REPORT OF THE
VIRGINIA DEPARTMENT OF TRANSPORTATION

NEED FOR AND THE FEASIBILITY OF NEW NORTHERN, SOUTHERN, AND/OR WESTERN ACCESS TO THE WASHINGTON DULLES INTERNATIONAL AIRPORT

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

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EXECUTIVE SUMMARY

STUDY PURPOSE AND APPROACH

The purpose of the Washington Dulles International Airport Access Study is to examine the need for and the feasibility of new northern, southern, and/or western access to the Washington Dulles International Airport (Dulles Airport). Through Senate Joint Resolution No. 122 (SJR 122), February 1996, the Virginia Legislature requested that the Virginia Department of Transportation (VDOT), the Metropolitan Washington Airports Authority (MWAA), and the Washington Airports Task Force (WATF) "conduct a study to determine the need for and feasibility of a northern, southern, and western access to Dulles Airport".

To accomplish the intent of SJR 122, a three part approach was used for this access study. An overview of each of the following steps describes sources of information and methods used to complete the study:

- Characterize existing and future passenger and goods travel demand from northerly, westerly and southerly areas to the Dulles Airport,
- Identify alternatives which meet forecast directional access needs, and
- Evaluate the alternatives to demonstrate the ability of each to meet identified needs and feasibility.

NEED FOR ALTERNATIVE ACCESS TO THE DULLES AIRPORT

Increases in Trip Making. The Dulles Airport is expected to grow substantially to accommodate the growing number of air passengers and airport-related employees generated by the growth in population and employment. The increase in passenger volumes at Dulles Airport is directly related to expected increases in population. Table 1 characterizes daily trip making by three types of trips from the north, west and south of the airport as well as from the east.

Future trip making to and from the airport from all directions is predicted to increase between 200 and 300 percent. The greatest increase is expected in the "other" trip category coming from or two the north, west and southern quadrants. The predicted growth is more than a 500 percent increase over the 1992 levels. This is a result of the predicted growth in cargo and business uses at the airport as well as the planned siting of the national air and Space Museum (NASM) annex at the intersection of Routes 28 and 50 coupled with the growth in population and employment for the four county areas. While not enough to fully shift the balance in travel from the east to the other three quadrants, the increases in trips from these three lays the basis for a finding of need for consideration of additional access points to the airport.

Table E-1
Geographic Distribution of Daily Trips to Dulles Airport

Aggregated Area	1992						2020					
	Employee Trips		Passenger Trips		Other Trips		Employee Trips		Passenger Trips		Other Trips	
	#	%	#	%	#	%	#	%	#	%	#	%
WTCS Area (1)	5,769	48.5	1,834	15.7	572	13.1	19,135	61.0	7,398	21.4	3,393	32.8
North of Airport (2)	779	6.5	2,502	21.4	85	1.9	654	2.2	5,648	16.5	52	0.5
West of WTCS Area (3)	311	2.6	225	1.9	3	0.1	1,360	4.3	552	1.6	0	0
STUDY AREA Subtotal	**6,859**	**57.6**	**4,561**	**39**	**660**	**15.1**	**21,149**	**67.5**	**13,598**	**39.5**	**3,445**	**33.3**
East of Airport (4)	5,040	42.4	7,144	61	3,705	84.9	10,178	32.5	20,801	60.5	6,870	66.7
TOTAL	**11,899**	**100**	**11,705**	**100**	**4,365**	**100**	**31,327**	**100**	**34,399**	**100**	**10,315**	**100**

Source: Washington Dulles International Airport Access and Parking Study, Technical Memorandum #4, November 1992. Parsons Brinckerhoff Quade & Douglas, Inc., September 1995.

WTCS = Western Transportation Corridor Study
(1) Includes Loudoun, Prince William, Fauquier, and Stafford Counties
(2) Includes Montgomery, Frederick, and other Maryland Counties
(3) Includes Clarke County in Virginia and Jefferson County in West Virginia
(4) Includes Fairfax and Arlington Counties, City of Alexandria, District of Columbia, and Prince George's County in Maryland

Table E-2
Total Air Cargo Handled

	Average Freight Tons Enplaned Annually		
Primary Air Cargo Airports	1989	2010	Average Annual Growth
Washington Dulles	211,061 Tons	718,943 Tons	6.0%
Total Virginia	309,277 Tons	1,004,404 Tons	5.8%

Source: 1991, Virginia Air Cargo System Plan Executive Summary.

Increases in Air Cargo. Air cargo growth is expected that an annual growth rate of 6 percent (see Table E-2) will be maintained. In 1993, however, growth totaled 23.7 percent due to the opening of additional cargo space and a dedicated ramp.

Capacity Additions Which Affect Airport Access. Only two additional improvements to roadway capacity near the Dulles Airport are included as part of the regional Constrained Long Range Plan (CLRP). One of these is the widening of the Dulles toll Road (DTR) to three general purpose lanes and a high-occupancy vehicle (HOV) lane in each direction. The improvement is currently under construction. The second improvement is the widening of Route 606, which borders Dulles Airport on the west and north, from two lanes to four lanes between Route 50 and Route 28.

Description of Need. Existing evening peak traffic, as characterized by the LOS D ratings on Route 28 between the Dulles Toll Road and Route 50, on the DTR, and on Route 50 east of Route 28 indicate that today; there is a need that is directionally

based on travel to and from the eastern quadrant. The balance of the road system in the immediate vicinity of the airport, however indicates a LOS C or better during the evening peak hour.

Future roadway performance is predicted to decline if no additional improvements beyond the two described above are made. Service levels on the DTR and Route 28 south of the DTR and south of Route 50 are expected to be extremely poor (LOS F). The Dulles Greenway is predicted to operate at LOS F between Ashburn Road and Route 28. Route 50 is predicted to experience degraded operations to LOS E by 2020. Both the west-bound and eastbound approaches to the intersection with Route 28 are predicted to operated at LOS E, with traffic volumes on the eastern approach exceeding those on the western approach by 2,000 vehicles. Access to the Dulles Airport under the 2020 Baseline alternative will be delayed as a result of poor levels of service during the evening peak period on Route 28 and the Dulles Greenway and congestion and delay on Route 50.

S.3 DEFINITION OF ALTERNATIVES

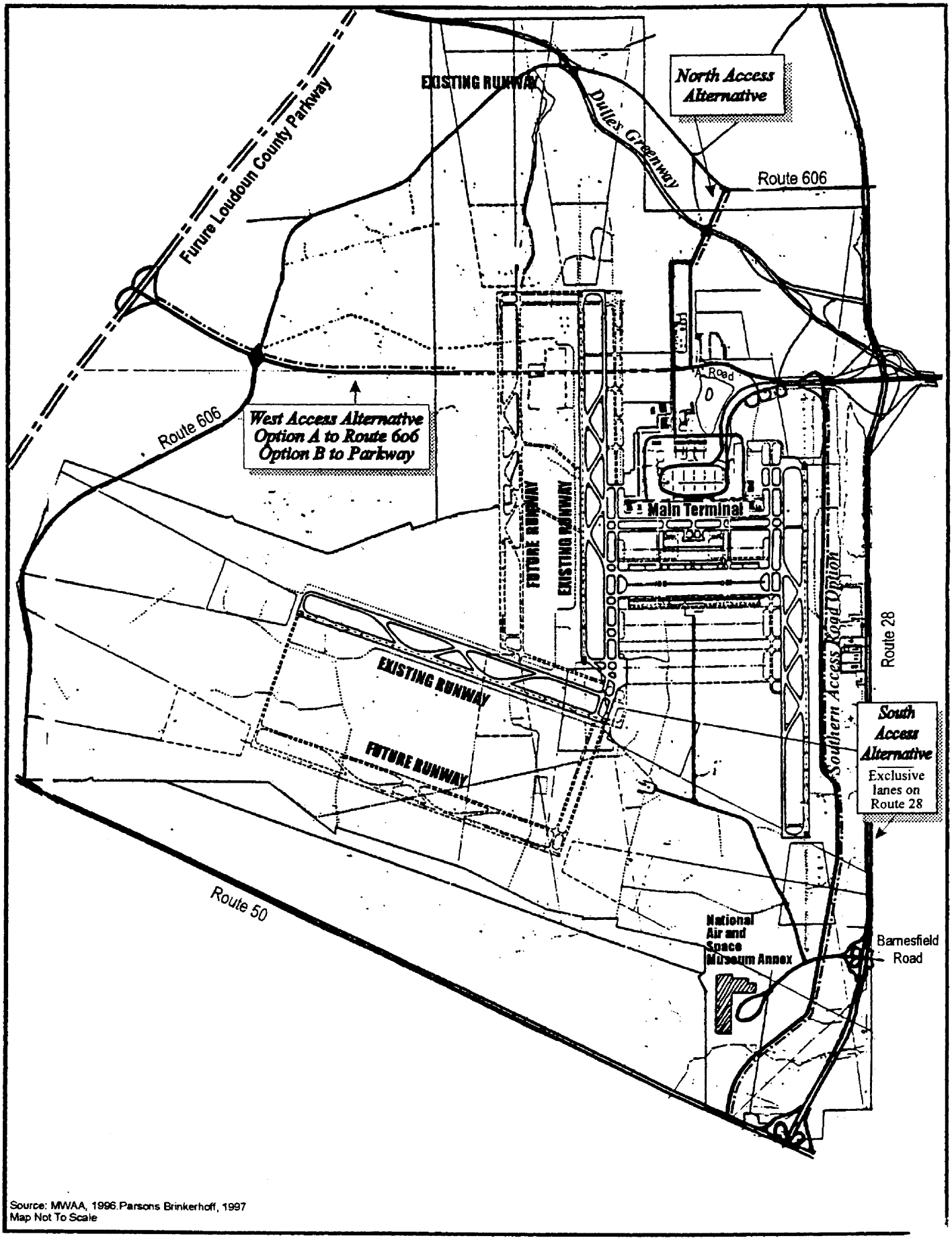
Four alternatives (the western access has two options) were developed to test the need for and feasibility of providing access to the Dulles Airport from the north, west or southern areas surrounding the airport. Figure E-1 provides an overview of the airport, its surrounding access roads and the locations of the four proposed build alternatives. Each alternative is summarized generally below.

- The **Baseline Alternative** (No Action) provides access from the existing Dulles Access Road at its intersection with Route 28. The only planned improvements included in this alternative are the DTR mixed flow and HOV additions and the widening of Route 606 from two lanes to four lanes.

- **North Access Alternative** includes the existing access from Route 28 and the Dulles airport access Road (DAAR) and a second access point on the north side of the airport from Route 606. This access point was assumed to be an upgrade and completion of the existing north access point that was built, but not opened, when the Greenway was built. The North Access Alternative is essentially already constructed and would require a minor upgrading of the roadway.

- **West Access -Option A** would introduce a new access point to the Dulles Airport's main terminal from Route 606 on the west side of the airport. The facility is assumed to be a 4 -lane, limited access roadway which will be carried as a tunnel under the existing and planned runways.

- The **West Access Alternative - Option B** would access the airport's main terminal from a new roadway facility such as the Loudoun County Parkway, the final Tri-County Connector connection currently in the Countywide Transportation Plan for Loudoun County (July 1995). The facility is assumed to be a 4-lane, limited access roadway of approximately four miles in length and would require tunneling under the Dulles Airport runways. No additional widening of Route 606 is included in this alternative.



Source: MWAA, 1996.Parsons Brinkerhoff, 1997
Map Not To Scale

Washington Dulles International Airport Access Study

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Figure E-1
Dulles Airport Access Alternatives

The **South Access Alternative** includes the Baseline Alternative access point plus the addition of an exclusive airport in-bound access lane northbound in Route 28 between Route 50 and the airport entrance, running for a distance of approximately 4.5 miles.

FEASIBILITY OF ALTERNATIVES

A review of baseline travel forecast results suggests that airport access demand is increasing while the capacity of the system to handle additional trips is stagnant. Travel estimates indicated that although the greatest volume of trips to and from the airport will be with areas to the east, significant growth in travel from areas to the north, west and south of the airport will result in degraded level of service (LOS) on the Dulles Greenway and on Routes 28, 606 and 50. Feasibility of alternatives was assessed using the following measures:

- Numbers of trips attracted to an alternative,
- Reductions in traffic volume on selected roadways,
- Improvements in Level of Service (LOS) on selected roadway segments, and
- Cost estimates.

Table E-3 provides a comparative matrix of the alternatives performance and cost.

CONCLUSIONS

A new roadway facility and/or completion of the Loudoun County Parkway as part of the Tri-County Connector and/or the 234 Bypass north of Route 66 would provide improved regional access to Dulles Airport from the north, west and south, with its related benefits (refer to the Western Transportation Corridor Study, 1996). However, if a new facility west of the Dulles Airport does not have a direct connection to the airport, the traffic destined to the airport from the west, and south still would be required to continue to use Route 28, the Dulles Greenway and the DAAR.

Once the traveler reaches the airport, the ease by which the traveler enters the airport locally is an important component of the total trip and the continued growth of the Dulles Airport.

The primary evaluation considerations were traffic projections on airport-related roadways and cost estimates. While the West access Alternative - Option B offers the greatest benefits to the overall transportation system, the cost estimate is $248 million in 1996 dollars. This compares to a cost of in 1996 dollars is $26 million for a South Access Alternative which has fewer travel benefits, but still provides for some lessening of congestion.

Table E-3

Airport Access Alternatives Feasibility Comparison

FEASIBILITY CRITERIA	1990 EXISTING CONDITIONS	BASELINE	NORTH ACCESS	SOUTH ACCESS	WEST ACCESS OPTION A	WEST ACCESS OPTION B
NUMBER OF DAILY TRIPS (ADT)	NA	NA	1,400	12,000	6,000	19,300
ADT ON SELECTED SEGMENTS						
Route 28 - Route 50 to Barnesfield Rd.		80,700	80,700	68,700	87,700	68,800
Route 28 - Barnesfield Rd. to Airport Entrance		104,200	104,200	92,000	104,200	92,100
Route 28 South of Route 50		88,100	58,600	88,100	88,100	76,700
Route 606 -Route 50 to the Greenway		21,200	21,300	21,300	25,300/19,100	18,230/12,300
Route 606 - Greenway to Route 28		19,700	20,500	19,700	19,900	19,700
Route 50 West of Route 28		61,900	61,900	61,900	61,300	60,000
Route 50 East of Route 28		59,400	59,400	59,400	59,400	60,500
Greenway- Route 28 to Route 606		86,000	85,200	86,000	82,700	76,500
Greenway - Route 606 to Ashburn Rd.		86,600	86,800	86,800	85,800	66,100
LEVEL OF SERVICE ON SELECTED SEGMENTS						
Route 28 - Route 50 to Barnesfield Rd.	D	F	F	D	F	D
Route 28 - Barnesfield Rd. to Airport Entrance	D	F	F	F	F	F
Route 28 South of Route 50	C	F	F	F	F	E
Route 606 -Route 50 to the Greenway	C	C	C	C	C/C	B/A
Route 606 - Greenway to Route 28	C	D	D	C	D	D
Route 50 West of Route 28	C	E	E	E	E	E
Route 50 East of Route 28	D	E	E	E	E	E
Greenway- Route 28 to Route 606	A	F	F	F	F	F
Greenway - Route 606 to Ashburn Rd.	A	F	F	F	F	F
COST OF ALTERNATIVES (1996 $)	NA	NA	$711,000	$7,000,000	$241,000,000	$249,000,000

1.0 INTRODUCTION

1.1 STUDY PURPOSE

The purpose of this Airport Access Study is to examine the need for and the feasibility of new northern, southern, and/or western access to the Washington Dulles International Airport (Dulles Airport). The study results in a comparison of alternative actions which could be taken by the Commonwealth of Virginia on cooperation with the Metropolitan Washington Airports Authority (MWAA) and local jurisdictions. Travelers from the east currently approach Dulles Airport via the Dulles Airport Access Road (DAAR) which intersects Route 28 at the airport's eastern boundary (see Figure 1-1). Passenger and cargo traffic, as well a some employees, originating from the north, south, and/or west of the airport must use the sole eastern entrance via Route 28. Employee traffic to the airport also arrives via an entrance at Gate 4 which is reached via Route 28 south of the airport and north of Route 50.

Through Senate Joint Resolution No. 122 (SJR 122), February 1996, the Virginia Legislature requested that the Virginia Department of Transportation (VDOT), the Metropolitan Washington Airports Authority (MWAA), and the Washington Airports Task Force (WATF) "conduct a study to determine the need for and feasibility of a northern, southern, and western access to Dulles Airport".

JR 122 states that "optimal development of Dulles Airport depends, in part, on adequate and convenient highway access to the airport from all directions" and that "particular attention needs to be paid to improvement to and protection of land-side access to Dulles Airport from the north and west because of the relative paucity of existing access from those directions and for the purpose of relieving congestion on highway arteries to the airport's south and west".

1.2 STUDY APPROACH

To accomplish the intent of SJR 122, a three part approach was used for this access study. An overview of each of the following steps describes sources of information and methods used to complete the study:

- Characterize existing and future passenger and goods travel demand from northerly, westerly and southerly areas to the Dulles Airport,
- Identify alternatives which meet forecast directional access needs, and
- Evaluate the alternatives to demonstrate the ability of each to meet identified needs and feasibility.

Existing and Future Travel Demand. Regional growth and implications for the continued growth expected at the Dulles Airport were summarized from existing studies, including the Washington Dulles International Airport Access and Parking Study (January 1992), Washington Transportation Corridor Study (1996) (WTCS), and The Virginia Air Cargo System Plan (1991) (VACSP).

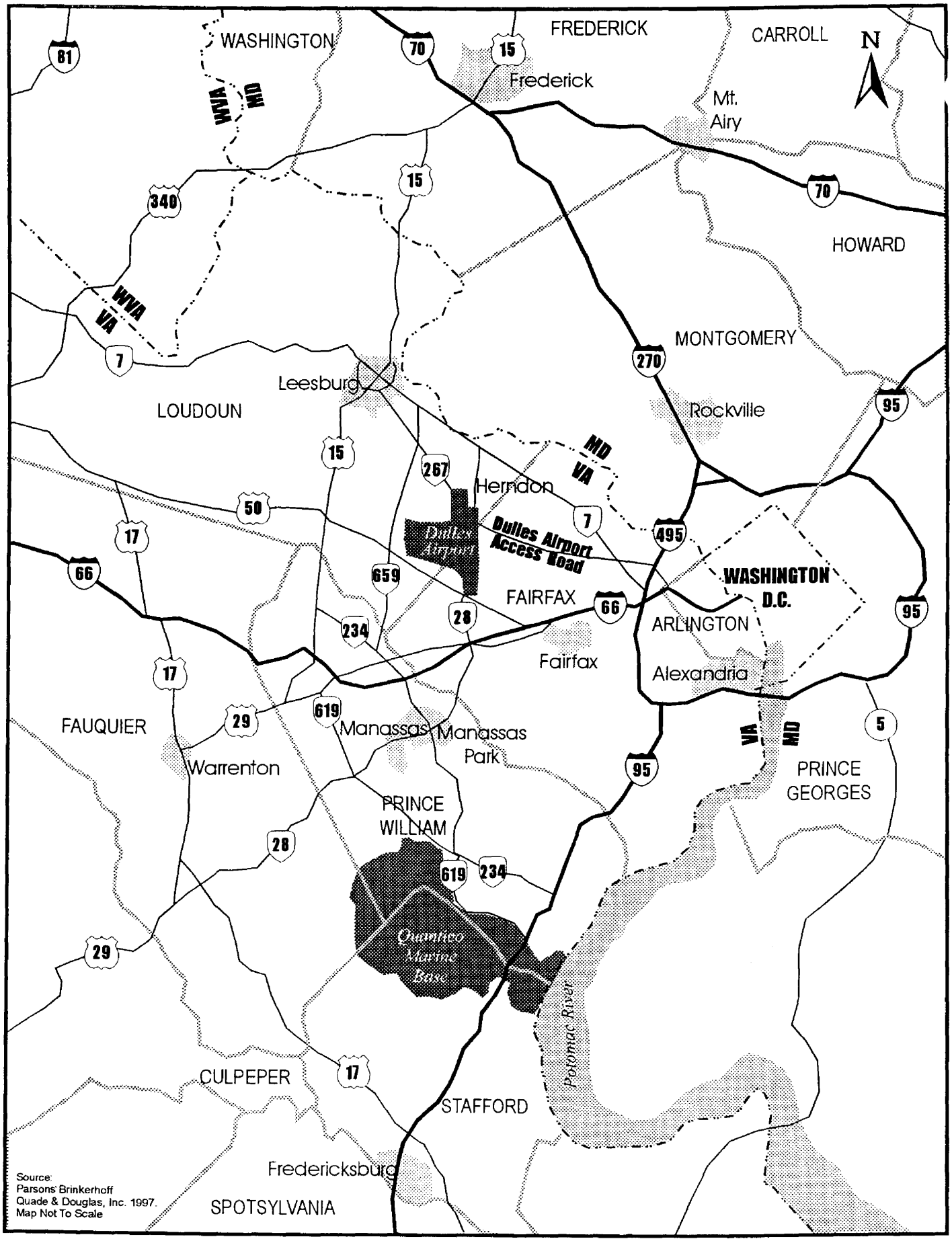

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Figure 1-1
Northern Virginia Region

Existing and projected traffic conditions for the year 2020 were analyzed by reviewing the types of travel to the Dulles Airport and the projected growth in travel and direction of that travel. Four types of travel to the airport were identified: air passenger trips, employee trips, air cargo trips, and trips to the proposed National Air and Space Museum annex. The pattern of airport passenger trips was developed using the latest air passenger survey and Metropolitan Washington Council of Governments (MWCOG) forecasts of population and employment for 2020. The pattern of employee trips and of trips to the proposed National Air and Space Museum annex was developed using information from an expanded regional travel demand forecasting procedure and forecasts of population and employment. The air cargo patterns were developed from the VACSP through a review of its air cargo patterns for freight forwarding trips, U.S. Mail trips, and express delivery trips.

The total number of trips, by type of travel, was developed using the Washington Dulles International Airport Access and Parking Study data. This study, based on the Airport Master Plan, assumed that Dulles Airport would handle 32 million passengers a year in 2020 and the Main terminal would continue to be the only passenger facility. This activity level would generate approximately 68,000 vehicle trips to and from the Dulles Airport by air passengers and 50,000 vehicle trips to and from the Dulles Airport by employees on an average day.

The traffic volumes used for this study were from two sources. The estimate for non-airport traffic was derived from the expanded regional travel demand forecasting procedure, initially developed for the Dulles Corridor Transportation Study and up-graded to handle corridor studies in the Northern Virginia including the Western Transportation Corridor Study (WTCS) and the I-66 Corridor Major Investment Study (MIS).

Transportation planning programs were used to estimate the volume of traffic on each highway segment potentially affected by airport travel. These programs, called assignment procedures, used a description of the existing and proposed highway network for 2020 and the trip patterns to estimate these volumes.

Identify Alternatives. To develop the alternatives for evaluation, the Airport Master Plan was reviewed, existing and projected travel data studied and a field reconnaissance made to confirm the ability to physically implement the alternatives.

Cost estimates using 1996 dollars were derived from recent cost estimating methodology for the Dulles Corridor Transportation Study and the Washington Transportation Corridor Study.

Evaluate Alternatives. The alternatives were evaluated comparing the results of the travel forecasting and cost estimates.

2.0 EXISTING CONDITIONS AND FUTURE NEEDS

An understanding of transportation needs for access to the Dulles Airport from the surrounding north, west and southern quadrants can be seen from a brief review of the current and planned transportation improvements and levels of congestion on the road system in this section. Existing population and employment as well as planned growth is used to forecast future traffic congestion on the region's planned and funded roadway system. Future Dulles Airport plans and growth in airport cargo movements are discussed in this section as well. Four counties have been considered as the quadrants to the north, west and south: Loudoun, Fauquier, Prince William and Stafford counties. Today's and future (year 2020) levels of congestion on Routes 28 and 50 which are predicted by travel forecasting will serve as the basis for defining a transportation need.

2.1 EXISTING ROADWAY SYSTEM AND CONDITIONS

2.1.1 Description of the Airport Access Roadway Network

The regional roadway network provides a framework of the transportation system for the movement of passengers, employees and freight. This section briefly describes existing roadways that most directly serve the Dulles Airport (see Figure 1-1). Figure 2-1 shows the current number of lanes for the major roads near the Dulles Airport.

The Dulles Airport Access Road (DAAR), is a four-lane freeway restricted to Dulles Airport traffic traveling from just west of the "Beltway" to the main terminal of the Dulles Airport; the DAAR is the primary airport access. As documented in the Washington Dulles International Airport Access and Parking Study (see Table 2-3), 64 percent of airport passengers are projected to use the Dulles Airport Access Road (DAAR) as the primary route to the Dulles Airport whereas only 21 percent of the Dulles Airport employees will use the DAAR from the east as a primary route. Route 28, which intersects the DAAR immediately east of the Dulles Airport, is expected to be the primary employee access corridor for employees from the west and south.

The Dulles Toll Road (DTR) parallels the DAAR until it diverges at Route 28 and continues west as the Dulles Greenway. The DTR is a six-lane divided freeway that intersects with Route 28 near the Dulles Airport, providing a major east-west commuting corridor to Tysons Corner and a link to I-66 via the Dulles Airport Access Road. The Dulles Toll Road directly connects to the Dulles Greenway. The DTR is being expanded to eight lanes to include an HOV lane in each direction.

The Dulles Greenway toll road, which opened in 1995, provides access to Dulles Airport's main entrance from the Loudoun County communities located west and northwest of the Dulles Airport. This privately-financed, 14-mile, four-lane divided toll road provides an additional east-west link connecting Leesburg with the existing Dulles Toll Road. It enhances access to Tysons Corner from Leesburg via the DTR.

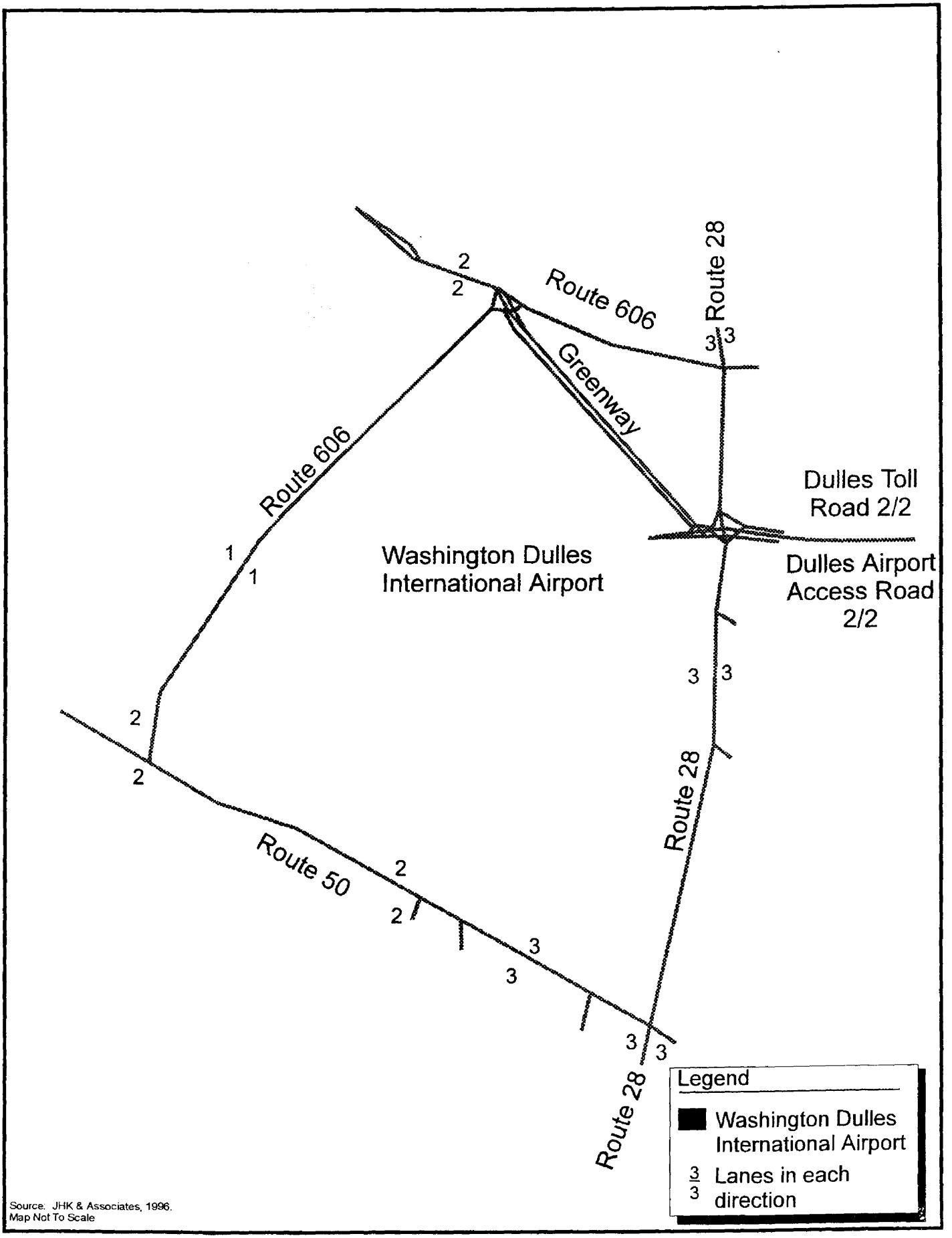

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Figure 2-1
Existing Travel Lanes

Route 28 is the principal north-south arterial connecting eastern Loudoun County with Chantilly and Centreville in Fairfax County and the City of Manassas in Prince William County. From Manassas, Route 28 travels southwest through southern Fauquier County to a juncture with Route 15/29 west of Route 17. Route 28 is a six-lane divided highway from Route 7 to I-66 and four lanes through Manassas, becoming two lanes from just outside Manassas to its terminus in Fauquier County. Route 28 intersects with the DTR/DAAR directly east of the Dulles Airport. Route 28, therefore, is one of the primary airport access routes.

Route 50, an east-west arterial, connects the middle of Fairfax County and the City of Fairfax with southern Loudoun County (i.e., Middleburg) and northern Fauquier County. Route 50 intersects I-66 in Fairfax County near Fair Oaks Mall providing an important link to the Capital Beltway for commuters on Route 50. Route 50 serves the Dulles Airport as it intersects Route 28 at the southeast corner of the Dulles Airport property. Travelers continue north on Route 28 to the airport's main entrance. The Fairfax County Comprehensive Plan calls for Route 50 to be a six-lane facility from the Loudoun County line eastward.

Interstate 66 (I-66) provides an east-west link between northern Fauquier and Prince William Counties and other northwestern Virginia areas (Front Royal, northern Shenandoah Valley) with the greater metropolitan Washington area. Major I-66 interchanges in the study area occur at Routes 15 and 29 (two interchanges), and Routes 28 and 234. Leaving I-66, travelers to the Dulles Airport continue northward. The I-66 Corridor, from the Capital Beltway westward to the vicinity of Haymarket, is the subject of an ongoing MIS. The MIS is evaluating possible improvements in the corridor (HOV/busway improvements, commuter rail improvements, I-66 and parallel route improvements).

Route 15, a north-south arterial, connects Frederick, Maryland to Leesburg and Warrenton, to central Virginia (Culpeper and Charlottesville) via Route 29, and to the I-95 corridor via Route 17. Route 15 is the next bridge crossing of the Potomac River to the west of the Capital Beltway crossing. It is a two-lane undivided roadway for most of the study area, but is a four-lane divided highway along the Routes 7/15 Leesburg Bypass and in western Prince William and Fauquier Counties where Route 15 shares right-of-way with Route 29. Travelers to the Dulles Airport, leaving Route 15, continue eastward on Route 7 or the Dulles Greenway.

Route 29 is a four-lane divided highway. This arterial connects Warrenton and central Virginia (i.e., Culpeper, Charlottesville) with Fairfax County. It parallels I-66 from western Prince William County to Washington DC, and has two interchanges with I-66 in the study area (east and west of its alignment through the Manassas National Battlefield Park). Route 29/15 also serves as a major north-south route along the eastern edge of the Piedmont area.

Route 7 is a major east-west travel corridor through the middle of Loudoun County, connecting Fairfax County with Clarke County and other destinations to the west such as Winchester and the panhandle of West Virginia. This principal arterial is a four-lane divided highway, with some six-lane sections east of Leesburg. Route 28 intersects Route 7 and Dulles Airport travelers may continue southward to the airport's main entrance.

Route 234 provides a link between I-95 and I-66 through the middle of Prince William County. Route 234 continues to the northwest from I-66 through the Manassas National Battlefield Park to a juncture with Route 15 in northern Prince William County.

Prince William County has identified a need for an extension of the Route 234 Bypass north of I-66. This also was considered as part of the Upgrade/link Existing and/or New Roadways Alternative as part of the WTCS.

Route 659 is a north-south major collector from Route 7 to Route 50 in the Dulles North Area of Loudoun County. It is a two-lane road with varying right-of-way, but would be widened from Route 7 south to the Prince William County line to four lanes as part of the Long-Range Transportation Plan.

Route 606, a two-lane rural roadway which borders Dulles Airport on the west and north, provides a "backdoor" route around Dulles Airport. This route connects Route 28 at a point north of the airport entrance with Route 50 south of the airport.

2.1.2 Current Access Roadway Level of Service

Today's traffic congestion on Route 28 and Route 50 is somewhat congested south and east of the study airport. Portions of Route 28 north of the DTR and Route 50 west of Route 28 experience a freeflow level of congestion. Figure 2-2 indicates 1990 congestion levels, called a level of service (LOS), for each segment of road in the immediate vicinity of the Dulles Airport. LOS measures the ratio of the amount of traffic on a road (volume) to how much road is available (capacity). For this study LOS is defined as the ratio of the volume to capacity for the evening peak hour. Table 2-1 shows the ranges of this ratio and LOS ratings.

Table 2-1

Level of Service Definition

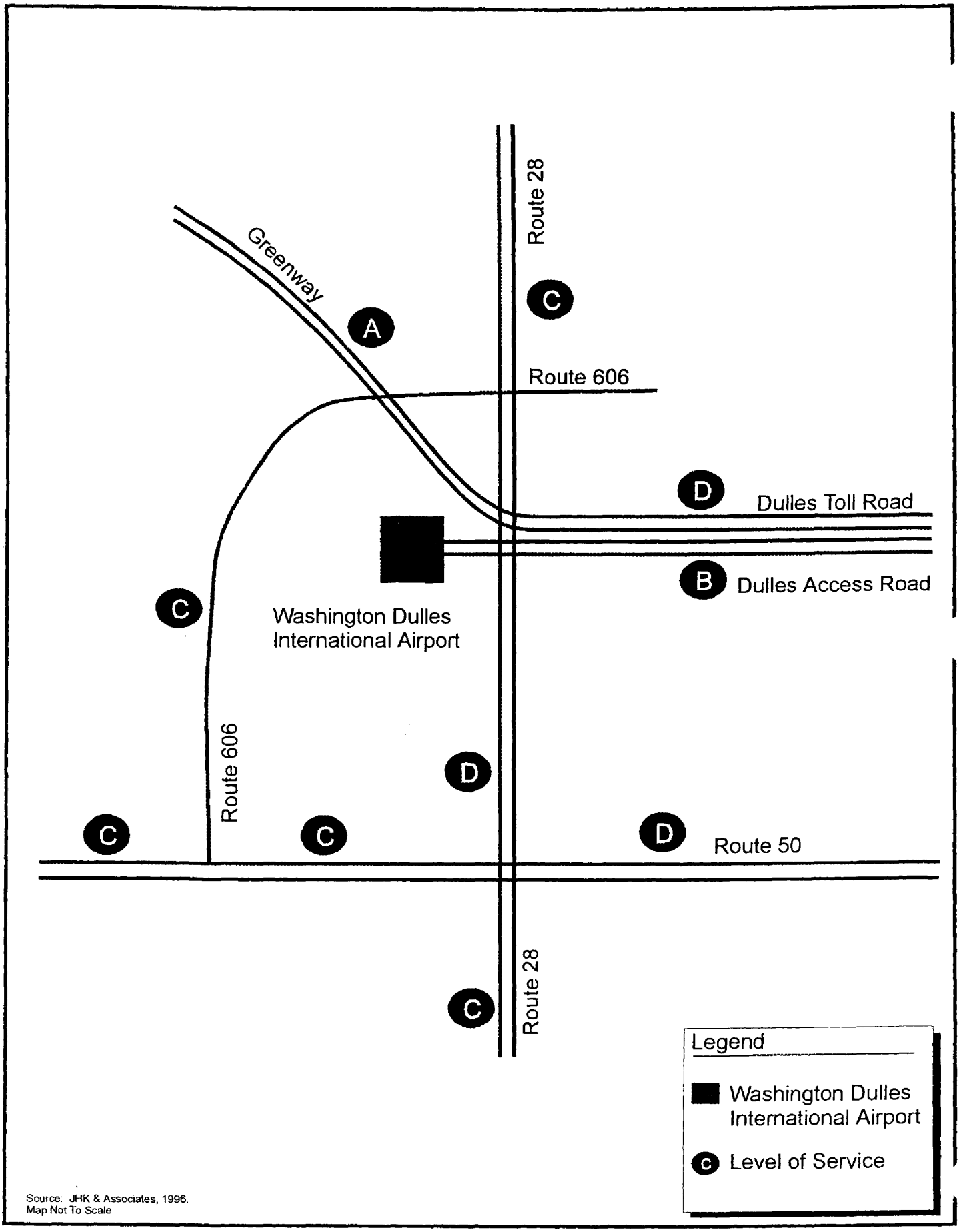
Rating	V/C Range	Description	Traffic Condition
A	0 - .36	Free Flow	Drivers feel no restriction.
B	.37 - .54	Stable Flow	Drivers feel some restriction.
C	.55 - .77	Stable Flow	Drivers feel somewhat restricted but not objectionably so.
D	.78 - .93	Approaching Unstable Flow	Increasing restriction and congestion.
E	.94 - 1.00	Capacity	Substantial restriction and delays.
F	1.00 +	Forced Flow	Jammed conditions, extreme delays.

Source: Transportation Research Board, 1985 Highway Capacity Manual, Special Report 209, Washington, D.C.

The Dulles Toll Road east of Route 28 experiences evening peak period congestion at D while the remaining road segments surrounding the airport experience acceptable traffic flow and conditions.

2.2 CURRENT AND PROJECTED GROWTH

The predominant direction of travel to and from the Dulles Airport is from the east, from Arlington and downtown Washington D.C. (the District). Growth in these areas has increased travel to and from the airport along the Dulles Toll Road and on Route 28. Growth in the north,



Source: JHK & Associates, 1996.
Map Not To Scale

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Figure 2-2
1990 Existing Level of Service

west, and south quadrants surrounding the airport also contributes to congestion on Route 28 and Route 50. The projected growth in these three quadrants serves as the basis for estimates of increases of travel from the three quadrants to the airport. In order to determine future needs for access to Dulles Airport from the north, west and south of the airport, future traffic conditions are forecasted.

2.2.1 Population and Employment - Today and in the Future

Within the major counties north, west, and southwest of the Dulles Airport, the population increased from 278,489 in 1980 to 411,777 in 1990, a 48 percent increase. The population is expected to continue to increase to 881,988 in 2020. This is an increase of 114 percent as compared to 1990 (see Table 2-2 and Figure 2-3). The fastest growing county is Loudoun County, whose population is expected to increase from 86,100 in 1990 to 259,500 in 2020. This is an increase of 201 percent as compared to 1990.

Table 2-2

Round 5.2
Cooperative Forecasts of Population by Jurisdictions

Jurisdiction	Total Population				Percent Increase
	1990	2000	2010	2020	1990 to 2020
Loudoun County	86,100	131,200	191,300	259,500	201%
Prince William County (1)	215,700	280,300	367,200	428,600	99%
Stafford County	61,236	76,800	92,400	105,600	72%
Fauquier County (2)	48,741	59,415	72,427	88,288	81%
TOTAL	**411,777**	**547,715**	**723,327**	**881,988**	**114%**

Source: MWCOG, Summer 1995.

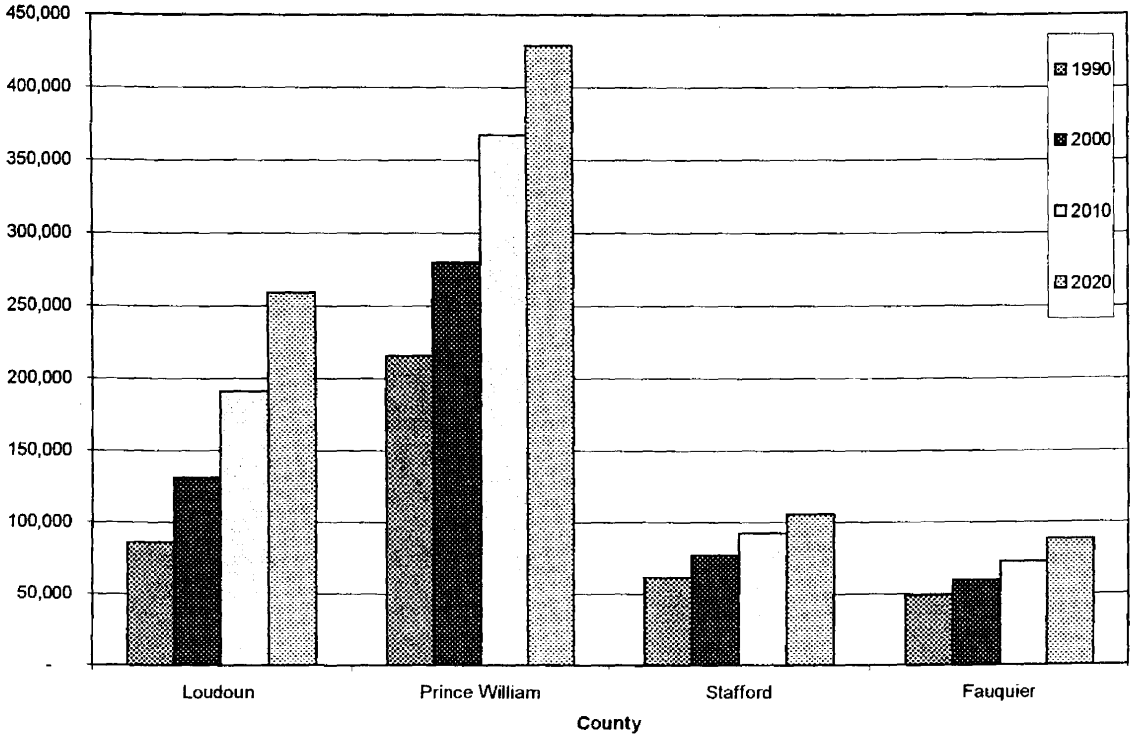
(1) Includes Cities of Manassas and Manassas Park.
(2) From Fauquier County Planning Staff, August 1995.

Employment in the region's outer suburbs including Loudoun, Prince William, and Stafford counties, is expected to more than double between 1990 and 2020 (MWCOG, May 1994). Within the major counties north, west, and southwest of the Dulles Airport, the employment increased from 73,484 jobs in 1980 to 136,331 jobs in 1990, an 86 percent increase. The employment is expected to continue to increase to 338,471 in 2020 (see Table 2-3 and Figure 2-4). This is an increase of 148 percent as compared to 1990. While all jurisdictions are reporting a high increase of employment, Loudoun County and Stafford County each show an increase of over 200 percent.

In the metropolitan Washington area, the projected highway capacity in 2020 shows an increase of approximately 20 percent, while the demand increases 70 percent (Long-Range Transportation Plan for the National Capital Region, September 1994). Congestion is

Figure 2-3

Cooperative Forecast of Population by Jurisdiction



Source: Parsons Brinckerhoff Quade & Douglas, Inc., 1995.

Table 2-3

Round 5.2
Cooperative Forecasts of Employment by Jurisdictions

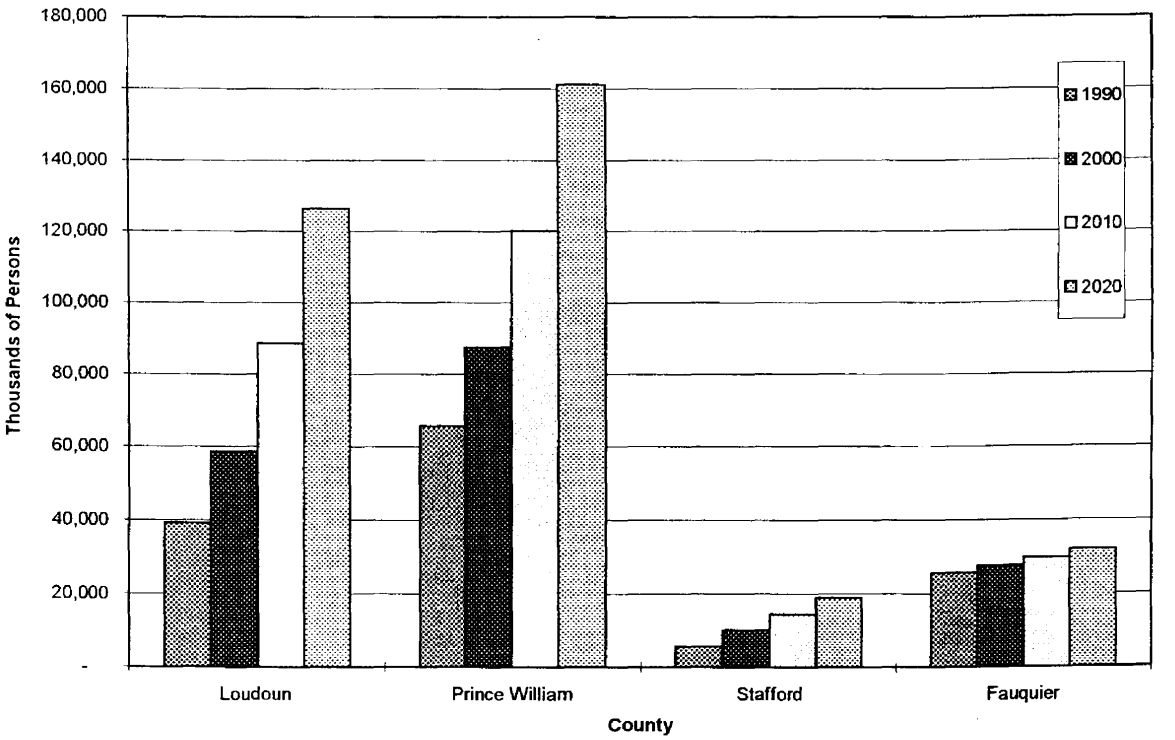
Jurisdiction	Total Employment				Percent Increase
	1990	2000	2010	2020	1990 to 2020
Loudoun County	39,300	58,640	88,673	126,351	221%
Prince William County (1)	65,800	87,600	120,200	161,300	145%
Stafford County	5,700	10,100	14,500	18,900	231%
Fauquier County (2)	25,531	27,504	29,630	31,920	25%
TOTAL	**136,331**	**183,844**	**253,003**	**338,471**	**148%**

Source: MWCOG, May 1994.

(1) Includes Cities of Manassas and Manassas Park.
(2) From Fauquier County Planning Staff, August 1995.

Figure 2-4

Cooperative Forecasts of Employment by Jurisdiction



Source: Parsons Brinckerhoff Quade & Douglas, Inc., 1995.

expected to increase in the area as would be expected from such an imbalance. Due to an even greater percentage of growth in population and employment in the western portion of Northern Virginia as compared to the metropolitan area as a whole and limited increase in the carrying capacity for vehicles a similar, if not greater, imbalance is expected to occur. Increases in trips to the Dulles Airport are forecast as clear outgrowth of this growth.

2.2.2 Growth at Dulles Airport

Growth in Daily Trips From the North, West and South Quadrants. The Dulles Airport is expected to grow substantially to accommodate the growing number of air passengers and airport-related employees generated by the growth in population and employment. The increase in passenger volumes at Dulles Airport is directly related to expected increases in population. Table 2-4 characterizes daily trip making by three types of trips from the north, west and south of the airport as well as from the east. The trip contribution from the north, west and south quadrants are represented in the first three rows of data with a subtotal provided in the fourth row. Under the present conditions (represented by the 1992 figures), the number of employee trips to and from the airport area are slightly greater than the passenger trips. Trips to and from the north, west and south quadrants contribute greater numbers of

Table 2-4

Geographic Distribution of Daily Trips to Dulles Airport

Aggregated Area	1992						2020					
	Employee Trips		Passenger Trips		Other Trips		Employee Trips		Passenger Trips		Other Trips	
	#	%	#	%	#	%	#	%	#	%	#	%
WTCS Area (1)	5,769	48.5	1,834	15.7	572	13.1	19,135	61.0	7,398	21.4	3,393	32.8
North of Airport (2)	779	6.5	2,502	21.4	85	1.9	654	2.2	5,648	16.5	52	0.5
West of WTCS Area (3)	311	2.6	225	1.9	3	0.1	1,360	4.3	552	1.6	0	0
STUDY AREA Subtotal	**6,859**	**57.6**	**4,561**	**39**	**660**	**15.1**	**21,149**	**67.5**	**13,598**	**39.5**	**3,445**	**33.3**
East of Airport (4)	5,040	42.4	7,144	61	3,705	84.9	10,178	32.5	20,801	60.5	6,870	66.7
TOTAL	**11,899**	**100**	**11,705**	**100**	**4,365**	**100**	**31,327**	**100**	**34,399**	**100**	**10,315**	**100**

Source: Washington Dulles International Airport Access and Parking Study, Technical Memorandum #4, November 1992. Parsons Brinckerhoff Quade & Douglas, Inc., September 1995.

WTCS = Western Transportation Corridor Study
(1) Includes Loudoun, Prince William, Fauquier, and Stafford Counties
(2) Includes Montgomery, Frederick, and other Maryland Counties
(3) Includes Clarke County in Virginia and Jefferson County in West Virginia
(4) Includes Fairfax and Arlington Counties, City of Alexandria, District of Columbia, and Prince George's County in Maryland

employee trips than passenger trips and a small percentage of the other trips including goods movement trips.

A subtotal of daily trips to the airport from the three quadrants suggest that the majority of employee trips originate from the growth areas north, west and south of the airport while the majority of passenger trips and other trips originate or end in the areas east of the airport. In the future, even greater numbers of employee trips will be generated from the three quadrant area. According to the Washington Dulles International Airport Access and Parking Study (1992), as a result of growth in passengers and cargo at the Dulles Airport, the employee base for Dulles Airport is expected to grow and shift to the west, northwest, and southwest. Employee trips are expected to substantially increase from Loudoun, Prince William, Stafford, Fauquier, and Clarke counties.

Future trip making to and from the airport from all directions is predicted to between 200 and 300 percent. The greatest increase is expected in the "other" trip category coming from or two the north, west and southern quadrants. The predicted growth is more than a 500 percent increase over the 1992 levels. This is a result of the predicted growth in cargo and business uses at the airport as well as the planned siting of the NASM Annex at the intersection of Routes 28 and 50 (see Section 2.4 below) coupled with the growth in population and employment for the four county areas. While not enough to fully shift the balance in travel from the east to the other three quadrants, the increases in trips from these three lays the basis for a finding of need for consideration of additional access points to the airport.

Air Cargo Growth. Air cargo operations at the Washington Dulles International Airport have become increasingly important to the economy of the region:

> The ability of airports to adequately plan and efficiently handle air cargo operations is important to the overall economics of market areas served by the airport. The fast and secure movement of goods by air is becoming an essential part of product distribution for manufacturing, trade and service related businesses. Air cargo services at the local airport can help promote economic development in the area and create new jobs.

In Virginia, the rate of increase for air cargo services averaged 9.1 percent annually between 1979 and 1989. While Washington Dulles, Norfolk, Richmond and Roanoke handled 90 percent of the air freight in the State; Dulles Airport alone handled approximately 67 percent (VACSP, 1991).

"All-cargo" has become an increasingly important component of the air freight market. "At Washington Dulles, about 50 percent of the domestic air freight moves via all-cargo aircraft and much of the freight transported by passenger airlines does so on wide-body aircraft which carry large volumes of containerized freight." (VACSP, 1991). As the use of wide-body planes and all-cargo aircraft are increasingly important, several key airports in Virginia have emerged as dominant in the field. Amongst these is the Dulles Airport with almost 53 percent of the all-cargo carrier service in Virginia.

Another factor that has emerged as important in the decision of shippers to use a specific airport is the availability to offer direct flights to international and national destinations. Dulles Airport is ranked as the eighth largest international gateway in the Unites States and the third largest on the East Coast. Dulles Airport now captures 24 percent of all of Virginia's export air freight, while New York's JFK Airport ships 46 percent of Virginia's export air freight (Virginia Air Cargo System Plan, 1991). Access to Dulles Airport, as well as an increase in direct flights from Dulles, will be important to increasing the Dulles market share of Virginia's air cargo exports.

While the overall future growth in air freight is not expected to be as steep as in the 1980s, it is expected that an annual growth rate of 6 percent (see Table 2-5) will be maintained. In 1993, however, growth totaled 23.7 percent due to the opening of additional cargo space and a dedicated ramp.

Table 2-5

Total Air Cargo Handled

	Average Freight Tons Enplaned Annually		
Primary Air Cargo Airports	**1989**	**2010**	**Average Annual Growth**
Washington Dulles	211,061 Tons	718,943 Tons	6.0%
Total Virginia	309,277 Tons	1,004,404 Tons	5.8%

Source: 1991, Virginia Air Cargo System Plan Executive Summary.

2.3 PLANNED ROADWAY IMPROVEMENTS

2.3.1 Improvements Considered in the Future Traffic Modeling Analysis

Only two additional improvements to roadway capacity near the Dulles Airport are included as part of the regional Constrained Long Range Plan (CLRP). One of these is the widening of the DTR to three general purpose lanes and a high-occupancy vehicle (HOV) lane in each direction. The improvement is currently under construction. The second improvement is the widening of Route 606, which borders Dulles Airport on the west and north, from two lanes to four lanes between Route 50 and Route 28.

2.3.2 Additional Planned Improvements

The Fairfax County Comprehensive Plan envisions the widening of Route 28 to six lanes from the Prince William County line to I-66 and to eight lanes from I-66 northward to the Loudoun County line.

Related to Dulles Airport access is the Dulles Corridor Transportation Study Major Investment Study (MIS), which evaluated bus and commuter rail alternatives in the corridor from the West Falls Church Metrorail station to Loudoun County (Route 772). A recommendation has been put forth for a system, similar to Metrorail to be built, generally in the median of the DAAR to the Dulles Airport with exception of service to Tysons Corner. Such a system would be an important component of Dulles Airport access from the east.

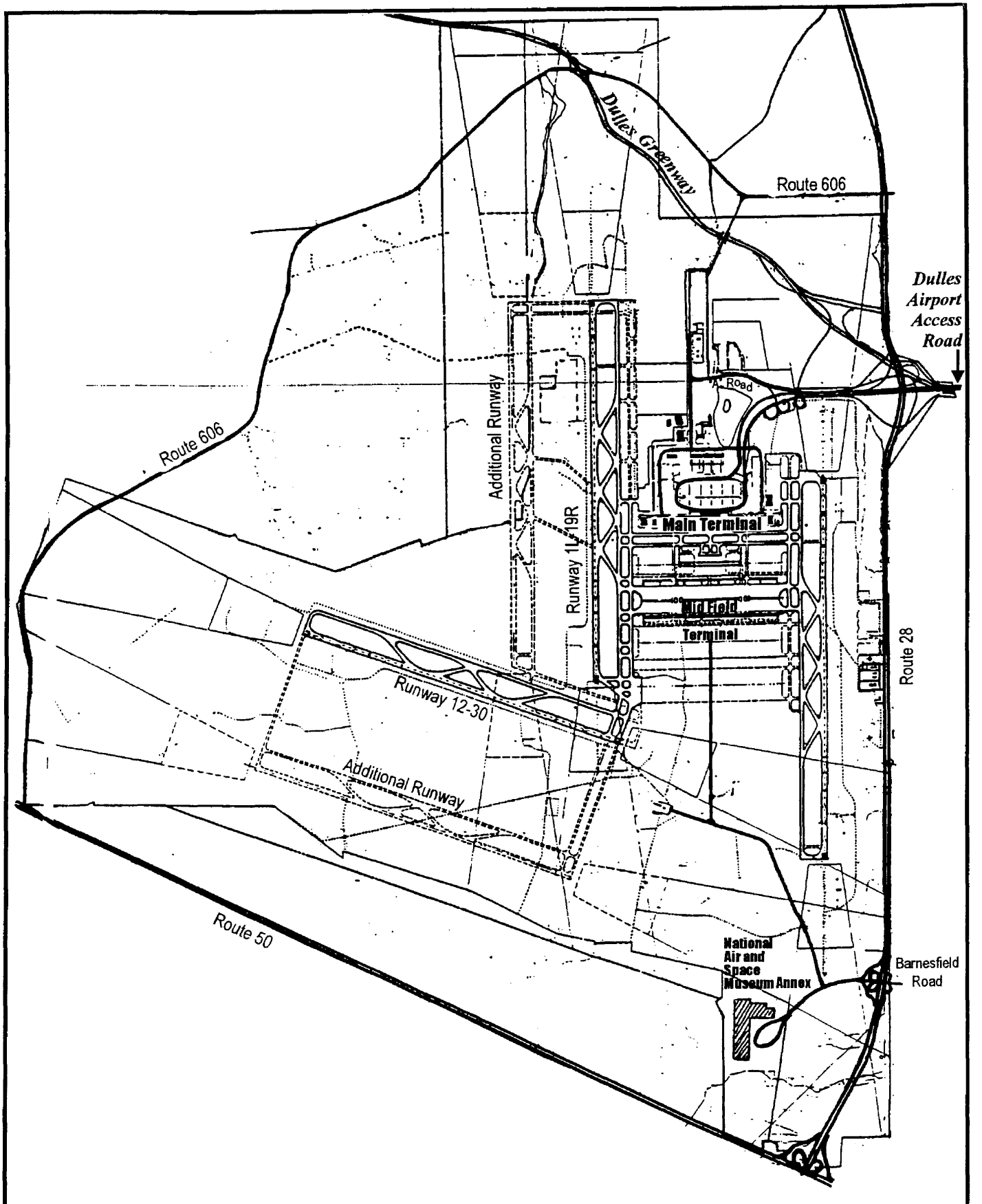
According to The 1990 Prince William County Draft Comprehensive Plan, the Route 234 Bypass main function "will be to service traffic headed for the Dulles Airport corridor in Loudoun County. However, further study should be performed in order to set an exact alignment that satisfies both Prince William and Loudoun Counties."

According to Loudoun County's Countywide Transportation Plan (July 5, 1995), "the segment of Route 659, the Dulles South Area, just north of Route 772 south to the Prince William County line, will be relocated and serve as a major north/south corridor running between Route 7 and Prince William County."

2.4 AIRPORT MASTER PLAN COMPONENTS

The Airport Master Plan envisions the existing Main Terminal complex (see Figure 2-5) as being the sole passenger facility until it exceeds its capacity of 45 million passengers per year. Then a southern terminal, in the vicinity of the proposed NASM annex (near the Route 28/50 intersection), would be constructed to serve international passengers. The capacity of the airport, with five runways (includes two additional runways), would be 55 million passengers per year.

Two new runways also are planned (see Figure 2-5). One is a full-length north-south runway parallel to and 2,500 feet west of Runway 1L-19R. The other is a full-length crosswind runway parallel to and 4,300 feet south of Runway 12-30. These two runways and the planned improvements discussed above would effectively use the remaining Dulles Airport property.



Source: MWAA, 1996., Parsons Brinkerhoff, 1997.
Map Not To Scale

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Figure 2-5
Dulles Airport Master Plan

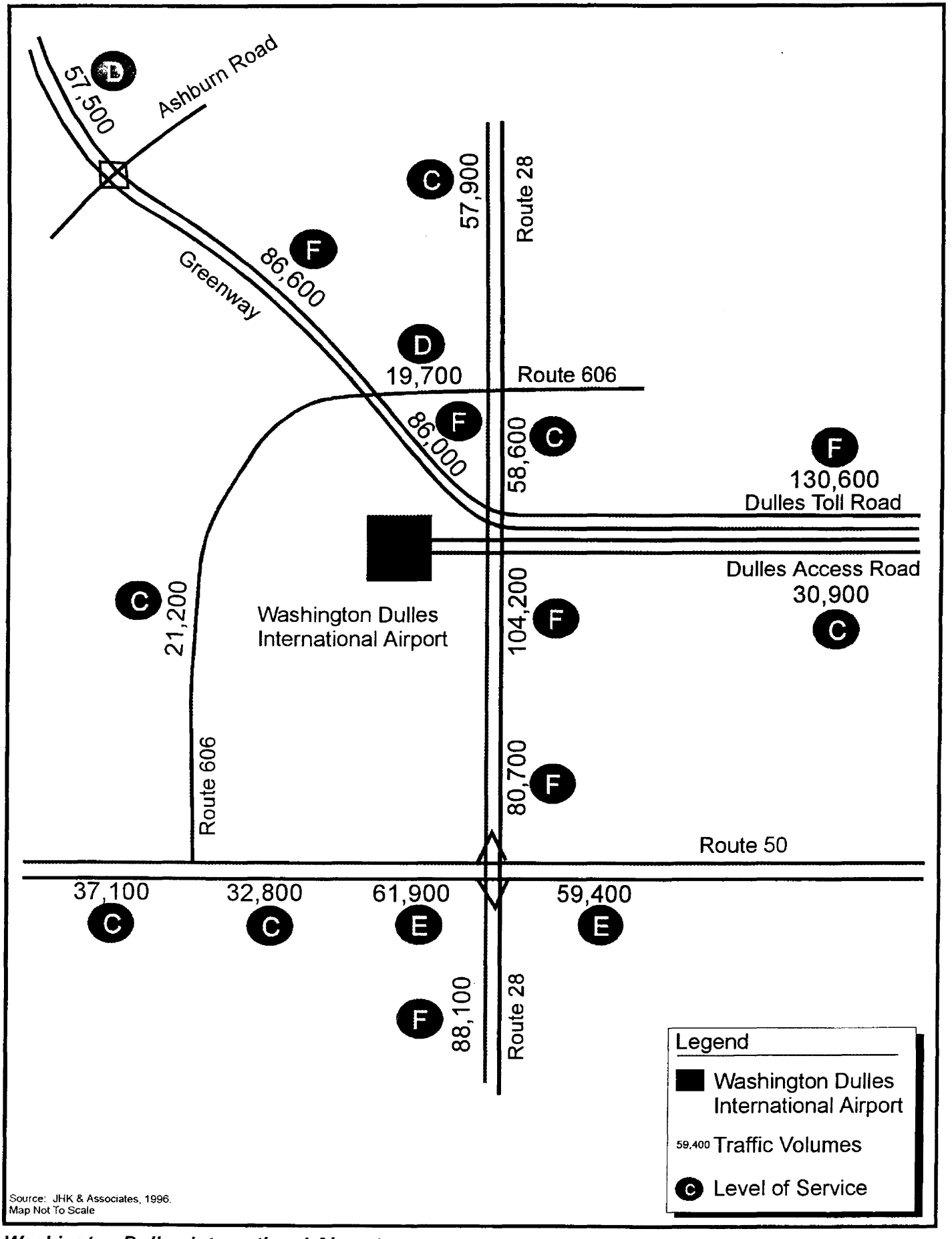
The NASM annex is planned in the southeast corner of the Dulles Airport property (see Figure 2-5). The NASM in Washington, DC is now the most heavily visited museum in the U.S. The annex would be used to show large exhibits such as the Space Shuttle which attracts close to 15,000 visitors per day. Its primary access would be a four-lane entrance roadway from Route 28 at a new interchange at Barnsfield Road.

2.5 EXISTING AND FUTURE TRANSPORTATION NEEDS

Existing evening peak traffic, as characterized by the LOS D ratings on Route 28 between the Dulles Toll Road and Route 50, on the DTR, and on Route 50 east of Route 28 indicate that today; there is a need that is directionally based on travel to and from the eastern quadrant. The balance of the road system in the immediate vicinity of the airport, however indicates a LOS C or better during the evening peak hour. This suggests that the surrounding roadways are presently serving travel demand from the north, west and south.

Growth in employment, population and airport passenger and cargo travel planned and predicted for the Dulles Airport and its surrounding is expected to further degrade LOS on the airport access roads. Figure 2-6 provides the 2020 forecast LOS for the roadway system with future capacity enhancements only to the DTR and Route 606. Service levels on the DTR and Route 28 south of the DTR and south of Route 50 are expected to fail (LOS F). The Greenway is predicted to operate at LOS F between Ashburn Road and Route 28. Route 50 is predicted to experience degraded operations to LOS E by 2020. Both the west-bound and eastbound approaches to the intersection with Route 28 are predicted to operated at LOS E, with traffic volumes on the eastern approach exceeding those on the western approach by 2,000 vehicles.

Travel forecasts of future person trips to and from the airport predicted more than double or triple between now and 2010 based on airport plans for expanded services and facilities. Even if the projected growth does not occur until 2020, the evening peak traffic congestion will continue to increase. The contribution of the north, west and southern quadrants to the growth in employee, cargo and other trips from these three areas is substantial. It is not, however, greater than the growth predicted for trips of all types to and from the eastern quadrant or the District. The LOS failure of the Greenway and the increased volumes on Route 50 support the case of need for improved access to the Dulles Airport.



Source: JHK & Associates, 1996.
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Figure 2.6
Baseline Alternative-2020

3.0 AIRPORT ACCESS ALTERNATIVES

A range of alternatives was considered for access to the Dulles Airport by the year 2020; however, the existing and planned airport uses and the related roadway network constrained the feasible alternatives to the following four (see Figure 3-1) reviewed as part of this study.

3.1 BASELINE ALTERNATIVE

The Baseline Alternative (No Action) provides the existing single passenger access to the Dulles Airport from the Dulles Access Road at its intersection with Route 28. The only planned improvements included in this alternative are the DTR mixed flow and HOV additions and the widening of Route 606 from two lanes to four lanes. As noted in the introduction, some employees arrive at the airport via Gate 4 off of Route 28 south of the main entrance. An access point to the NASM Museum from Route 28 near Gate 4 at Barnsfield Road also is assumed to be in place.

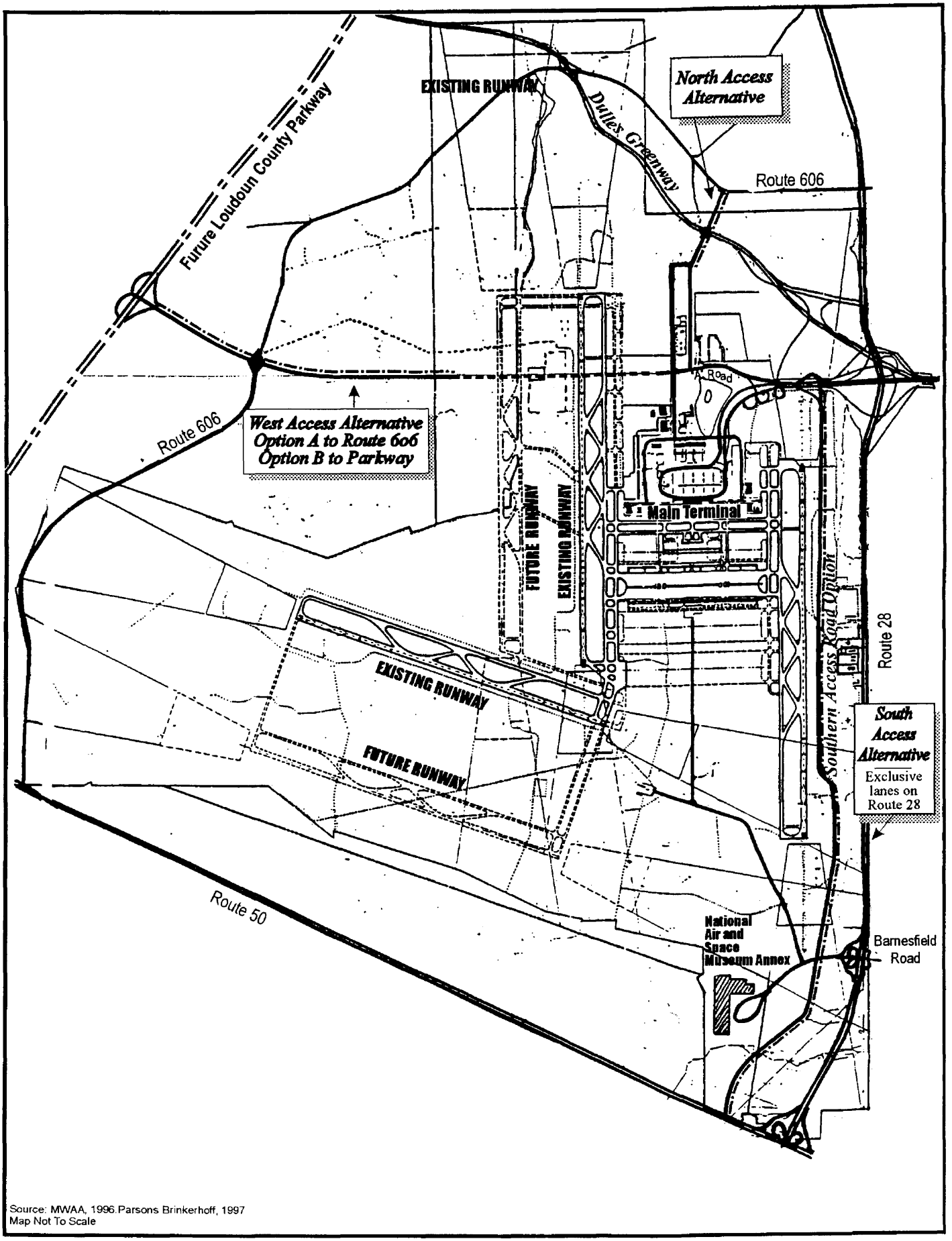
3.2 NORTH ACCESS ALTERNATIVE

This alternative includes the existing access from Route 28 and the DAAR and a second access point on the north side of the airport from Route 606. This access point was assumed to be an upgrade and completion of the existing north access point that was built, but not opened, when the Dulles Greenway was built. The North Access Alternative is essentially already constructed and would require a minor upgrading of the roadway (from 2 to 4 lanes) and a 0.1 mile extension to allow this access point to function as a passenger access point. However, a connection from Route 606 would serve a limited area of airport users, "near "eastern" Loudoun County because of its location and the availability of the Dulles Greenway as an alternative route.

3.3 WEST ACCESS ALTERNATIVE

The West Access Alternative includes the current access from Route 28 and the DAAR and two western options. West Access Alternative - Option A would introduce a new access point to the Dulles Airport's main terminal from Route 606 on the west side of the airport. The facility is assumed to be a 4-lane, limited access roadway which will be carried as a tunnel under the existing planned runway 1L-19R.

The West Access Alternative - Option B would access the airport's main terminal from a new roadway facility such as the Loudoun County Parkway, the final Tri-County Connector connection currently in the Countywide Transportation Plan for Loudoun County (July 1995) and studied as part of the WTCS alternatives. The combination of a western access facility and a new roadway facility such as the Loudoun County Parkway is intended to assess the feasibility and need for more direct access to Loudoun and Prince William counties, and portions of western Fairfax County. This alternative should help to indicate the service from the areas due west and south west of the airport. This a facility is assumed to be a 4-lane,



Source: MWAA, 1996.Parsons Brinkerhoff, 1997
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Figure 3-1
Dulles Airport Access Alternatives

limited access roadway approximately 4.0 miles in length. West Access Alternative-Option B would also require tunneling under the Dulles Airport runways. No additional widening of Route 606 is included.

3.4 SOUTH ACCESS ALTERNATIVE

The South Access Alternative includes the Baseline Alternative access points as discussed previously plus the addition of an exclusive airport in-bound access lane northbound in Route 28 between Route 50 and the airport entrance, a distance of approximately 4.5 miles. The South Access Alternative be used by people currently using Route 50 of Route 28.

A second option was considered for a southern airport access. That access would on a roadway that would access the Dulles Airport at Barnsfield Road as it intersects Route 28. Then continue north on airport property parallel to Route 28 to an intersection with the DAAR west of the current intersection of Route 28 and the DAAR. However, the right-of-way on the Airport property is constrained by the airport runway on the west, wetlands, existing tank farm and other airport infrastructure and Route 28 on the east. The congestion relief on the adjacent roadways would be very similar to the south access option with exclusive airport travel lanes on Route 28. These constraints, and the inability of the option to provide greater congestion relief, eliminated this option from further consideration.

4.0 EVALUATION OF ALTERNATIVES FEASIBILITY

The need for additional access capacity to the Dulles Airport was established through a review of the existing and future levels of service on the primary access roads to the airport. The evaluation indicated that although the greatest volume of trips to and from the airport will be with areas to the east, significant growth in travel from areas to the north, west and south of the airport will result in failed and degraded levels of service on the Dulles Greenway and on Routes 606 and Route 50.

4.1 FEASIBILITY MEASURES

Feasibility of alternatives was based on several measures:

- Numbers of trips attracted to an alternative,
- Reductions in traffic volume on selected roadways,
- Improvements in Level of Service (LOS) on selected roadway segments,
- Cost estimates.

4.1.1 Attractiveness of Alternative

Daily trip volumes forecast for the alternatives are one indicator of the roadways effectiveness at serving as a feasible access alternative. In addition, the volume of traffic the alternative draws serves as part of the indication of which area the trips are coming to the airport from. The effect of each alternative on attracting traffic from areas to the east is considered minimal.

4.1.2 Reductions in Traffic Volumes and Improvements to Levels of Service on Selected Roadways

Reductions in traffic volumes and changes in LOS on selected roadway segments was targeted at those segments for which reductions in traffic volumes and the associated increase in volumes on the alternative access road would indicate that transportation demand from either the north, west or south quadrant was being affected. Those segments used for comparison include the following:

1. Route 28 between Route 606 and Route 50,
2. Route 50 between on the approach segments east and west of Route 28, and
3. Dulles Greenway between Ashburn Road and Route 28.

4.1.3 Cost Estimates

Preliminary planning level construction cost estimates were prepared for each alternative. Cost assumptions included unit costs for widening, new roadway construction, tunneling and structures. Unit costs were based on recent local area construction experience and technical cost estimating training. Estimated quantities and/or lengths were scaled from U.S.G.S. quadrangle maps for the area. Contingency costs for design, right of way and environmental

mitigation were included. No operations or maintenance cost assumptions were developed for this analysis.

4.2 ALTERNATIVES EVALUATION

4.2.1 Baseline (No Action) Alternative

The vehicular volumes assumed to enter and leave the Dulles Airport in 2020 on a daily basis and the breakdown of those volumes by the purpose of the trip are shown in Table 4-1. The Dulles Airport is assumed to operate at a level of 32 million passengers per year in 2020 this equates to approximately 68,800 daily vehicle trips for passengers. At this passenger activity level the main terminal would continue to be the only passenger facility.

Route 50 east of Route 28 also would operate at a high level of congestion (LOS E), but this congestion would decrease west of Route 28 and Route 50 would operate with minor congestion west of Route 606. Route 606, upgraded to 4 lanes, would operate with average congestion (LOS C) except between the Dulles Greenway and Route 28, where the congestion will be significant (LOS D).

Air cargo facilities to meet increase demand (refer to Section 2.2.2) would expand along the North-South Service Road north of the main terminal. The main entrance to the airport would continue to be the Dulles Airport Access Road and Route 28.

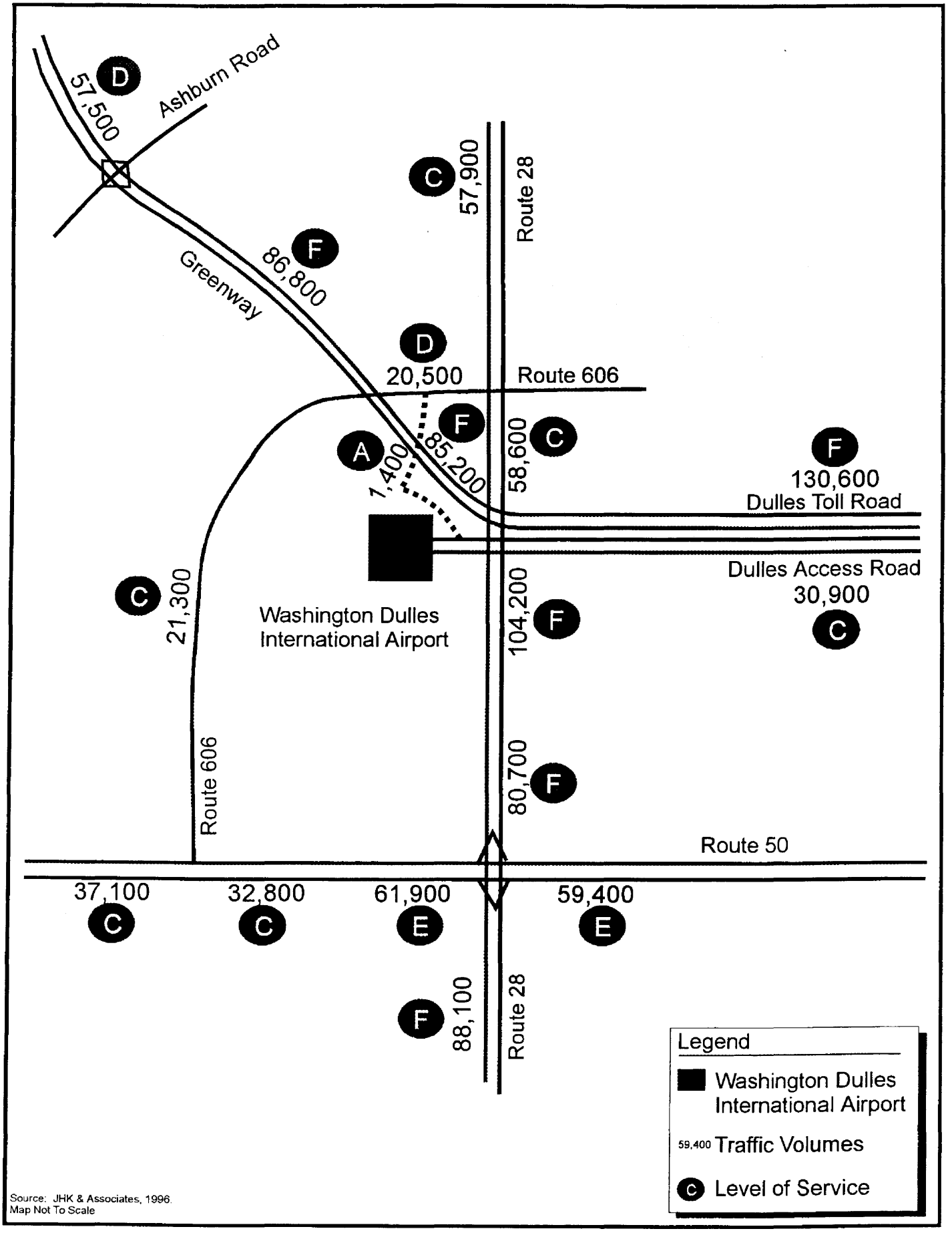
In 2020, many of the highways near Dulles Airport will be operating at a high level of congestion (Level of Service F) (see Figure 2-6). It is anticipated that the Dulles Greenway and the DTR would operate at extreme congestion levels (LOS F), The DAAR lanes, however, would still operate with average congestion, LOS C. Route 28 from the DTR to south of Route 50 would operate at extreme congestion levels (LOS F) but north of the DTR, Route 28 would operate with average congestion (LOS C).

4.2.2 North Access Alternative

Since the existing movement from the Greenway to the main airport entrance would be more direct and faster than the north access to the airport from Route 606, the north access to Dulles Airport, from Route 606, is anticipated to attract a fairly small volume of traffic, less than 2,000 vehicle a day. The primary travelers that would use the north airport access would be travelers in the immediate vicinity of Route 606, an area that is primarily commercial and light industrial. Therefore, the north airport access would be important for some cargo movements, especially if truck "transshipping" points such as the present post office facility, continue to develop near Route 606.

As shown on Figure 4-1, a north airport access, when compared to the Baseline Alternative, would relieve traffic on Route 606 between the Greenway and Route 28. Traffic conditions on the remaining roadways would be similar to the Baseline Alternative in 2020.

Since there is an existing roadway from Route 606 to the Dulles Airport, only an upgrade to



Source: JHK & Associates, 1996.
Map Not To Scale

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Figure 4-1
North Access Alternative-2020

Table 4-1

Vehicle Trips Entering/Leaving Dulles Airport in the Year 2020

Trip Type		Vehicle Trips
Passengers		68,800
Rental Car	6,100	
Satellite Parking	9,200	
Main terminal	53,500	
Employees		49,600
Airport	44,300	
Office Lease	5,000	
General Aviation	300	
Air Cargo		6,900
Freight Forwarders	2,850	
U.S. Mail	1,550	
Package Express	2,550	
National Air and Space Museum		14,750
TOTAL VEHICLE TRIPS		**140,050**

Source: JHK and Associates, December 1996.

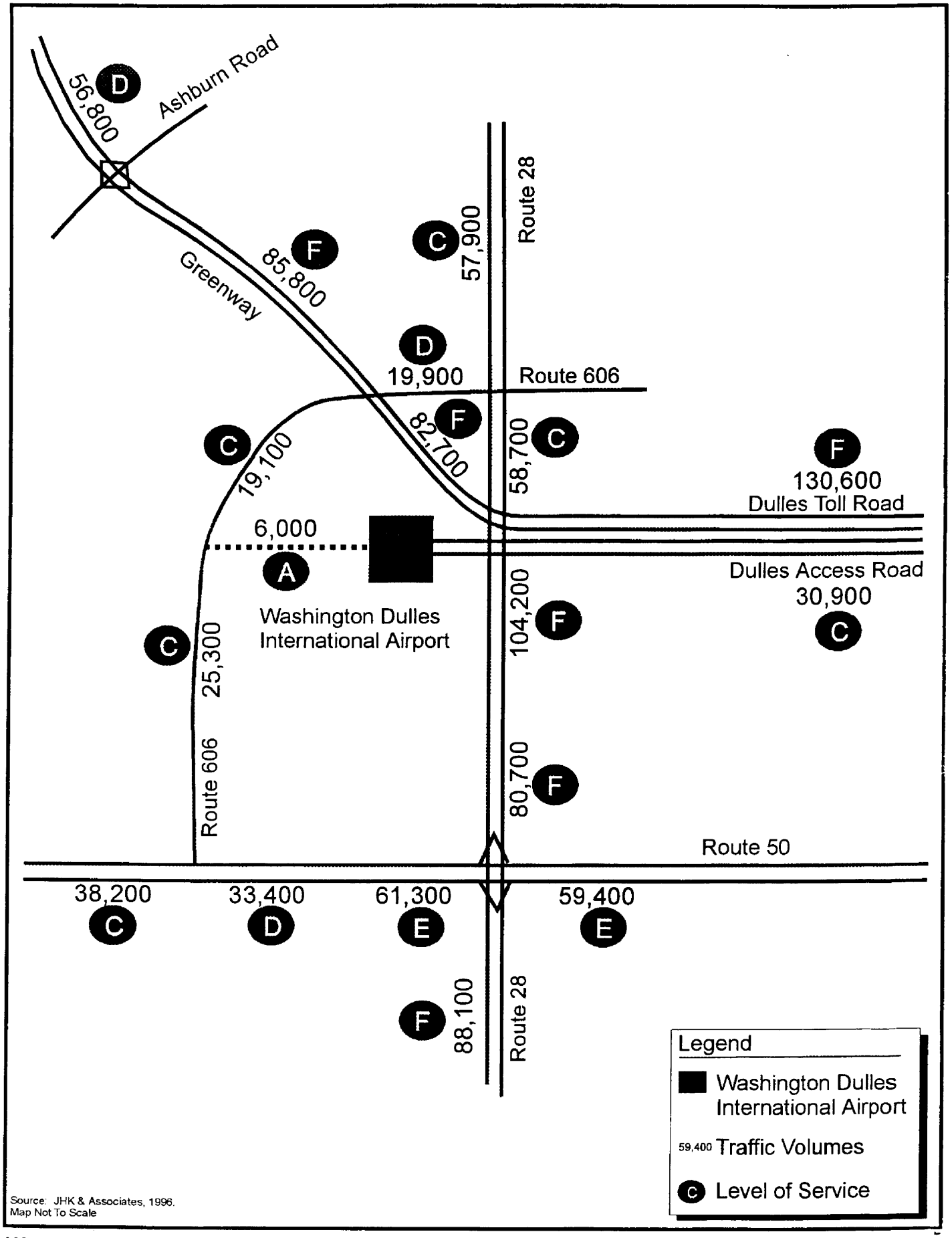
that roadway and a small connection to the North-South Service Road would be needed. The cost for this alternative is approximately $711,000 in 1996 dollars.

4.2.3 West Access Alternative

The Western Access Alternative - Option A to Dulles Airport from Route 606 would attract traffic, approximately 6,000 vehicles a day, from the areas near Route 606 and the areas near Route 50 and west of Route 606. This would result in an increase in traffic on Route 606; However, there would be little overall change in congestion on the remaining roadways as compared to the Baseline Alternative (see Figure 4-2).

Construction of a new roadway to serve the Dulles Airport from the west (Option A) would require tunneling under the EXISTING and future runways west of the Main terminal. The cost estimate for construction of the new roadway, including the tunnels, is approximately $241 million in 1996 dollars.

The Western Access Alternative - Option B, direct access from a new roadway facility west of Route 606, would increase the traffic volumes on a western access road to the airport as compared to access from Route 606 alone. It is estimated that this volume would be more than 19,000 vehicles per day on the western access facility with the use of aggressive signing on the Dulles Greenway to encourage the use of the new roadway facility and the western airport access itself as compared to approximately 6000 vehicles per day with Option A. The



Source: JHK & Associates, 1996.
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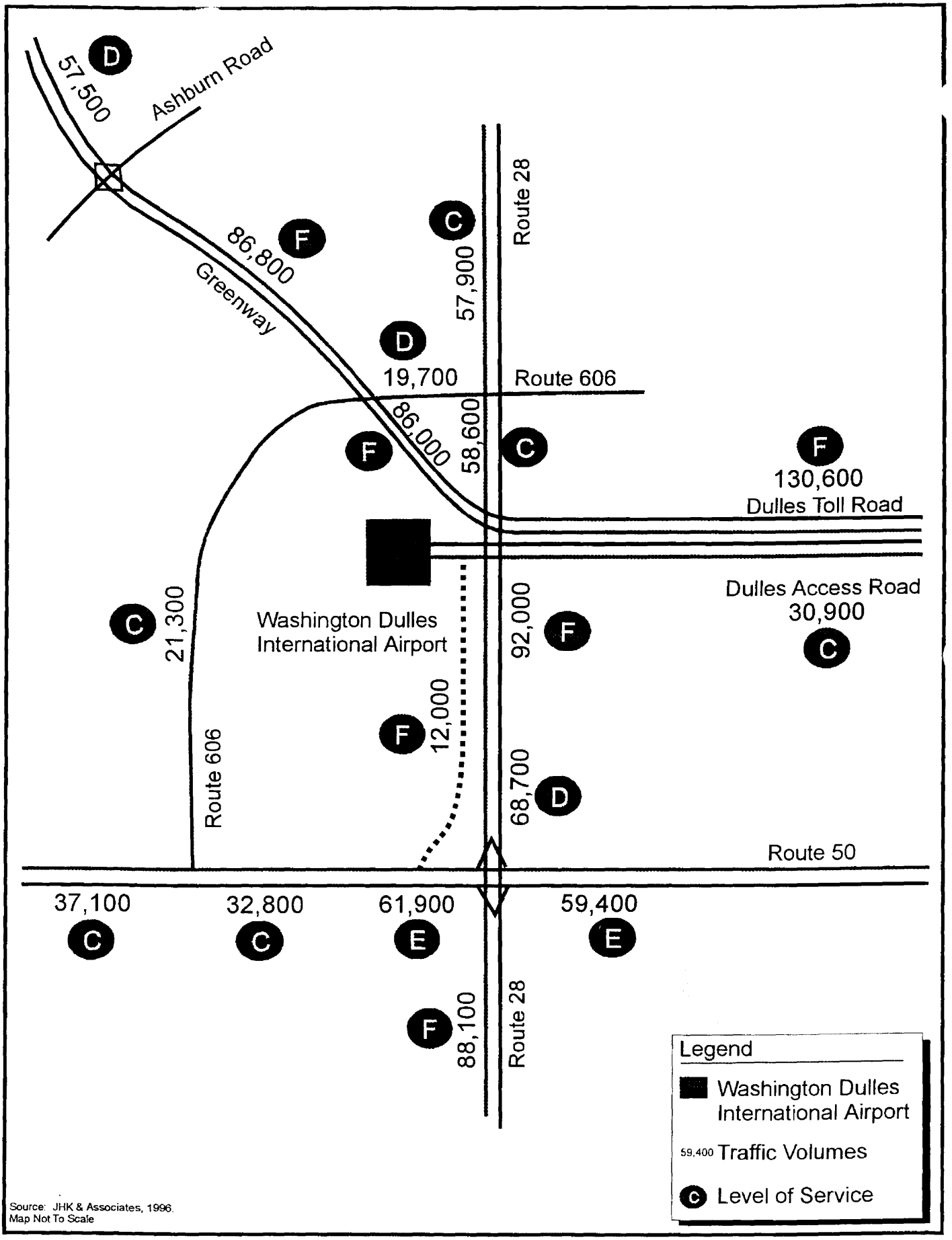
Figure 4-2

West Access Alternative Option A-2020



Source: JHK & Associates, 1996.
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Washington Dulles International Airport Access Study

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Figure 5-4
South Access Alternative-2020

REFERENCES

JHK & Associates, Hunnicutt and Associates, EDAW, Inc. and Cervantes and Associates, Alexandria, Virginia. Washington Dulles International Airport Access and Parking Study, Technical Memorandum #1 - Issues, Goals and Objectives, January 1992.

JHK & Associates, Hunnicutt and Associates, EDAW, Inc. and Cervantes and Associates, Alexandria, Virginia. Washington Dulles International Airport Access and Parking Study, Technical Memorandum #2 - Data Compilation, January 1992.

JHK & Associates, Hunnicutt and Associates, EDAW, Inc. and Cervantes and Associates, Alexandria, Virginia. Washington Dulles International Airport Access and Parking Study, Technical Memorandum #3 - Evaluation Criteria and Concept Approaches, December 4, 1991.

JHK & Associates, Hunnicutt and Associates, EDAW, Inc. and Cervantes and Associates, Alexandria, Virginia. Washington Dulles International Airport Access and Parking Study, Technical Memorandum #4 - Forecasts, Facility Requirements and Needs Analysis, November 1992.

JHK & Associates, Alexandria, Virginia. Western Washington Bypass Major Investment Study - Truck Data Memorandum, September 18, 1995.

Loudoun County, Virginia. Choices and Changes General Plan, September 17, 1991.

Loudoun County, Virginia. Countywide Transportation Plan, July 5, 1995.

Loudoun County, Virginia, Department of Economic Development. Loudoun County Major Employers, 1995.

Report of the Dulles Airport Economic Study Commission, House Document No. 54, Richmond, Virginia, 1996.

SH&E, Inc. Virginia Air Cargo System Plan, 1991 Executive Summary.

Virginia Employment Commission Economic Information Services Division. Virginia Economic Indicators, 4th Quarter 1994 Data, Volume 26, No. 4.

Virginia Employment Commission Economic Information Services Division. Virginia Population Projections 2010, June 1993

Virginia Employment Commission Economic Information Services Division, Washington DC-MD-VA-WV PMSA (Virginia Portion). Industry and Occupational Employment Projections: 1990 - 2005, May 1994.

Virginia Employment Commission Economic Information Services Division, State Data Center. Commuting Patterns of Virginia Workers: County and City Level for 1990, March 26, 1993.

Virginia Employment Commission Economic Information Services Division, State Data Center. Population: Transportation to and Place of Work, County and City Level for 1990, May 11, 1992.

Washington Airports Task Force, Washington, DC. Washington Dulles International Airport Access Needs, May 19, 1989.

Washington Dulles Air Cargo Limited Partnership/Aviation Facilities Company, Inc., McLean, Virginia. Washington Dulles International Cargo Directory and Users Guide 1994.