Appendix C: Transportation

C1: Road Classifications

Road Classifications	Segment Miles
Bonded Local	2.25
BURKWOOD CIR	0.04
GRAPE HOLLY LN	0.29
NANDINA DR	1.03
OLD MILL PLANTATION DR	0.56
WATERSTONE DR	0.22
WILLOW LEAF CIR	0.10
Named Driveway	3.09
BOHON FARM RD	0.60
BUCKEYE RD	0.10
COUNTRY VIEW RD	0.13
FIVE OAKS RD	0.45
KIRK LN	0.07
LAUREL HILL RD	0.13
LAWRENCE LN	0.34
LODI LN	0.09
MARY B PL	0.08
MASONS VIEW LN	0.25
MOONLIGHT LN	0.14
PIPPIN LN	0.12
STONE MOUNTAIN RD	0.25
STRAWBERRY LN	0.00
SUNNYCREST LN	0.12
SUNNYCREST RD	0.14
WILLOW VALLEY RD	0.07
Parkway	2.98
BLUE RIDGE PKY	2.98
Private Road	1.81
COUNTRY HOMES RD	0.11
HARMONY LN	0.26
HENRY FARMS RD	0.21
HILLTOP DR	0.10
PEEBLES LN	0.11
RAINTREE RD	0.56
SPLIT OAK RD	0.29
WELLINGTON RD	0.17

Rural Local	14.31
AMBER CT	0.05
ANN LN	0.06
APPLE GROVE LN	0.78
AUTUMN PARK DR	0.41
BAYBERRY CT	0.09
BERGANBLICK LN	0.23
BOXWOOD CIR	0.05
BOXWOOD DR	0.34
CANYON RD	0.14
CARRIAGE HILLS DR	0.58
CEDAR EDGE RD	0.44
COUNTRYWOOD DR	0.29
CREEK CIR	0.32
CROWN RD	0.28
EMPIRE LN	0.10
FERNWAY DR	0.45
FOREST CREEK DR	0.28
FOREST EDGE DR	0.49
HIGHFIELDS FARM CIR	0.13
HIGHFIELDS FARM DR	0.39
HIGHFIELDS FARM TRL	0.30
HOLLYBERRY CIR	0.06
HOLLYBERRY RD	0.66
LANDMARK CIR	0.22
LEFFLER LN	0.12
LOST MOUNTAIN RD	0.46
MILL RUN CIR	0.28
MONCAP TRL	0.21
OLD BENT MOUNTAIN RD	0.47
PARKWAY DR	0.39
PENCHECK CIR	0.24
POAGES MILL DR	0.66
RAINTREE RD	0.22
RAN LYNN DR	1.06
SPRING RUN DR	0.19
SUNNYVALE RD	0.12

SYLVAN BROOK RD	0.17
TIMBERLINE CIR	0.04
VINYARD RD	0.50
VISTA FOREST DR	0.43
WHISTLER DR	1.09
WINTERWOOD TRL	0.20
WOODBROOK DR	0.32
Rural Local (Shortcut)	10.02
CORNTASSEL LN	1.67
COTTON HILL RD	0.22
DAWNWOOD RD	0.66
MARTINS CREEK RD	0.81
MT CHESTNUT RD	1.18
OLD MILL RD	2.39
POAGE VALLEY RD	0.96
POAGE VALLEY ROAD EXT	1.96

SHAVER RD	0.16
Rural Major Collector	1.17
TWELVE OCLOCK KNOB RD	1.17
Rural Minor Arterial	4.73
BENT MOUNTAIN RD	4.73
Urban Collector	0.29
RAN LYNN DR	0.29
Urban Local	0.64
MONET DR	0.34
SUNNYCREST RD	0.30
Urban Local (Shortcut)	0.60
S ROSELAWN RD	0.60
Urban Other Principal Arterial	0.75
BENT MOUNTAIN RD	0.73
BRAMBLETON AVE	0.02

C2: AADT

VIRGINIA DEPARTMENT OF TRANSPORTATION 2007 ANNUAL AVERAGE DAILY TRAFFIC VOLUME ESTIMATES BY ROUTE SECTION U.S. 221 & INTERSECTING SECONDARY ROADS IN THE STUDY CORRIDOR		
Route	Length	AADT
U.S. 221 / Bent Mountain Road	0.80 mi.: Rt. 745 – Rt. 635	13,284
U.S. 221 / Bent Mountain Road	0.90 mi.: Rt. 690 – Rt. 688	9,880
U.S. 221 / Bent Mountain Road	0.55 mi.: Rt. 1774 – Rt. 694	7,155
U.S. 221 / Bent Mountain Road	0.80 mi.: Rt. 1999 – Rt. 696S	4,327
VA 688 / Cotton Hill Road	0.46 mi.: Rt. 888 – Rt. 221	3,100
VA 694 / Twelve O'Clock Knob Road	0.65 mi.: Rt. 221 – Rt. 1780	1,113
VA 696 / Martins Creek Road	0.15 mi.: Rt. 1790 – Rt. 221	906
VA 1950 / Forest Edge Drive	0.07 mi.: Rt. 221 – Rt. 2035	720
VA 745 / Ran Lynn Drive	0.30 mi.: Rt. 221 – Rt. 690	690
VA 690 / Poage Valley Road Ext.	0.70 mi.: Rt. 691 – Rt. 221	520
VA 752 / Old Mill Road	0.90 mi.: Rt. 764 – Rt. 221	450
VA 690 / Poage Valley Road	0.40 mi.: Rt. 221 – Rt. 923	440
VA 692 / Mt. Chestnut Road	1.67 mi.: Rt. 221 – Rt. 762	380
VA 696 / Apple Grove Lane	0.80 mi.: Rt. 221 – Dead End	340
VA 752 / Old Bent Mountain Road	0.44 mi.: Rt. 221 – Rt. 759	300
VA 1200 / Highfields Farm Drive	0.22 mi.: Rt. 221 – Rt. 1201	260
VA 1776 / Pencheck Circle	0.23 mi.: Rt. 221 – Rt. 1777	200
VA 1952 / Autumn Park Drive	0.42 mi.: Rt. 221 – Cul-de-sac	140
VA 725 / Sunnycrest Road	0.30 mi.: Rt. 221 – Dead End	110
VA 1774 / Empire Lane	0.03 mi.: Rt. 221 – Rt. 1775	100
VA 1999 / Countrywood Drive	0.29 mi.: Rt. 221 – Cul-de-sac	60
VA 707 / Landmark Circle	0.24 mi.: Rt. 221 – Rt. 221	20

Figure 2.10. AADT estimates Note-AADT for Harmony Drive (VA 4087) and Old Mill Plantation Drive (VA 4200) are not available on the state website. Country Homes Road, Moonlight Lane, Strawberry Land and Back Creek Orchard Road are privately maintained and traffic figures are not available.

C3: Crash Data (RCPD)

ROANOKE COUNTY POLICE DEPARTMENT JANUARY 1, 2006 THROUGH MAY 31, 2008 U.S. 221 & INTERSECTING SECONDARY ROADS IN THE STUDY CORRIDOR					
Intersection	2006	2007	2008	Type	Total
Twelve O'Clock Knob Road	6	4	3	7 PI; 6PD	13
Cotton Hill Road	4	5	2	2PI; 9PD	11
Sunnycrest Road	5	3	1	2PI; 6PD	9
Mount Chestnut Road	3	4	2	4PI; 5PD	9
Ran Lynn Drive	3	3	1	4PI; 3PD	7
Poage Valley Road	2	3	2	4PI; 3PD	7
Poage Valley Road Ex.	4	3	0	1PI; 6PD	7
Martin's Creek Road	3	1	1	1PI; 4PD	5
Empire Lane	2	1	1	1 PI; 3PD	4
Countrywood Drive	1	1	2	2PI; 2PD	4
Strawberry Lane	2	2	0	1F; 3PI	4
Apple Grove Lane	0	2	1	1PI; 2PD	3
Pencheck Circle	3	1	0	3PI; 1PD	4
Country Homes Road	0	1	1	2PD	2
Forest Edge Drive	1	1	0	2PD	2
Highfields Farm Drive	0	1	0	1PD	1
Old Mill Drive	1	0	0	1PD	1
Autumn Park Drive	0	1	0	1PD	1
Five Oaks Road	0	0	1	1PD	1
Back Creek Orchard Road	0	1	0	1PD	1
Individual Driveways	1	1	1	3PI	3
TOTALS	41	38	20	1F; 36PI; 59PD	99
*Note: "type" indicates crash resulting in Fatality (F), Personal Injury (PI) and Property Damage (PD)					

Figure2.11. Accident and crash data from Roanoke County Police

In addition to statistics shown in the above table, one verified crash reported by police occurred at each of the following intersections during the 29-month timeframe:

- Cotton Hill Road / Monet Drive
- Cotton Hill Road / Ripplebrook Road
- South Roselawn Road / Ran Lynn Road
- Old Mill Road / Vinyard Road
- Twelve O'Clock Knob Road / Canyon Road
- Twelve O'Clock Knob Road / Poages Mill Drive
- Twelve O'Clock Knob Road / Lost Mountain Road
- Poages Mill Drive / Mill Run Circle
- Vista Forest Drive / Winterwood Drive
- Poage Valley Road Extension / Dawnwood Road
- Mount Chestnut Road / Willow Valley Road
- Poage Valley Road / Ran Lynn Road

Total verified (documented by police report) crashes over the 29-month period within the study area on all roads indicated 115 recorded crashes per Police Department staff.

C4: VDOT Program Information

2.1.1. VDOT Six-Year Improvement Program

The Virginia Department of Transportation (VDOT) is responsible for maintenance along roads in Roanoke County that are part of the state system. Maintenance includes repairs, repaving, snow removal, and major construction. Private roads in the county that are not in the state system are the responsibility of the homeowners along that road for maintenance and improvements. Developers are responsible for roads in subdivisions still being built out, whose roads have not yet been accepted into the state system.

The Transportation Division of the Roanoke County Department of Community Development coordinates local, regional and state efforts to help our community improve safety, traffic and congestion within the County. The Transportation Division acts as a liaison between citizens, developers, County staff and representatives, the Roanoke Valley Metropolitan Planning Organization (MPO), the Roanoke Valley-Alleghany Regional Commission (RVARC) and VDOT.

Secondary Six Year Improvement Plan, Revenue Sharing Program and Rural Addition Program projects are added, removed and prioritized each fiscal year. When projects are fully funded, Roanoke County assists VDOT in the planning, design and construction of these projects.

The Six-Year Improvement Program allocates funds for transportation projects proposed for construction, development or study in the next six fiscal years. The program is updated annually and is categorized into primary and secondary systems projects. The Commonwealth Transportation Board (CTB) is responsible for making decisions regarding the primary system. The localities are responsible for decisions regarding secondary and urban highway system projects. The Virginia Department of Transportation (VDOT) assists to the CTB and the localities.

2.1.2. Secondary Road System Six-Year Plan

The Code of Virginia requires the Board of Supervisors to approve the allocation of funds for projects identified within the Secondary Roads System Six-Year Plan. In order for a project to remain on the Six-Year Plan, the project must receive sufficient funding to begin the preliminary engineering process within the six-year period. Not all of the requests can be funded due to budget constraints, but the requests are prioritized based upon traffic counts, existing and future development, pavement conditions, drainage, safety, and the economic benefit of the project.

The County of Roanoke and the Virginia Department of Transportation (VDOT) are continuously reviewing and updating the Secondary Roads System Six-Year Improvement Plan. Secondary roads are defined as any route number 600 or greater. Staff receives requests throughout each fiscal year concerning secondary roads in Roanoke County. Requests are reviewed and classified as maintenance or construction projects. Requests are classified as having maintenance status when the activities involve preserving or restoring the roadway, facility or structure to its original condition; construction improvements generally change or add characteristics to a roadway, facility or structure. Maintenance projects are normally referred to VDOT's Resident Administrator for immediate correction, but some of the projects are added to the Revenue Sharing Program list.

Construction projects usually take more than one (1) fiscal year to complete, because these requests require right-of-way acquisition, additional funding, and/or preliminary engineering. Due to the complex nature of construction projects, these requests are put on file to be reviewed during the Six-Year or Revenue Sharing yearly updates.

There are two funding categories in the Secondary Six-Year Plan: **County-Wide Incidental Construction Items** and **Numbered Projects**. VDOT defines incidental improvements as any operation, usually constructed within one year, which changes the type, width, length, location, or gradient of a road, facility or structure. Incidental improvements could also include features not originally provided for the road, facility, or structure. The categories of Incidental Construction Services are as follows: traffic services, pipe installation/private entrances, preliminary engineering and surveys, fertilization and seeding, subdivision plan review, right-of-way engineering, traffic calming and rural addition.

2.1.3. Rural Addition Program

The Rural Addition Program is a process for acceptance of private roads into the public, State-maintained system. A petition must be submitted to Roanoke County with the support of all property owners impacted by the process. A basic obligation of property owners is that the right-of-way and easements necessary for State acceptance shall be donated. The County will prepare the documents and assume the costs for legal and recordation fees along with survey expenses for donation transactions. No state or county funds may be disbursed to the property owners. Another requirement of the Program is that the right-of-way must be unencumbered by utilities. All existing services shall be relocated outside of the right-of-way. The County will coordinate with the utility companies to relocate the services; however, the property owners shall contribute payments to the utility companies for the full amount of expenses endured by the utility companies to relocate/adjust their services.

The last requirement of the Rural Addition Program is determining whether any property owners have a speculative interest in the proposed right-of-way. Speculative interest exists when ownership or partnership in two or more parcels occurs, or there is equivalent frontage and/or acreage available to create/subdivide additional lots abutting the street in question. A pro rata fee for properties that have speculative interest is applied. The pro rata fee for a property is based on the ratio between the value of that property, and the total value of all involved properties. The pro rata fee amount is the result of

this ratio applied to the estimated cost of reconstructing the road to meet minimum road standards for acceptance.

2.1.4. Revenue Sharing Program

The VDOT Revenue Sharing Program provides Roanoke County with an annual opportunity to receive State matching funds for the construction, maintenance, and improvements to primary and secondary roads in the State's highway system. VDOT and County staff review and evaluate each request received for inclusion in the Revenue Sharing Program. An application for Revenue Sharing Program funding must be made by resolution of the Roanoke County Board of Supervisors. Project funding is allocated by resolution of the Commonwealth Transportation Board. Construction may be performed by VDOT, or where appropriate, by Roanoke County under an agreement with VDOT. The maximum state participation amount is $1 million per locality. The Revenue Sharing Projects in Roanoke County receive $500,000 in County funds and $500,000 in State Matching funds.

C5: Section 527 Methodology

Submitted to VDOT for review of requirements of Chapter 527 of the 2006 Acts of Assembly

As part of new state legislation that took effect, July 1, 2007, localities are required to determine the impacts of comprehensive plan amendments on transportation on state controlled highways. These regulations came into effect July 1, 2008:

> *Section 15.2-2222.1 of the Code of Virginia requires localities to submit comprehensive plans and amendments to comprehensive plans that will substantially affect transportation on state controlled highways to VDOT in order for the agency to review and provide comments on the impact of the item submitted. This section also requires localities to submit traffic impact statements along with proposed rezonings, site plans, subdivision plats, and subdivision development plans that will substantially affect transportation on state-controlled highways to VDOT for comment by the agency. Chapter 527 of the 2006 Acts of Assembly directs VDOT to promulgate regulations for the implementation of these requirements.*

A significant part of the planning process involves examining the future land use maps (as an adopted component of the 2005 Comprehensive Plan). The future land use maps are intended to guide future development and serve as a framework for policy-makers and citizens in Roanoke County. For this area plan, three alternative scenarios were proposed. The impacts on traffic of the changes to the future land use map were examined for all three scenarios.

Introduction to the Route 221 Area Plan

The Route 221 Area Plan, to be adopted into the Roanoke County Comprehensive Plan, will aid decision-making for future development along the Route 221 corridor, in an area commonly referred to as Back Creek. The area is referred to as "Back Creek" for the name of the primary stream in the area, which flows in an easterly direction from the base of Bent Mountain and generally parallels Route 221.

Recent development pressures, the planned widening of Route 221 from the end of the current four-lane section to Cotton Hill Road (Route 688), and the recent purchase agreement of the Poage Farm by the Roanoke County School Board have resulted in a need to create and implement a plan to protect the area's unique resources while planning for compatible development.

The study area is comprised of some of the most rural land in Roanoke County. It is located in the southwestern portion of Roanoke County and is situated among Bent Mountain, Sugar Loaf Mountain, Twelve O'clock Knob, the Blue Ridge Parkway, and the suburban fringes of the City of Roanoke. Route 221 is a popular scenic road that serves as a vital link connecting the citizens of Roanoke Valley to the Blue Ridge Parkway and Floyd County. Significant development pressure is occurring along the suburban

fringes of Roanoke County; development pressures subside outward from Route 221 and south on Route 221 towards Floyd County. Therefore, for purposes of the Route 221 Area Plan, only a portion of the corridor is included within the boundaries of the study area. Refer to the attached maps for the study area boundary.

Methodology

3.3.1 Land Use Data

Existing data was examined to determine how best to estimate the traffic impacts of changing the future land use maps in the study area. The chosen method to project traffic increases resulting from changes in the future land use map was to first look at the current uses of the parcels in each future land use designation across the county. Definitions of each future land use category are attached. Upon determining current uses for all occupied property, average weekday trips could be determined for each use. Finally, these numbers could be examined for each future land use designation, then that number could be applied to the amount of acreage being redesignated.

In Roanoke County real estate data, a "Land Use Code" is assigned to each property in the county. Using GIS software, real estate data for the entire county was joined with the future land use layer. This enabled an examination of what types of land uses exist in each future land use designation. The calculated acreage and square footage of each parcel were available. The data was then exported into an excel spreadsheet.

In order to determine the traffic generated by existing uses in each future land use designation, all vacant parcels were removed from the table. Then two tables were generated in Excel: owner-occupied residential, and then everything else (including renter-occupied housing). In the table containing non-residential parcels, staff calculated the square footage of buildings for each parcel, as the real estate data counts sections of buildings and additions separately. Data that would not be considered in the generation of trips such as stoops, unfinished attics and basements, and porches were removed. The remaining calculations were added together.

Pivot tables were created in Excel. These tables allow users to summarize data across rows and columns simultaneously. These tables first attributed all to a future land use designation. Then, parcels were further divided by their land use code from real estate data. The chart below illustrates a section of that chart:

Use	Sum of CALC SQ FOOTAGE	Sum of Acreage	Count of PARCELID
Conservation	**190,285**	**8,148.69**	**10**
Church	4,575	2.93	1
Light manufacturing	5,280	64.19	1
Other county	10,655	608.57	2
Other federal	2,193	2,549.36	1
Other municipal	15,312	3,878.32	1
Public hospital	128,931	1,028.12	1
Warehouse	23,339	17.20	3

Table 1. Section of Pivot Table showing non-residential parcels in the Conservation future land use designation

As can be seen above, for each category of existing land use (within each future land use designation), the number of parcels with each use, along with the acreages and relevant square footage of improvements were summarized.

3.3.2 Average Weekday Trips

In order to generate average weekday trips, variables needed to be defined for the trip generation software for each existing land use. The following methodology was selected:

1. Owner-occupied housing utilizes parcel count
2. Commercial properties use calculated square footage as gross leasable floor area
3. Other anomalies evaluated on case-by-case basis
4. In cases where assumptions are made, documentation exists in the table.

This methodology was used to insert values in the trip generation software. The software used was Trip Generation by Microtrans, Version 5, which calculates trips on the bases of Institute of Transportation Engineers (ITE) Trip Generation Report, Seventh Edition, 2003.

Calculations for residential and non-residential parcels were computed and these numbers were then divided by the total acreage for each land use to generate trips per acre. This data created a value of average weekday trips per acre for each future land use category. The increase or decrease in average weekday trips per acre was calculated based on each proposed future land use scenario. Table 2 shows these figures.

The number of trips per day that would elicit the need for a traffic impact study is 5,000. As can be seen below, the only proposed scenario to amend the Future Land Use map which would exceed this threshold is in Scenario 3. This is mostly due to the amount of land being changed to Neighborhood Conservation, but is important to note that no new developments are proposed in these areas. A full chart, which shows the acreage of each designation in each scenario is attached. In Scenario 3 as well as Scenario 2, area currently designated as Rural Village is proposed to be designated as Suburban Village. As can be seen below, the net result of this change results in a net decrease of just over 9,000 trips for the change from Rural Village to Suburban Village. As this is a new land use designation, future evaluation of this designation will be necessary. Scenarios 2 actually results in a decrease in traffic, likely because of the change of almost 1,500 acres of land to the Conservation designation. As can be

seen below, the amount of trips that are proposed to be generated per acre of land in the Conservation designation is just 1.62 trips per acre. In Scenario 1, the increase in trips generated likely results in the increase in land designated as Neighborhood Conservation and because there was no significant addition of land to the Conservation Designation. The elimination of any land designated as Transition accounts for a decrease of 2,572 trips in all three proposed scenarios. It is also important to note that there is no land designated as Core, nor is any proposed, in the study area.

Future Land Use	Acreage	Percent	Trips/Acre	Trips Generated
Conservation	173	3.20%	1.62	280.89
Development	359	6.63%	54.79	19,663.04
Neighborhood Conservation	113	2.09%	165.87	18,789.75
Rural Preserve	1978	36.55%	22.09	43,697.78
Rural Village	2488	45.98%	70.19	174,659.39
Suburban Village	0	0.00%	192.11	0.00
Transition	19	0.35%	137.45	2,571.69
Village Center	281	5.19%	90.93	25,530.42
	5412	100.00%		285,192.95

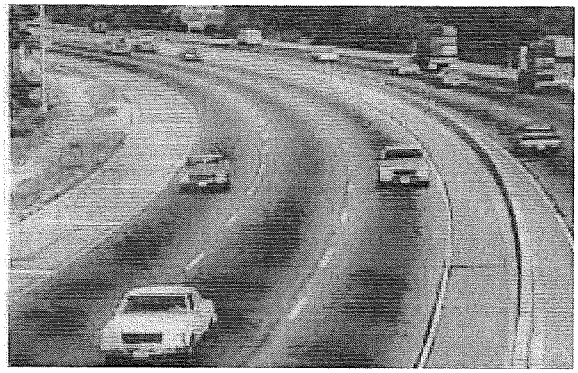
Future Land Use Scenario 1	Acreage	Percent	Change	Trips/Acre	Trips Genera	Difference from 2005 Plan
Conservation	174	3.22%	1	1.62	282.20	1.31
Development	331	6.11%	-28	54.79	18,110.39	-1,552.64
Neighborhood Conservation	160	2.97%	47	165.87	26,612.01	7,822.26
Rural Preserve	1965	36.36%	-13	22.09	43,415.22	-282.56
Rural Village	2498	46.21%	10	70.19	175,358.46	699.07
Suburban Village	0	0.00%	0.00	192.11	0.00	0.00
Transition	0	0.00%	-19	137.45	0.00	-2,571.69
Village Center	277	5.12%	-4	90.93	25,189.33	-341.09
	5406	100.00%				3,774.66

Future Land Use Scenario 2	Acreage	Percent	Change	Trips/Acre	Trips Genera	Difference from 2005 Plan
Conservation	1051	19.44%	878	1.62	1,702.62	1,421.73
Development	523	9.67%	164	54.79	28,656.29	8,993.26
Neighborhood Conservation	160	2.97%	47	165.87	26,607.57	7,817.82
Rural Preserve	1131	20.92%	-847	22.09	24,983.52	-18,714.25
Rural Village	2296	42.46%	-193	70.19	161,124.42	-13,534.97
Suburban Village	154	2.85%	154	192.11	29,599.44	29,599.44
Transition	0	0.00%	-19	137.45	0.00	-2,571.69
Village Center	91	1.68%	-190	90.10	8,199.10	-17,331.32
	5406	100.00%				-4,319.99

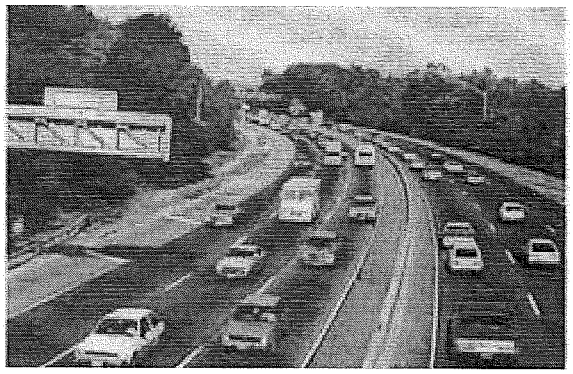
Future Land Use Scenario 3	Acreage	Percent	Change	Trips/Acre	Trips Genera	Difference from 2005 Plan
Conservation	1051	19.44%	878	1.62	1,702.62	1,421.73
Development	609	11.26%	250	54.79	33,354.50	13,691.46
Neighborhood Conservation	468	8.65%	354	165.87	77,553.73	58,763.97
Rural Preserve	1131	20.92%	-847	22.09	24,983.52	-18,714.25
Rural Village	1882	34.82%	-606	70.19	132,107.85	-42,551.54
Suburban Village	175	3.23%	175	192.11	33,538.84	33,538.84
Transition	0	0.00%	-19	137.45	0.00	-2,571.69
Village Center	91	1.68%	-190	90.10	8,199.10	-17,331.32
	5406	100.00%				26,247.20

Future Land Use Scenario 4	Acreage	Percent	Change	Trips/Acre	Trips Genera	Difference from 2005 Plan
Conservation	1030	19.05%	857	1.62	1,668.60	1,387.71
Development	590	10.91%	231	54.79	32,326.10	12,663.06
Neighborhood Conservation	160	2.96%	47	165.87	26,539.20	7,749.45
Rural Preserve	1131	20.92%	-847	22.09	24,983.52	-18,714.25
Rural Village	2250	41.62%	-238	70.19	157,927.50	-16,731.89
Suburban Village	154	2.85%	154	192.11	29,584.94	29,584.94
Transition	0	0.00%	-19	137.45	0.00	-2,571.69
Village Center	91	1.68%	-190	90.10	8,199.10	-17,331.32
	5406	100.00%				-3,963.99

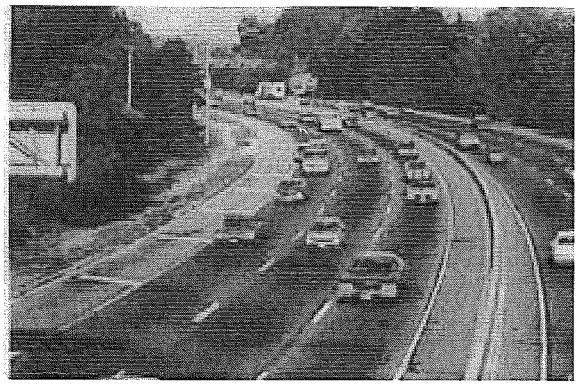
FIGURE 1. LEVEL OF SERVICE (LOS) DEFINITIONS



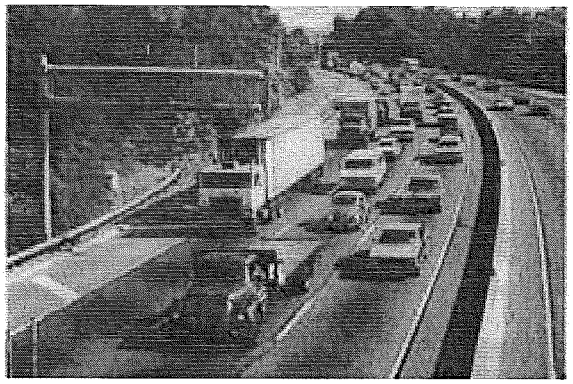
Level of Service A: Free-flow traffic with individual users virtually unaffected by the presence of others in the traffic stream.



Level of Service D: High-density flow in which speed and freedom to maneuver are severely restricted and comfort and convenience have declined even though flow remains stable.

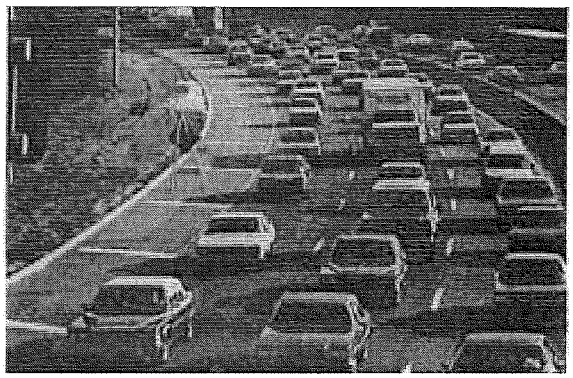


Level of Service B: Stable traffic flow with a high degree of freedom to select speed and operating conditions but with some influence from other users.



Level of Service E: Unstable flow at or near capacity levels with poor levels of comfort and convenience.

Level of Service C: Restricted flow that remains stable but with significant interactions with others in the traffic stream. The general level of comfort and convenience declines noticeably at this level.



Level of Service F: Forced traffic flow in which the amount of traffic approaching a point exceeds the amount that can be served. LOS F is characterized by stop-and-go waves, poor travel times, low comfort and convenience, and increased accident exposure.