with design volumes less than or equal to 400 vehicles per day as determined by the Chief Engineer, the "Low volume" values shown shall be used. All other road classifications shall use the "Regular" values.

d. Vertical Curvature.

The safe stopping sight distance over vertical curves comply with **TABLE III-A**. For roads classified as "local roads and streets" with design volumes less than or equal to 400 vehicles per day as determined by the Chief Engineer, the "Low volume" values shown shall be used. All other road classifications shall use the "Regular" values.

e. Intersection(s).

(1) County Jurisdiction Intersections.

Analyze intersections, including driveway entrances, for adequate sight distance based on **TABLE III-B**. For roads classified as "local roads and streets" with design volumes less than or equal to 400 vehicles per day as determined by the Chief Engineer, the values shown in the "Low Volume" column shall be used. All other road classifications shall use the values in the "Regular" column. Should any leg of an intersection exceed the 400 vehicles per day threshold, the "Regular" values shall be used.

TABLE III-B – INTERSECTION SIGHT DISTANCE		
POSTED ROAD SPEED (MPH)*	**REGULAR (Feet)**	**LOW VOLUME (Feet)**
25 MPH	280	125
30 MPH	335	165
35 MPH	390	205
40 MPH	445	250
45 MPH	500	300
50 MPH	555	350

* Road speed shown in **TABLE III-B** shall be that of the intersected road and shall be the posted speed limit. If no posting exists, the road speed shall be based upon the design speed for the functional classification.

(2) Adequate Geometric Configuration.

When analyzing for adequate geometric configuration, considerations may include among others

(i) Adequate paved area for traffic movements

(ii) Excessive intersection skew

(iii) Approach grades.

(3) SHA/Municipal Jurisdiction Intersections.

Analyze intersections, excluding driveway entrances, for adequate site distance based on the standards of the agency having jurisdiction over the intersection being analyzed.

3. <u>Pavement Condition</u>

a. General.

Existing roads are adequate provided that they meet the minimum standards contained herein, are publicly maintained, are all-weather roads (i.e., bituminous/asphalt concrete, Portland cement concrete, or surface treated roads) and that the pavement is in

sound condition as determined by the Chief Engineer. The Chief Engineer shall determine on a case-by-case basis those developments and associated roads that must comply with this section. The Chief Engineer reserves the right to evaluate unique situations and traffic characteristics (i.e., construction traffic type of traffic and volume of heavy trucks) to determine structural adequacy of the pavement section and require improvements.

b. Evaluation Required.

The Consultant/Developer shall evaluate roadway pavements indicated by the Chief Engineer and make recommendations for improvements if any of the following apply.

(1) Visual inspection by the Chief Engineer reveals existing sub-grade distress or failure;
(2) Excessive rutting or shoving of the pavement structure is occurring;
(3) The existing pavement section is structurally inadequate to support the traffic or additional loads imposed; or
(4) The pavement is not adequate in the opinion of the Chief Engineer.

c. Evaluation Method.

(1) Material properties and dimensions used in the analysis shall be based upon “as-built” information, laboratory and/or field-testing, and/or pavement cores, all as approved by the Chief Engineer. Generally, pavement cores and field tests shall be taken along the road segment under study at intervals not to exceed 300’, although a minimum of 2 must be taken at any segment greater than 300’ in length. The core and test

locations shall be somewhat random in order to provide a good representation of general pavement condition and properties. However, specific areas may be identified for coring and/or testing in order to provide reliable information for suspect locations. CBR's shall be determined using the Laboratory-Compacted Soils method (ASTM D1883, incorporating subsection 7.2). Atterburg Limits, gradation analysis, soil classifications and modified proctors (ASTM D1557) shall be performed in accordance with the appropriate ASTM and/or AASHTO standards to verify soil properties. Soil samples for these tests shall be obtained at approximately 1/3 of the coring and testing locations. The Chief Engineer will use the results of these tests to determine those requiring a CBR determination.

(2) The evaluation method shall use the procedures set forth in AASHOTO Guide for Design of Pavement Structures, 1993.

(3) Unless the Division grants prior approval, the design/analysis parameters for all pavement evaluation shall be as follows:

- Terminal Serviceability 1.5
- Reliability 60
- Standard Deviation 0.44

(4) The Consultant shall determine Initial Serviceability of existing pavements based on field conditions at the time of the analysis. He shall assume a value of 4.2 for newly constructed pavement and a value of 1.5 for completely failing pavement. Most pavements will fall in between these values and will be subject to engineering judgment. The serviceability value used shall be subject to approval by the Chief Engineer.

(5) The Consultant shall base the value for the Effective Soil Modulus (Mr) and Effective Structural Number (SN_{eff}) on field conditions and obtain them using either the Visual Survey and Materials Testing or Nondestructive Deflection Testing methods in accordance with Section III, Chapter 5 of the AASHTO Guide for Design of Pavement Structures, 1993.

(6) To be considered adequate, the pavement's life expectancy based on current traffic shall not be reduced by more than 50% when accounting for the new traffic from the development under consideration, unless the remaining life expectancy is at least 15 years which will be considered acceptable, but under no circumstances shall the life expectancy be less than 5 years.

4. Bridges and Culverts

a. General.

The following standards shall be considered general and in most cases minimums. However, the Chief Engineer shall reserve the right to adjust the applicable standard as necessary to properly account for the characteristics of the traffic using the structure (i.e. emergency vehicles, school bus routes, construction traffic, volume of heavy truck traffic, etc.) under consideration as well as the significance of the structure itself.

b. Minimum Width.

The minimum clear width across any bridge or culvert shall be in accordance with **TABLE III-D** as a function of the traffic volume.

TABLE III-D – MINIMUM CLEAR WIDTH (Feet)			
Design Volume (2-Way Vehicles/Day)	**Local Streets & Local Roads**	**Commercial Streets**	**All Others**
0 to 400	18	20	22
401 to 1,500	20	22	22
1,501 to 2,000	22	24	24
More than 2,000	26	28	28

* 15 Ft. single lane structures are permitted at certain locations as approved by the Division.

** Minimum clear width shall be measured from the face of the most restrictive feature (i.e., curb, traffic barrier, railing, etc.).

c. Approach Road.

Measurement of the approach road width shall be at locations in the general vicinity of the structure but outside of any tapers or transitions leading to the bridge.

d. Sight Distance.

Sight distances on road approaches to and across structures shall meet the requirements of Section III.F.2.

e. Posted Weight Limits.

(1) All bridges with a projected increase in traffic due to new development shall satisfy a minimum posted weight limit of 13 tons, except when the design volume exceeds 400 vehicles per day. For those cases, the minimum posted weight restriction shall be 15 tons.

(2) The Chief Engineer shall determine the posted weight restrictions for County owned and maintained structures with concurrence from SHA.

5. Additional Items

Other items such as traffic barrier requirements, roadside obstacles, accident history, pavement markings, traffic control signs, pavement skid resistance, flooding and drainage may impact the adequacy of a road network. Despite the inclusion herein of specific requirements, the Chief Engineer shall review such items on a case-by-case basis as deemed necessary by the Division.

IV. TRAFFIC OPERATIONS

A. DETERMINING ADEQUACY - The affected road network shall be studied using the method and procedures described herein for the following conditions: existing traffic; existing traffic plus background growth traffic; and existing traffic plus background growth traffic plus subject development traffic.

B. EXISTING ROADS DETERMINED INADEQUATE – If existing roads are determined by the Division to be inadequate to handle the traffic volume from any of the studied conditions, the Chief Engineer shall not recommend development approval until the inadequacies are corrected to the satisfaction of the Division or alternative measures are agreed to by the County.

C. ROAD NETWORK – The portion of the overall County road network requiring adequacy for a subject development shall be determined by the Chief Engineer. Such determination will be handled on a case-by-case basis and will take into account, among other things, existing traffic

conditions in the development area and traffic generated by the subject development.

D. STATE AND MUNICIPAL ROUTES – All routes under the jurisdiction of and/or maintained by the Maryland State Highway Administration (SHA) and incorporated municipalities may be exempt from the requirements of this policy. The Chief Engineer may require analysis of SHA/municipal routes for the benefit of SHA/municipality to determine operational conditions and need for improvements; however, actual improvements may not be a condition of development approval.

E. TRAFFIC IMPACT STUDY (TIS)

If so directed by the Chief Engineer, the developer shall be responsible for preparing a Traffic Impact Study (TIS) using the criteria contained in this policy. Where development is to be constructed in phases over time, every effort shall be made to properly account for such phasing in the TIS. However, the determination as to the adequacy of traffic operations shall only be binding for those phases submitted for final approval.

F. MINIMUM REQUIREMENTS

The following are specific minimum requirements and considered as an aggregate total, unless otherwise specified.

1. Road Segments – The minimum LOS acceptable for road segments in all areas shall be LOS D.

2. Intersections

   a. The minimum LOS acceptable for intersections in Urban and Town Growth Areas is LOS D, and in all other areas LOS C. The LOS criteria are based upon each general approach direction and

not the overall intersection LOS. Furthermore, any individual movement not meeting the LOS criteria established herein may be subject to mitigation requirements.

b. All applicable lane lengths shall be adequate to accommodate associated queue lengths and to avoid blocking of adjacent lanes for the 95th percentile queue.

c. Signal warrants shall be evaluated if so directed by the Chief Engineer. Due to the significant amount of engineering judgment required for this analysis, specific adequacy criteria cannot be established, but instead will be addressed on a case-by-case basis by the Chief Engineer.

V. EXEMPTIONS

A. APPLICATION

The exemptions listed in this policy do not supersede or modify any portion of the APFO. These exemptions apply only to this policy and shall not be cumulative with those contained in the APFO.

B. ADEQUATE PUBLIC FACILITIES ORDINANCE

Section 4.1 of the Adequate Public Facilities Ordinance permits exemptions from the ordinance for agricultural parcels conveyed to immediate family members and based on a ratio of total lands. The Developer/Consultant should consider these alternatives before investing in an engineering study of the road network.

C. RESIDENTIAL DEVELOPMENT

1. Application To The Original Tract

   The exemptions described in V.C.2 and V.C.3, below, shall only apply to the original tract of land. The cumulative traffic generation shall not exceed those values specified herein.

2. Four (4) or fewer Peak Hour Trips

   This policy does not apply to those residential developments that generate four (4) or less peak hour trips to any road segment providing the pavement of all road segments within the road network are a minimum of sixteen feet (16') wide. The Developer shall provide rights-of-way from their property fronting the road network consistent with the County or SHA design standards for the highway in question.

3. Between Five and 25 Peak Hour Trips

   For residential developments that generate more than 4 peak hour trips but not more than 25 peak hour trips to any road segment:

   a. Sections III.F.2 and III.F.4.d regarding sight distance shall not apply;
   b. Section III.F.3 regarding pavement condition shall not apply; and
   c. Section III.F.1 regarding pavement width shall not apply, instead the pavement of all road segments within the road network shall be a minimum of eighteen feet (18') wide.

   The Developer shall provide rights-of-way from his property fronting the road network consistent with the County or SHA design standards for the highway in question. All other applicable sections of this Policy shall apply.

5. Drainage

For residential developments affected by Sections V.C.2 through V.C.4, above, drainage will be addressed on a case-by-case basis as required by the Chief Engineer and consistent with all Federal, State, and local regulations.

D. COMMERCIAL DEVELOPMENT

1. Application To The Original Tract

The exemptions described in V.D.2 and V.D.3, below, shall only apply to the original tract of land. The cumulative traffic generation shall not exceed those values specified herein.

2. Fifteen or Fewer Peak Hour Trips

This policy does not apply to commercial developments that generate fifteen (15) or less peak hour trips to any road segment providing the pavement width of all road segments within the road network are a minimum of eighteen feet (18') wide. The Developer shall provide rights-of-way from their property fronting the road network consistent with the County or SHA design standards for the highway in question.

3. Between 16 and 25 Peak Hour Trips

For commercial developments that generate more than 15 peak hour trips, but not more than 25 peak hour trips to any road segment:

a. Sections III.F.2 and III.F.4.d regarding sight distance shall not apply; and
b. Section III.F.3 regarding pavement condition shall not apply.

The Developer shall provide rights-of-way from their property fronting the road network consistent with the County or SHA design

standards for the highway in question. All other applicable sections of this Policy shall apply.

E. CUMMULATIVE IMPACTS

The Engineering Department shall maintain a cumulative database of those developments meeting the exemptions, for monitoring the respective cumulative impacts on roads and bridges.

VI. REFERENCES

A. A policy on Geometric Design of Highways and Streets, AASHTO, 4th Edition, 2001

B. Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400), AASHTO, 2001

C. Trip Generation, ITE, 7th Edition, 2003

D. Highway Capacity Manual, Transportation Research Board, 2000

E. Manual on Uniform Traffic Control Devices for Streets and Highways, FHWA, 2003

APPENDIX A

CONSULTANTS GUIDE FOR PREPARING ROAD CONDITION SURVEY

The Consultant shall perform Road Condition Surveys in accordance with this Appendix.

The Consultant shall submit the completed survey to the Chief Engineer for review using the forms and procedures contained herein. The Chief Engineer shall verify the field measurements periodically to assure accuracy.

Not all sections will apply to all developments under review and accordingly, not all sections of these forms need to be completed. Refer to the Policy to determine what information will be required for a complete adequacy determination for the size and type of development under consideration.

I. ROAD WIDTH MEASUREMENTS

Roadways shall be measured from edge of paving to edge of paving at uniform intervals and at critical areas identified in the field. The uniform measuring interval shall not exceed 10% of the length of road section being evaluated or 0.2 mile, whichever is less. Critical areas shall be identified in the field and will consist of those locations that significantly deviate from the information contained at the uniform intervals.

Roadway width measurements shall be recorded to the nearest tenth of a foot on **FORM A-1** along with appropriate mileage stations.

Washington County Engineering Department Road Condition Survey						FORM A-1
MILEAGE	MILEAGE REDUCED	DESCRIPTION	ROAD WIDTH (Feet)	S.D. 2 Ft.	S.D.3.5 Ft.	
					L	R
		Falling Waters Rd.				
76.8	0.0	Intersection w/MD Rt. 63	18.5		325’	261’
77.0	0.2	-	16.8			
77.2	0.4	Vertical Curve	17.2	185’		
77.4	0.6	-	20.4			
77.5	0.7	Horizontal Curve	19.8	247’		
77.7	0.9	35 MPH Speed Sign	18.6			

FIGURE A-1 – Sample FORM A-1

II. SIGHT DISTANCE MEASUREMENTS

The Consultant shall analyze the horizontal curves, vertical curves, driveways and intersections for adequate sight distance as listed in **TABLES III-A and III-B** of this Policy.

A. HORIZONTAL CURVES – Horizontal curves shall be measured to the nearest foot for adequate stopping site distance using a 3.5 foot high eye height, observing a 2.0 foot high object. The location of the eye and the object shall be 2.0 foot from the centerline of road within the inside lane. The sight distance length shall be measured along the centerline of the road using a measuring wheel. **FIGURE A-2** shows the location for measurement around a horizontal curve.

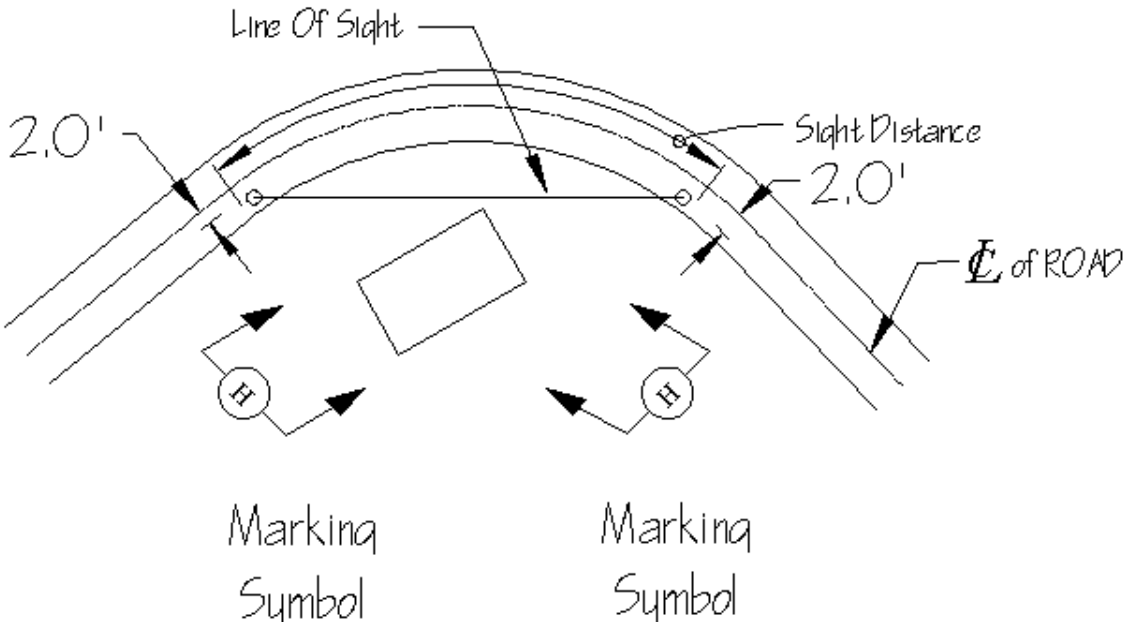

FIGURE A-2 – Horizontal Curve Sight Distance Measurements

Record the sight distance measurements on **FORM A-1** for, at a minimum, all curves that have a sight distance within 25% of the minimum requirements, listing the appropriate mileage station, description and sight distance.

Use florescent orange paint and using the symbol shown in **FIGURE A-2** mark the limits for available sight distance around horizontal curves along the centerline on the road.

B. **VERTICAL CURVES** – Vertical curves shall be measured to the nearest foot for adequate stopping site distance using a 3.5' high eye height, observing a 2.0' high object. The location of the eye and the object shall be along the centerline of road, where practical. In the case of a vertical curve coincidental with a horizontal curve, the measurement may have to be skewed across the roadway to depict the actual line of sight. **FIGURE A-3** shows the sight distance measurements across a vertical curve

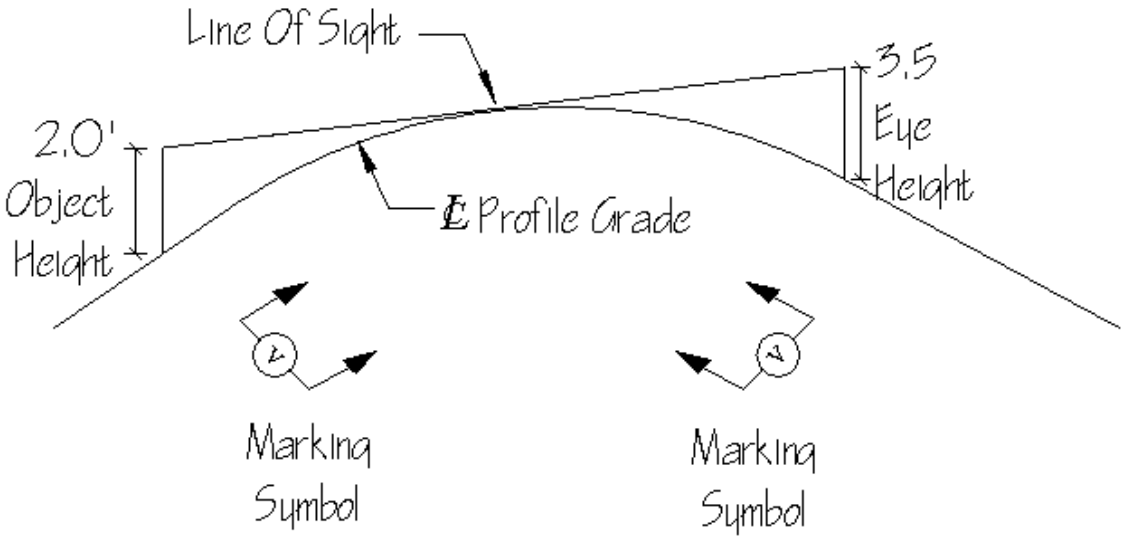

FIGURE A-3 – Sight Distance Measurement on a Vertical Curve

Record the sight distance measurements on **FORM A-1** for, at a minimum, all curves that have a sight distance within 25% of the minimum requirements, listing the appropriate mileage station, description and sight distance.

Use florescent orange paint and using the symbol in **FIGURE A-3** mark the limits for available sight distance across vertical curves along the centerline on the road

C. **INTERSECTIONS** – Intersecting roadways shall meet the minimum sight distance requirements shown in **TABLE III-B** of this Policy. The Consultant shall note that sight distances for each direction may vary.

Intersection sight distance is measured using a 3.5 foot high eye height located 14.4 feet from the edge of the intersecting road; observing a 3.5 foot object height, 2 feet inside the respective travel lane. Intersection sight distance measurements are shown in **FIGURE A-4**.

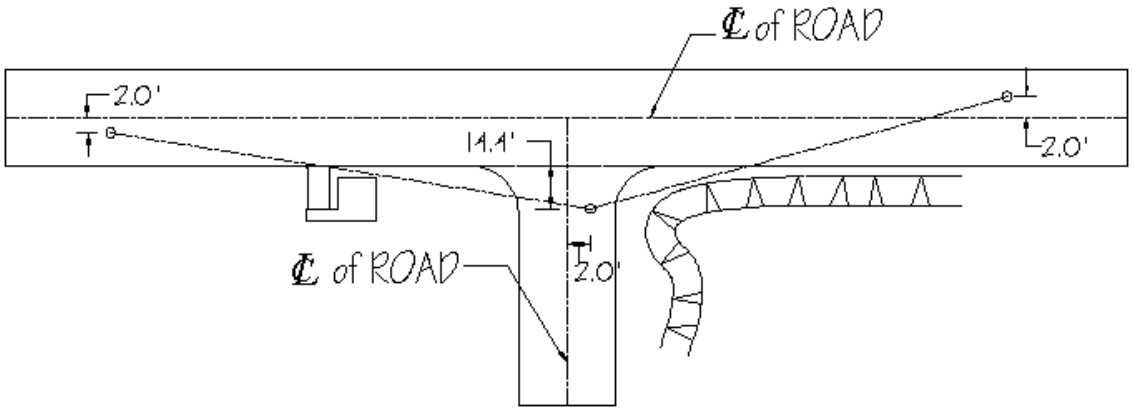

FIGURE A-4 - Intersection Sight Distance Measurements

Record the intersection sight distance measurements on **FORMA-2**.

D. DRIVEWAYS – Measure the available sight distance at the subject development driveway locations in accordance with the criteria stated in Section II.C, above and as shown in **FIGURE A-4**. Record the driveway sight distance on **FORMA-2**.

III. PAVEMENT CONDITIONS

The Consultant shall inspect by visual observation the road segments under evaluation for damage or distress to the pavement. Report the findings in narrative form in the Special Comments section of **FORM A-2**. Include the stationing of any damaged or distressed areas. Any severely damaged or distressed areas may require photographic documentation.

IV. BRIDGES AND CULVERTS

The Consultant shall measure bridges and culverts within the road network for clear width and sight distance across them. Additionally, note any weight restrictions posted and record on **FORM A-2**.

V. TRAFFIC OPERATIONS

When directed by the Chief Engineer, the Consultant shall perform appropriate Traffic Impact Studies in accordance with **APPENDIX B** of this Policy.

VI. SUMMARY

While all inadequacies within the road network may not be known at the completion of the Road Condition Survey, the Consultant shall include a summary of identified inadequacies along with the completed **FORMS A-1** and **A-2**. The summary should be as complete as possible, but at a minimum include the following information:

A. Road sections that fail to meet the minimum road width requirements.

B. Horizontal & vertical curve locations that fail to meet the requirements for minimum stopping sight distance.

C. Proposed driveways and intersections that fail to meet the minimum stopping sight distance requirements.

D. Bridges and culverts that fail to meet the minimum width and/or weight limit requirements.

VII. CERTIFICATION

A certification of the Road Condition Survey is not required. However, the County assumes that the Consultant will prepare this information under the supervision of a Maryland Registered Professional Engineer or Registered Professional Land Surveyor and shall be willing to attest to the accuracy and completeness of the information provided.

FORM A-1

WASHINGTON COUNTY ENGINEERING DEPARTMENT
ROAD CONDITION SURVEY

MILEAGE	MILEAGE REDUCED	DESCRIPTION	ROAD WIDTH	S.D. 2'	S.D. 3.5'	
					L	R

Instructions for FORM A-1:

Increase mileage stationing from the road considered adequate toward the proposed development.

In addition to the uniform measuring intervals, the following critical areas shall be included on **FORM A-1**, as well as on **FORM A-2** with the appropriate mileage station noted.

1. Name of road being measured
2. Intersecting roads
3. Horizontal Curves
4. Vertical Curves

5. Locations of road width measurements
6. Bridges and Culverts
7. Any other feature considered significant for determining adequacy.

FORM A-2

WASHINGTON COUNTY ENGINEERING DEPARTMENT
ROAD CONDITION SURVEY

Date: _____20___ Project Name: _____

By: _____ Of: _____

Description of Development/Subdivision: _____

Road Network: _____

Traffic Volumes:

Road Name	Peak Hourly Volume	Source Code

[1] - Actual Counts [2] - County Records [3] - SHA Records

Alignment:

Does the road segment under evaluation contain any horizontal or vertical curves that restrict sight distances? Yes ____, No ____.

Bridge or Culvert Restrictions:

Mileage station	Clear Width	Posting	Sight Distance

Driveway Sight Distance:

Lot Number	Left	Right	Obstruction

Intersection Sight Distance:

Intersection of			Left	Right
	and			
	and			
	and			
	and			

Special Comments:

APPENDIX B

GUIDELINES
FOR PREPARING TRAFFIC IMPACT STUDIES

I. **GENERAL** – The purpose of a Traffic Impact Study (TIS) is to evaluate the projected traffic impacts of proposed development on the affected highway system. Engineers will use the TIS to determine existing and anticipated traffic conditions, along with required improvements to mitigate any deficiencies.

Once it has been determine that a TIS is required, the Chief Engineer will prepare a detailed scope of work, often in consultation with SHA and/or any affected municipalities. The scope of work will designate which intersections and road segments the Consultant is to analyze and the procedures that he is to use. Because the information contained in this Appendix is general in nature, the unique characteristics of traffic and/or road networks may require deviation from the provided guidance in order to best evaluate the conditions. Thus, the Division reserves the right to deviate from these guidelines and/or request additional information based upon the findings presented in the TIS.

Along with several basic, documents referenced herein (i.e. Highway Capacity Manual, ITE Trip Generation Rates, MUTCD, etc), various other documents may be useful in performing a TIS. Any document not specifically identified herein shall be subject to approval by the Chief Engineer.

II. **REPORT FORMAT** – The TIS shall include the following information:

A. Table of Contents

B. An introduction with an explanation of the proposed project, description of the project phasing, general description of the timing of the project and an area map showing site location and road network being analyzed. Within this section, clearly identify the study years along with justification for the selected years.

C. A description and analysis of existing conditions, clearly identifying traffic counts used and road network geometry.

D. A description and analysis of background conditions that clearly identify traffic counts used and road network geometry. The background conditions are to represent the anticipated traffic conditions that are expected to exist at the study years selected but without including the anticipated impacts for the proposed project. Among other things, clearly identify and/or provide the following items:

1. Annual growth rate of traffic;
2. Area map showing approved but un-built and/or unoccupied developments;
3. Traffic generated by approved but un-built and/or unoccupied developments; and
4. Description and inclusion in the analysis of highway improvements proposed by others in the study area.

E. A description and analysis of future conditions including the proposed project, clearly identifying traffic counts used and road network geometry. This section consists of adding the project traffic to the background conditions consistent with the study years provided in the introduction.

F. The Conclusions/Recommendations section shall explain the results and provide engineering based recommendations for improvements to address all identified deficiencies, including all analysis to support the recommendations. This section is not intended to assess responsibility for making improvements.

G. Provide appendices that include all pertinent work sheets, traffic counts, photographs, field notes and correspondence.

III. TRAFFIC COUNTS

Perform traffic counts for analysis at each intersection and identified road segment. The Consultant may use previous traffic counts if approved by the Chief Engineer. Generally, traffic counts shall not predate the report preparation by more than 1 year.

The Consultant shall take traffic counts generally between the hours of 7-9am and 4-6pm, Tuesday, Wednesday or Thursday. However, the Chief Engineer may require other days or times depending upon the unique characteristics of the proposed development and/or road network.

The Consultant shall not take counts on State or Federal holidays or during events that would create traffic patterns or volumes that are not indicative of normal conditions.

The Consultant must consider the presence of schools and school activities in the area when determining count dates.

IV. ANALYSIS PROCEDURES

A. The Consultant shall analyze intersections in accordance with the Highway Capacity Manual (HCM), using the latest edition of HCS approved for use by the Chief Engineer (currently 2000). He shall show the results for each peak hour in tabular form. The table shall include the LOS and delay obtained for each intersection movement, approach direction and the overall intersection.

B. The Consultant shall analyze road segments in accordance with the Highway Capacity Manual (HCM), using the latest edition of HCS approved for use by the Chief Engineer (currently 2000). He shall show the results for each peak hour in tabular form. Except for the following

and unless approved by the Chief Engineer, the Consultant shall base all input upon field measurements:

Percentage of Trucks……10%

Percentages of Buses……..0%
Percentage of Recreational Vehicles……2%
Highway Classification……..Class II
Percentage No Passing Zone……100%

C. The Consultant shall analyze all intersections and road segments under State and/or municipal jurisdiction using the procedures of the respective jurisdictions.

D. The Consultant shall perform queuing analyses at all signalized intersection using the latest edition of SYNCHRO approved for use by the Chief Engineer to verify the adequacy of the turning lane length. He shall address both storage lengths and blocking concerns using the 95th percentile queue.

V. TRIP GENERATION AND DISTRIBUTION

A. The Consultant shall determine trip generation using the latest ITE Trip Generation Rates approved for use by the Chief Engineer (currently 7th edition). Should ITE not address the proposed development, or is of a limited sample size; the Consultant may use studies of similar uses if pre-approved by the Chief Engineer. The Consultant shall submit documentation of these studies for verification. Use Peak Hour of Generator (if available) for commercial development unless the Consultant can show that the actual peak hour of the development does coincide with the peak hour of adjacent street, in which case he shall use Peak Hour of

Adjacent Street. He shall use Peak Hour of Adjacent Street for residential development unless directed otherwise.

B. The Consultant shall provide a discussion of the assumptions behind the distribution of all generated trips (both site and approved development).

C. Use of pass-by and diverted trip adjustments in the TIS requires prior approval by the Chief Engineer. The Consultant shall include justification for using either of these adjustments in the TIS.

D. The Division recommends that the Consultant submit trip generation and distribution to the Chief Engineer for approval prior to starting the TIS.

VI. **GROWTH IN EXISTING TRAFFIC** – Increases in existing traffic resulting from growth outside the study area is accounted for by using an annual growth rate. The Consultant shall apply this growth rate to the existing through traffic, and turning movements between and along major through routes. He shall compound the annual growth rate based on the timing and phasing of the development. The annual growth rate shall be 2.5% unless adjusted by the Chief Engineer.

VII. **APPROVED DEVELOPMENT TRAFFIC** – Approved development traffic includes the traffic that is expected to be generated by all approved developments impacting the study area at the time of the TIS preparation, but has not yet materialized as a result of incomplete or unoccupied construction. The Chief Engineer shall provide the consultant with the size and type of this development for inclusion in the TIS. The Chief Engineer may require developments that have not received final County approval, but under review, also be included in the analysis. The Consultant shall be responsible for estimating the traffic generation from this type of development using the procedures described herein and the information clearly documented in the TIS.

VIII. **EXISTING CONDITIONS ANALYSIS** – The existing conditions analysis includes analyzing the study area accounting for existing traffic and conditions using the procedures described herein. In addition to an appropriate narrative explaining the methods and results of the analysis, the Consultant shall present the results in a tabular form.

IX. **BACKGROUND CONDITIONS ANALYSIS** – The background condition analysis includes analyzing the study area, accounting for existing traffic, growth in existing traffic, and approved development traffic using the procedures described herein. This analysis shall take into consideration existing conditions and all transportation improvements anticipated in the study area within the study period. These improvements shall include those that are already programmed by the State, County, Municipalities and/or other developer(s) and the information clearly documented in the TIS. In addition to an appropriate narrative explaining the methods and results of the analysis, the Consultant shall present the results in a tabular form.

X. **FUTURE CONDITIONS ANALYSIS** – The future conditions analysis includes analyzing the study area accounting for both the background conditions and the proposed development generated traffic using the procedures described herein. In his analysis, the Consultant shall consider all of the improvements included in the background analysis, along with any improvements required because of the proposed development, and the information clearly documented in the TIS. In addition to an appropriate narrative explaining the methods and results of the analysis, the Consultant shall present the results in a tabular form.

XI. **TRAFFIC SIGNAL WARRANT ANALYSIS**

A. The Consultant shall base the proposed installation of a traffic signal upon a comprehensive traffic engineering study that examines all aspects of the intersection in accordance with the requirements of the MUTCD. The Chief Engineer shall determine the need for such a study which the

County would typically require in the case of operational problems, excessive side street delay, poor LOS and/or in consideration of an overall signal system.

B. The Consultant may perform an initial or preliminary study by comparing the basic site parameters (volumes and accidents) to the warrants listed in the MUTCD. However, the Division does not consider this as a comprehensive study and it shall only serve to determine if a comprehensive study is necessary.

C. The comprehensive traffic engineering study to justify the need of signalization shall include, but not necessarily be limited to, the following:

1. A site description including detailed schematics/sketches of the intersection and adjoining area showing all relevant features such as general location, physical layout, geometrics, nearby signals and intersections, existing control features, etc.;
2. 12 hour turning movement counts, that are not more than one year old, and include the percentage of trucks. Where the study includes future traffic projections from proposed development, the Consultant shall include a detailed discussion of assumed diurnal distributions;
3. A detailed evaluation of all warrants;
4. Detailed information regarding intersection operations including field observations, identifiable hazards, measured vehicle delay and system needs;
5. Accident data for the last three (3) years in both report and collision diagram form;
6. An evaluation and discussion of the impact signalization will have on safety, operation, delay, queuing, signal spacing and signal systems;
7. An evaluation and discussion of alternate intersection control; and

8. A detailed discussion of the Consultant's recommendation and his justification for it.

D. Satisfying one or more warrants shall not alone justify the installation of a traffic signal. Unless an appropriate engineering study determines that the benefits of signalization outweigh the detriments and that such infrastructure will improve overall safety and/or operation at the intersection, the Chief Engineer shall not approve a traffic signal installation.

XII. CONCLUSIONS/RECOMMENDATIONS

A. Based on the information provided in the TIS, the Consultant shall summarize the results and provide recommendations for improvements to address any deficiencies cited in the study. He shall support all recommendations with appropriate analysis.

B. The Consultant shall provide a schedule if the study suggests phasing for any of the proposed improvements over time.

C. The Consultant shall identify the responsible party, along with evidence of funding and scheduling, for any improvement specified as implemented by "others".

D. The Consultant shall provide a discussion on the feasibility of constructing any of the recommended improvements. Although the Division does not require detailed construction plans, the Consultant's discussion shall include any obvious constraints.

XIII. SUBMITTAL

A. The Consultant shall submit two (2) copies of the initial TIS and all subsequent resubmittals to the Chief Engineer.

B. The Consultant shall submit the appropriate number of copies of the TIS to SHA and/or affected municipalities in accordance with the procedures of the respective jurisdiction.

C. The Chief Engineer shall not grant final TIS approval until all applicable County TIS review fees are paid. The fee amount shall be determined in accordance with the fee structure existing at the time of TIS review.

D. Unless directed otherwise, TIS resubmittals shall be complete reports incorporating all required changes.

E. County TIS approvals shall only be binding for the project phase(s) or section(s) formally submitted to the County for final approval. The TIS shall serve as a planning document for subsequent project phases or sections and may require updating as a condition of their approval.