# DRAFT ENVIRONMENTAL IMPACT STATEMENT
# DULLES AIRPORT ACCESS ROAD - OUTER PARALLEL TOLL ROADS

FEDERAL AVIATION ADMINISTRATION

METROPOLITAN WASHINGTON AIRPORTS

and

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

DULLES AIRPORT ACCESS ROAD - OUTER PARALLEL TOLL ROADS

from Sully Road (Route 28), Loudoun County, Virginia
to Capital Beltway (I-495), Fairfax County, Virginia

DRAFT ENVIRONMENTAL IMPACT STATEMENT

U.S. Department of Transportation, Federal Aviation Administration, and
Virginia Department of Highways and Transportation

This statement is submitted for review pursuant to the following legal requirements:
Section 102(2) (C) of P.L. 91-190, 42 U.S.C. 4321 et seq.

James A. Wilding, Director
Metropolitan Washington Airports,
Federal Aviation Administration

3/27/81
Date

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Deputy Commissioner and Chief Engineer
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3/27/81
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This document summarizes the environmental studies concerning the proposed construction of parallel lanes alongside the Dulles Airport Access Road in Loudoun and Fairfax Counties, Virginia and the alternatives to the proposed action.


Comments on this Draft Environmental Impact Statement are due by May 22, 1981 and should be sent to Mr. Robert L. Hundley at the address noted above.

Prepared in Consultation with

FEDERAL AVIATION ADMINISTRATION
METROPOLITAN WASHINGTON AIRPORTS

By

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

## PREFACE

The Dulles Airport Access Road (DAAR), which was developed by the Federal Aviation Administration (FAA) in conjunction with Dulles International Airport, is a four-lane divided highway that extends from the airport eastward for approximately 15 miles to an interchange with Interstate Route 495 (the Capital Beltway) and Virginia Route 123 near McLean, Virginia (Figure 1). The DAAR is maintained primarily for airport traffic with carpools given access at selected ramps during peak hours. Going east from the airport, off-ramps allow airport traffic to exit, but the absence of on-ramps prevents other vehicles from entering. Heading west, on-ramps provide access only to the airport, the sole exit. The road is the principal ground access route to the airport.

Dulles International Airport is located at Chantilly, Virginia, 26 miles from downtown Washington, and since the airport's inception rapid ground access has been essential to the airport's success. FAA believed that an effective way to ensure rapid ground access was to build an airport access road and to physically separate airport traffic from non-airport traffic. Therefore, the DAAR was planned as an exclusive use facility which would extend from the airport to the future Interstate Route 66 leading into Washington, D.C. The airport road was not constructed as a local commuter road or to fulfill the need for a community-use road. Such roads are within the purview of local and state governments. However, the potential demand for access to the highway by non-airport-related traffic was recognized by FAA and a decision was made to acquire a sufficiently wide right-of-way to accommodate future local service roadways alongside the airport express lanes if such service roads were to become necessary. The additional right-of-way was acquired by the FAA more than 20 years ago and at considerable expense extra long bridge spans were included with the original roadway construction to accommodate the future local service capability. In addition, a median strip of sufficient width to accommodate a future rapid rail system was reserved within the DAAR right-of-way (Figure 2).

Over the past 20 years there have been numerous requests from individuals, citizen groups, land development companies, local governments, and various congressional interests to use the airport road for non-airport-oriented purposes. With three exceptions, these requests have been denied. The operation of private commuter vehicles on the DAAR has not been authorized because opening the road to such vehicles would cause congestion and disrupt airport traffic thereby defeating the purpose for which the DAAR was built.

The three exceptions to the airport-traffic-only policy are limited in nature. Temporary ramps connecting the DAAR to Wolf Trap Farm Park (and its Filene Center for the Performing Arts) were opened in July 1971 and are used for performances at the park. These ramps, funded by the Wolf Trap Foundation for the Performing Arts, are operated by the National Park Service and are under the administrative control of the Federal Aviation Administration.

The second exception to the highway policy are the Reston commuter bus ramps at Reston Avenue, which were opened for use in July 1973.

Finally, in April 1980 the use of the ramps at Wolf Trap Farm Park and at Reston Avenue was expanded to allow four-person carpools on the DAAR during peak commuter periods. The use of the DAAR in this manner adds little traffic to the airport road. Carpool use is scheduled to terminate on January 1, 1985.

Figure 1
**Dulles Airport Access Road Corridor—Regional Location**

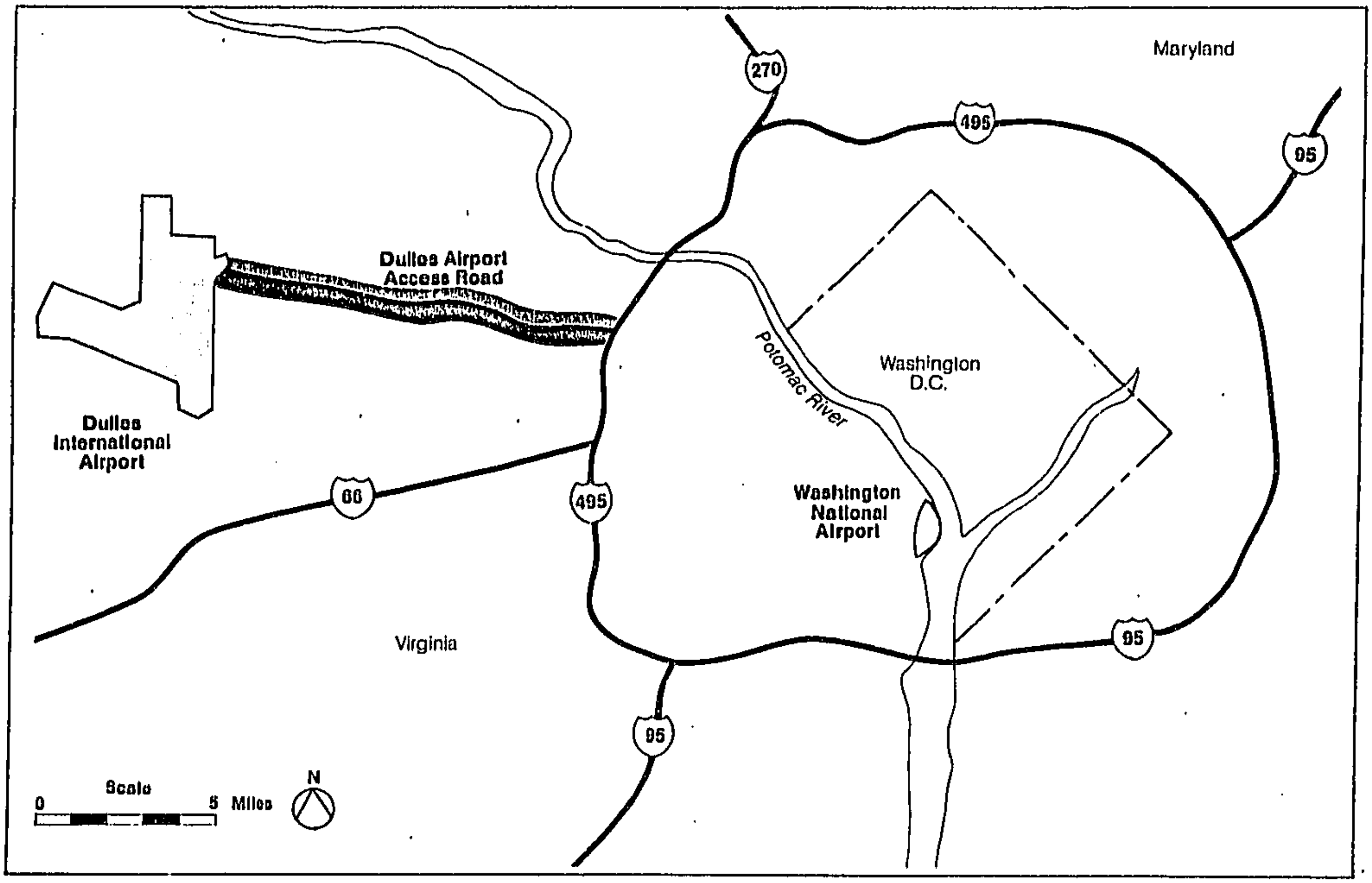
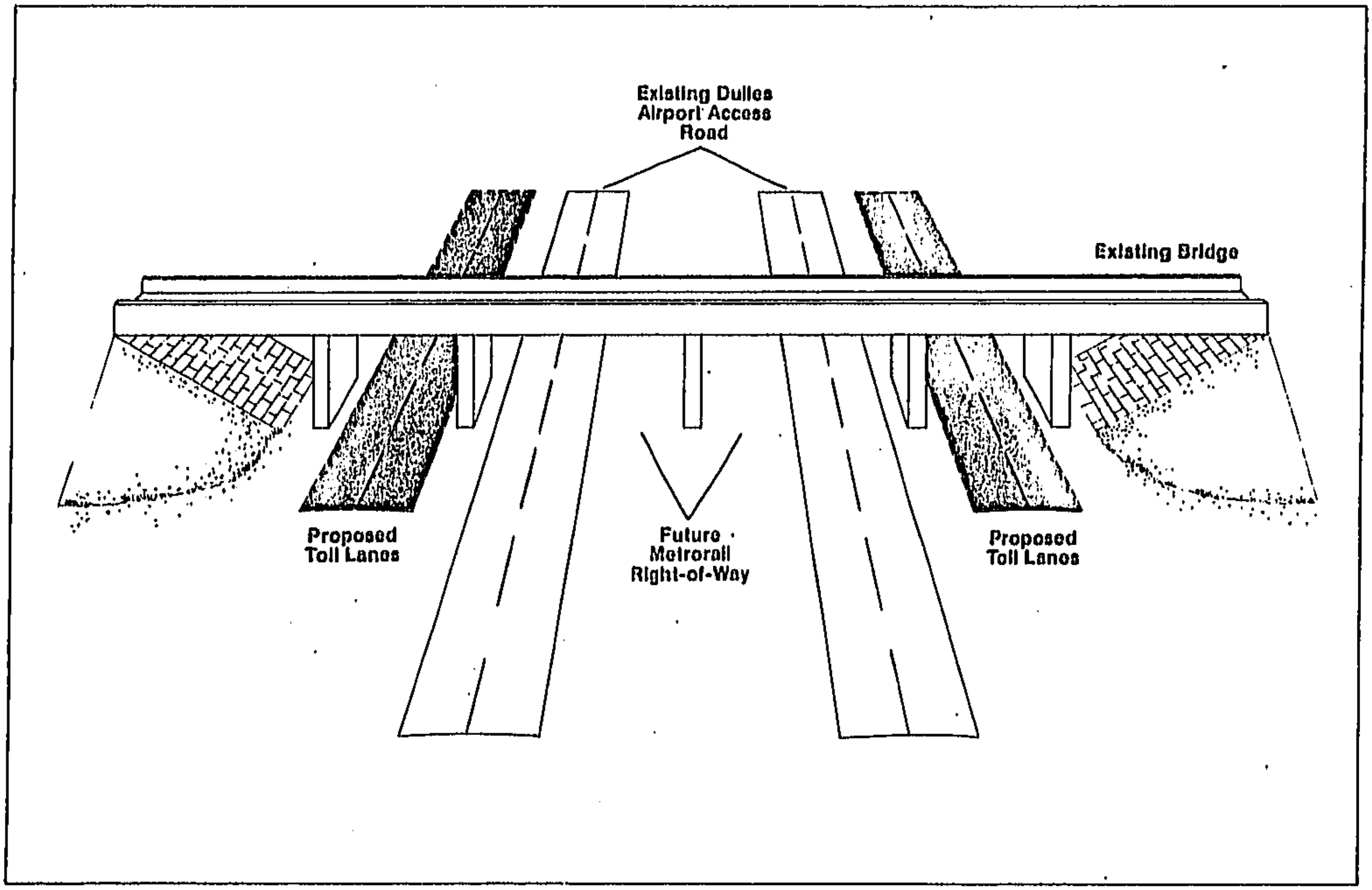


Figure 2
**Provision for Future Lanes—Typical Section**



The provision of local service roads paralleling the DAAR lanes is the subject of this Draft Environmental Impact Statement (DEIS) which is issued jointly by the FAA and by the Virginia Department of Highways and Transportation. The proposed federal action is to permit the Commonwealth of Virginia to construct and operate a toll road in the FAA right-of-way. Under the National Environmental Policy Act of 1969, this permission by FAA would be a major federal action significantly affecting the quality of the human environment and, therefore, requires the preparation of an environmental impact statement.

The policy of the FAA on the DAAR has not changed. The airport road is considered to be a part of the airport. A free flowing level of service must be maintained now and in the future on that highway to enable Dulles Airport to better compete with closer-in Washington National Airport. Improving ground access to Dulles is an important aspect of the FAA's efforts to achieve a more balanced utilization of the area's airports. It is against this policy, which has been briefly summarized here, that the FAA will view each of the alternatives presented in this environmental impact statement.

This environmental impact statement fulfills the requirements of both the federal government and the General Assembly of Virginia. To generate funds for construction of the proposed outer parallel lanes as a state highway project, the General Assembly of Virginia in the 1979 session enacted legislation authorizing the issuance of revenue bonds for construction of the DAAR outer parallel roadways as a toll facility. This legislation also required that an environmental impact statement be prepared for the outer parallel roadways between Dulles Airport and Route 7. (Environmental studies for proposed outer parallel roadways from Route 7 to I-495 are already included in analyses published in

November 1980 by the FAA for the extension of the Dulles Airport Access Road to Interstate Route 66 -- Final Environmental Impact Statement: Dulles Access Highway Extension to I-66 and Outer Parallel Roadways from Route 7 to I-495. This study, which has been updated herein to reflect a change in design from a four-lane to a six-plus-lane facility on the segment east of Route 7, is included by reference in the summary of this DEIS.)

The study examines three primary alternatives and several suboptions. Primary project alternatives are (1) build the outer parallel toll roads, (2) do not build the toll roads but utilize various transportation system management measures for improved access in the corridor including removing the airport-only restriction on the DAAR, and (3) do nothing --the "no-build" alternative. In addition, the feasibility of widening the DAAR to six lanes and opening it to general traffic or providing reversible lanes on the DAAR for carpools and buses is also considered.

An important planning factor for DAAR corridor development is the possible extension of the METRO transit line to Dulles Airport. However, the timetable for extension of METRO in the DAAR right-of-way is highly uncertain and specific features of such a facility have not yet been defined. In this study of the proposed toll road, the possible extension of METRO is considered as a suboption to each of the primary project alternatives. This provides an assessment of the effect of the presence or absence of METRO on the environmental impact of the toll road project alternatives. It is anticipated that an analysis of the full range of METRO-related impacts would be required as part of the information upon which decisions regarding future expansion of the METRO system would be based.

This report summarizes the environmental studies performed to assess the impacts of the project alternatives. It was prepared, through a cooperative effort, by the Virginia Department of Highways and Transportation and the Federal Aviation Administration. The consultant firm of Parsons Brinckerhoff Quade & Douglas assisted in the preparation of the DEIS; JHK & Associates served as subconsultant for traffic and transportation and James R. Reed & Associates was subconsultant for ecology. Detailed technical reports, which were also prepared as part of the overall study program and from which the information contained in this document was extracted, are available at the offices of the Federal Aviation Administration at Washington National Airport and at the Virginia Department of Highways and Transportation for review by readers wishing greater detail on a particular subject.

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## SUMMARY

### PROJECT DESCRIPTION

The Virginia Department of Highways and Transportation is proposing to construct a four-lane divided highway that would extend from the Dulles International Airport in Loudoun County, Virginia eastward to Route 7 (Leesburg Pike) in Fairfax County, Virginia (about 10.3 miles). The alignment of the proposed road, which would operate as a toll facility, would run parallel to the Dulles Airport Access Road on right-of-way owned by the Federal Aviation Administration. This road currently is restricted primarily to airport-related traffic. The proposed parallel lanes along the airport road, on the other hand, would provide access for non-airport-related travel needs — both to and from Washington, D.C. and within Fairfax County itself. From Route 7, the outer parallel lanes would continue as a six-plus lane highway to the Capital Beltway (Interstate Route 495).

### RELATED PROJECTS

The Tysons Bypass, a four-lane road that would be built in the DAAR right-of-way between Route 7 and Interstate Route 495, was assessed by the FAA in a Final Environmental Impact Statement (EIS) issued in January 1981. The FAA has decided that its right-of-way may be made available for the Tysons Bypass as assessed in that EIS, but that no transfer of an interest in the right-of-way will occur before the draft EIS on the entire outer roadway was available for public review. This Draft Environmental Impact Statement on the entire outer roadway describes and assesses the incremental impacts associated with the change in the bypass design from a four- to a six-plus-lane facility east of Route 7. Major effects associated with the expansion of the number of lanes of the road have been included below in the final section of this summary.

Another project, the extension of the Dulles Airport Access Road from its present terminus at Route 123 to connect with Interstate Route 66, has been studied by the FAA and approved. The extension is totally within the right-of-way acquired by the FAA when Dulles Airport was under construction. It is not affected by the Commonwealth of Virginia's outer roadway projects.

## ALTERNATIVES

The effects associated with six project alternatives are being evaluated in this study. The three major alternatives are:

- o Toll road -- build outer parallel toll roads from Route 28 at Dulles International Airport to Route 7.

- o Transportation system management (TSM) -- provide preferential treatment for high occupancy vehicles (HOVs) such as buses and carpools during peak hours by allowing them access to the DAAR in both directions at five interchanges. During off-peak hours, the DAAR would be unrestricted for private vehicles. Also, implement low cost intersection improvements not associated with the DAAR at two intersections.

- o No-build -- make no modifications to the DAAR other than regular maintenance of the existing facility. In a regional context, however, make all planned and programmed improvements to the roadway network.

Each of these three Dulles corridor alternatives has both with- and without-METRO options. The former assumes that the Metrorail will be extended to Dulles International Airport by year 2000, while the latter assumes that only the adopted regional system with a station at Vienna will be in place by that year. The combination of the three corridor alternatives with the two METRO options results in six overall project alternatives.

## IMPACTS

### Cost

The toll road from Route 28 to Route 7 would cost approximately $33.5 million (in 1981 dollars) to build. The Tysons Bypass section of the toll road from Route 7 to I-495 would cost an additional $21.6 million, bringing the total cost of the project to $55.1 million. Construction of the toll road under consideration in this study would take approximately 30 months while the Tysons Bypass section, which would be implemented earlier, would require 36 months to build.

The TSM would cost about $3.9 million (in 1981 dollars) to construct three sets of ramps and five park-n-pool lots.

### Traffic and Transportation

Comparing the traffic projections for all year 2000 alternatives with those for the base year indicates that by the design year vehicle miles of travel will increase by 89 to 94 percent, vehicle hours of travel will grow even more substantially (114 to 122 percent), while average speed will drop 3.7 to 5.7 miles per hour. Likewise, level of service conditions will deteriorate as the number of network miles operating at unacceptable conditions (level of service E or F) will increase from 6.3 percent in 1977 to between 22.3 and 27.7 percent in year 2000. These increases in traffic activity in year 2000 over 1977 reflect the increased population growth and more dense development patterns projected throughout the impact area roadway network by the turn of the century.

The comparison among the year 2000 alternatives themselves shows that the toll road would result in increases in vehicle miles of travel with decreases in vehicle hours of travel (improved speeds) over both the TSM and no-build. The implementation of the toll road would yield a reduction in roadway mileage operating at the worst level of service (F) -- a 2 to 6 percent drop over the no-build and TSM alternatives with METRO. Roads at level of service E, however, would increase by 2 to 3 percent under the toll road and TSM alternatives over the no-build. The toll road would also be expected to result in combined increases for levels of service A, B, C, and D of 4.0 to 5.4 percent over the TSM and no-build.

Although the TSM alternative is projected to result in an improvement in traffic operations as compared to the no-build alternative, the benefits accruing to area residents would not be as substantial as those under the toll road alternative. Increases in TSM roadway mileage percentages are projected to occur within level of service D and E at the expense of roadways operating at level of service A, B, C, and F. Hence, no perceptible change in overall network operating conditions over the no-build alternative would be expected with implementation of the TSM alternative. The level of service on a number of sections of the DAAR under the TSM alternative without METRO would change to level of service D or E.

Although the toll road alternative would provide a better level of traffic operation throughout the impact area than either the no-build or TSM, it would not eliminate all the impact area traffic flow problems. Many street segments are expected to operate at unacceptable levels of service and require some form of remedial capacity improvements --from relatively low-cost traffic signal installation to major construction programs such as lane widenings or grade-separated intersections -- under any of the alternatives under consideration.

Community Resources

Implementation of the toll road or TSM would avoid many of the most disruptive physical impacts on community resources. Displacement and relocation of residences, businesses, and community facilities, for example, which are often among the most severe social impacts of a highway project, would not occur under the toll road or TSM. Likewise, the introduction of the highway would not result in the establishment of physical barriers isolating communities or impeding pedestrian access. Because planning of the DAAR corridor provided for the later addition of outer parallel lanes, many of the potentially serious adverse community impacts would be avoided.

Despite the beneficial effects of early planning for the parallel lanes, implementation of the project would not be without some social impacts. These could include beneficial changes such as improved accessibility and reduced traffic congestion on local streets, as well as adverse effects such as increased noise levels along the corridor or impaired visual quality at several nearby subdivisions. The community impacts associated with the toll road or TSM -- including perceptual barriers, land acquisition, increases in noise levels, degradation of visual quality, etc. -- would not be concentrated on a particular ethnic, minority, or income group. The edges of certain subdivisions close to the proposed road, however, would experience the majority of community-related effects. These subdivisions are Reflection Woods in Herndon, Sun Valley in Difficult Run, and Cinnamon Creek and Wolftrap Woods in Wolftrap. Although the community impacts would be concentrated in these subdivisions, the project-related effects are not expected to significantly disrupt community character or cohesion.

Most community impacts attributable to the toll road or TSM alternative are not expected to cause modifications in the general perception of the communities in the study area by either residents or those persons living in other parts of the affected counties. The toll road, however, may intensify development pressures in North Frying Pan and in Browns Mill. If these pressures give way to larger populations at greater densities, the character of these two communities may be altered -- from a suburban/rural to a suburban/urban area -- and along with it, the perception of the community. The TSM alternative is not expected to have any effects on the perception of communities in the study area.

Land Acquisition and Land Use Requirements

Right-of-way requirements for the toll road from Route 28 to Route 7 total approximately 20 acres. The Tysons Bypass section of the toll road would require another 15 acres of right-of-way for additional lanes and a toll plaza located west of Spring Hill Road, bringing the total additional land requirements for the project to 35 acres. The majority of land required for the toll road section between Routes 28 and 7 would be in North Reston, where 12 acres would be used for a maintenance facility. The location of that facility -- between Sunset Hills Road and the DAAR west of Hunter Mill Road, in an undeveloped area planned for industrial uses -- would minimize any significant impact on the North Reston community. Other land requirements would be primarily for the ramps at Centreville Road and at Wiehle Avenue. Approximately 5 acres are classified as prime agricultural lands. Land use at the proposed sites, except for about 1 acre, generally precludes agricultural enterprises, although several parcels are being farmed.

Right-of-way requirements for the TSM are approximately 5.5 acres. This land would be used for the park-n-pool lots located at the HOV ramps. The TSM ramps and park-n-pool lots are not located within any sensitive community areas or prime agricultural lands and this alternative would not result in an adverse impact on the activity patterns of community residents or on farming in Fairfax County.

## Economic Development

The employment forecasts developed by the Metropolitan Washington Council of Governments (COG) in conjunction with both Fairfax and Loudoun Counties assumed that the toll road would be built. Whether the low, medium or high employment estimate is reached will largely be a function of the strength of regional growth. However, the ability of the counties to attract their expected share of the different regional growth scenarios will depend in part upon the provision of high speed access afforded by the alternatives. Since neither the TSM nor the no-build alternatives offers the level of accessibility afforded by the toll road, it is likely that if the toll road alternative were not implemented, the corridor would not be able to attract its share of regional growth indicated by COG projections. Due to the attractiveness of the DAAR corridor, some office and industrial development would still occur there if the toll road were not built, but many of the firms who would otherwise opt for a DAAR location might be expected, instead, to seek other sites affording better highway access. Fairfax County might retain a portion of these "potential DAAR activities" since it can offer alternative sites either in existing centers (although land is becoming scarce) or in the I-66 corridor (upon the opening of that facility). Loudoun is not as fortunate as Fairfax in this regard, however, since the DAAR corridor offers the best industrial locations in Loudoun County. Without the toll road then, the two counties would lose some of their forecasted share of regional employment growth to competing counties, particularly Montgomery and Prince Georges. Should this occur, out-commuting from both Fairfax and Loudoun Counties could be expected to rise somewhat as residents look elsewhere for job opportunities.

With the exception of the Crowells Corner and Hattontown areas, population growth in the corridor is likely to be unaffected by the project alternatives. This is because most residential land is either developed, in the process of being developed, or subject to environmental constraints. In the two areas cited, however, the toll road might create pressure for more intense development than is currently envisioned in the Fairfax County Plan. Analysis indicates that even if density in these two areas doubled, corridor population would increase by approximately 6.7 percent over total build-out population (when all land is developed) and student population would remain virtually unchanged.

Of the various kinds of public infrastructure needed to serve development, only sewer treatment capacity might be affected by the project alternatives. Since none of the alternatives would significantly alter school populations, the number and location of school facilities needed within the corridor would be unaffected. Likewise, both counties anticipate more than adequate supplies of water and solid waste disposal acreage to accommodate growth expected under any of the alternatives.

In terms of county administered services, both counties would be in a better fiscal position with the toll road than without. Population growth associated with the toll road would be small, having only a minimal effect on school costs — the major residential tax burden. At the same time, the toll road is considered essential for the ultimate high quality office and industrial development envisioned for the DAAR corridor.

If the toll road were not constructed, both counties would stand to lose some portion of their anticipated economic development to other jurisdictions. To the extent that this might occur, residents in both Loudoun and Fairfax Counties might face somewhat higher tax burdens than if the toll road were built.

If METRO is built in conjunction with the toll road, it would both complement and supplement the accessibility provided by the toll road and therefore serve to reinforce and further promote the development of the corridor. In fact, since it would improve the corridor's competitive position with regard to other locations which provide only highway access, it is possible that with METRO the corridor would attract an even greater share of regional growth than is now anticipated.

## Air Quality

Microscale Carbon Monoxide Impacts. Microscale carbon monoxide (CO) concentrations were estimated at ten worst case representative locations within the project study for the no-build, TSM and toll road alternatives in 1985 (the project opening year) and in 2000 (the project design year) both with and without the proposed METRO extension to Dulles Airport. In all cases, estimated CO concentrations would not exceed either the one-hour or eight-hour standards for CO.

Mesoscale Carbon Monoxide (CO), Hydrocarbon (HC), Nitrogen Oxide ($NO_x$) Impacts. While all pollutant burdens would be expected to decrease from 1977 base year levels, the greatest reductions would occur for the no-build and TSM alternatives with METRO. The small increases in CO, HC and $NO_x$ pollutant burdens in 1985/2000 due to the operation of the proposed toll road represent an insignificant change in emissions when viewed in a regional context (for example, a 0.11 percent increase in the HC pollutant burden in year 2000, based on 1977 regional data). Ambient concentrations of ozone are proportional to regional burdens of hydrocarbons and nitrogen oxides. The 73 percent overall decrease in the HC burden over base year conditions would significantly contribute to the anticipated attainment of the regional standard for ozone.

## Noise

Design year (2000) noise levels are projected to increase at all monitoring sites over base year values. While design year no-build and TSM noise levels are comparable (within $\pm$ 1 dBA), design year toll road noise levels would be expected to experience a 4 to 6 dBA increase over no-build conditions along the DAAR corridor. Furthermore, noise levels along the DAAR corridor were estimated to equal, or exceed, the FHWA design noise levels at 261 residential structures under the toll road alternative and 31 residences under the TSM alternative. Noise impacts requiring either full or partial abatement can therefore be expected for these sites in the DAAR corridor under both the TSM and toll road alternatives. The noise barrier analyses indicate that constructing barriers could attenuate noise levels to below the 67 dBA design noise levels for residential land use at 243 of the 261 affected residences along the corridor under the toll road alternative and 25 of 30 residences under the TSM, but not to below the 57 dBA standard for lands for which serenity and quiet are especially important, such as the amphitheatre at Wolf Trap Farm Park.

## Energy

Total energy consumed over the design life of each alternative is estimated at approximately 190 x $10^{12}$ British thermal units (Btu's) (152 x $10^7$ gallons) for the toll road alternative vs. about 184 to 185 x $10^{12}$ Btu's (147.9 to 148.4 x $10^7$ gallons) for the TSM and no-build alternatives. All the estimates include fuel associated with vehicles traveling in the impact area as well as construction and maintenance energy consumption for each alternative.

## Water Resources

Storm Water Runoff. The increase in paved areas for the construction of the parallel roadways and interchanges would increase runoff rates and peak discharges by reducing the amount of water from precipitation that otherwise would infiltrate the ground or be retained in depressions or by vegetation. The increase in peak discharges as a result of increases in impervious surface area would be much higher in small drainage basins such as Colvin Run, Smilax Branch, Sugarland Head Run, and Copper Branch than in large streams such as Difficult Run. The increase in peak discharges may increase flood hazards locally in the vicinity of the road crossings. The increase in impervious cover area may also result in a decrease of low flow between storms since larger impervious areas would decrease the natural recharge of the groundwater table which feeds streams. This effect would be more pronounced in small watersheds such as Smilax Branch, Colvin Run, Sugarland Head Run, and Copper Branch.

Groundwater. Approximately 50 percent of the toll road would extend over soil of low permeability such as clays and silts. These soils are also characterized by a relatively high rate of absorption of ions of pollutants, which tends to protect the groundwater table from pollutants conveyed by runoff waters. Also, the pollutants resulting from highway runoff would be discharged to drainage ditches and streams where the flows would be diluted. Consequently, it is expected that the quantities of materials entering the groundwater table would be insignificant.

Surface Water Quality. The principal long-term impact of the toll road on water quality would be the change in quality of storm water runoff and its effect on the receiving waters. The estimated pollutant loadings released to the study area in the year 2000 would be approximately double the 1977 estimates whether or not the project is built. Annual pollutant loadings would be highest under the toll road alternative without METRO (approximately 4 percent higher than the year 2000 no-build without METRO) vs. 0.8 percent of the 2000 levels for the TSM alternative. This incremental change, however, is insignificant compared to the increase of pollutant loadings in the year 2000 over 1977, regardless of alternative.

Permits. Permit regulations and related requirements applicable to the toll road alternative include a subaqueous bed permit, a Virginia water quality certification for discharge of effluent, and a U.S. Army Corps of Engineers 404 permit for discharge of dredge/fill.

## Ecology

There are no endangered species in the immediate project area that would be affected by alterations associated with the toll road alternative, nor are there any endangered species located in the proximity of the planned interchanges.

Loss of some Forest Wetlands located in Difficult Run, Old Courthouse Spring Branch, Wolftrap Creek, and Copper Branch would occur as a result of construction of the toll road. Aquatic Bed wetlands located in the Wolftrap Creek, Old Courthouse Spring Branch, and Difficult Run floodplains could be protected through effective erosion control measures during construction.

No long term impacts on aquatic life are expected to result from the toll road or TSM alternatives.

## Historic and Recreational Resources

None of the project alternatives would involve the demolition, relocation, or acquisition of property from a historic or recreational site. Changes in ambient noise levels due to vehicular traffic during operation of a new road would represent the most disruptive effect of the alternatives on the historic and recreational sites within the primary impact area. Wolf Trap Farm Park, a national park for the performing arts with a roofed, outdoor amphitheatre, would be most sensitive to the increases in noise. The amphitheatre is classified as a facility for which quiet and serenity are especially important, and increased noise levels under both the toll road and TSM alternatives would be expected to exceed Federal Highway Administration (FHWA) design noise levels. (Base year and design year no-build noise levels would also exceed FHWA design noise levels, but by less than the toll road and TSM alternatives would.) These increases in noise levels, if unabated, would disturb the setting of the historic and recreational sites closest to the corridor.

Archaeological Resources

Since no significant archaeological sites are located along the corridor of the proposed toll roads, the project alternatives would not have any impact on archaeological resources.

Visual Quality

Although the toll road would be located alongside the DAAR in an already disturbed visual environment, the alternatives would adversely affect visual quality at particular locations. These visual effects are expected to be localized in nature, affecting individual homes nearest the toll road but not creating a disruptive effect on an entire subdivision or community.

Some disruption in existing visual quality would be experienced in South Herndon at those homes in the Reflection Woods subdivision and at a few scattered farmhouses along the right-of-way. At the Sun Valley subdivision in Difficult Run, the homes abutting the right-of-way would experience a significantly adverse visual impact, with the toll road bringing the parallel lanes about 70 feet closer to these newly constructed homes. The toll road would also create a more visually intrusive effect on the Cinnamon Creek and Wolftrap Woods subdivisions in Wolftrap, although differences in elevation and existing tree cover should mitigate the severity of these impacts.

Under the TSM, the park-n-pool lots would represent the most significant change in the existing visual environment. The lots, however, are far enough from residential concentrations and close enough to the DAAR and local arterials not to represent a visually disruptive impact.

TYSONS BYPASS

The section of the toll road from Route 7 to I-495 -- the Tysons Bypass -- was studied by the FAA as a four-lane facility. Under subsequent design development, the road has been modified to a six-plus-lane roadway (one additional lane in each direction). The environmental consequences associated with this subsequent design modification have been assessed and are summarized below by impact category.

Cost. The estimated cost for the four-lane toll road segment between Route 7 and I-495 was \$11.5 million. The six-plus-lane Tysons Bypass would cost \$21.6 million in 1981 dollars -- a \$10 million increment unadjusted for inflation.

Traffic and Transportation. The analysis of regional traffic and transportation impacts for the toll road segment and alternatives west of Route 7 encompassed a study area which extended east to the Capital Beltway. Its transportation modeling network thus included the Tysons Bypass. Increasing the bypass from four to six lanes would not alter traffic volumes or vehicle miles traveled according to the assumptions of the modeling process. Roadway capacities, however, would be increased, and level of service conditions on the segment of the toll road east of Route 7 would be improved. The level of service analysis and map for the toll road alternative included in this DEIS was prepared for the six-lane Tysons Bypass. The expansion of the bypass facility would improve its operating conditions -- from level of service E under a four-lane condition to level of service C or better under the six-lane design.

Displacement and Relocation. Expansion of the Tysons Bypass from four to six lanes would not affect displacement and relocation; none would be required under either design.

Land Acquisition. The four-lane Tysons Bypass design would require 6.5 acres. Increasing the facility to six lanes would necessitate the acquisition of an additional 8.5 acres, for a total of 15 acres of right-of-way. This additional land would be required for the additional lanes and for the toll plaza located west of Spring Hill Road.

Economic Development. Expansion of the Tysons Bypass to a six-lane road would not alter regional economic development. It would result in some additional construction-related employment and associated indirect effects.

Air Quality. The mesoscale carbon monoxide, hydrocarbon, and nitrogen oxide impacts were assessed based on regional transportation modeling procedures which assumed a six-lane facility and therefore reflect an expanded Tysons Bypass condition.

Noise. The change in design from a four-lane to a six-plus-lane facility in the Tysons Bypass section of the toll road necessitated a reevaluation of noise impacts. The results of the reanalysis indicate that a noise barrier could be constructed adjacent to the westbound lanes of the toll road to protect two residences in the vicinity of Gordon Avenue and Spring Hill Road. The barrier would be 10 feet high and would extend 1000 feet. However, this barrier has been eliminated from further consideration due to excessive costs with respect to the number of receptors protected.

A noise barrier could be constructed adjacent to the westbound lanes of the toll road in the vicinity of McLean Hamlet Park. It would extend along the ramp from southbound I-495 to the westbound lanes of the toll road. The barrier would be 10 feet high and would extend for 4300 feet. It would provide protection to noise sensitive areas of the park and to 24 residences, and is likely to be incorporated as a feature of the project. This analysis is based upon preliminary cost and design data. If these conditions change substantially, the barrier may not be provided. The final design will be made upon completion of the project design and the public involvement processes.

Energy. Annual operational fuel consumption associated with vehicles traveling through the Tysons Bypass was calculated assuming the design modification to a six-lane facility. Since traffic volumes would remain unchanged in the expansion from a four- to a six-lane design but capacities would increase, operational fuel consumption would be reduced somewhat because of the better operating conditions on the road.

Water Resources. Traffic-originated surface water quality pollutant loadings were calculated on the basis of average daily traffic volumes. Because traffic volumes are assumed to remain unchanged in the Tysons Bypass expansion, highway-originated pollutant loadings will not be affected. The increase in paved area on the Tysons Bypass section of the toll road resulting from the design modification to a six-plus-lane facility would increase the runoff rates and peak discharges. The increase in peak discharges in Rocky Run and in Tributaries 1 and 2 of Scott Run may increase the flood hazard locally in the vicinity of the road crossings. The estimated increase in peak discharges for the six-lane segment compared to the four-lane design would reach a maximum of 4.8 percent -- occurring at the crossing of Rocky Run, which has the smallest drainage area of the three tributaries.

The 100-year peak discharges resulting from the six-lane roadway would be as much as 11.4 percent higher than the existing conditions. Existing culverts would have adequate capacity to convey the increased flows.

# I. PURPOSE OF AND NEED FOR THE PROJECT

The Virginia Department of Highways and Transportation (VDHT) is proposing to construct outer parallel lanes as a toll road facility alongside the Dulles Airport Access Road (DAAR). Located in Fairfax and Loudoun Counties, Virginia, near Washington, D.C. (Figure I-1), the DAAR connects Dulles International Airport with Route 123 just east of Interstate Route 495 (the Capital Beltway). The airport road is restricted primarily to airport-related traffic.

The proposed parallel lanes along the DAAR would provide access for non-airport-related travel needs -- both to and from Washington, D.C. and within Fairfax County itself. The project, which is part of the adopted plans of both the Metropolitan Washington Council of Governments (COG) and Fairfax County, would also fulfill a number of specific transportation and economic development objectives. These are:

(1) Improve regional access to western Fairfax and eastern Loudoun Counties by providing a direct link between the DAAR corridor and the Capital Beltway and Interstate Route 66. This goal would be accomplished by a reduction in the travel time on the parallel lanes over more circuitous routings now taken to reach Washington, D.C.

(2) Improve local access within Fairfax County by facilitating east-west movements of community travel in the corridor. The lack of east-west arterials west of Route 7 currently hampers intracommunity travel.

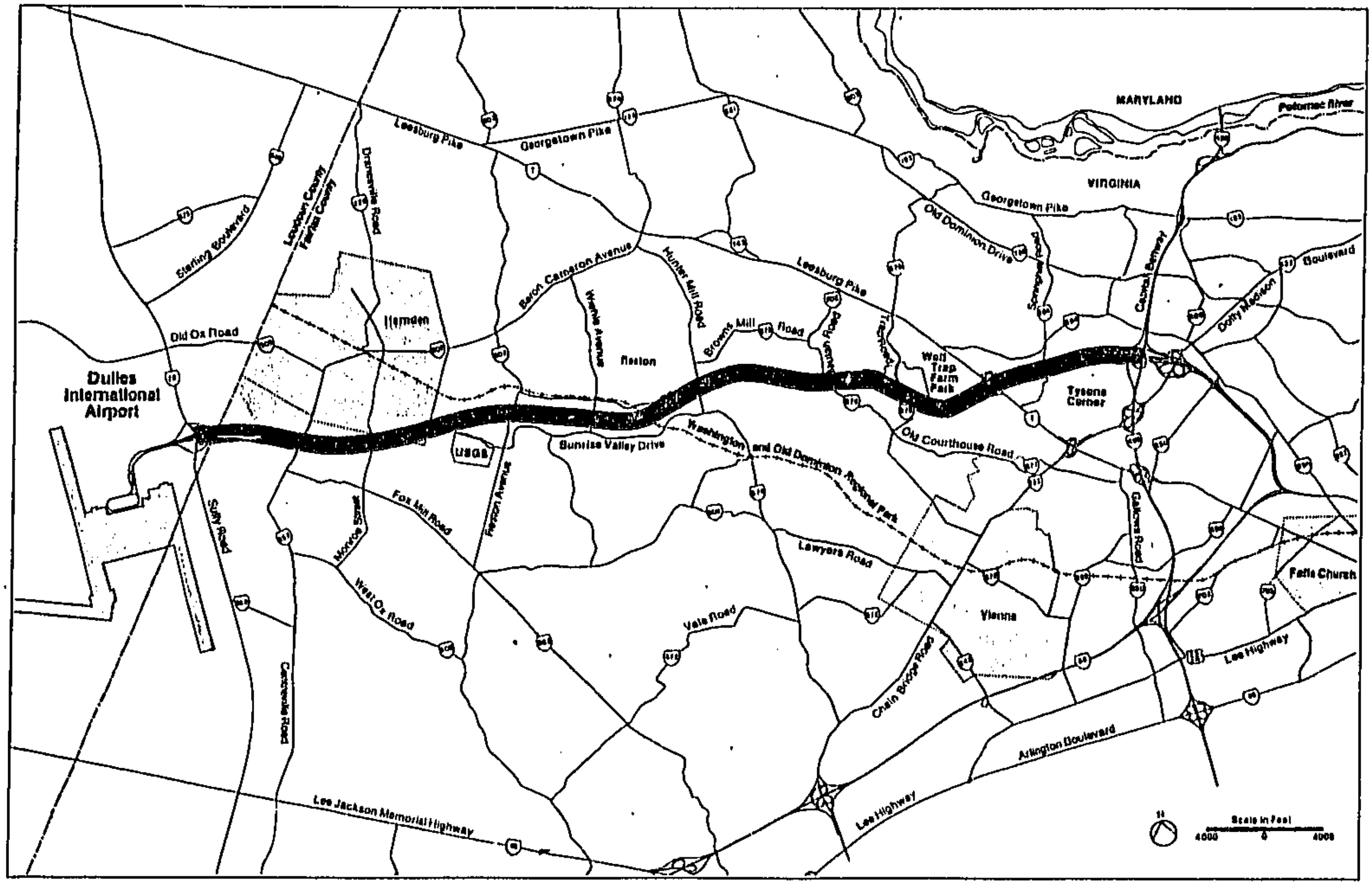
(3) Relieve congestion by diverting traffic from currently congested arterials to the outer parallel lanes. Many of the local roads leading to the Capital Beltway have insufficient capacity to accommodate traffic demand. Even with implementation of the proposed improvements to these roads, projected volumes will exceed capacities in many instances.

(4) Promote economic development of the DAAR corridor by improving accessibility to the corridor. Called the "Gateway to the Nation" because it links the Dulles International Airport with Washington, D.C., the DAAR corridor has not yet fully achieved its development potential -- partly because of poor access. The parallel lanes would enhance its attractiveness to potential employers and employees by making the corridor more accessible.

(5) Reverse the imbalance in commuter traffic patterns. The prevailing work-related travel patterns are east to employment concentrations in Washington, D.C. in the morning peak hours and west, returning from Washington in the afternoon rush hours. Improving the locational advantages of Fairfax and Loudoun Counties via better access would promote economic development and increase employment opportunities in these counties thereby increasing the "reverse commuter" pattern and making more efficient use of the underutilized capacity in the off-peak direction.

In addition to recommending the construction of parallel lanes, both the Washington COG and Fairfax County transportation plans recommend allowing buses to use the DAAR, which is normally restricted to airport use. The purpose of this provision would be to promote increased travel on buses by providing improved east-west access, especially for transit. Elements of an arrangement for transit access to the DAAR are contained in a separate alternative, transportation system management (TSM), described in Chapter II.

Figure I-1
**Toll Road Corridor**



## II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

### A. NO-BUILD

The no-build alternative consists of no modifications to the DAAR other than the regular maintenance of the existing facility. In a regional context, however, the no-build includes, in addition to the existing roadway system, highway improvements that are programmed and proposed to be implemented by the year 2000. These improvements consist of upgrading and widening existing roads as well as constructing new ones (Figure II-1). Some examples of the roadway upgrading program are:

- Route 7, widened to six lanes from Loudoun/Fairfax County line to Idlywood Road;
- Route 123, widened to six lanes from Old Courthouse Road to Route 193;
- I-66, widened to six lanes from U.S. Route 50 to Route 123;
- Lee Highway, widened to four lanes from U.S. Route 50 to Westmoreland Street; and
- Route 28, widened to four lanes from Route 7 to U.S. Route 50.

The new construction will include:

- I-66, a four-lane facility from Capital Beltway to Roosevelt Bridge;

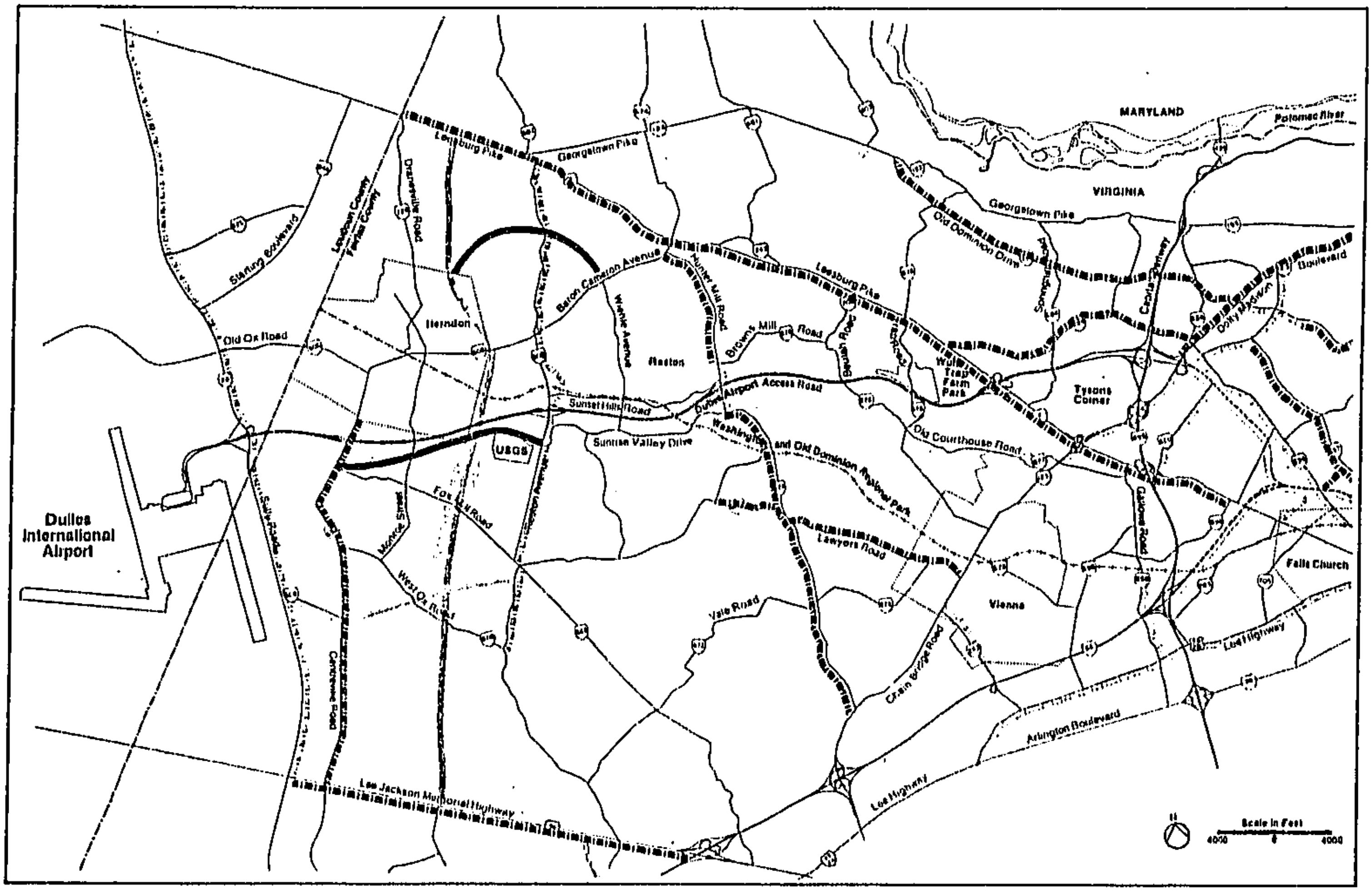
- Dulles Access Highway Extension, a four-lane connection from Route 123 to I-66;
- Springfield Bypass, a four-lane bypass from Leesburg Pike (Route 7) to I-66 (two alternative alignments have been proposed -- the intersection of each of the bypass alignments with the Dulles corridor is shown below in Figure II-4);
- Lawyers Road Extension, a four-lane extension from Sully Road (Route 28) to Fox Mill Road;
- Wiehle Avenue Extension, a four-lane extension from Baron Cameron Avenue to Route 28; and
- Sunrise Valley Road, a four-lane road from Reston Avenue to Centreville Road.

## B. TRANSPORTATION SYSTEM MANAGEMENT (TSM)

The transportation system management (TSM) alternative adds two types of low-cost transportation improvements to the no-build. Designed to maximize the efficiency and productivity of the regional transportation system, the TSM would provide preferential treatment for high occupancy vehicles (HOVs) such as buses and carpools on the DAAR, and traffic operational improvements in the regional network.

Figure II-1
**Proposed Roadway Improvements—No-Build**

**Legend**
1985 Construct
1985 Upgrade
2000 Construct
2000 Upgrade



Preferential Treatment for HOVs on the DAAR

The TSM would allow access to the DAAR in both directions by carpools with four or more persons and by buses. Interchanges where ramps would allow access, as shown in Figure II-2, are:

- o Sully Road (Route 28)
- o Springfield Bypass
- o Reston Avenue
- o Hunter Mill Road
- o Leesburg Pike (Route 7)

Under the TSM, the ramps would be restricted to HOV use during peak periods (6:00 - 9:30 A.M., 3:00 - 7:00 P.M.), and unrestricted for private vehicles during off-peak periods. Commercial vehicles would be allowed to use the ramps during the off-peak period with an FAA permit only.

To promote the practice of carpooling, park-n-pool lots would be located near the HOV ramp interchanges. (The lots would be separated from proposed METRO park-n-ride stations at Reston Avenue and Route 7). Parking lots with 100 spaces would be built at Springfield Bypass and Hunter Mill Road, and lots with 200 spaces at Sully Road, Reston Avenue, and Route 7.

Traffic Operational Improvements

A number of low cost traffic operational improvements not associated with the DAAR are also part of the TSM and are designed to improve the overall traffic flow in the general DAAR corridor. These improvements involve restriping and marking at:

- Baron Cameron Avenue and Route 7 intersection — a double left turning lane from Route 7 westbound to Baron Cameron Avenue southbound, and a double right turning lane from Baron Cameron Avenue northbound to Route 7 eastbound.

- Lewinsville Road and Route 7 intersection — a double left turning lane from Route 7 southbound onto Lewinsville Road eastbound, and a double right turning lane from Lewinsville Road westbound to Route 7 northbound.

Estimated Construction Cost

The estimated construction cost for the TSM is about $3.9 million (1981 dollars). This figure reflects about $1.35 million for building three HOV ramps at Sully Road, Hunter Mill Road, and Route 7. (Ramps already exist or are proposed at the other HOV access points.) The five park-n-pool lots covered under the estimate at Sully Road, proposed Springfield Bypass, Reston Avenue, Hunter Mill Road, and Route 7 would cost about $2 million. The remaining $550,000 would go for right-of-way acquisition for the park-n-pool lots. A detailed breakdown of the estimate of construction costs of the TSM is shown in Table II-1.

No displacement of residences, businesses, community facilities, or farms would be required to construct the TSM. Right-of-way requirements for this alternative would total approximately 5.5 acres to be used for five park-n-pool lots located at the HOV ramps.

Figure II-2
**Transportation System Management (TSM) Plan**

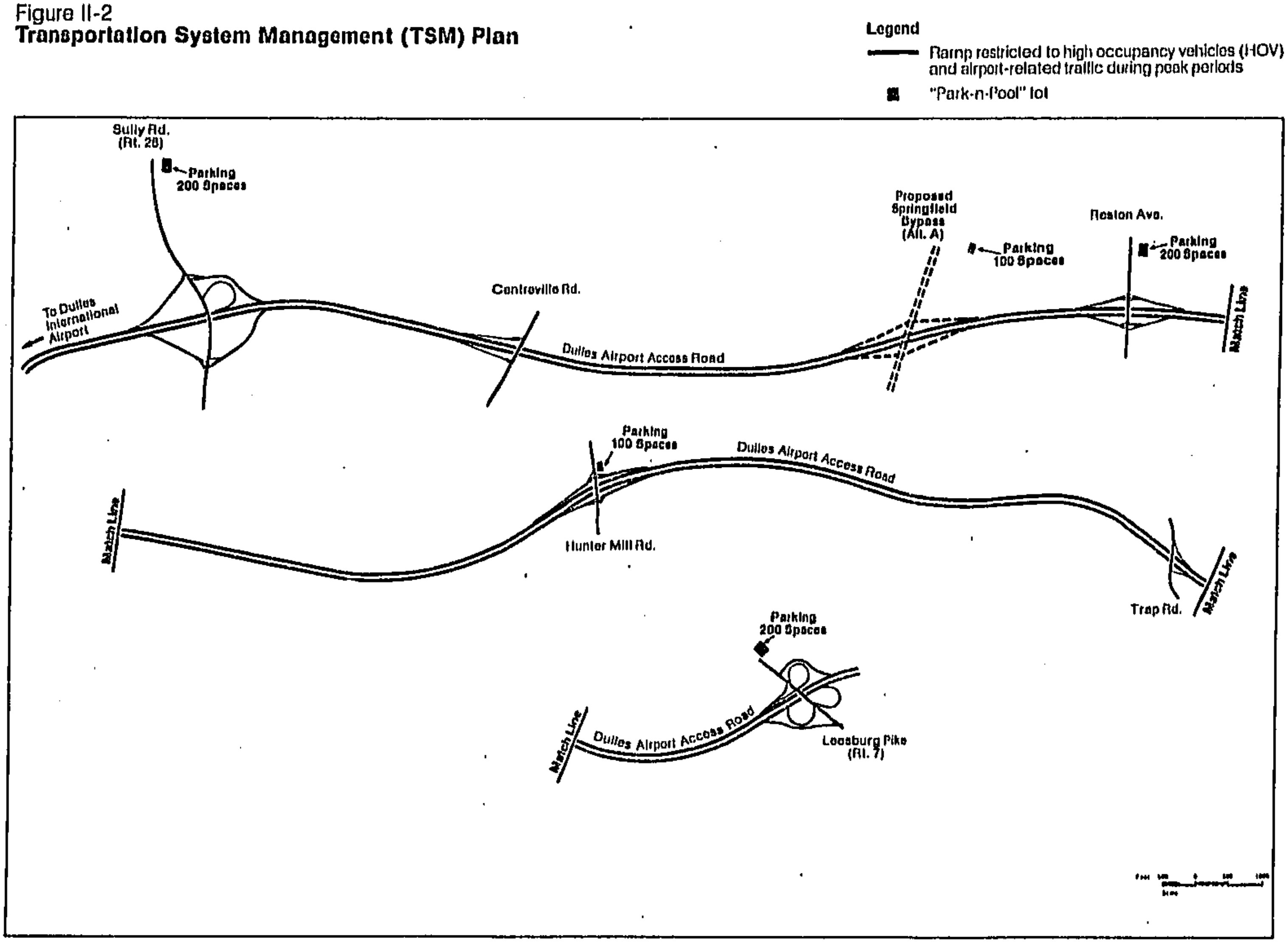


Table II-1.
**TSM Construction Cost Estimate (1981 Dollars)**

| HOV Ramp Construction | |
|---|---|
| **Component** | **Cost*** |
| Ramps | $1,354,400 |
| Contingencies | 203,200 |
| Mobilization, Field Office, etc. | 77,900 |
| Engineering | 98,200 |
| Subtotal | $1,733,700 |
| **Park-n-Pool Lots** | |
| **Component** | |
| Parking Lots | $2,000,000 |
| Right-of-Way | 171,000 |
| Subtotal | $2,171,000 |
| Total | $3,904,700 |

Note: * Costs are based on unit prices developed by VDHT and have been escalated by 12 percent to reflect costs in the year 1981.

## C. TOLL ROAD

The proposed Dulles Toll Road is designed as a four-lane toll facility with two 12-foot lanes and paved shoulders, 3 feet on the inside and 10 feet on the outside, on either side of and parallel to the existing four-lane divided limited access Dulles Airport Access Road. The edge of the inside travel lane of the proposed toll road is typically about 37 feet from the edge of the outside travel lane of the DAAR in order to accommodate the existing bridge openings. (When the bridges over the DAAR were originally built, provision was made for the addition of parallel lanes without having to reconstruct the bridges.) For this study, it has been assumed that the grade of the toll road is the same as that for the parallel DAAR with a minimum grade of 0.5 percent and a maximum grade of 3.0 percent.

At two locations, the distance between the toll road and the DAAR has been widened by an additional 40 feet (approximately) to allow adequate length and clearance for a pair of slip ramps. The slip ramps are generally 16 feet wide with additional paved shoulders of 6 feet on the right and 3 feet on the left.

All interchanges with crossroads are made from the toll road and, with the exception of Route 28 and Route 7, all are diamond interchanges allowing left turn movements, across traffic, on the crossroads. Tolls are collected on all westbound exit ramps and eastbound entrance ramps at all interchanges west of Trap Road. Each toll plaza provides for one manned and one unmanned toll lane. The interchange ramps are generally 16 feet wide with additional paved shoulders of 6 feet on the right and 3 feet on the left. Ramps with toll facilities are widened at the toll areas to accommodate the necessary lanes and toll islands. All ramps have minimum grades of 0.5 percent, and maximum grades of 6.0 percent where necessary to limit costs and right-of-way taking. Toll areas have maximum 1.0 percent grades.

The 10.3-mile toll road is largely within the right-of-way of the DAAR; additional right-of-way is required mainly at new interchanges and at the maintenance facility.

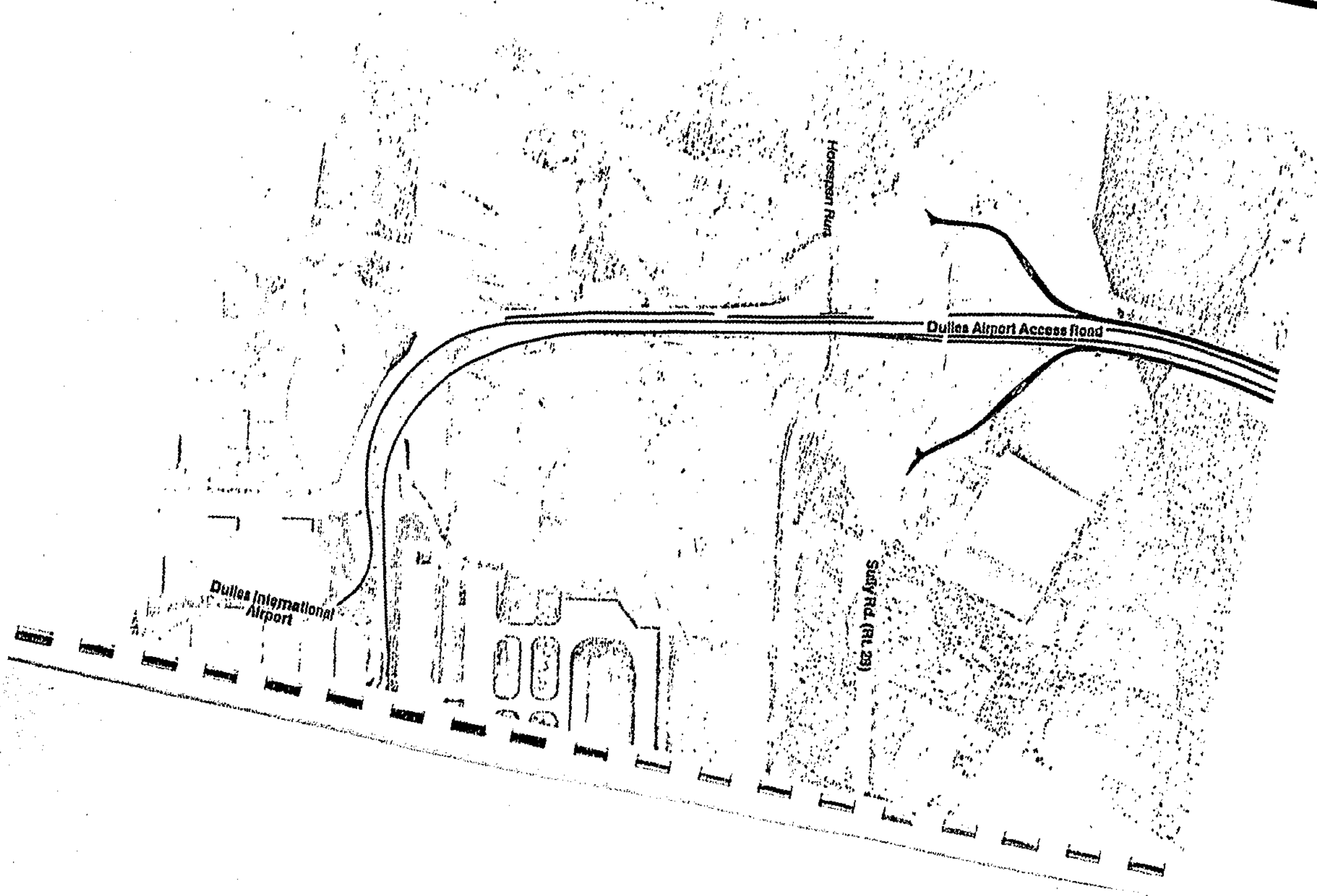
For the with-METRO option of this alternative, the METRO extension is assumed to be built in the median area of the DAAR. Possible locations for METRO stations with parking facilities are provided just west of Route 7 and just west of Reston Avenue, with pedestrian overpasses connecting the stations to the parking facility.

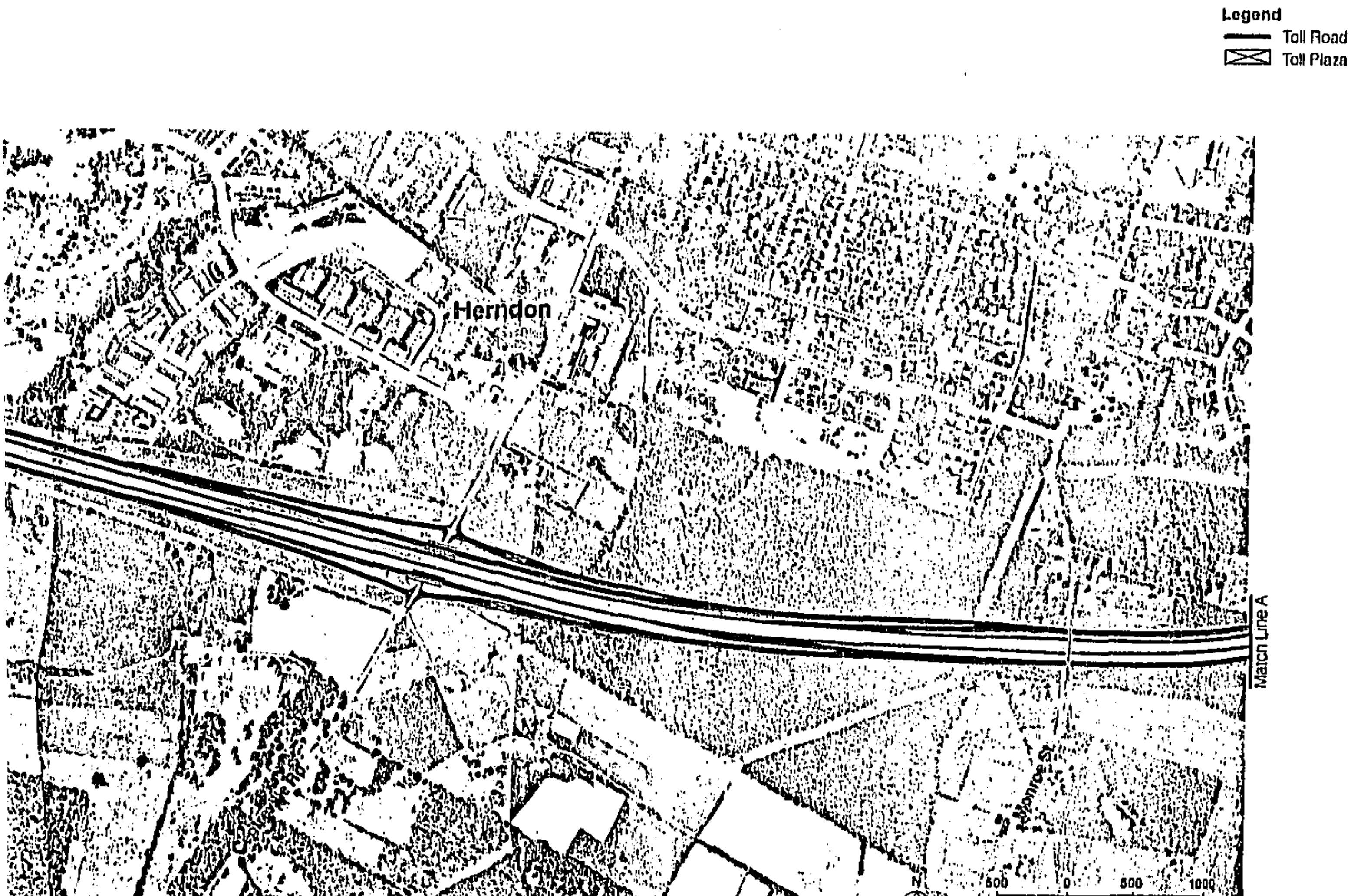
Starting at its western terminus, the eastbound toll road, as designed, begins as a one-lane exit ramp just west of Route 28, goes under Route 28, through the existing bridge opening, and joins an entrance toll ramp from Route 28 to form a two-lane facility continuing to the east (Figure II-3). The westbound toll road ends with an exit toll ramp to Route 28 and a lane merging with the existing westbound loop ramp from Route 28. An additional one-lane widening on the westbound DAAR and on the existing bridge over Horsepen Run is proposed in the Route 28 interchange area west of Route 28 to accommodate projected traffic demand.

Continuing in an easterly direction, the toll road passes over Centreville Road on two new structures. The design provides for a diamond interchange at Centreville Road using the two existing DAAR ramps in the west quadrants as toll road ramps and new ramps with toll facilities in the east quadrants. The toll road then passes under Monroe Street through the existing bridge openings. Midway between Centreville Road and Monroe Street, a pair of slip ramps provide access to the inner road from the westbound toll road and egress via the toll road from the eastbound inner roadway.

East of Monroe Street, the toll road is designed to pass under Reston Avenue, through the existing bridge openings; a diamond interchange with the toll road is provided at Reston Avenue

Figure II-3
**Toll Road Location Plan**
**(Dulles Airport to East of Monroe Street)**



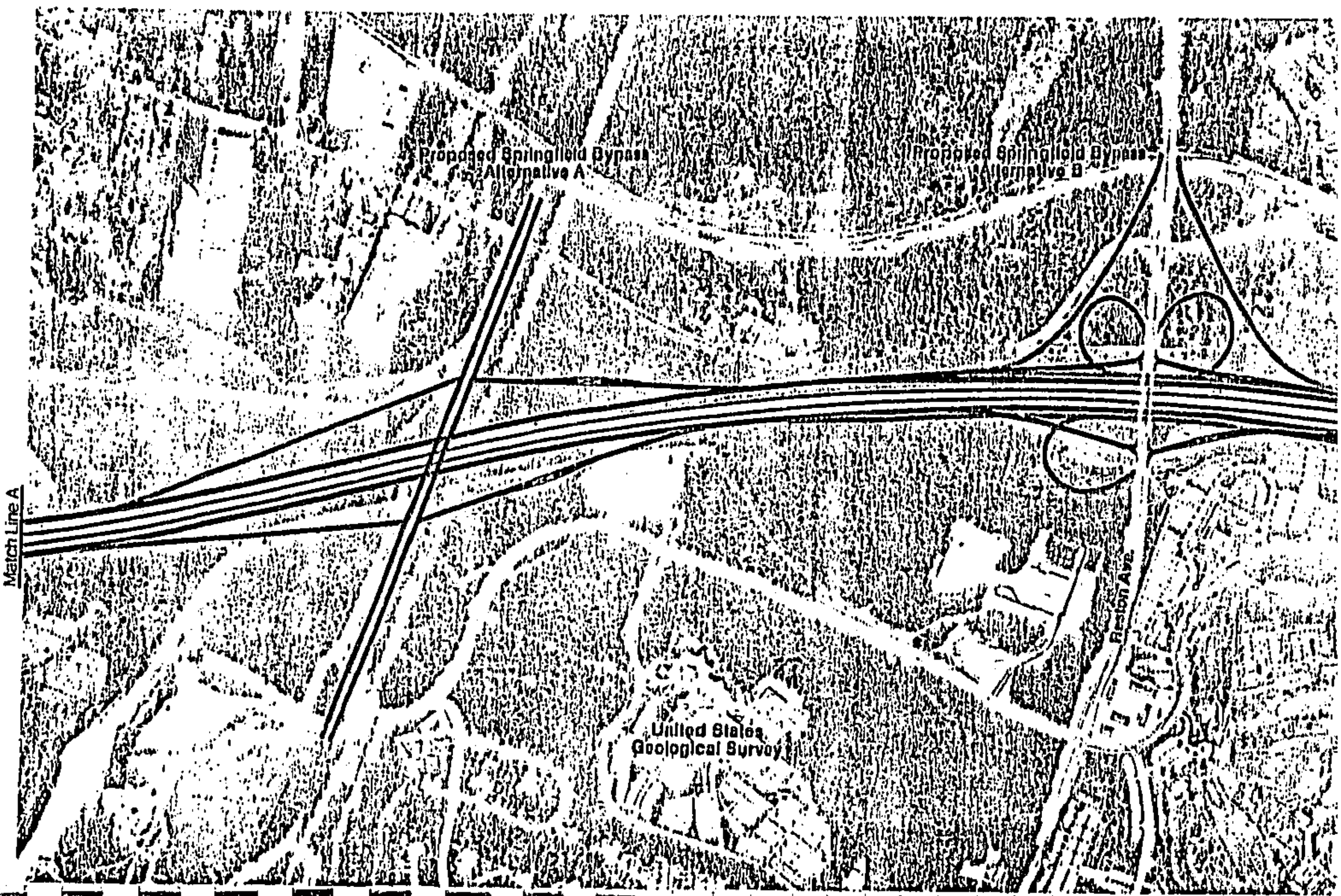

Legend
Toll Road
Toll Plaza
Herndon
Monroe St
Match Line A
N
500 0 500 1000
Scale in Feet

using the four existing ramps presently interchanging with the DAAR (Figure II-4). The two east quadrant ramps have been lengthened to allow flatter grades for toll facilities. Approximately 2,000 feet west of Reston Avenue, a METRO station (under the with-METRO option) is located in the DAAR median with a pedestrian overpass providing access to an adjoining METRO parking facility. The proposed Springfield Bypass will also interchange with the toll road in this area, with tolls collected on westbound exit ramps and eastbound entrance ramps. Two alternative alignments for the bypass are shown for this study, one near the Herndon Town line and one at Reston Avenue.

Continuing, the toll road passes under Wiehle Avenue, through existing bridge openings, where the design provides for a new diamond interchange between the toll road and Wiehle Avenue, with tolls on the east quadrant ramps. The toll road then continues over the Washington and Old Dominion (W & OD) Regional Park (formerly the W & OD Railroad) on two new structures, then over Hunter Mill Road, also on two new structures. Between the park and Hunter Mill Road, a 12-acre maintenance yard for the toll road is located between the westbound toll road and Sunset Hills Road. A diamond interchange is provided at Hunter Mill Road using the two existing DAAR ramps in the west quadrants as toll road ramps and new ramps with toll facilities in the east quadrants (Figure II-5). The toll road then continues east parallel to the DAAR passing over Difficult Run on two new structures. Midway between Hunter Mill Road and Difficult Run, a pair of slip ramps provide access to the inner road from the westbound toll road and egress via the toll road from the eastbound inner roadway. The toll road then proceeds under Beulah and Trap Roads, using existing bridge openings. The two existing ramps at Trap Road, for traffic to and from the east, are adjusted to meet the toll road and continue to serve the same special purpose traffic movements for Wolf Trap Farm Park performances.

The toll road then continues under Route 7 (Leesburg Pike), through existing bridge openings, where it joins the Tysons Bypass segment of the toll road to Route I-495, which has been studied by the

Figure II-4
**Toll Road Location Plan**
**(East of Monroe Street to West of Hunter Mill Road)**



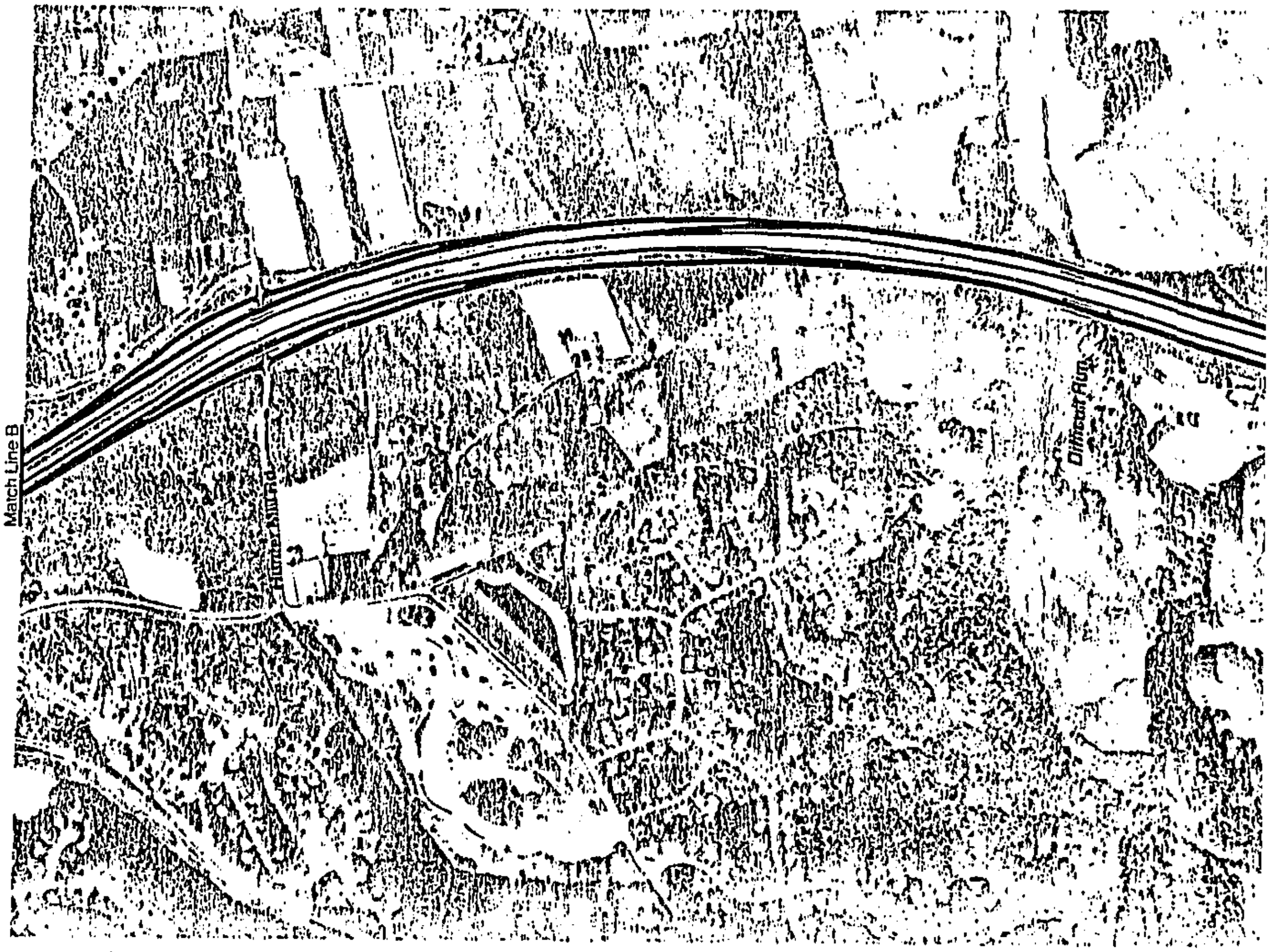
FAA (Figure II-6). Immediately west of Route 7, a METRO station (under the with-METRO option) would be located in the DAAR median with a pedestrian overpass providing access to an adjoining METRO parking facility. At Route 7, the existing slip ramp in the northwest quadrant, the existing outer connection ramp in the southwest quadrant, and the existing inner loop in the northeast quadrant are all reconnected to the toll road. The existing Route 7 bridge over the DAAR is widened to accommodate traffic entering a new inner loop in the southwest quadrant. The existing inner loop in the southeast quadrant is rebuilt to allow room for a new outer connection for Route 7 traffic entering the eastbound toll road. A new outer connection is also provided in the northeast quadrant.

East of Route 7, the toll road, as designed, becomes a six-lane facility and continues over Spring Hill Road on two new structures and joins the existing DAAR roadway which is widened to three lanes in each direction to the I-495 interchange. West of Spring Hill Road the toll road is widened to accommodate a toll plaza in each direction. The design calls for a tunnel under the existing DAAR connecting the two toll plazas and an administration building, which is immediately north of the westbound plaza. At Spring Hill Road, a new diamond interchange is constructed with toll facilities on the ramps to and from the east. The Spring Hill Road interchange provides toll road access only to and from the area to the south. Spring Hill Road itself is rebuilt in this area as a four-lane divided highway to accommodate the interchange traffic and the two existing DAAR bridges over Spring Hill Road are rebuilt as part of this widening. Immediately east of Spring Hill Road, a METRO station (under the with-METRO option) would be located south of the DAAR. Toll road traffic is provided with full interchange connections with Interstate Route 495 and Virginia Route 123 near McLean.

East of Spring Hill Road, a new four-lane divided DAAR extends to a connection with Interstate Route 66 in the Falls Church area.

Figure II-5

**Toll Road Location Plan**
**(West of Hunter Mill Road to West of Route 7)**



## Estimated Construction Cost

The estimated construction cost for the toll road (Sully Road to Route 7) is approximately $33.5 million (1981 dollars). The estimate encompasses costs to build the road, bridges, ramps, toll facilities, and maintenance yard and is based on 1980 unit prices developed by VDHT escalated by 12 percent to reflect costs in the year 1981. Also included in these estimates are costs associated with right-of-way acquisition, engineering and design, and mobilization. A detailed breakdown of the estimate of construction costs is shown in Table II-2.

No displacement of residences, businesses, community facilities, or farms would be necessary to construct the toll road. Right-of-way requirements for this alternative would total approximately 20 acres. The majority of this land would be in Reston, where 12 acres of land zoned for industrial uses would be used for a maintenance facility. Most of the other land requirements would be for the ramps at Centreville Road and at Wiehle Avenue.

## D. OTHER ALTERNATIVES

During the public information meeting held in Vienna, Virginia in the spring of 1980, and the subsequent submission of comments by members of the public, several persons recommended that additional alternatives be considered in the environmental studies. The additional alternatives suggested included:

Figure II-6
**Toll Road Location Plan**
**(West of Route 7 to East of Route 123)**

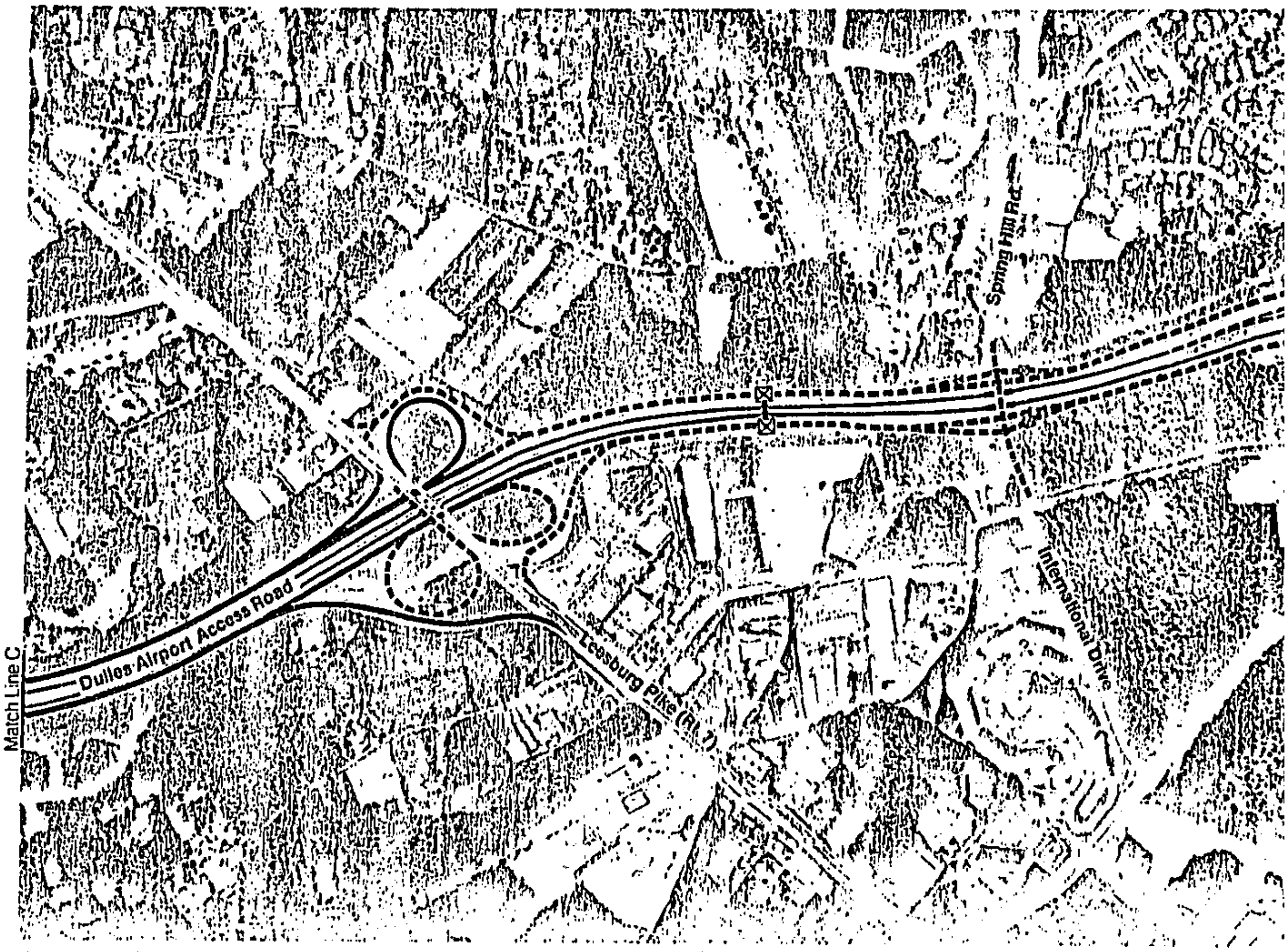


Table II-2
**Toll Road Construction Cost Estimate (1981 Dollars)**

| Component | Cost* |
|---|---|
| Highway | $16,555,000 |
| Bridges | 3,550,000 |
| Toll Facilities | 4,596,000 |
| Maintenance Yard | 539,000 |
| Subtotal | $25,240,000 |
| Contingencies | 3,786,000 |
| Mobilization, Field Office, etc. | 1,451,000 |
| Engineering | 1,432,000 |
| Right-of-Way | 1,595,000 |
| Subtotal | $8,264,000 |
| Total | $33,504,000 |

Note: * Costs are based on 1980 unit prices developed by VDHT and have been escalated by 12 percent to reflect costs in the year 1981.

A. Widen the DAAR to six lanes and open it to general commuter traffic without restriction.

B. Construct one additional two-lane roadway. The center lane would be reversible during peak periods and restricted to HOVs. The outer lanes would be restricted to airport use.

C. Construct one additional two-lane roadway. The center lanes would be reversible during peak hours and restricted to HOVs and airport traffic. The outer lanes would be open to general traffic.

After the public information meeting and receipt of comments, a traffic operations feasibility analysis was performed for these additional three alternatives, in order to decide whether to undertake detailed environmental analyses.

The three alternatives, referred to as supplemental alternatives A, B, and C, were analyzed using three separate scenarios regarding METRO and airport trip generation. The scenarios were: (1) METRO would be extended and trip forecasts would be based on average annual vehicle trip generation rates at the airport; (2) METRO would not be extended and traffic forecasts would be based on average annual vehicle trip generation rates at the airport; and (3) METRO would not be extended and traffic forecasts would be based on the average peak month of vehicular trip generation at the airport. (During the peak month of airport activity, Dulles Airport vehicular trip generation rates are approximately 12 percent higher than the average annual rates.) Thus, in analyzing level of service conditions for access to Dulles Airport, consideration was given to the airport's busiest month as well as to periods of average airport trip generation. The results of the analysis are summarized below.

Supplemental Alternative A

Under this alternative both airport and general use traffic would travel on the same roadway, making enforcement of the peak period restrictions on the Dulles Access Highway Extension to Interstate Route 66 virtually impossible. This is because there would be no way to differentiate between low-occupant autos going to or coming from Dulles Airport and general use low-occupant autos that are prohibited from using the extension during peak periods in the peak direction. Furthermore, traffic would operate under level-of-service E conditions during the PM peak hour--conditions which do not meet either VDHT or FAA standards for this roadway.

Supplemental Alternative B

Opening an additional roadway for HOVs to use in the peak direction during peak periods would not provide significantly better level of service -- either to these HOVs or to airport traffic -- than would be obtained under the TSM alternative, but would result in substantial captial costs being incurred to build the new two-lane facility.

Supplemental Alternative C

This alternative would not provide adequate capacity in the off-peak direction during peak periods to meet either VDHT or FAA standards for level of service on this roadway.

On the basis of the analyses, it was recommended that the supplemental alternatives be dropped from further consideration and not undergo detailed environmental impact studies.

## III. AFFECTED ENVIRONMENT

### A. TRAFFIC AND TRANSPORTATION

#### Impact Area Roadway Network

Figure II-1, shown previously in Section II.A, depicts the boundaries of the transportation impact area and shows the impact area roadway network surrounding the Dulles Toll Road corridor. The impact area boundaries are Route 28 to the west, the Arlington-Fairfax County line to the east, the Potomac River to the north and Interstate Route 66/U.S. Route 50 to the south. These boundaries enclose those roads that would experience a minimum 5 percent change in average daily traffic volume resulting from the construction of the toll road. The impact area roadway network is a composite of the base year (1977) and design year (2000) roadway systems. It is composed of the major existing arterials and those programmed for implementation by the design year 2000.

As shown in Figure II-1, the existing arterial highway network includes such radial routes as Interstate Route 66 (I-66); the Dulles Airport Access Road (DAAR); and U.S. Routes 7, 50, 193 and 123 serving travel between communities located along the DAAR corridor and Washington D.C. The Capital Beltway (Interstate Route 495) in the eastern portion of the impact area functions as an outer belt highway for Washington D.C. and would experience minor impacts as a result of construction of the toll road project. Since the DAAR corridor is outside the Washington D.C. outer belt, it is not expected that any of the roads serving as an inner belt around Washington D.C. would be affected by the project alternatives. Other roads that would experience changes in traffic volumes with the implementation of the toll road are shown in Figure II-1 and include major collector-distributors such as Routes 28, 7 and 123, and Baron Cameron and Reston Avenues.

Those new or improved sections of roadways that are either programmed or proposed for implementation by the design year under present state or local programs regardless of whether the proposed toll road or alternatives are constructed are also shown in Figure II-1. Noteworthy among the new roadways is Springfield Bypass, whose Alternative A crosses the corridor in a north-south direction between Reston and Centreville Avenues. The Springfield Bypass would have an interchange with the toll road, or a connection with the DAAR limited to HOVs under the TSM, but no link with the DAAR under the no-build.

The base-year arterial network is composed of approximately 228 miles (456 directional miles) of roadways including interstate highways, major and minor arterials, and some local streets located in Fairfax and Loudoun Counties. With the addition of the programmed new roads to be implemented by the year 2000, the design year network miles amount to approximately 250 miles (not including the toll road), shown below as directional mileages. The additional 22 miles in the design year roadway network include a new section of I-66, Dulles Access Highway Extension (from Route 123 to I-66), Springfield Bypass, and the extension of existing roads such as Lawyers Road, Wiehle Avenue, and Sunrise Valley Drive.

DIRECTIONAL NETWORK MILES

| Year | Fairfax County | Loudoun County | Total |
|---|---|---|---|
| 1977 | 418.8 | 37.3 | 456.1 |
| 2000 | 462.1 | 37.3 | 499.4 |

## Existing Conditions

Highways. Utilizing 1977 average daily traffic volumes, travel speeds, and link distances on all sections of the impact area roadway network, vehicle miles of travel and vehicle hours of travel were computed for the base year as shown below. The majority of travel (95 percent) in the impact area occurs in Fairfax County. Hence impacts occurring from the implementation of the toll road or TSM would be felt predominantly by Fairfax County residents.

1977 VEHICLE MILES OF TRAVEL, VEHICLE HOURS OF TRAVEL, AND AVERAGE SPEED

| | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed (mph) |
|---|---|---|---|
| Fairfax County | 3,509,200 | 90,670 | 38.7 |
| Loudoun County | 202,400 | 5,050 | 40.1 |
| Total | 3,711,600 | 95,720 | 38.8 |

To identify the level of transportation service at which the various sections of the existing roadway network are currently operating, a comparison of estimated design hour volumes and roadway capacity was made for each link in the base year network. As part of the description of existing traffic conditions, a level of service (LOS) evaluation was made which takes into consideration this volume-capacity analysis as well as speed and travel time; traffic interruptions or restrictions; freedom to maneuver; safety; and driving comfort and convenience.

Figure III-1 delineates three levels of service — D, E, F — for the base year roadway network. Traffic flow at these levels of service can be described as follows:

- Level of service D (LOS D) approaches unstable flow, with tolerable operating speeds being maintained though considerably affected by changes in operating conditions. Drivers have little freedom to maneuver, and comfort and convenience are poor, but conditions can be tolerated for short periods of time.

- Level of service E (LOS E) represents operations at even lower operating speeds than in LOS D with volumes at or near the capacity of the highway. Flow is unstable, and there may be stoppages of momentary duration.

- Level of service F (LOS F) describes forced flow operations at low speeds resulting from queues of vehicles backing up from a constriction downstream. Speeds are reduced substantially and stoppages may occur for short or long periods of time. In the extreme, both speeds and volume can drop to zero.

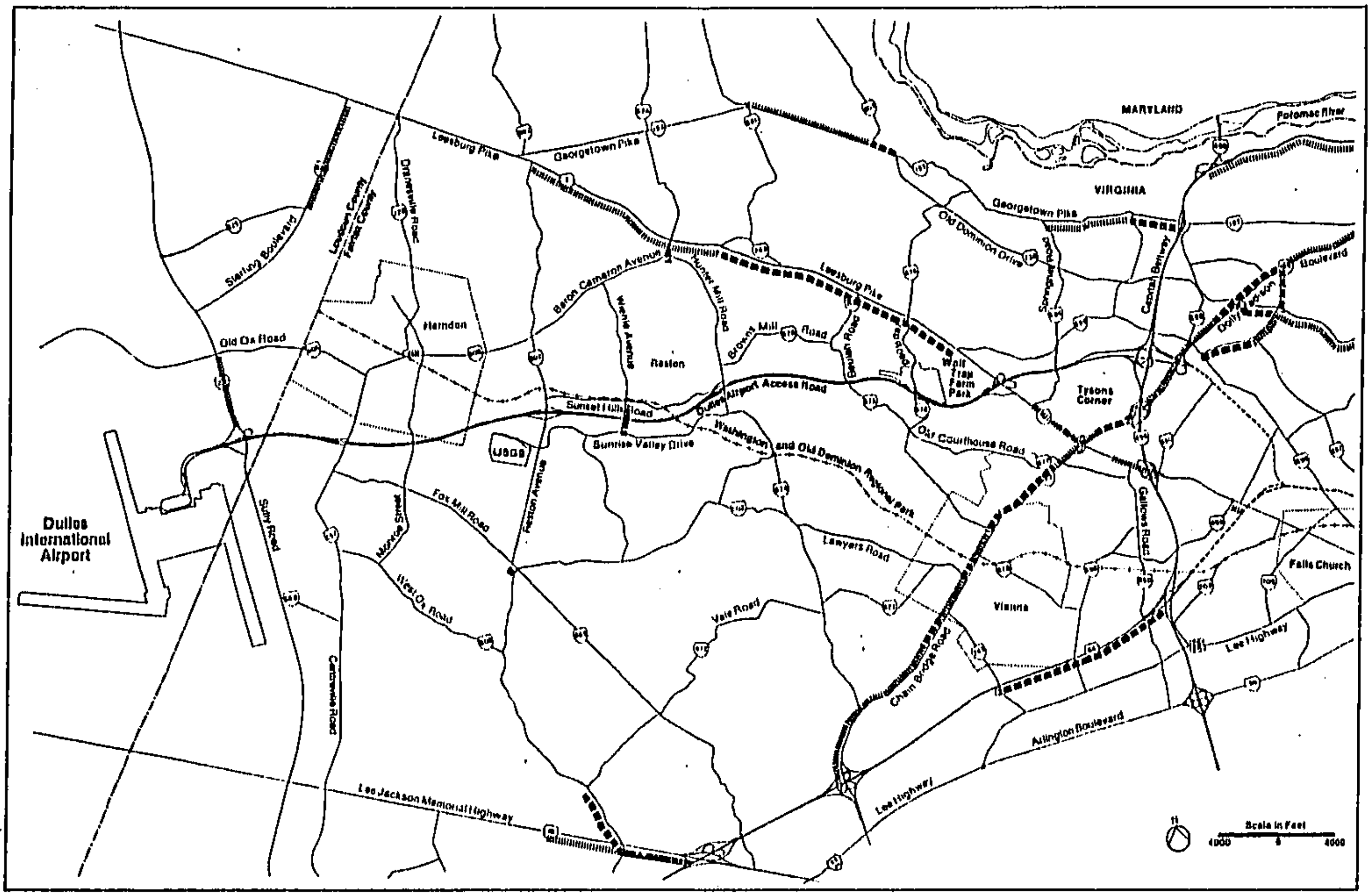
Those links not shown in Figure III-1 at levels of service D, E, or F are currently operating at LOS C or better (LOS A or B). This implies stable to free traffic flow and a relatively satisfactory to high operating speed. A summary of directional network miles by area and level of service is shown below.

BASE YEAR DIRECTIONAL NETWORK MILES BY LEVEL OF SERVICE

| | A,B,C | % | D | % | E | % | F | % | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| Fairfax County | 349.7 | 83.5 | 40.2 | 9.6 | 27.0 | 6.4 | 1.9 | 0.5 | 418.8 | 100.0 |
| Loudoun County | 35.1 | 94.1 | 2.2 | 5.9 | - | - | - | - | 37.3 | 100.0 |
| Total | 384.8 | 84.4 | 42.4 | 9.3 | 27.0 | 5.9 | 1.9 | 0.4 | 456.1 | 100.0 |

Figure III-1
**Existing Traffic Conditions (1977)**

Legend
Level of Service
D
E
F



Approximately 94 percent of the overall impact area network is operating at LOS D or better during peak periods. Generally, this level or better is considered acceptable for urban areas like those in the northern Virginia study area. The remaining 6 percent of the impact area roadway network is currently operating at LOS E or F.

As shown in Figure III-1, the major roadways in Fairfax County currently experiencing peak period congestion are:

- Route 123 between I-66 and the Georgetown Pike;
- Route 7 from the Capital Beltway west to Georgetown Pike;
- Lee Jackson Memorial Highway (U.S. Route 50) just west of the interchange with I-66;
- Interstate Route 66 between Route 243 and the Capital Beltway;
- Georgetown Pike at intermittent locations throughout the impact area; and
- Chain Bridge Road and Old Dominion Drive to the east of the Capital Beltway

Major intersection congestion currently occurs at the intersections of Route 7 with Baron Cameron Avenue, U.S. Route 50 and Reston Avenue, and Old Dominion Drive and Dolly Madison Boulevard. Other minor intersection problems occur along those routes previously listed.

Many of the roads experiencing peak period congestion have already been recognized by the appropriate agencies. Proposed improvements developed as a result of a comprehensive and cooperative planning effort by the state and counties will ameliorate several of these adverse traffic conditions. These planned and programmed improvements have been incorporated into the level of service analyses for all year 2000 study alternatives.

Public Transportation. Transit in the Washington metropolitan area is undergoing a major change with the phased opening of the Washington Metropolitan Area Transit System 100-mile Metrorail system. Prior to the opening of the first portion of the Metrorail network in 1976, transit travel in the Washington area was almost entirely by bus. As individual segments of the rail system have opened, however, Metrorail has gradually replaced the line haul function of the bus system, with buses becoming primarily feeders to the rail system and providing local access within individual corridors.

Present plans call for the 100-mile system to be completed in 1990. The adopted regional system consists of a number of radial spokes that converge on downtown Washington. The portion of the system that would serve the DAAR corridor is the "K" Route that extends from Rosslyn through Falls Church to Vienna outside the Capital Beltway. This route follows the Interstate Route 66 right-of-way for much of its length. Stations on the western half of the line will have a large number of parking spaces available and it is anticipated they will attract a substantial number of park-and-ride patrons. The section of the "K" Route from Rosslyn to Ballston opened late in 1979 while the section from Ballston to Vienna is planned for a 1983 opening.

With the opening of the "K" Route, bus service in the DAAR corridor will be largely reoriented to serve as a feeder to Metrorail. The West Falls Church Station will be located at the intersection of the Dulles Access Highway Extension and Interstate Route 66 with bus ramps being provided from the extension and Interstate Route 66. This will have the effect of allowing the toll road to serve as a major transit route for buses going from the DAAR corridor to the West Falls Church station. In addition to bus routes feeding the West Falls Church station from the DAAR corridor, other cross-corridor routes will feed the East Falls Church, Dunn Loring, and Vienna stations.

Although it is not currently part of the adopted regional system, a Metrorail extension along the DAAR right-of-way has received serious consideration in recent years, and as development continues to occur in the corridor, the need may become apparent to include such an extension as part of the regional Metrorail system.

One Metrorail alignment into the corridor has been considered in this study. This alignment, referred to as "with-METRO," would begin at the West Falls Church station and follow the DAAR right-of-way, with intermediate stations at Spring Hill Road, Route 7, and Reston Avenue before terminating with a station at Dulles Airport. If this alignment is constructed at some future date, the bus system in the corridor would likely be reoriented to feed the Metrorail stations along the alignment.

## B. SOCIOECONOMIC AND LAND USE RESOURCES

### Existing Sociodemographic Conditions

The rapid growth of the Washington, D.C. metropolitan area since the close of World War II has transformed many of its traditionally rural counties with relatively stable populations to rapidly developing suburban and urban areas. Between 1950 and 1977, the District of Columbia Standard Metropolitan Statistical Area (SMSA) grew from about 1.287 million to 3.065 million persons -- an increase of 138 percent (Table III-1). The overwhelming majority of this growth occurred in the surrounding suburbs rather than in the District of Columbia itself.

Table III-1
**Population Growth for Washington, D.C. SMSA, Fairfax and Loudoun Counties: 1950-1977**

| Year | Total Population | | | Change from Preceding Period (%) | | | Change Between 1950 and 1977 (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | SMSA | Fairfax County | Loudoun County | SMSA | Fairfax County | Loudoun County | SMSA | Fairfax County | Loudoun County |
| 1950 | 1,287,000 | 98,557 | 21,147 | – | – | – | – | – | – |
| 1960 | 1,808,000 | 248,897 | 24,459 | 40.5 | 152.6 | 15.7 | – | – | – |
| 1970 | 2,481,000 | 454,275 | 37,150 | 37.2 | 82.6 | 51.9 | – | – | – |
| 1977 | 3,065,000 | 573,200 | 58,500 | 23.6 | 26.2 | 57.5 | 138.2 | 481.6 | 176.6 |

Sources: 1950-1970 – U.S. Bureau of the Census.

1977 – Metropolitan Washington Council of Governments, Cooperative Forecasting Program.

Both Fairfax and Loudoun Counties -- the counties in which the proposed toll road and project alternatives are located -- participated in the post-World War II regional growth and, in fact, grew at rates significantly faster than that of the SMSA. Fairfax County's population increased almost five-fold between 1950 and 1977, while Loudoun County grew by 177 percent during that 27-year period.

Within Fairfax and Loudoun Counties, particular areas have experienced accelerated growth rates in recent years. Of Fairfax County's four planning areas, Area III -- which contains, in its western part, most of the DAAR corridor under study -- accounted for 60 percent of the total county population increase between 1970 and 1975. Loudoun County is subdivided into magisterial districts rather than planning areas. Its eastern districts -- Broad Run, Guilford, and Sterling -- grew by about 17,000 persons between 1970 and 1977, accounting for over 75 percent of that county's total growth during that period.

The racial composition of both Fairfax and Loudoun Counties is predominantly white. Whereas just over 75 percent of the SMSA's population in 1970 was white, the white population of Fairfax and Loudoun Counties in that year was about 96 and 87 percent, respectively. The largest racial minority in these counties was black, representing 3.5 percent and 12 percent of the 1970 population of Fairfax and Loudoun, respectively. Both counties have experienced a relative decline in black population since 1970; blacks made up an estimated 3.1 percent of Fairfax County's 1980 total population and 3.7 percent of Loudoun County's 1977 total population.

Two measures of the financial status of an area's inhabitants are median family income and per capita income. For both these indicators Fairfax County rated above the SMSA average while Loudoun County fell below the regional figure. Median family income in 1978 for Fairfax and Loudoun Counties was $29,325 and $15,691 respectively, versus $25,821 for the Washington SMSA. Per capita income in 1974 for these areas was $7,004 for Fairfax County, $5,111 for Loudoun County, and $6,404 for the region.

The overall sociodemographic picture that emerges from this regional sketch is of a rapidly growing metropolitan area. Fairfax County is a middle to upper middle class suburban county whose eastern portion (within and around the beltway) is largely developed and whose western sections are less densely populated but are quickly being filled in. Loudoun County, on the other hand, is a mostly rural area whose residents have a somewhat lower average financial status. Within that county, the eastern edge that borders Fairfax County is growing most rapidly and developing in a pattern of cluster developments.

Development trends within the DAAR corridor have mirrored many of the regional growth patterns. The corridor is principally suburban with residential land uses predominating. Small amounts of light industrial and office uses are located in the area and are mainly dispersed along the corridor, especially in the South Herndon and Reston communities.*

Residential development in the corridor (Figure III-2) has occurred relatively recently with the overwhelming majority of homes having been built since the mid-1960s. Housing types include a mix of single family detached homes, duplexes, townhouses, and garden and highrise apartments. The mix is greatest in the western portions of the corridor, in South Herndon and North and South Reston, while

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* Study area communities in the primary impact area (one-half mile on either side of the DAAR right-of-way) are shown on Figure III-2.

single family detached homes predominate in the east. Housing values reflect this pattern and, overall, housing is more expensive in the eastern portion of the corridor than in the west. Single family homes in the corridor generally range in price from about $50,000 to $160,000 while most townhouses run from $40,000 to $75,000.

Demographic characteristics, as measured from the 1970 Census for the tracts in which the corridor communities are located, indicate variations among communities and between the communities and Fairfax County as a whole.

Median family income in 1970 for the corridor tracts ranged from just over $12,000 to about $19,700 vs. approximately $15,700 for all of Fairfax County (Table III-2). The tracts in which the western portions of the corridor are located had 1970 median family incomes below the county average while tracts in the central and eastern portions had median incomes $1,400 to $4,000 above the county average.

The percentage of families in 1970 with incomes below the poverty line generally reflected median family income characteristics. Families below the poverty level represented from between 2.6 percent of the population in the east (tracts covering Wolftrap and West Tysons) to 8.8 percent in the tract for South Herndon. The 1970 countywide average was 3.5 percent.

Mobility, as measured by a household's ownership of a car, was, as expected, also closely associated with income. The great majority of households in the corridor owned at least one car in 1970 and the percentage of households that were "carless" ranged from a low of 1.1 percent in the eastern sections of the corridor to a high of 5.1 percent in the west. The county average in 1970 was 3.8 percent.

**Legend**

1 Reflection Woods
2 Lakeview
3 Reflection Place
4 Parcher Village
5 Four Seasons
6 Courts of Chandon
7 Chandon Woods
8 Chandon
9 The Downs
10 Greg-Roy
11 The Sycamores
12 Ivy Oak Square
13 Charter Oak Cluster
14 Golf Course Village
15 Chesnut Grove Apartments
16 Ryland
17 The Greens
18 Hunters Green
19 Newbridge
20 Wethersfield
21 Hampton Meadow
22 Fairway Woods
23 Harborside
24 Boston Ridge
25 Winterport
26 Richland Hunt
27 Hunters View
28 Rolling Heights
29 Brittain
30 Westford
31 Victoria Farms
32 Windstone
33 Wayside
34 Sun Valley
35 Cinnamon Creek
36 Beau Ridge
37 Shouse Village
38 Wolf Trap Woods
39 The Trails
40 Spring Lake
41 Bluffs of Wolf Trap
42 Ankerdale
43 Tysons Green
44 Tysons West

Figure III-2
**Subdivisions in the Primary Impact Area**

Legend
☐ Subdivisions
Primary Impact Area/ Community

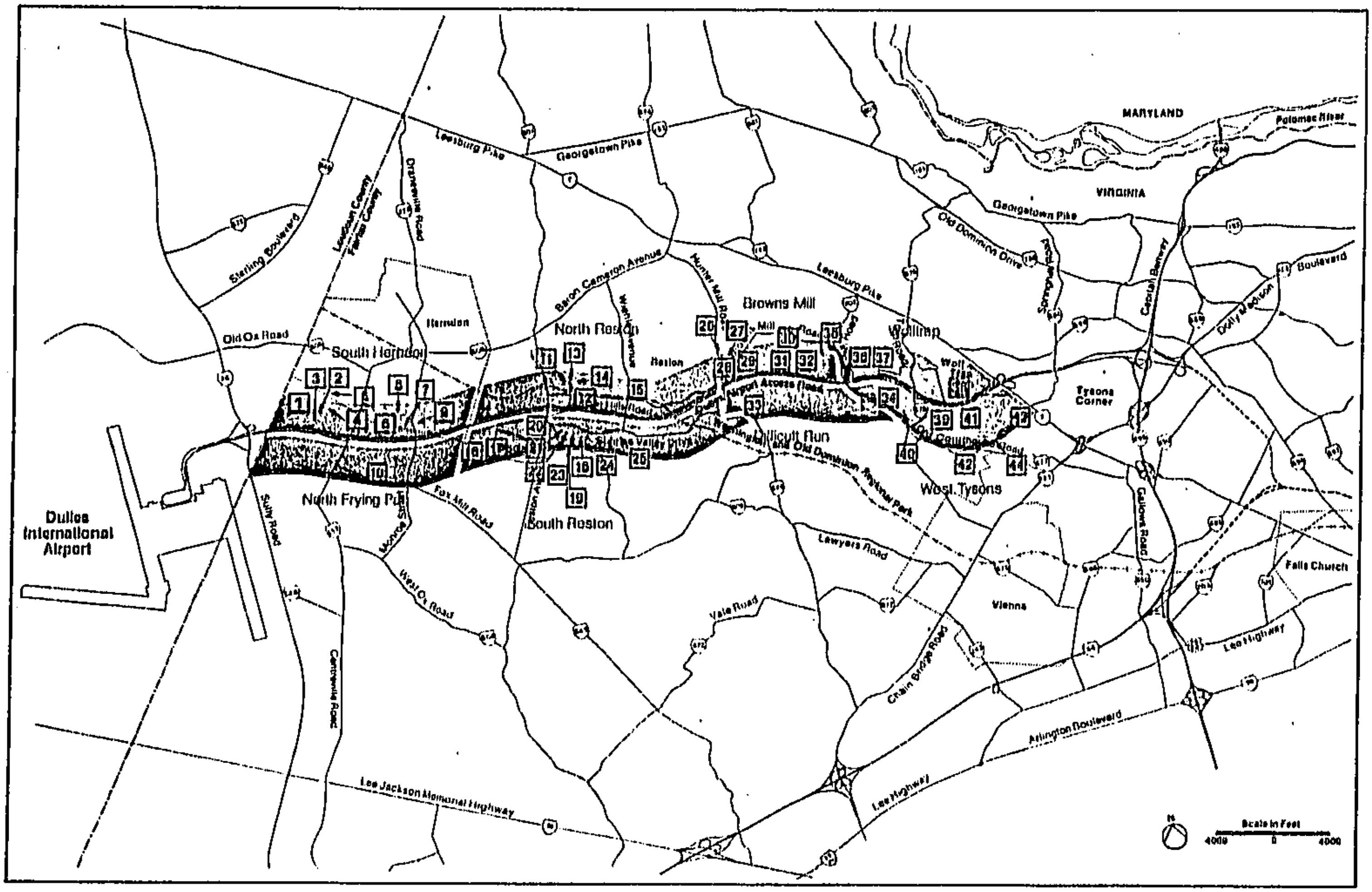


Table III-2
**Selected Sociodemographic Characteristics for Fairfax and Loudoun Counties and Study Area Communities**

| | Fairfax County | Loudoun County | Census Tract Containing Study Area Community(ies) of: | | | |
|---|---|---|---|---|---|---|
| | | | South Herndon | North Frying Pan | North Reston South Reston Difficult Run Browns Mill | Wolftrap West Tysons |
| Median family income | $15,697 | $10,576 | $12,049 | $14,814 | $17,120 | $19,659 |
| Percent of families with incomes below the poverty line | 3.5 | 9.6 | 8.8 | 3.4 | 3.5 | 2.6 |
| Percent black | 3.5 | 12.5 | 2.1 | 3.3 | 5.7 | 2.0 |
| Percent of households with no autos available | 3.8 | 11.3 | 4.7 | 5.1 | 2.6 | 1.1 |

Source: *U.S. Census of Housing and Population*, 1970.

The racial composition in the corridor in 1970 did not vary significantly from the county average. The Reston, Difficult Run, and Browns Mill communities had the highest proportion of blacks (5.7 percent of the total population for their tract) vs. 3.5 percent for the county. The proportion of black population in the tracts covering residents of the corridor ranged from 2.0 percent to 3.3 percent.

Although residents of the corridor make use of public facilities in the general area, they also have a moderate variety of community facilities within their own community boundaries (one-half mile of the DAAR). Foremost among these facilities in both number and acreage are the ten parks and recreational sites in the corridor. Other community facilities include three schools, three churches, two clusters of commercial establishments, and four other miscellaneous public facilities (Figure III-3).

Land Use

Most of the DAAR corridor passes through a mix of sparsely developed suburban and rural areas (Figure III-4). Although much of the frontage of the roadway is currently undeveloped, its western portion is planned for industrial uses. The residential developments nearest the right-of-way have been constructed, for the most part, since the existing airport road was built and their layout reflects the location of that dominant land use.

Extending from just west of the Loudoun-Fairfax County line, the right-of-way of the DAAR crosses the southeastern tip of the town of Herndon and runs between the two sections of the planned residential community of Reston. The right-of-way then proceeds through a primarily undeveloped expanse before passing near residential developments adjacent to Wolf Trap Farm Park north of the DAAR and near residential uses north of the town of Vienna south of the roadway. The portion of the DAAR under study terminates at Route 7 northwest of the commercial center of Tysons Corner.

For purposes of this discussion, the DAAR corridor has been divided into five sections: (1) Sully Road to Centreville Road; (2) Centreville Road to the Herndon-Reston line; (3) Herndon-Reston line to Hunter Mill Road; (4) Hunter Mill Road to Beulah Road; and (5) Beulah Road to Route 7.

Section 1: Sully Road to Centreville Road. The western terminus of the DAAR is located near the edge of Loudoun County. Except for Dulles International Airport immediately to the west and the Sterling Park community about two miles to the north, much of the eastern portion of the county is rural or underutilized. The area immediately surrounding the airport road is zoned for industrial use of which only about 9 percent is currently developed.

On the eastern portion of this segment is located the western edge of Fairfax County. As opposed to the planned industrial, but currently sparsely developed areas south of the DAAR, the section immediately to the north is developed at medium residential densities with townhouses and single family homes. Near the eastern boundary of the segment is located Hutchison Elementary School serving these subdivisions and the southwestern portion of Herndon. The school also contains a large athletic area with eight soccer fields situated between the school building and the airport road's right-of-way.

Section 2: Centreville Road to Herndon-Reston line. Both sides of the land adjoining the DAAR are planned for industrial uses. The area to the south of the roadway in this segment continues the sparse, primarily rural pattern to the west. Dispersed somewhat further to the south are two schools, several churches, Frying Pan Park, and a few low density subdivisions. Developed land uses on the northern side of the roadway are concentrated along the southern part of Herndon. Most of the residential development nearest the roadway is located between Centreville Road and Van Buren Street and off Sunset Hills Road and Alabama Drive. Also found in this section near the northern part of the right-of-way are two 8-acre parks -- Chandon and Bruin.

**Legend**

○ **Educational**

1 Hutchison Elementary School
2 Montessori Country School
3 Proposed Elementary School Site
4 Sunrise Valley Elementary School

◇ **Recreational**

1 Chandon Park
2 Bruin Park
3 Reston Golf & Country Club
4 Reston South Golf Course
5 Lake Fairfax Park
6 Wolftrap Stream Valley Park
7 Difficult Run Stream Valley Park
8 Wolf Trap Farm Park for the Performing Arts
9 Spring Lake Park
10 Washington and Old Dominion Regional Park

□ **Religious**

1 St. Timothy's Episcopal Church
2 Cartersville Baptist Church
3 Berea Church

△ **Cluster of Commercial Establishments**

1 Dulles Park Shopping Center
2 Reston International Center

⌓ **Public Institutional**

1 Fairfax County Police Station
2 Fairfax County Tax Assessor's Office
3 Fairfax County Fire Station
4 Post Office

Figure III-3
**Community Facilities in the Primary Impact Area**

Legend

**Type of Community Facility**

- ○ Educational
- □ Religious
- △ Cluster of Commercial Establishments
- ◇ Recreational
- ⌂ Public Institutional
- Primary Impact Area / Community

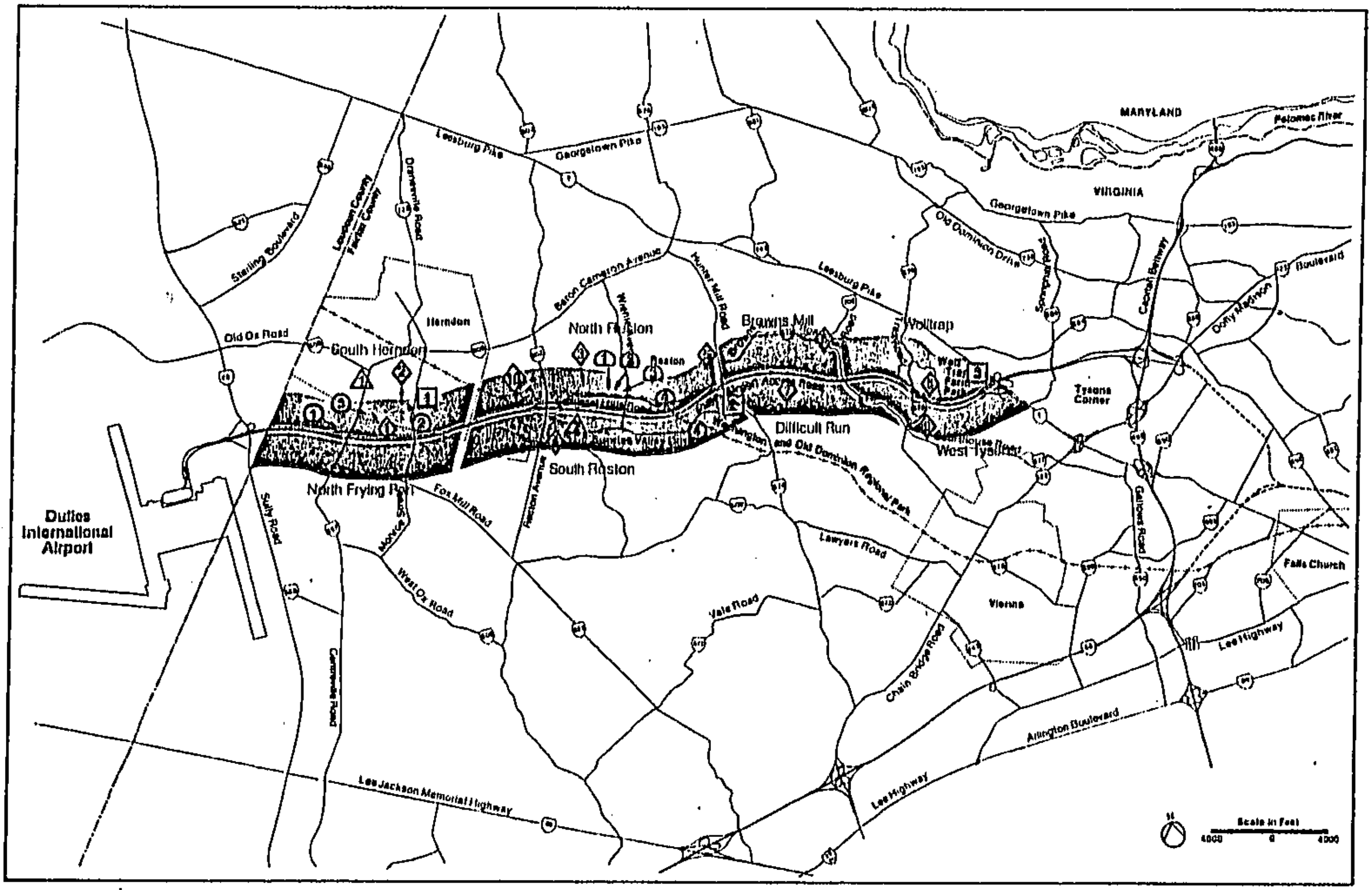
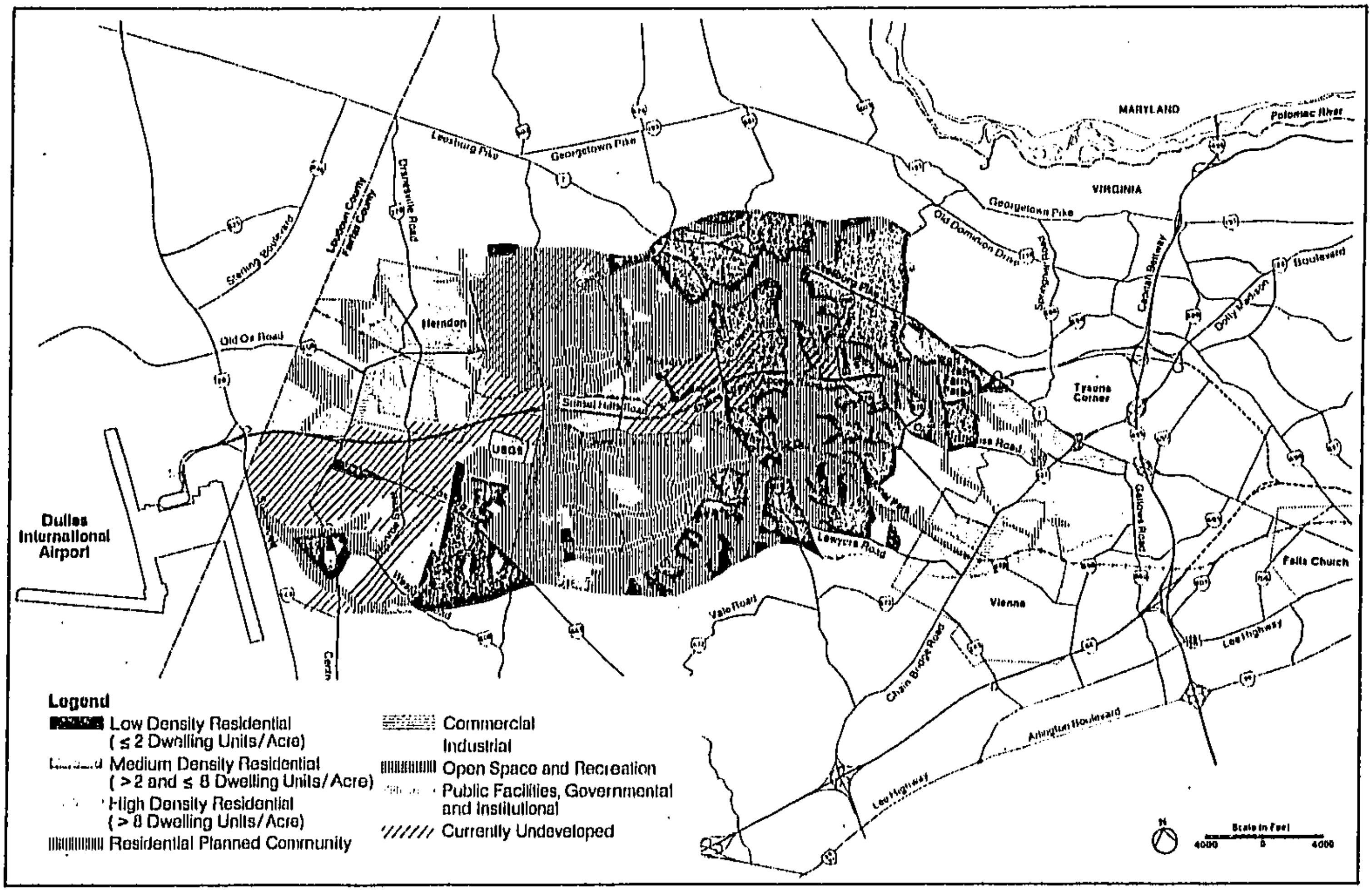


Figure III-4
**Generalized Land Use**



Section 3: Herndon-Reston line to Hunter Mill Road. The third segment comprises mainly the planned residential community of Reston. Reston offers a variety of housing types including highrise and garden apartments, townhouses, and semi-detached and detached single family homes. The planned community also contains commercial centers, such as Reston International Center and Issac Newton Square; offices, such as those along Sunset Hills Road, Association Drive, and Sunrise Valley Drive; and extensive recreational areas, such as North Reston Golf and Country Club and Reston South Golf Course, that wind through much of the residential acreage. Virtually all of the residential land has purposely been sheltered from the DAAR and is situated to the north of Sunset Hills Road north of the DAAR and to the south of Sunrise Valley Drive south of the DAAR.

The area north of the DAAR between the Herndon-Reston line is being planned to accommodate major commercial/industrial type activities, a Reston town center, and high density residential development. Little of this area has been developed to date. With the exception of the United States Geological Survey headquarters, the planned industrial land south of the road is mostly undeveloped, whereas most of the residentially planned areas are in use.

Section 4: Hunter Mill Road to Beulah Road. Except for a few scattered subdivisions of single family homes north of the DAAR and a portion of Difficult Run Stream Valley Park to the south, this portion of the corridor near the roadway is mostly undeveloped. This area is planned to house low density residential uses.

Somewhat further from the roadway to the south, the area is more developed. Included there are several parks, other community facilities, and medium density residential development north of the town of Vienna. Residential development further north of the DAAR corridor is more sparsely distributed.

Table III-3
**Employment* by Sector in United States, Washington, D.C. SMSA, Fairfax and Loudoun Counties: 1978**

| Sector | United States | Washington, D.C. SMSA | Fairfax County | Loudoun County |
|---|---|---|---|---|
| Manufacturing | 23.7% | 3.6% | 3.9% | 5.0% |
| Construction | 4.9% | 5.5% | 7.9% | 8.7% |
| Transportation, Communications, Utilities (T.C.U.) | 5.7% | 4.4% | 3.7% | 7.7% |
| Wholesale and Retail Trade | 22.6% | 19.1% | 27.2% | 25.0% |
| Finance, Insurance and Real Estate (F.I.R.E.) | 5.5% | 5.8% | 5.7% | 3.5% |
| Services and Mining | 19.6% | 25.0% | 26.6% | 20.9% |
| Federal Government | 3.2% | 24.5% | 8.9% | 10.8% |
| State and Local Government | 14.8% | 12.2% | 16.1% | 18.4% |
| Total Percent | 100.0% | 100.0% | 100.0% | 100.0% |
| Total Employment | 85,763,000 | 1,463,000 | 158,930 | 14,454 |

Note: * Non-agricultural wage and sales "Place of Work" employment.

Source: U.S. Bureau of Labor Statistics, *Employment and Earnings*, Virginia Employment Commission, Manpower Research.

Section 5: Beulah Road to Route 7. This section contains mainly dispersed low to medium density and some high-density residential uses on both sides of the right-of-way. Wolf Trap Farm Park, a 117-acre cultural center for the performing arts that is owned and operated by the National Park Service, is located in the center of this last segment on the north side of the DAAR. Berea Church, just off to the northwest of the DAAR Route 7 intersection, is the only other community facility near the airport road. Several churches and a school are located in the vicinity of Route 7 somewhat further north of the corridor as are additional community facilities including several churches, schools, parks, and a country club further south of the DAAR just north of the town of Vienna and west of the commercial complex of Tysons Corner.

Existing Economic Conditions

The Washington SMSA is a rapidly growing region whose economy, stabilized by the presence of the federal government, is primarily service rather than industrially based. Fairfax County's economy is similar to that of the region (Table III-3), containing (particularly along high access corridors such as I-95 and I-495) concentrations of high quality office/industrial complexes housing corporate headquarters, research and development firms, and the like. While the employment growth of Fairfax County has been rapid (82 percent between 1970 and 1979), economic development within the county's DAAR corridor has been slow. In 1976, the corridor contained only 7 percent of county employment, most of which was concentrated in the Reston-Herndon area; (even most of this employment was in residentially-related or in federal government employment).* Although most of the land immediately adjacent to the road in the western part of the county has been zoned and planned for office/industrial

* For the purposes of examining employment impacts, the DAAR corridor is defined as an area extending 1 mile on either side of the road. For population impact analyses, a wider corridor of 2½ miles is used.

use, only a small proportion has actually been developed (Figure III-4). Discussions with local officials and developers as well as examination of various planning documents* indicate that the lack of high speed access to both the interstate highway system and Washington, D.C. has been a prime factor in restricting development in this area.

Loudoun's economy varies from that of the region and of Fairfax County in that its basic employment sector is industrial. For example, almost 14 percent of Loudoun's employment in 1978 was in manufacturing, construction, and quarrying (Table III-3). Most existing service sector employment is locally oriented, serving the growing Loudoun County population. The major concentration of the industrial activities in the county is in the DAAR corridor, which contains 60 percent of the county's industrially zoned land and 80 percent of its industrial firms. To date, access provided by Routes 28 and 7 has apparently been sufficient to serve the truck traffic generated by the manufacturing and construction firms in the area. With the increasing congestion problems on Route 7, however, firms in the area may soon be hindered from operating effectively without a major limited access truck facility.

While Fairfax and Loudoun differ in their economic makeup, both have been experiencing burgeoning population growth (average annual rates between 1970 and 1980 of 3.3 percent and 6.2 percent, respectively). In Fairfax, the growth in employment has kept pace with population, fostering a reduction in out-commuting among the county's residents (34 percent worked in the county in 1970 compared to 42 percent in 1977). In Loudoun, on the other hand, out-commuting rose from 45.8 percent

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* Dulles Airport Access Road Corridor Study, 1978 and Analysis of Economic Development Potential in the I-66 Corridor of Fairfax County, 1980, Fairfax County Office of Comprehensive Planning; Loudoun County Planning Commission; Reston Land Corp.; and GESTINVEST.

in 1970 to 58 percent in 1977. Furthermore, population has grown within the corridor itself, despite the lack of good highway access. Currently, with the exception of parts of North Frying Pan and Browns Mill, most of the corridor's residentially zoned land is either developed, in the process of being developed, or subject to environmental constraints limiting development (Figure III-4).

This population growth has given rise to some problems in the provision of public services. Schools, which on a county-wide basis in both Fairfax and Loudoun have excess capacity, are or will shortly be experiencing space shortages within the DAAR corridor. While water supply and current or planned solid waste disposal sites appear adequate to deal with anticipated future development, sewer services may become insufficient. Fairfax County's Lower Potomac Plant will need to be expanded after the early 1990's to permit continued population and economic growth. Loudoun will soon have to obtain the capacity committed by the District's Blue Plains Treatment Plant or find alternative methods for treating county sewerage.

Both counties recognize the need to attract additional economic growth to support the costs associated with servicing their growing populations. Education, for example, which accounted for about two-thirds of the counties' 1978 budgets, is a key public cost associated with residential development (Table III-4). Moreover, studies conducted by the Fairfax County Office of Comprehensive Planning indicate that, on the average, for every $1.00 of tax revenue contributed by office and industrial development, the county must provide only $0.35 in services (exclusive of water and sewer), leaving a surplus of $0.65 to be contributed to the General Fund. Conversely, for every $1.00 contributed by residential development, the county must provide $1.47 in services (including capital costs for schools).* This shortfall is financed in part by taxes from nonresidential development.

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* Fiscal Impact Model for Fairfax County, 1977 and Fairfax County Development-Presentation for Mason District Council, Fairfax County Economic Development Authority, 1980.

Table III-4
**Operating Expenses* for Fairfax and Loudoun Counties—FY1979**

| Expenditure Category | Fairfax County | Loudoun County |
|---|---|---|
| General Government | 17.5% | 8.8% |
| Public Safety | 10.0% | 7.0% |
| Public Health and Welfare | 4.6% | 9.3% |
| Public Works | 6.7% | 3.1% |
| Schools | 61.2% | 71.8% |
| Total Percent | 100.0% | 100.0% |
| Total Operating Expenses | $442,116,000 | $30,040,400 |

Note: * Excludes debt service and/or capital expenditures.

Sources: *Fairfax County Profile, 1980,* Fairfax County Office of Research and Statistics; *Resources Management Plan,* Loudoun County.

## C. HISTORIC, ARCHAEOLOGICAL, AND RECREATIONAL RESOURCES AND VISUAL QUALITY

### Existing Historic Resources

Seven historic sites are located within the primary impact area -- a one-half mile wide band on either side of the outer boundary of the right-of-way for the proposed toll road (Figure III-5). None of these sites are either on or nominated for the National Register of Historic Places or the Virginia Landmarks Register, although Sunset Hills and the A. Smith Bowman Distillery may be jointly proposed to the latter. A brief description of the historic sites that are of local interest follows.*

Sunset Hills. The Sunset Hills mansion was built in 1899 by Dr. Adolph M. Wiehle, who dreamed of erecting a planned new town on almost 6,500 acres which he and General William McKee Dunn owned in separate parcels on both sides of the Washington, Ohio and Western Railroad. The house was designed by Erskin M. Sunderland, a Washington architect, and features 12-foot-high first floor ceilings; 24-inch-thick walls; plaster ceiling rosettes and chandeliers of different styles throughout the house; and marble mantels and arched transoms over opposing entrances.

Although Dr. Wiehle's new town was never fully developed, several structures were erected. A post office called "Wiehle" was established in 1887. Later, a talc mill was constructed as well as a small mill and brick kiln, which were built to furnish construction material for the new town.

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* The description of these sites is based on "Historic American Buildings Survey Inventory" summary sheets prepared by the staff of the Fairfax County Office of Comprehensive Planning/History.

**Legend**

☐ **Historic**

1 Sunset Hills
2 A. Smith Bowman Distillery
3 Plantation
4 Wolf Trap Farm
5 Filene Center
6 Ash Grove
7 Pleasant Grove Methodist Church

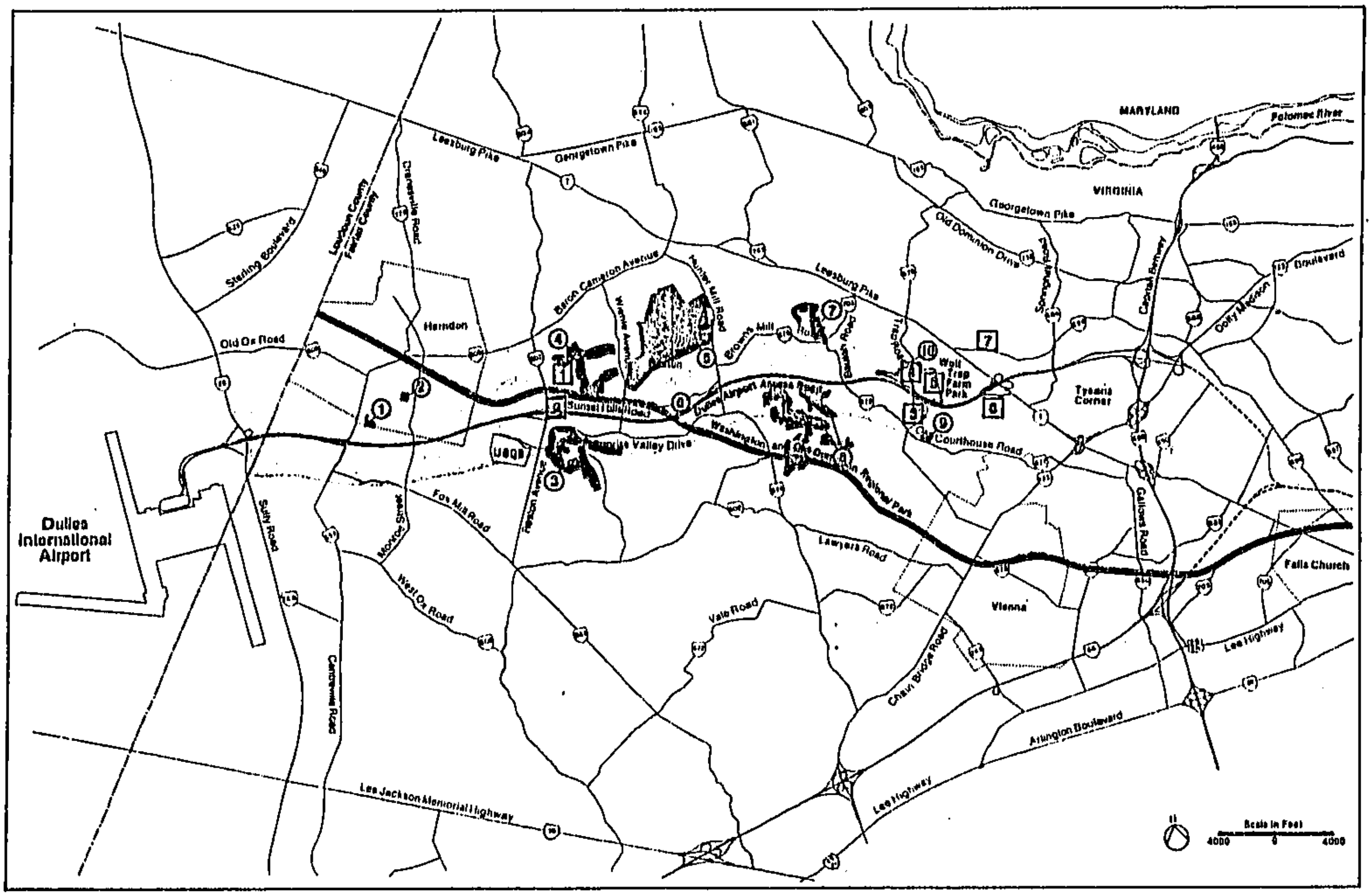
○ **Recreational***

1 Chandon Park
2 Bruin Park
3 Reston South Golf Course
4 Reston Golf and Country Club
5 Lake Fairfax Park
6 Washington and Old Dominion Regional Park
7 Wolftrap Stream Valley Park
8 Difficult Run Stream Valley Park
9 Spring Lake Park
10 Wolf Trap Farm Park

*Does not include school-related recreational facilities.

Figure III-5
**Historic and Recreational Resources in the Primary Impact Area**

Legend
□ Historic Site
○ Recreational Site
Primary Impact Area



After Dr. Wiehle's death, the property passed through several hands before being purchased by A. Smith Bowman of Kentucky, its present owner and resident, who eventually purchased 7,200 acres of land. Many of the old town buildings were reconverted for product processing and storage for the A. Smith Bowman Distillery after the repeal of prohibition in 1934.

Dr. Wiehle's idea of building a new town was implemented over 60 years later by Robert E. Simon, an investor. Mr. Simon purchased thousands of acres of the property and in the 1960s began developing the new town of Reston, the name of which was formed from Simon's initials, R.E.S.

A. Smith Bowman Distillery. After the repeal of prohibition in 1934, A. Smith Bowman applied for a permit to manufacture distilled liquors on the Sunset Hills Farms (originally owned by Dr. Aldolph Wiehle) which Bowman had purchased in 1927. The distillery complex was located in buildings which survived from the days of the planned new town of Wiehle; the first distillery was located in an old soapstone mill and the warehouses in structures that were previously the Town Hall, a stable, a mill workshop, and a warehouse.

A bottling house and new distillery building were constructed in 1966 and the original 1935 distilling vats and still were installed in the latter. The Bowman distillery is the only one of four pre-World War II distilleries in Virginia still in operation.

Plantation. Built in 1895 by Rose (Adams) and Samuel McDaniel, Jr., the structure now called the "Plantation" served as a country farm house on land once part of Wolf Trap Farm. The building was renovated in 1958 and in 1970. A brick addition was erected by Mrs. Catherine Filene Shouse, its present owner and resident, and donor of Wolf Trap Farm Park and the Filene Center.

The house is located on a wooded ridge that looks across the depressed Dulles Airport Access Road to Wolf Trap Farm Park's Filene Center. Mrs. Shouse is sponsoring construction of a $1 million music barn and community building adjacent to the eastern part of the Plantation to house musical and cultural events year round.

Wolf Trap Farm. Purchased as a country retreat in 1930 by Mr. and Mrs. Jouett Shouse, the original portion of the farm's main house is of log construction, covered with exterior clapboard. Several additions have been erected at unknown periods. A small one-story log guest house adjacent to the main house was refashioned from a dismantled two-story log cabin in Fredericksburg.

A meeting at Wolf Trap in 1944 precipitated the initial discussion which led to the creation of the United Nations. A bronze plaque, mounted on a large oak tree adjacent to the house, commemorates that event.

In 1966, Mrs. Shouse donated 95 acres of Wolf Trap Farm and funds for design and construction of the first national park for the performing arts. The managers of the park, the National Park Service, use the farm's main house for Park Service offices.

Filene Center. Built in 1971 by a $2 million donation from Mrs. Jouett Shouse, the Filene Center is the main auditorium for the Wolf Trap Farm Park for the Performing Arts. Built on a slope, the 3,500-seat amphitheatre with its 10-story stagehouse is constructed of native red Virginia cedar. The rear of the roofed theatre, which was designed by the architectural firm of MacFayden & Knowles, is open; its sides are flanked by a series of upright baffles on the diagonal to give the appearance of a closed theatre from the stage, but with an open view of the surrounding trees and grass from the audience. The lawn behind the back of the theatre can seat an additional 3,000 people.

The Filene Center is the only facility in the Washington, D.C. metropolitan area planned to serve all the performing arts. The setting, on about 100 acres of woodland with rolling hills and stream, permits those attending Wolf Trap to picnic on the lawn before the performance.

Ash Grove. Built about 1790, Ash Grove stands on land which was owned by the Fairfax family and may have been used as a hunting lodge by either Lord Fairfax of Greenway Court in Clarke County, or by Byran, Eighth Lord Fairfax of Mount Eagle. The house was sold in 1850 to James Sherman, grandfather of the present owner and resident W. Alvord Sherman.

Arranged in a T-shape with a rear ell, the house has a clapboard exterior with inside brick and chimneys. Its front has double entrance doors and a finely detailed covered porch with fixed benches. There are also two false doors in the interior. On the grounds are cemeteries of both the Fairfax and Sherman families.

The house was seriously damaged by fire in 1960, but much of it was subsequently restored.

Pleasant Grove Methodist Church. Built in 1892, the church is a simple one-room frame-and-clapboard structure topped by a steeple. A basement was dug in the first part of the twentieth century and the original siding, roof, and windows have been replaced.

About 1967, the congregations of Pleasant Grove and another Methodist church merged to become the William Watters United Methodist Church. This group subsequently leased the old church to the Peace Baptist Church, but the Methodist congregation still maintains the building and its adjacent cemetery.

Table III-5
**Inventory of Parks in the Primary Impact Area***

| Name and Address | Acreage | Functional Classification | Service Area | Description of Facilities** |
|---|---|---|---|---|
| Bruin Park, 412 South Van Buren Street, Herndon | 8.2 | Community | ¾-mile walking radius | Baseball field, basketball court, conservation area, nature trail, open play area, tot lot, picnic area, playground, shelter, two tennis courts, parking area |
| Chandon Park, end of Palmer Drive, Herndon | 7.9 | Community | ¾-mile walking radius | Playground, two tennis courts, parking area |
| Difficult Run Stream Valley Park, segments along length of Difficult Run | 907.1 | Stream Valley | Planning district | Hiking trail, historic site |
| Lake Fairfax Park 1400 Lake Fairfax Drive, Reston | 476.2 | County | Entire county | Boat rental, camping, carousel, fishing area, conservation area, open play area, miniature golf, miniature train, picnic area, playground, river boat, refreshment stand, restrooms, parking area |
| Spring Lake Park, Arabian Ave. at Old Courthouse Road | 5.0 | Community | ¾-mile walking radius | None |
| Wolftrap Stream Valley Park, segments along length of Wolftrap Creek | 38.8 | Stream Valley | Planning district | Hiking trail |
| Wolf Trap Farm Park, 1551 Trap Road, Vienna | 117.0 | Cultural center for the performing arts | Northern Virginia/ southern Maryland region | 3,500-seat outdoor covered amphitheatre, concert shell, children's theatre, cottage, farmhouse, barn, restrooms, and parking area |
| Washington and Old Dominion (W&OD) Regional Park, along former W&OD rail line | 42 miles long at completion | Linear park-hike/ bike trail | Portions of Fairfax and Loudoun Counties | Paved hike/bike trail, shoulder for jogging, and parallel bridle path |

Notes: * The primary impact area is defined as a one-half-mile-wide band on either side of the outer boundary of the right-of-way for the proposed road.
** One of each facility/amenity unless otherwise stated.

Sources: For all facilities except Wolf Trap Farm Park and Washington and Old Dominion Regional Park – Phone interviews with Mr. Theodore Zavora, Fairfax County Park Authority, 4/17/80 and 8/18/80.
For Wolf Trap Farm Park – Personal interview with Ms. Claire St. Jacques, Director, and Mr. Herbert Graul, Deputy Director, Wolf Trap Farm Park, 5/16/80.
For Washington and Old Dominion Regional Park – Phone interview with Ms. Kay Settle, Northern Virginia Regional Park Authority, 8/18/80.

## Existing Archaeological Resources

A literature search and field reconnaissance survey indicate that there are no significant archaeological sites within the right-of-way of the proposed outer parallel lanes and alternatives.

## Existing Recreational Resources

Ten recreational sites are located within the primary impact area (Figure III-5). These sites, comprising five parks, two stream valley parks, and a hike/bike trail (all of whose characteristics are summarized on Table III-5) as well as two golf courses, are briefly described below.

Parks. The five parks within the primary impact area are Bruin, Chandon, Spring Lake, Lake Fairfax, and Wolf Trap Farm Parks. The first three are community parks of between 5 and 8 acres, each serving an area of about 3/4-mile walking radius. These community parks are managed by Fairfax County Park Authority (FCPA) and provide various facilities for active and passive recreation including baseball fields, playgrounds, nature and bicycle trails, and open play areas.

Lake Fairfax Park, also operated by FCPA, is classified as a county park. It offers an extensive range of facilities for various recreational activities including boating, camping, fishing, and picnicking and is patronized by residents from throughout the county.

Wolf Trap Farm Park is a cultural park for the performing arts. Operated by the National Park Service, this national park features a roofed, outdoor amphitheatre which seats 3,500, a concert shell, a children's theatre, Tent in the Meadow for discussion of the arts, and parking for approximately 2,000 cars. Most of the events at Wolf Trap, which draw over 600,000 visitors annually, are held from May through September. These programs include a variety of performing arts such as opera, jazz, ballet, drama, and symphonic music.

Stream Valley Parks. Stream valley parks are created by the county via FCPA to preserve natural and ecologically sensitive areas such as lands along a stream valley or within a 100-year flood plain. Land for these parks is being acquired in segments and, although the parks are not necessarily continuous at present, the county eventually plans to acquire the remaining portions.

The two stream valley parks within the primary impact area are Difficult Run and Wolftrap. The former currently comprises over 900 acres of land along the entire length of Difficult Run, while the latter measures almost 40 acres along Wolftrap Creek. Both are used mainly for hiking, primarily by residents within their respective planning districts.

Hike/Bike Trail. The Washington and Old Dominion Regional Park is planned as a 42-mile-long trail or linear park along the former Washington and Old Dominion Railroad line. The Northern Virginia Regional Park Authority (NVRPA) purchased the right-of-way about two years ago and is in the process of developing the land as a park. Six miles of the park, between Falls Church and Vienna, have been completed. The next 9½-mile segment -- between Vienna and the Fairfax/Loudoun County line -- is under construction, with completion expected in the late fall of 1980.

The park's facilities will include an 8-foot wide paved hike/bike trail with a shoulder for jogging, and a parallel bridle path. Although no other facilities are planned for the immediate future, NVRPA's long range goals include the construction of several "balloon parks," restrooms, and connectors with Fairfax, Herndon, and Loudoun trail systems.

Golf Courses. The two golf courses within the primary impact area are Reston Golf and Country Club and Reston South Golf Course. The former facility contains an 18-hole golf course, four lighted tennis courts, an indoor swimming pool, two racquet ball courts, and a dining room and bar. It is a private country club with 500 members, about 90 percent of whom live in Reston.

Reston South is open to the general public. There is no paid membership; instead people wishing to use the course pay a daily greens fee. Facilities at Reston South include a golf course and driving range.

Existing Visual Resources

Most of the DAAR corridor passes through a mix of undisturbed, rural, and suburban areas. Much of the undisturbed portion of the corridor consists of forested areas -- predominantly hardwoods and mixed hardwood/pines with small amounts of flood plain forest and softwoods. The rural areas comprise mainly agricultural lands, pasturelands, and old fields. Suburban land uses in the vicinity of the roadway include various housing types such as townhouses, duplexes, quadriplexes, and single family detached homes, with some office and light industrial developments.

For purposes of this analysis, the DAAR corridor has been divided into three sections. These are: (1) Sully Road to Reston Avenue; (2) Reston Avenue to Hunter Mill Road; and (3) Hunter Mill Road to Route 7 (Leesburg Pike).

Section 1: Sully Road to Reston Avenue. From the west at Sully Road, the DAAR passes through mostly forested and agricultural lands until Reston Avenue. Very few structures are visible from the road along this segment and, conversely, the road can be seen from only a small number of developed areas. The major developments that are within the viewshed of the DAAR are a two-story brick office building of the National Concrete Masonry Association, about 200 feet away on Horsepen Road, a parallel local road; the edge of the Reflection Woods subdivision about 125 feet away, which is partially sheltered visually from the road by a row of low trees; the Hutchison Elementary School whose building is about 1000 feet from the road but whose playing fields abut the right-of-way and are separated only by some scattered trees; the Parcher Village and Reflection Place subdivisions about 1300 feet away; and some scattered single family homes and farms.

Section 2: Reston Avenue to Hunter Mill Road. Perhaps the most visually dominating structure along this corridor is the Reston International Center. Located off the southeastern quadrant of the Reston Avenue-DAAR intersection, the 15-story dark glass office building is visible from several miles away along the road and throughout much of Reston and adjacent communities; it serves as an orientation node for much of the area. Adjacent to the office complex is the horse-shoe-shaped Sheraton Hotel, as well as parking for shops and offices.

The remaining portion of this section of the corridor consists of a variety of scattered office and light industrial buildings, some located less than 200 feet from the roadway. (Except for two or three buildings, these facilities are visually secluded from the DAAR.) The structures are located off Sunset Hills Road or Sunrise Valley Drive, are usually two or three stories high, and are not necessarily oriented towards the DAAR frontage. Along the south side of the corridor, near Wiehle Avenue, the DAAR is within the viewshed of some single family homes located on the south side of Sunrise Valley Drive. Although much of the DAAR frontage within Reston is currently undeveloped, plans by the Reston Land Corporation call for office and light industrial uses along most of the segment within the planned residential community.

Section 3: Hunter Mill Road to Route 7 (Leesburg Pike). Running east from Hunter Mill Road until just west of Beulah Road, the corridor is composed mainly of pastureland and scattered forested areas. Near the northeastern and southwestern quadrants of the Beulah Road overpass of the DAAR are located the subdivisions of Cinnamon Creek and Sun Valley, respectively. Built since 1977, the subdivisions are relatively expensive single family homes some of which abut the DAAR right of way. The view from some of the homes is shaded somewhat by scattered trees but the foliage is not dense enough to block the view of the roadway entirely. In Sun Valley especially, the layout of homes along the right of way together with the absence of trees heightens the presence of the DAAR. East of Beulah Road, the frontage of the DAAR is mostly forested, sheltering several subdivisions which fall within about 200 to 300 feet of the DAAR. The parking lots of the Wolf Trap Farm Park for the Performing Arts are visible on the north side of the DAAR near Trap Road. The park's 3500-seat outdoor amphitheatre is located behind about 250 feet of trees on the inside of a natural slope and its viewshed does not include the roadway.

## D. AIR QUALITY, NOISE, AND ENERGY

### Air Quality

National Ambient Air Quality Standards. Primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for seven major air pollutants: carbon monoxide, hydrocarbons, nitrogen oxides, ozone, total suspended particulate matter, sulfur oxides, and lead (Table III-6). The primary standards have been established to protect the public health. The secondary standards, which are intended to protect the nation's welfare, account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Table III-6
**National Ambient Air Quality Standards***

| Pollutant | Averaging Time | Primary Standard** | | Secondary Standard*** | |
|---|---|---|---|---|---|
| Carbon Monoxide | 8 hours | 10 $mg/m^3$ | 9 ppm | 10 $mg/m^3$ | 9 ppm |
| | 1 hour | 40 $mg/m^3$ | 35 ppm | 40 $mg/m^3$ | 35 ppm |
| Hydrocarbons† (corrected for methane) | 3 hours (6 to 9 a.m.) | 160 $\mu g/m^3$ | 0.24 ppm | 160 $\mu g/m^3$ | 0.24 ppm |
| Nitrogen Dioxide | Annual Arithmetic Mean | 100 $\mu g/m^3$ | 0.05 ppm | 100 $\mu g/m^3$ | 0.05 ppm |
| Ozone (corrected for NO and $SO_2$) | 1 hour | 235 $\mu g/m^3$ | 0.12 ppm | 235 $\mu g/m^3$ | 0.12 ppm |
| Sulfur Oxides (Sulfur Dioxide) | Annual Arithmetic Mean | 80 $\mu g/m^3$ | 0.03 ppm | – | – |
| | 24 hours | 365 $\mu g/m^3$ | 0.14 ppm | – | – |
| | 3 hours | – | – | 1,300 $\mu g/m^3$ | 0.50 ppm |
| Particulate Matter | Annual Geometric Mean | 75 $\mu g/m^3$ | – | 60 $\mu g/m^3$†† | – |
| | 24 hours | 260 $\mu g/m^3$ | – | 150 $\mu g/m^3$ | – |

Notes:
* Standards, other than those based on annual arithmetic mean or annual geometric mean, are not to be exceeded more than once per year.

** National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

*** National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

† As a guide in devising implementation plans to achieve ozone standards.

†† As a guide to be used in assessing implementation plans to achieve the 24-hour standard for particulate matter.

Source: 40 CFR Part 50, "National Primary and Secondary Ambient Air Quality Standards," 36FR22384, November 25, 1971, as amended.

Of principal importance to this project are those pollutants that can be traced to motor vehicles. These include carbon monoxide, hydrocarbons, nitrogen oxides, ozone, and lead.

Priority Classification of Virginia Portion of National Capital Interstate Air Quality Control Region. The proposed toll road is located in the Virginia portion of the National Capital Interstate Air Quality Control Region (AQCR VII). This region was designated in 1971 as the official area for the development of air quality plans for northern Virginia. AQCR VII was classified (based upon measured ambient air quality) Priority I for particulate matter, sulfur oxides, carbon monoxide, and ozone. Portions of AQCR VII (Alexandria, Arlington City, and areas of high traffic density in Fairfax County) are now classified as nonattainment areas of NAAQS for carbon monoxide while the entire region is considered a nonattainment area for ozone. (A nonattainment area is any area which is shown by air quality monitoring data or which is calculated by air quality modeling to exceed the levels allowed by NAAQS.) Virginia has implemented a control strategy to achieve NAAQS by 1987.

Existing Ambient Air Quality. Existing ambient air quality — one-hour and eight-hour averages of carbon monoxide (CO) concentrations -- was estimated at ten locations in the project study area (Figure III-6) using the Virginia Highway and Transportation Research Council AIRPOL-4A Gaussian dispersion model together with the EPA MOBILE 1 vehicular emission factors. The area that was considered for study encompasses roads projected to experience a minimum 5 percent change in average daily traffic volume resulting from the proposed toll road. Within this area, 10 microscale sites were selected at those locations with the highest potential for exceeding the CO 8-hour NAAQS. The estimates were based on worst-case meteorological conditions (atmospheric stability class E for one-hour estimates and class D for eight-hour estimates; wind speed of 1.0 meter per second; ambient temperature of 30.4°F); design hour traffic volumes and corresponding capacity constrained speeds; and, to represent background conditions, second highest background CO concentration recorded at the

**Legend**

☐ **Air**

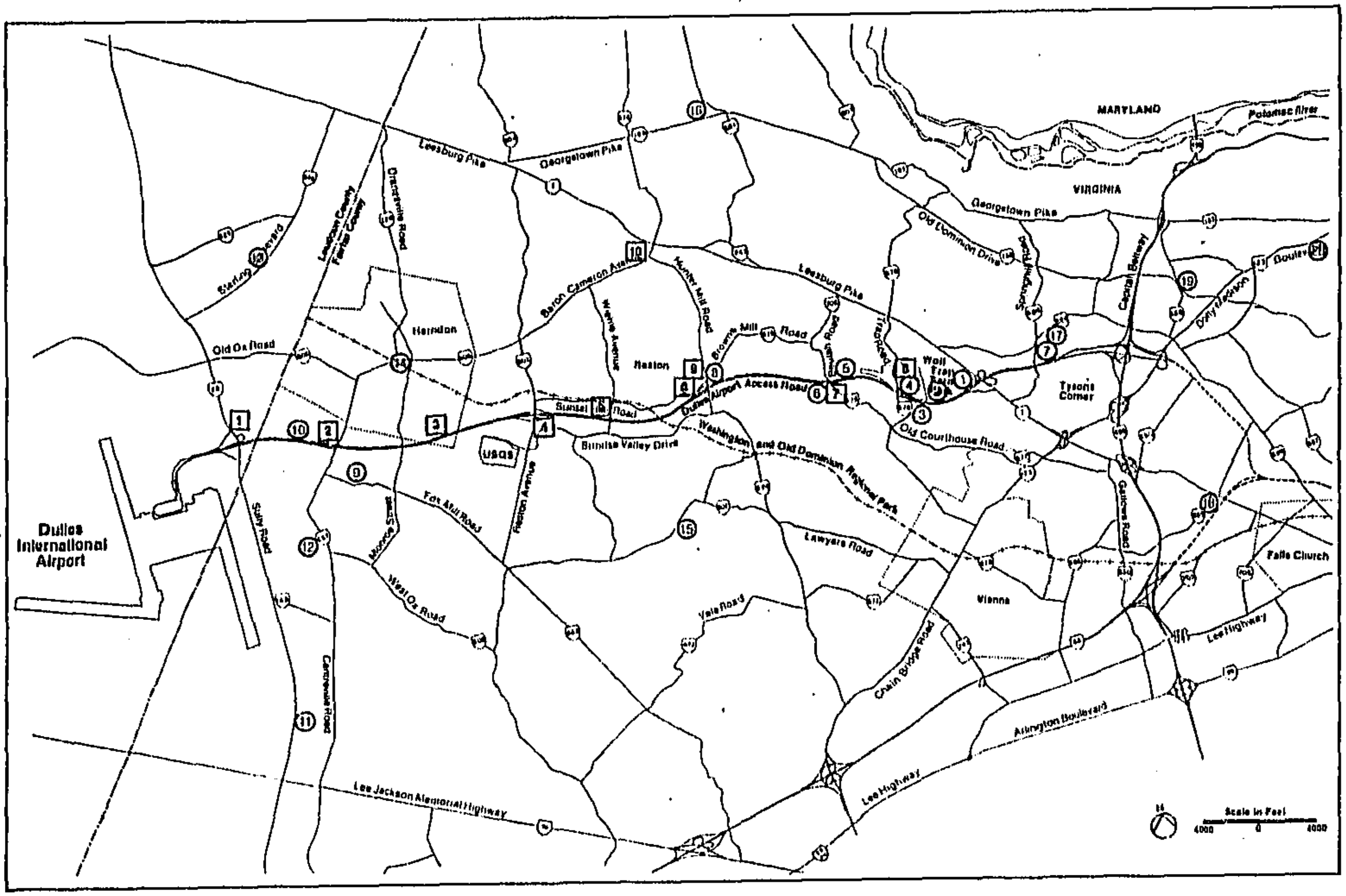
1 Sully Road
2 Centreville Road
3 Springfield Bypass
4 Reston Avenue
5 Wiehle Avenue
6 Hunter Mill Road
7 Beulah Road
8 Trap Road
9 Crowell Road
10 Baron Cameron Avenue

○ **Noise**

1 Berea Church Leesburg Pike
2 Laurel Court
3 Bois Avenue
4 Wolf Trap Farm Park
5 Cinnamon Creek Drive
6 Squaw Valley Drive
7 Shiloh Church
8 Crowell Road
9 Fox Mill Road
10 Aiken Place
11 Sully Plantation
12 Near Floris United Church
13 Sterling Middle School
14 First Baptist Church
15 Stream Valley Park
16 Near Forestville Methodist Church
17 Spring Hill Elementary School, Lewinsville Road
18 Near St. Pauls Lutheran Church Idlywood Road & Leesburg Pike
19 Near McLean Presbyterian Church
20 Near Trinity Church and School

Figure III-6
**Location of Air Quality Prediction and Noise Monitoring Sites**

Legend
□ Air Sites
○ Noise Sites



Virginia Air Pollution Control Board Balls Hill Road monitoring station on Dolly Madison Boulevard (Route 123) in Fairfax County. These background concentrations were 11.9 parts per million (ppm) and 8.4 ppm for the one- and eight-hour averages, respectively. Estimated CO concentrations for the ten prediction locations exceeded the eight-hour National Ambient Air Quality Standard of 9 ppm for CO at one site shown in Table III-6: at Baron Cameron Avenue (9.8 ppm). The one-hour standard for CO of 35 ppm was not exceeded at any of the ten prediction sites.

Existing CO, hydrocarbon, and nitrogen oxide pollutant burdens, determined on a link-by-link basis for the entire study area traffic network, were 75,154.2, 9,259.0 and 7,551.1 tons per year, respectively.

Noise

Existing noise levels were determined through a noise monitoring program at representative locations within the project study area (Figure III-6). Twenty noise-sensitive locations such as churches, schools, parks, residences, public buildings, recreation centers and nursing homes within the project study area were selected on the basis of the following criteria: (1) the nature and location of the highway section in terms of topography, complexity of roadway configuration, sensitivity of nearby receptors, and anticipated traffic volumes; (2) representation of other sites with similar characteristics; (3) geographic distribution within the study area; (4) presence of public structures where insulation might be considered a noise abatement option; and (5) presence of Section 4(f) lands (publicly owned parklands, recreational areas, wildlife and waterfowl refuges and historic sites) affected by the proposed action under Section 4(f) of the Department of Transportation Act of 1966. Exterior 10-minute average equivalent ($L_{eq}$ 10 min.) noise levels, recorded at the twenty monitoring locations, are summarized in Table III-7.

Table III-7
**Summary of Noise Monitoring Results (Exterior)**

| Site | Location | Receptor Distance from Roadway (feet) | 1980 (dBA)* |
|---|---|---|---|
| 1 | Berea Church, Leesburg Pike | 25 | 59 |
| 2 | Laurel Court | 25<br>50 | 65<br>64 |
| 3 | Bois Avenue | 30<br>60 | 69<br>65 |
| 4 | Wolf Trap Farm Park | 10<br>30 | 71<br>68 |
| 4 | Wolf Trap Farm Park | 25<br>50 | 68<br>65 |
| 5 | Cinnamon Creek Drive | 200<br>225 | 60<br>58 |
| 6 | Squaw Valley Drive | 60<br>225 | 60<br>57 |
| 7 | Shiloh Church | 50 | 58 |
| 8 | Crowell Road | 40 | 60 |
| 9 | Fox Mill Road | 30 | 55 |

| Site | Location | Receptor Distance from Roadway (feet) | 1980 (dBA)* |
|---|---|---|---|
| 10 | Aiken Place | 50** | 54 |
| 11 | Sully Plantation | 25 | 71 |
| 12 | Near Floris United Church | 25 | 61 |
| 13 | Sterling Middle School | 75 | 58 |
| 14 | First Baptist Church | 25 | 69 |
| 15 | Stream Valley Park | 25 | 58 |
| 16 | Near Forestville Methodist Church | 25 | 66 |
| 17 | Spring Hill Elementary School, Lewinsville Road | 25 | 66 |
| 18 | Near St. Paul's Lutheran Church, Idlywood Road & Leesburg Pike | 25 | 67 |
| 19 | Near McLean Presbyterian Church | 25 | 64 |
| 20 | Near Trinity Church and School | 25 | 67 |

Note: * 10-minute average equivalent noise levels.
** From fence.

## Energy

Existing vehicular fuel consumption estimates were determined on a link-by-link basis for the entire study area traffic network using the PBFUEL model. Base year (1977) annual fuel consumption was estimated at 97,362,000 gallons based on a network daily vehicle miles traveled of 3,711,431 miles and network average daily speed of 38.8 miles per hour. The corresponding network annual average fuel consumption rate was 13.9 miles per gallon.

## E. WATER RESOURCES AND ECOLOGY

### The Hydrologic Setting of the Study Area

Precipitation. The project study area is located in or near the mean path of a tropical air mass movement from the Southwest Atlantic and Gulf of Mexico during summer and early fall and winter storms. As a result, abnormal climatic conditions occur periodically in the stream basins, producing either floods, drought or damaging storms. The average annual precipitation of Fairfax County is about 40 inches with annual totals ranging from 27 to 52 inches. The highest monthly snowfall recorded was 35.2 inches in February, 1899.

Flood Discharges, Low Flows and Flow-Duration. Eight streams cross the proposed Dulles Toll Road (Figure III-7). These streams and their associated drainage areas are: Wolftrap Creek (3.5 square miles (sq. mi.) upstream of the DAAR), Old Courthouse Spring Branch (1.15 sq. mi.), Difficult Run (30.6 sq. mi.), and Colvin Run (0.24 sq. mi.), which belong to the Difficult watershed; Smilax Branch (0.34 sq. mi.), Sugarland Run (1.04 sq. mi.), and Sugarland Head Run (0.41 sq. mi.), which belong to the Sugarland watershed; and Copper Branch (0.36 sq. mi.), which belongs to the Horsepen Creek watershed.

Difficult Run near the Great Falls gaging station (Figure III-7) has a drainage area of 57.9 sq. mi. This stream is the only one with a considerably long continuous monitoring record in the study area. The records at this station indicate peak discharges of 7,150 and 14,250 cubic feet per second (cfs) for the 25-year and 100-year flow recurrence intervals, respectively. The seven consecutive day, ten-year frequency low flow at this gaging station is estimated to be 3.2 cfs.

Erosion and Sedimentation. Most of the soils along the alignment of the proposed toll road are highly erodible. The soil erodibility for various drainage basins along the proposed toll road is shown in Table III-8. The estimated erosion rates available for the project area exhibit a large range of from 2 to 40 ton/acre/year, depending on whether the lands are under construction. The low part of the range reflects a nonconstruction condition at Smilax Branch at Reston gaging station (at a drainage area of 0.32 sq. mi.) while the upper end is a rate for a construction condition at Stave Run near Reston gaging station (at a drainage area of 0.08 sq. mi.).

Groundwater

Hydrogeology. There are four bedrock aquifers in the project study area: the siltstone and sandstone aquifers belong to the Triassic Lowland Province, and the schist and bedrock, low yield aquifers, belong to the Piedmont Province. The Triassic siltstone aquifer is known for its moderately high water yield of 200 to 1000 gallons per minute (gpm) and is a potentially important source of groundwater, while the Triassic sandstone aquifer is believed to provide moderate yields of 100 to 300 gpm. Both the Triassic siltstone and sandstone units form a westward thickening wedge extending from the periphery of the Piedmont Province toward the Blue Ridge Area. The schist aquifer (lower Paleozoic and/or Precambrian), on the other hand, is known for its low yield of 50 to 150 gpm, while the low yield bedrock aquifers consist of Triassic and Jurassic crystalline rocks and yield less than 50 gpm.

Figure III-7
**Streams and Surface Water Sampling Locations**

**Legend**
Stream
▲ Sampling Location
● Gaging Station

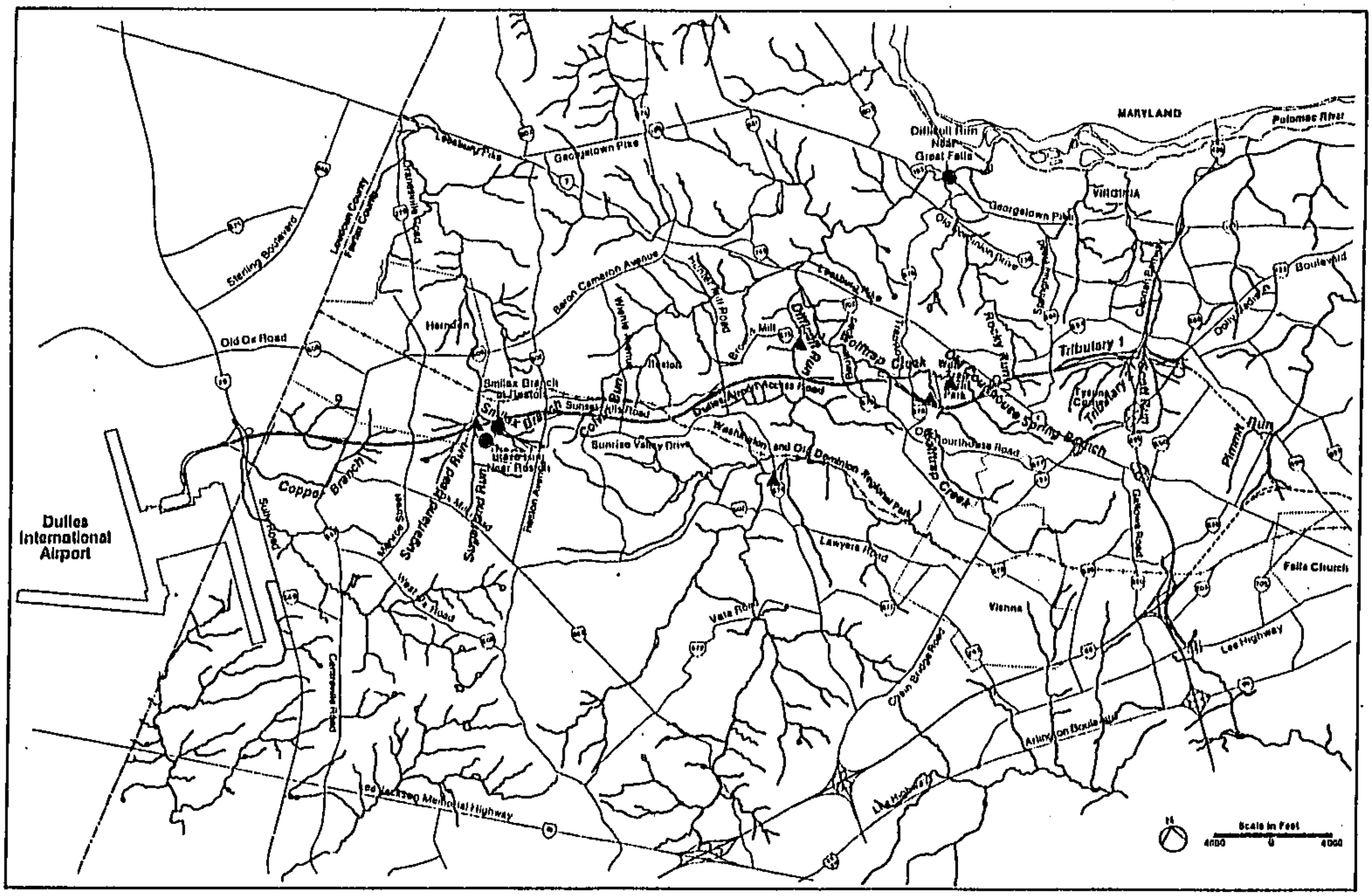


Table III-8
**Soil Erodibility Along the Proposed Dulles Toll Road**

| Stream | Soil Erodibility | |
|---|---|---|
| | Surface | Subsurface |
| Difficult Run | High | Moderate to High |
| Wolftrap Creek | Moderately High | Moderate to High |
| Colvin Run | High | Moderate to High |
| Horsepen Run | Medium to High | Moderate to High |
| Sugarland Run | Moderate | Low to High |

Sources: Parsons Brinckerhoff Quade & Douglas, *Difficult Run Environmental Baseline*, Fairfax County, Virginia, 1976; and *Pond-Nichol-Sugarland-Horsepen Environmental Baseline*, Fairfax County, Virginia, 1977.

Identification of Well Water Supplies. A well survey for water wells located within 500 feet of the centerline on each side of the DAAR was performed by the Virginia Department of Highways and Transportation. The survey located nine wells -- eight which are used for domestic water supply and one for institutional purposes.

Soils. The permeability characteristics of a soil determine the infiltration rate of rainwater and runoff toward the groundwater table. The soils that are located along the Dulles toll road alignment are distributed almost equally between poorly permeable and permeable. These permeability characteristics indicate that approximately half of the soils along the alignment would tend to protect the groundwater table from pollutants conveyed by runoff waters.

Groundwater Quality. Chemical analyses indicate that the water quality in the Piedmont rock is generally good and that the relevant chemical constituents do not exceed the limits indicated by Virginia State Water Control Board groundwater criteria. This water is generally soft although its predominant ions are calcium and bicarbonate.

Well water obtained from the area underlain by Triassic rocks is also characterized by predominant ions such as calcium, magnesium and bicarbonate. However, most of the chemical analyses indicate hard water and an increase in hardness and mineral content towards the west. The hardness range is between 47 and 1,600 milligrams per liter (mg/l) as calcium-carbonate. The sulfate concentration found in the Triassic sandstone and siltstone ranges from 2 to 468 mg/l. Consequently many wells exceed the sulfate concentration limit of 250 mg/l set by the EPA. Many Triassic sandstone and siltstone wells exceed the state's groundwater criteria for sodium, sulfate, dissolved solids and/or alkalinity.

## Surface Water

All the streams that cross the toll road alignment are designated Class III, which refers to free flowing streams in the Coastal and Piedmont Zones. Class III standards specify minimum and daily average dissolved oxygen concentrations of 4 and 5 mg/l, respectively; pH range between 6 and 8.5; and a maximum temperature of 32°C.

## Existing Water Quality

In order to assess the existing water quality for the study area, several water quality parameters such as temperature, pH, dissolved oxygen, turbidity, total phosphorus, nitrates, suspended solids, lead, and oil and grease were monitored during 1980 at the locations shown on Figure III-7.

The monitoring of Difficult Run, Stave Run, and Wolftrap Creek showed a variability of suspended solids concentrations and turbidity measurements that may be attributed to weather impacts such as storm water runoff. The lead and total phosphorus concentrations monitored at Difficult Run were found to be higher than the concentrations measured previously,* while nitrate concentrations at Stave Run were found to be higher than those noted in a previous study.** The dissolved oxygen concentrations in the monitored streams varied between 6.8 and 11.6 mg/l -- within a range that is acceptable for aquatic life.

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* Parsons Brinckerhoff Quade & Douglas, Difficult Run Environmental Baseline, Fairfax County Virginia, 1976.

** Parsons Brinckerhoff Quade & Douglas, Pond-Nichol-Sugarland-Horsepen Environmental Baseline, Fairfax County Virginia, 1977.

Ecology

Plant Communities and Wetlands. The study area sustains natural communities of hardwood forests disturbed by man's activities. According to the U.S. Fish and Wildlife Service List of Endangered and Threatened Wildlife and Plants, no endangered plant species are found in the study area.

The inland fresh water types in the project area that are classified by U.S. Fish and Wildlife Service in its 1979 "Classification of Wetlands and Deep Water Habitats in the United States" as important to the ecology are designated as Forest Wetland and Aquatic Beds.

Wildlife. A review of the U.S. Fish and Wildlife Service List of Endangered and Threatened Wildlife and Plants indicates that no rare or endangered species of birds, mammals, reptiles or amphibians were observed in the study area.

Fish or macrobenthos fauna observed in the study area are not listed as endangered species.

## IV. ENVIRONMENTAL CONSEQUENCES

### A. TRAFFIC AND TRANSPORTATION

To assess the traffic and transportation impacts associated with implementing the alternatives for the Dulles corridor, travel demand forecasts were developed from projected land use, population, and development in the area. The alternatives examined -- the no-build, TSM, and toll road -- were also analyzed with Metrorail extended to Dulles Airport by the year 2000 (with METRO) as well as with the rail service extended only to Vienna (without METRO).

The following discussion summarizes the results of the evaluation process in two ways. First, each alternative is analyzed separately for both with- and without-METRO options. Following this analysis, the alternatives are compared.

No-Build

This alternative was included in the evaluation process to determine the effect on the impact area roadway network of not constructing the proposed toll road or implementing any traffic management measures in the area other than those that are already planned and programmed for year 2000. Table IV-1 and Figure IV-1 show the design year vehicle miles of travel, vehicle hours of travel, and average speed as well as level of service (LOS) for the no-build alternative with and without the Metrorail extension to Dulles Airport. A comparison of the no-build alternative with METRO and the no-build without METRO indicates that the former would result in a moderate reduction in vehicle miles of travel and vehicle hours of travel in the impact area over the latter. There would also be an overall decrease in congestion (fewer miles at LOS F) throughout the area in the with-METRO alternative, compared to the without METRO option.

Table IV-1
**No-Build—Year 2000 Vehicle Miles of Travel, Vehicle Hours of Travel, and Level of Service**

| Area | With METRO | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service | | | | | | | | | |
| | | | | A, B, C | | D | | E | | F | | Total | |
| | | | | Miles | % | Miles | % | Miles | % | Miles | % | Miles | % |
| Fairfax County | 6,447,400 | 194,160 | 33.2 | 316.6 | 68.5 | 32.4 | 7.0 | 54.8 | 11.9 | 58.4 | 12.6 | 462.2 | 100.0 |
| Loudoun County | 573,400 | 17,910 | 32.0 | 13.9 | 37.3 | 5.2 | 13.9 | 1.4 | 3.8 | 16.8 | 45.0 | 37.3 | 100.0 |
| Total | 7,020,800 | 212,070 | 33.1 | 330.5 | 66.2 | 37.6 | 7.5 | 56.2 | 11.3 | 75.2 | 15.0 | 499.5 | 100.0 |
| | Without METRO | | | | | | | | | | | | |
| | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service | | | | | | | | | |
| | | | | A, B, C | | D | | E | | F | | Total | |
| | | | | Miles | % | Miles | % | Miles | % | Miles | % | Miles | % |
| Fairfax County | 6,569,500 | 199,900 | 32.9 | 312.9 | 67.7 | 31.2 | 6.8 | 50.6 | 10.9 | 67.5 | 14.6 | 462.2 | 100.0 |
| Loudoun County | 581,700 | 18,230 | 31.9 | 13.9 | 37.3 | 5.2 | 13.9 | 1.4 | 3.8 | 16.8 | 45.0 | 37.3 | 100.0 |
| Total | 7,151,200 | 218,130 | 32.8 | 326.8 | 65.4 | 36.4 | 7.3 | 52.0 | 10.4 | 84.3 | 16.9 | 499.5 | 100.0 |

Figure IV-1
**Design Year Traffic Conditions—No-Build (2000)**

Note: Road segments have the same level of service with or without METRO unless noted.

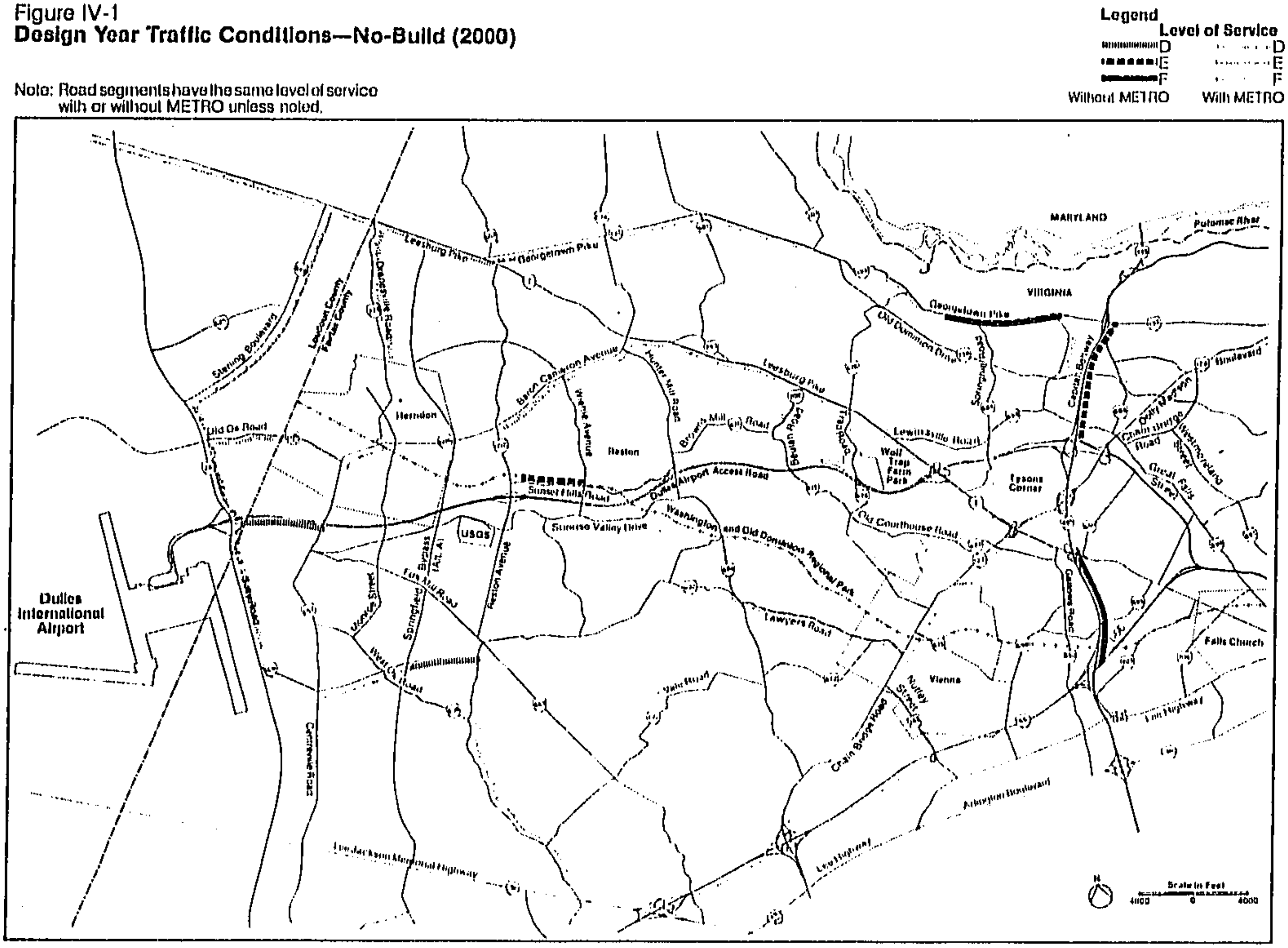
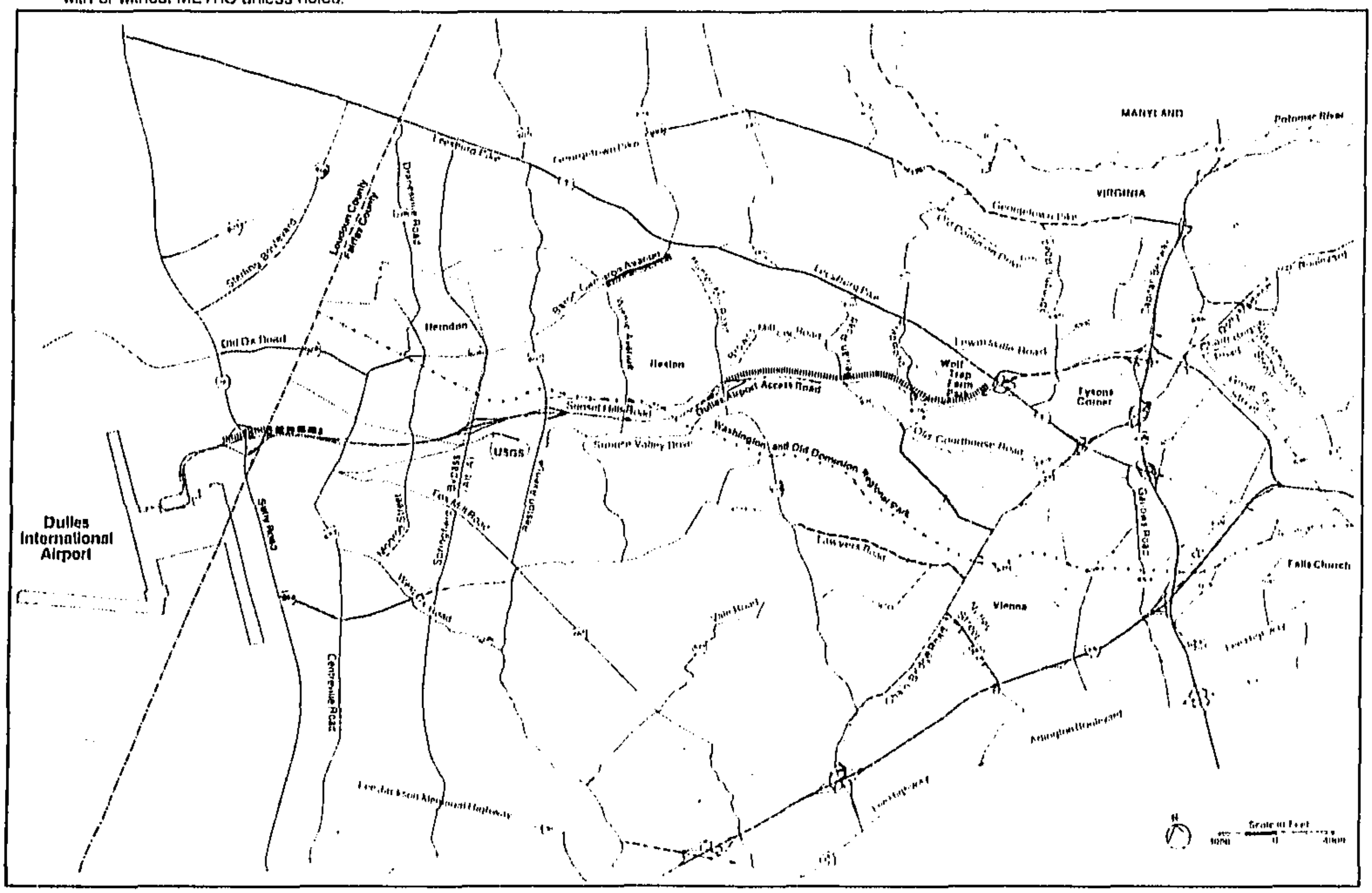


Figure IV-2
**Design Year Traffic Conditions—TSM (2000)**

Note: Road segments have the same level of service with or without METRO unless noted.

**Legend**

| Without METRO | Level of Service | With METRO |
|---|---|---|
| D | | D |
| E | | E |
| F | | F |



Transportation System Management (TSM)

Table IV-2 shows the design year vehicle miles of travel, vehicle hours of travel, average speed, and network directional roadway mileages for different levels of service resulting from implementation of the TSM. A comparison of the TSM with and without METRO indicates that extending the Metrorail would result in a slight decrease in vehicle miles of travel and vehicle hours of travel in the impact area, yielding an increase in areawide travel speed of about one mile per hour. The level of service analysis shows little change between the two TSM options, thus indicating that the extension of METRO to Dulles Airport would have little effect on areawide traffic operations although there would be fewer vehicle miles of travel with METRO.

Figure IV-2 shows year 2000 traffic conditions in the impact area under the TSM for with- and without-METRO conditions.

Toll Road

An analysis of year 2000 traffic conditions for the toll road was performed in a manner similar to the studies for the no-build and TSM alternatives. It examined vehicle miles of travel, vehicle hours of travel, average speed, and mileages for different traffic conditions projected as a result of building the toll road for both with-and without-METRO options. A comparison of these options shows that the with-METRO would not significantly improve the level of traffic operations in the impact area over the without-METRO option. The slight projected increase in vehicle miles of travel for the without-METRO condition would not result in a perceptible difference in traffic operations.

Figure IV-1
**Design Year Traffic Conditions—No-Build (2000)**

Legend
Level of Service

| Without METRO | With METRO |
|---|---|
| D | D |
| E | E |
| F | F |

Note: Road segments have the same level of service with or without METRO unless noted.

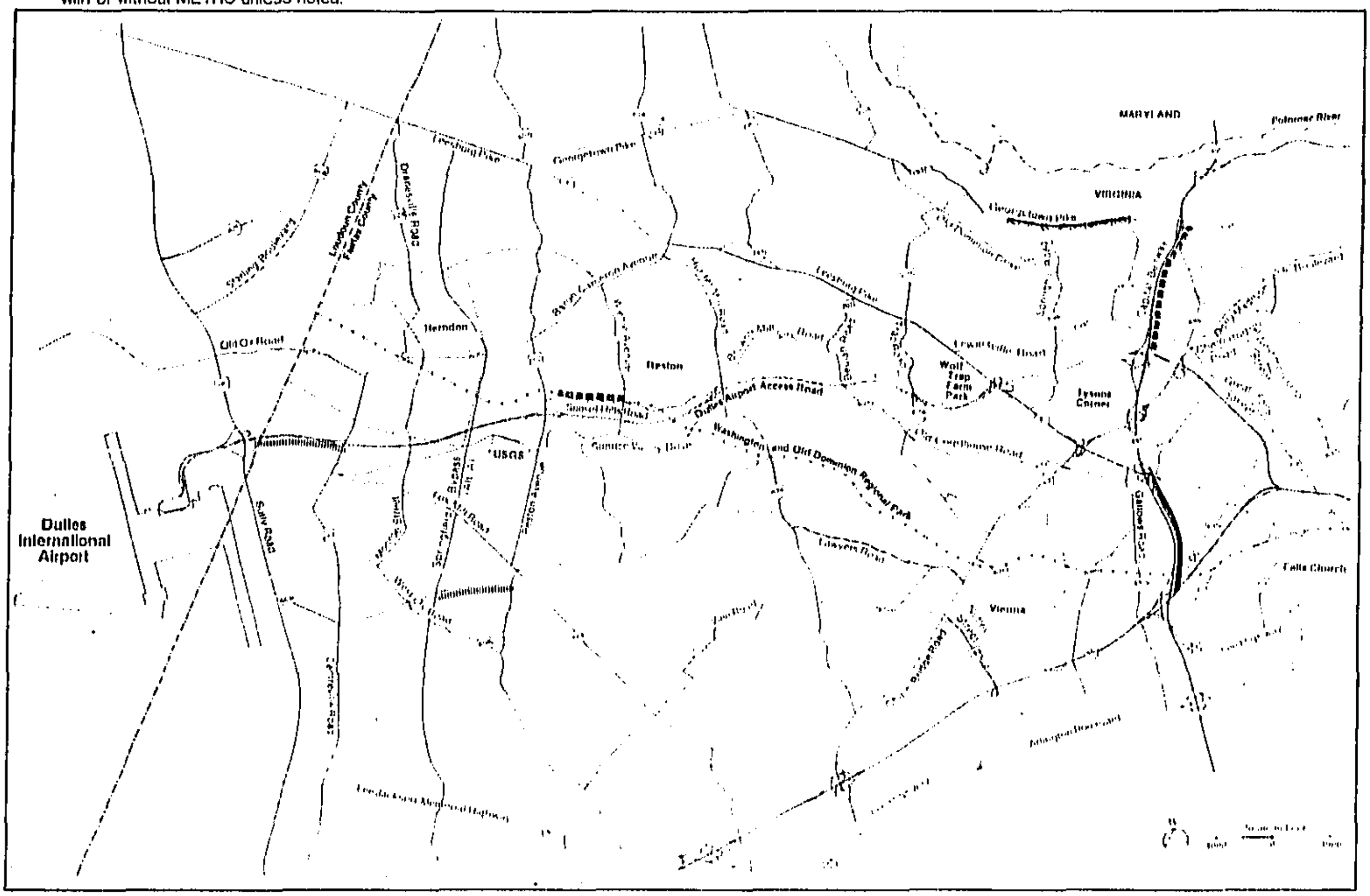


Figure IV-2
**Design Year Traffic Conditions—TSM (2000)**

Legend

| | Level of Service |
|---|---|
| D | D |
| E | E |
| F | F |
| Without METRO | With METRO |

Note: Road segments have the same level of service with or without METRO unless noted.

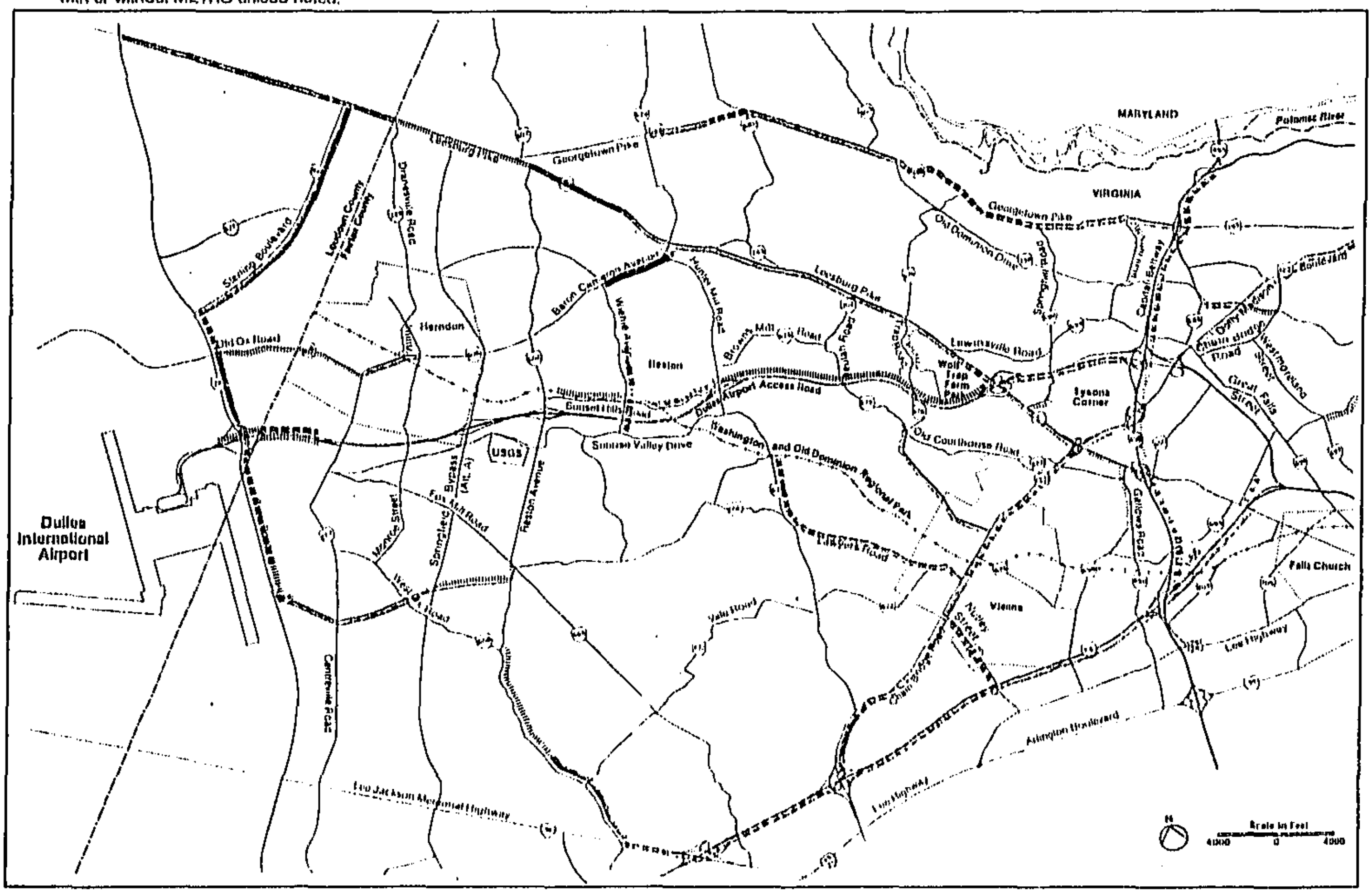


Table IV-2
**Transportation System Management—Year 2000 Vehicle Miles of Travel, Vehicle Hours of Travel, and Level of Service**

| Area | With METRO | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service | | | | | | | | | | |
| | | | | A, B, C | | D | | E | | F | | Total | | |
| | | | | Miles | % | Miles | % | Miles | % | Miles | % | Miles | % | |
| Fairfax County | 6,535,300 | 190,720 | 34.3 | 309.5 | 66.7 | 33.6 | 7.2 | 71.5 | 15.4 | 49.1 | 10.6 | 464.0 | 100.0 | |
| Loudoun County | 626,500 | 19,450 | 32.2 | 15.2 | 37.9 | 6.1 | 15.2 | 2.0 | 5.0 | 16.8 | 41.9 | 40.1 | 100.0 | |
| Total | 7,161,800 | 210,170 | 34.1 | 324.7 | 64.4 | 39.7 | 7.9 | 73.5 | 14.6 | 65.9 | 13.1 | 504.1 | 100.0 | |

| Area | Without METRO | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service | | | | | | | | | |
| | | | | A, B, C | | D | | E | | F | | Total | |
| | | | | Miles | % | Miles | % | Miles | % | Miles | % | Miles | % |
| Fairfax County | 6,566,300 | 196,560 | 33.4 | 305.9 | 65.9 | 36.6 | 7.9 | 69.7 | 15.0 | 51.8 | 11.2 | 464.1 | 100.0 |
| Loudoun County | 639,100 | 20,250 | 31.6 | 13.9 | 34.7 | 6.7 | 16.7 | 1.3 | 3.2 | 18.2 | 45.4 | 40.1 | 100.0 |
| Total | 7,205,400 | 216,810 | 33.2 | 319.8 | 63.4 | 43.3 | 8.6 | 71.0 | 14.1 | 70.0 | 13.9 | 504.1 | 100.0 |

Table IV-3 and Figure IV-3 shows year 2000 traffic conditions in the impact area under the toll road alternative for with- and without-METRO conditions.

Comparison of Alternatives

Table IV-4 presents a design year comparison of the network vehicle miles of travel, vehicle hours of travel, average speed, and level of service mileages among the three alternatives for both with- and without-METRO options. It also shows base year conditions as a reference point for evaluating year 2000 traffic.

Comparing the traffic projections for all year 2000 alternatives with those for the base year indicates that vehicle miles of travel will increase by the design year by between 89 and 94 percent, vehicle hours of travel will grow even more substantially (114 to 122 percent), while average speed will drop 3.7 to 5.7 miles per hour. Likewise, level of service conditions will deteriorate as the number of network miles operating at unacceptable conditions (LOS E or F) will increase from 6.3 percent in 1977 to between 22.3 and 27.7 percent in year 2000. These increases in traffic activity in year 2000 over 1977 reflect the increased population growth and more dense development patterns projected throughout the impact area roadway network by the turn of the century.

The comparison among the year 2000 alternatives themselves shows that the toll road would result in increases in vehicle miles of travel with decreases in vehicle hours of travel (improved speeds) over both the TSM and no-build. This consequence is a common effect associated with the introduction of a new road that parallels existing transportation facilities. This is because many drivers would be willing to travel longer distances on a limited access facility with continuous flow in order to save time. Also contributing to the increased vehicle miles of travel under the toll road may be the inclusion of those vehicles which would be attracted to the new road from outside the impact area, i.e., those vehicles

Table IV-3
**Toll Road—Year 2000 Vehicle Miles of Travel, Vehicle Hours of Travel, and Level of Service**

| Area | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service: A, B, C Miles | A, B, C % | D Miles | D % | E Miles | E % | F Miles | F % | Total Miles | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **With METRO** | | | | | | | | | | | | | |
| Fairfax County | 6,648,500 | 187,650 | 35.4 | 353.8 | 71.2 | 40.6 | 8.2 | 64.7 | 13.0 | 37.9 | 7.6 | 497.0 | 100.0 |
| Loudoun County | 553,100 | 17,360 | 31.9 | 17.0 | 45.2 | 4.0 | 10.6 | 6.0 | 16.0 | 10.6 | 28.2 | 37.6 | 100.0 |
| Total | 7,201,600 | 205,010 | 35.1 | 370.8 | 69.4 | 44.6 | 8.3 | 70.7 | 13.2 | 48.5 | 9.1 | 534.6 | 100.0 |
| **Without METRO** | | | | | | | | | | | | | |
| Fairfax County | 6,871,100 | 195,370 | 35.2 | 350.1 | 70.4 | 39.1 | 7.9 | 64.1 | 12.9 | 43.7 | 8.8 | 497.0 | 100.0 |
| Loudoun County | 564,600 | 18,380 | 30.7 | 17.0 | 45.2 | 4.0 | 10.6 | 6.0 | 16.0 | 10.6 | 28.2 | 337.6 | 100.0 |
| Total | 7,435,700 | 213,750 | 34.8 | 367.1 | 68.7 | 43.1 | 6.1 | 70.1 | 13.1 | 54.3 | 10.1 | 534.6 | 100.0 |

Figure IV-3
**Design Year Traffic Conditions—Toll Road (2000)**

Legend

Level of Service

D D

E E

F F

Without METRO With METRO

Note: Road segments have the same level of service with or without METRO unless noted.

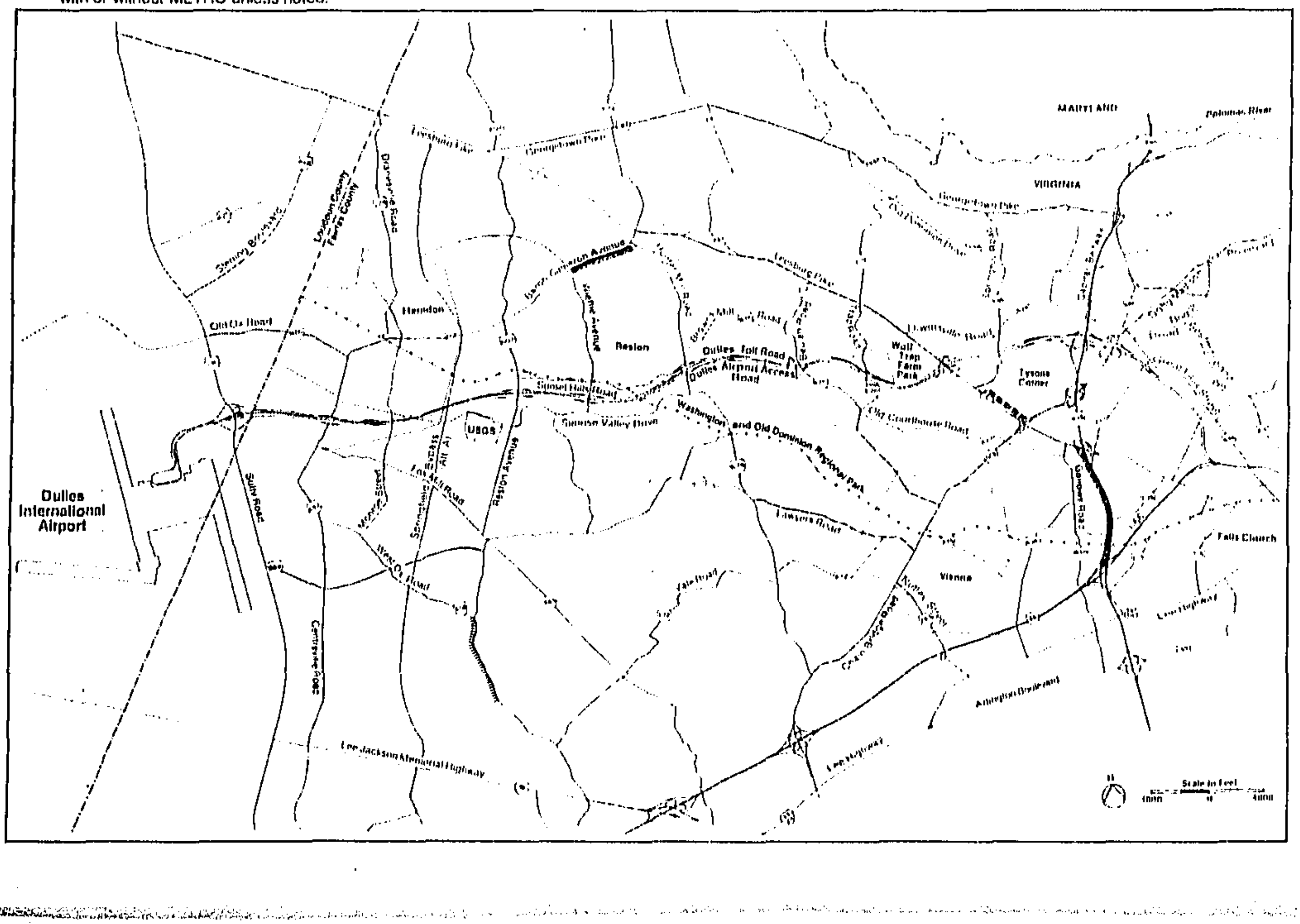


Table IV-4

**Comparison of Alternatives—Year 2000 Vehicle Miles of Travel, Vehicle Hours of Travel, and Level of Service**

**With METRO**

| Alternative | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service: A, B, C Miles | A, B, C % | D Miles | D % | E Miles | E % | F Miles | F % | Total Miles | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1977 Base Year) | (3,711,600) | (95,720) | (38.8) | (384.8) | (84.4) | (42.4) | (9.3) | (27.0) | (5.9) | (1.9) | (0.4) | (456.1) | (100.0) |
| No-Build | 7,020,800 | 212,070 | 33.1 | 330.5 | 66.2 | 37.6 | 7.5 | 56.2 | 11.3 | 75.2 | 15.0 | 499.5 | 100.0 |
| TSM | 7,161,800 | 210,170 | 34.1 | 324.7 | 64.4 | 39.7 | 7.9 | 73.5 | 14.6 | 65.9 | 13.1 | 504.1 | 100.0 |
| Toll Road | 7,201,600 | 205,010 | 35.1 | 370.8 | 69.4 | 44.6 | 8.3 | 70.7 | 13.2 | 48.5 | 9.1 | 534.6 | 100.0 |

**Without METRO**

| Alternative | Vehicle Miles of Travel | Vehicle Hours of Travel | Average Speed | Level of Service: A, B, C Miles | A, B, C % | D Miles | D % | E Miles | E % | F Miles | F % | Total Miles | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1977 Base Year) | (3,711,600) | (95,720) | (38.8) | (384.8) | (84.4) | (42.4) | (9.3) | (27.0) | (5.9) | (1.9) | (0.4) | (456.1) | (100.0) |
| No-Build | 7,151,200 | 218,130 | 32.8 | 326.8 | 65.4 | 36.4 | 7.3 | 52.0 | 10.4 | 84.3 | 16.9 | 499.5 | 100.0 |
| TSM | 7,205,400 | 216,810 | 33.2 | 319.8 | 63.4 | 43.3 | 8.6 | 71.0 | 14.1 | 70.0 | 13.9 | 504.1 | 100.0 |
| Toll Road | 7,435,700 | 213,750 | 34.8 | 367.1 | 68.7 | 43.1 | 8.1 | 70.1 | 13.1 | 54.3 | 10.1 | 534.6 | 100.0 |

Table IV-5
**Roadway Sections Operating at Level of Service E or F Under All Project Alternatives—Year 2000**

| Route: | From: | To: |
|---|---|---|
| Route 7 | Georgetown Pike (Route 193) | Baron Cameron Avenue |
| | Baron Cameron Avenue | Route 123 |
| | Route 123 | Capital Beltway (I-495) |
| | Loudoun-Fairfax County Line | Sully Road (Route 28) |
| Georgetown Pike (Route 193) | Capital Beltway | Route 7 |
| | Route 123 | George Washington Memorial Parkway |
| Baron Cameron Ave. | Wiehle Avenue | Hunter Mill Road |
| | Hunter Mill Road | Route 7 |
| Route 123 | Route 193 | Old Dominion Drive (Route 738) |
| | Capital Beltway | Interstate Route 66 |
| Interstate Route 66 | Route 7 | Capital Beltway |
| | Capital Beltway | Route 123 |
| | Route 123 | Route 50 |
| Route 50 | West Ox Road (Route 608) | Interstate Route 66 |
| West Ox Road | Just West of Route 672 | Route 50 |
| Lawyers Road | Route 674 | Route 123 |
| Route 243 | Route 123 | Interstate Route 66 |
| Route 676 | Old Courthouse Road | Route 123 |
| Old Dominion Drive | Route 686 | Route 123 |
| Wiehle Avenue | Baron Cameron Avenue | Sunset Hills Road |
| Sunset Hills Road | Hunter Mill Road | Wiehle Avenue |
| | Wiehle Avenue | Reston Avenue |
| Sterling Boulevard | Route 7 | Sully Road |
| | Centreville Road | Sully Road |
| Sully Road | Sterling Boulevard | DAAR |
| | DAAR | North of Route 668 |
| Capital Beltway | George Washington Memorial Parkway | Georgetown Pike |
| | Georgetown Pike | DAAR |
| | DAAR | Route 123 |
| | Route 123 | Route 7 |
| | Route 7 | Interstate Route 66 |
| Route 674 | Railroad Crossing | Lawyers Road |

which currently do and under the no-build alternative would bypass the impact area road network. Because the exact number of vehicles in this category cannot be estimated by the assignment process used in the study, it is not possible from study data to determine the effect of the alternatives on vehicle miles of travel for the entire Washington, D.C. metropolitan region.

The implementation of the toll road would yield a reduction in roadway mileage operating at the worst level of service (F) -- a 2 to 6 percent drop over the no-build and TSM alternatives with METRO. Level of service E, however, would increase by 2 to 3 percent under the toll road and TSM alternatives over the no-build. The toll road would also be expected to result in combined increases for levels of service A, B, C, and D of 4.0 to 5.4 percent over the TSM and no-build.

Although the TSM alternative is projected to result in an improvement in traffic operations as compared to the no-build alternative, the benefits accruing to area residents would not be as substantial as those under the toll road alternative. Increases in TSM roadway mileage percentages are projected to occur within level of service D and E at the expense of roadways operating at level of service A, B, C and F. Hence, no perceptible change in overall network operating conditions would be expected with implementation of the TSM alternative.

Although it would provide a better level of traffic operation throughout the impact area than either the no-build or TSM, the toll road alternative would not eliminate all the impact area traffic flow problems. Table IV-5 contains a list of street segments that are expected to operate at unacceptable levels of service and require some form of remedial capacity improvements -- from relatively low-cost traffic signal installation to major construction programs such as lane widenings or grade-separated intersections -- under <u>any</u> of the alternatives under consideration. It should be noted, however, that although many of these locations would still operate unacceptably under the toll road alternative, there would be some improvement in their level of service -- from LOS F to E.

Table IV-6
**Traffic Signal Requirements by Alternative**

| Arterial Street | Exit Ramp | No-Build | TSM | Toll Road |
|---|---|---|---|---|
| Sully Road (Route 28) | Eastbound | A | A | A |
| | Westbound | na | A | A |
| Centreville Road | Eastbound | B | B | B |
| | Westbound | na | na | B |
| Springfield Bypass | Eastbound | na | B | A |
| | Westbound | na | A | A |
| Reston Avenue | Eastbound | B | B | C/B* |
| | Westbound | na | A/B* | B |
| Wiehle Avenue | Eastbound | na | na | B |
| | Westbound | na | na | A |
| Hunter Mill Road | Eastbound | C | B | B |
| | Westbound | na | B | A |
| Leesburg Pike (Route 7) | Westbound | na | B | B |

Notes: A = Signal required as per Signal Warrants 1 and 2 from Manual of Uniform Traffic Control Devices.

B = Signal required as per NCHRP 212 – Unsignalized Intersection Analysis, which indicated turning vehicle demand cannot be handled without a signal due to heavy major street through movement.

C = No signal required.

na = Not applicable to this alternative.

* = With METRO/Without METRO.(Traffic signal requirements at all other locations do not differ between the with and without METRO options.)

## Traffic Signal Requirements

A determination of traffic signal needs was made to evaluate the interruption of traffic flow that would result from ramps intersecting with existing arterials. Table IV-6 summarizes the results of the analysis of signalization requirements at exit ramps for each of the alternatives.

Under the no-build alternative, traffic signals would be required at all existing exit ramps except at Hunter Mill Road. The TSM would require traffic signals at all HOV ramps as well as at those exit points that would remain exclusively for airport use. Under the toll road alternative, all exit ramps would require traffic signals (except for the Reston Avenue eastbound exit under the with-METRO option) to handle the large volumes of traffic projected to use the new facility. Although interruptions to traffic flow due to required traffic signal installations would be greatest with the toll road alternative, the analysis of vehicle hours of travel indicates that the time losses associated with the traffic signals would be more than offset by the travel time savings attributable to the toll road. This is because the effects of the traffic signals have been included in the computation of network vehicle hours of travel.

## Dulles Corridor Impacts

An important part of the analysis of alternatives is their impact in the immediate Dulles corridor. A significant part of this evaluation is the level of service projected for the DAAR under each of the alternatives as well as that forecast for the toll road and TSM ramps.

The level of service analysis indicates that for the with-METRO conditions, LOS C or better (A, B) would be attained by all alternatives along all sections of the DAAR as well as along the associated roadway links. For the without-METRO options, only the toll road alternative would provide LOS C or

Table IV-7
**Critical Intersections—Year 2000**

| Major Roadway* | Intersecting Road | Level of Service | | |
|---|---|---|---|---|
| | | No-Build | TSM | Toll Road |
| Route 7 | Sterling Boulevard | F | F | F |
| | Dranesville Road | F | F | E |
| | Route 193 | D/E** | D | D |
| | Baron Cameron Avenue | F | F | F |
| | Gallows Road | E/F** | E | D |
| Georgetown Pike (Route 193) | Route 123 | F | F | F |
| | Swinks Mill Road | F | F | E |
| Route 123 | Chain Bridge Road | E | E | E |
| | Old Dominion Drive | E | E | E |
| | South of Old Courthouse Road | F | F | F |
| | Lawyers Road | F | F | F |
| | Route 243 | F | F | F |
| Route 50 | Reston Avenue | F | F | F |
| Route 674 | Lawyers Road | F | F | F |
| Route 28 | Sterling Boulevard | F | F | F |
| | Old Ox Road | F | F | F |
| Baron Cameron Avenue | Dranesville Road | F | F | F |
| Sunset Hills Road | Reston Avenue | F | F | F |
| | Wiehle Avenue | F | F | F |

Notes: * The location of the critical intersections is shown on the level of service maps in Figures IV-1, IV-2, and IV-3.

** With METRO/Without METRO. (All other locations do not differ between with and without METRO options.)

better along the DAAR and all connecting links. For the no-build, the westbound section of the airport road between Route 28 and Centreville Road is projected to operate at LOS D, and for the TSM a number of sections on the DAAR in both directions would operate at LOS D or E.

Critical Intersections

Table IV-7 lists the at-grade intersections that will experience unacceptable levels of service in year 2000. As can be seen from the table, the levels of service for the intersections are not expected to vary greatly among alternatives. A comparison of the alternatives indicates that marginal improvements can be expected under the toll road alternative at four intersections. The TSM alternative would result in intersection levels of service virtually the same as the no-build. Implementation of the with-METRO option under the no-build, on the other hand, would improve the level of service at two intersections -- Route 7 with Georgetown Pike and Route 7 with Gallows Road.

In summary, the critical intersection analysis indicates a marginal improvement in traffic operations with the toll road alternative as compared to both the no-build and TSM alternatives. However, additional traffic measures beyond the building of the toll road or implementation of the TSM would still be required to resolve many of the traffic operation deficiencies throughout the impact area.

B. SOCIOECONOMIC AND LAND USE RESOURCES

Impacts on Community Cohesion

A community can be significantly affected by the location of a highway in its midst: if its physical, environmental, economic, or social components are altered by features of a roadway, other basic changes in its character may occur. In the case of the outer parallel toll roads, planning of the

DAAR itself prepared the way for parallel lanes to provide local, intracounty transportation service. Additional right-of-way was acquired alongside the DAAR for parallel roads, and bridges were built to span these lanes. Implementation of the toll road would thus be rare among highway construction projects: it would avoid many of the most disruptive physical impacts on community resources. Displacement and relocation of residences, businesses, and community facilities, for example, which are often among the most severe social impacts of a highway project, would not occur under the toll road or TSM. Likewise, the introduction of the highway would not result in the establishment of physical barriers isolating communities or impeding pedestrian access. Because of this planning of the Dulles corridor, many of the potentially serious adverse community impacts would be avoided.

Despite the beneficial effects of early planning for the parallel lanes, implementation of the project would not be without some social impacts. These could include beneficial changes such as improved accessibility and reduced traffic congestion on local streets, as well as adverse effects such as increased noise levels or impaired visual quality. To assess the potential community impacts associated with the project alternatives, ten impact categories were examined and are discussed below.

Barriers or Perceived Barrier or Buffer Effects. The outer parallel toll roads or ramps would not create any new barriers or buffers since the roadway improvements would fall almost entirely within the existing right-of-way alongside the DAAR and no local roads would be closed or relocated. In some areas, however, development of the parallel lanes or ramps would reduce the distance to the highway thereby heightening the perception of a barrier. In the subdivisions of Reflection Woods in South Herndon, Cinnamon Creek and Wolftrap Woods in Wolftrap, and Sun Valley in Difficult Run, the visual presence of the toll road would heighten the perception of a barrier. Fewer than 50 homes would experience, in varying degrees of severity, this perceptual barrier effect of the toll road.

The TSM would not be expected to create any significant perceptual barrier in the local communities. The ramps and park-n-pool lots at Sully Road, proposed Springfield Bypass, Reston Avenue, Hunter Mill Road, and Route 7 would be situated far enough from residential development to offset any potential barrier effect of the TSM.

Displacement and Relocation. Information on displacement and relocation was examined from the Right of Way Report prepared by the Virginia Department of Highways and Transportation (VDHT). No displacement or relocation of any residence, business, or community facility would be required for the toll road or TSM alternatives.

Land Acquisition and Land Use Requirements. Based on information from VDHT's Right of Way Report, the total number of acres required for the toll road and TSM was calculated. Existing and proposed land use and zoning maps were then examined to measure the total acreage requirements by land use category and to assess the community-related impacts of these changes.

Right-of-way requirements for the toll road total approximately 20 acres. The majority of this land would be in North Reston, where 12 acres would be used for a maintenance facility. The location of that facility -- between Sunset Hills Road and the DAAR west of Hunter Mill Road, in an undeveloped area planned for industrial uses -- would minimize any significant impact on the North Reston community. Other land requirements, primarily for the ramps at Centreville Road in South Herndon and North Frying Pan and at Wiehle Avenue in North and South Reston, would not have a significant effect on community character. This is because the parcels that would be required for construction of these road segments are situated at a considerable distance from residential uses and removal of the land area would not affect community activity patterns.

Right-of-way requirements for the TSM are approximately 5.5 acres. This land would be used for the park-n-pool lots located at the HOV ramps. The TSM ramps and park-n-pool lots are not located within any sensitive community areas and this alternative would not result in an adverse impact on the activity patterns of community residents.

Air Quality.* Microscale air quality effects for carbon monoxide (CO) were modeled for each alternative for years 1985 and 2000 at locations deemed to be potential worst case sites (such as at congested intersections). In all alternatives, estimated CO concentrations would not exceed either the one-hour or eight-hour standards set by EPA.

Noise Levels.* Noise generated by vehicular traffic along the parallel lanes and ramps and on the DAAR itself under the toll road and TSM alternatives was also modeled for the design year (2000) for each alternative. Based on noise contours drawn for the toll road and TSM alternatives, the effects of changed noise levels were assessed for each community and alternative. Instances were calculated in which Federal Highway Administration design noise levels, based on the design hour equivalent sound level ($L_{eq}h$), were found to be in excess of 57 decibels (dBA) for lands for which serenity and quiet are especially important, such as amphitheatres or wilderness preserves, and 67 dBA for residences and community facilities. The assessment of the impacts of altered noise levels on community resources also took into account the perception of change in noise levels and the estimated community response to these changes.

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* A detailed discussion of overall air quality and noise impacts is found below in Section IV.D.

Along most of the Dulles corridor projected noise levels would exceed the FHWA design noise level of 67 dBA for residences closest to the corridor in all alternatives. Although noise levels for the TSM would resemble those for the no-build (within ± 1 dBA), those for the toll road would be from 4 to 6 dBA greater than a do nothing condition. This increase would be readily noticeable to community residents living near the right-of-way. Some of the homes nearest the right-of-way in the following subdivisions would experience these increased noise levels: Reflection Woods, Reflection Place, Sun Valley, Cinnamon Creek, The Trails, and Wolftrap Woods.

Noise abatement measures such as barriers could attenuate the projected highway-related noise levels. A preliminary analysis of the noise attentuation achieved by use of the proposed barriers likely to be incorporated in the project indicates that the FHWA standard of 67 dBA for residential use could be achieved at 243 of the 261 affected residences along the corridor under the toll road alternative and 25 of 30 residences under the TSM. Detailed noise barrier analyses and cost estimates will be prepared following the combined Location and Design Public Hearing and receipt of public and review agency comments.

Visual Quality. Although the toll road would be located alongside the DAAR in an already disturbed visual environment, the alternatives would adversely affect visual quality at particular locations. These visual effects are expected to be localized in nature, affecting individual homes nearest the toll road but not creating a disruptive effect on an entire subdivision or community.

Some disruption in existing visual quality would be experienced in South Herndon at those homes in the Reflection Woods subdivision and at a few scattered farmhouses along the right-of-way. At the Sun Valley subdivision in Difficult Run, the homes abutting the right-of-way would experience a significantly adverse visual impact, with the toll road bringing the parallel lanes about 70 feet closer to these newly constructed homes. The toll road would also create a heightened visual effect on the Cinnamon Creek and the Wolftrap Woods subdivisions in Wolftrap, although differences in elevation and existing tree cover should mitigate the severity of these impacts.

Under the TSM, the park-n-pool lots would represent the most significant change in the existing visual environment. The lots, however, are located far enough from residential concentrations and close enough to the DAAR and local arterials not to represent a visually disruptive impact.

Accessibility. Accessibility within each community would not be expected to be impaired by the closing or relocating of any local roads. Intracommunity access might be affected, however, by changes in traffic volumes. The reduction or elimination of congested road segments would improve local travel times by remedying these network deficiencies. At the same time, other roads such as those leading to an interchange might experience increased traffic under the toll road or TSM. Based on level of service maps for each alternative shown previously, the toll road would afford a minor overall improvement in average network speed (34.8 to 35.1 mph) over the TSM (33.2 to 34.1 mph) and no-build (32.8 to 33.1 mph). Particular road segments, however, would experience greater congestion under the toll road than under the TSM or no-build. Comparing Figures IV-1, IV-2 and IV-3 indicates which roads (such as Baron Cameron Avenue between Wiehle and Reston Avenues) would experience heavier traffic under the no-build than under the TSM or toll road alternative. The figures also show which streets (such as Wiehle Avenue between Baron Cameron Avenue and Sunset Hills Road) would enjoy a better level of service if neither the TSM nor the toll road are implemented. Many roadway sections are projected to operate at unacceptable levels of service (E or F) with concomitant adverse community impacts under all alternatives. These segments, noted previously in Table IV-5, will require some form of remedial treatment exclusive of the proposed Dulles corridor improvements.

Developmental Impacts.* The project alternatives have the ability to alter the development potential of the corridor primarily by enhancing the locational attributes of the area. As travel times to and from employment centers improve, for example, the attractiveness of the corridor for residential development would be increased. Likewise, improved access to the corridor might cause offices or light industry to relocate along or near the DAAR. These changes in residential, office, commercial, and light industrial development patterns in the area -- if sufficiently large -- could significantly alter the character of the community. The demands of development could affect land values, density, demand for and supply of public services, local tax structure, and other factors which influence the makeup of a community.

The toll road has the potential to alter the demands for residential development only in two areas in Fairfax County -- the Hattontown area in North Frying Pan and the Crowells Corner area in Browns Mill (Figure III-4). These areas are planned at densities of 2-3 dwelling units per acre (du/ac) and 0.2-0.5 du/ac, respectively; doubling the densities because of anticipated toll-road-generated growth would increase the projected population size from 8,200 to 12,900 in the Hattontown area and from 550 to 1,100 in the Crowells Corner area. Although this potential induced growth would add only 6.7 percent to the total corridor population at build-out (when all land is developed), it would have a significant effect on the character of the two communities of North Frying Pan and Browns Mill.

Industrial/office development has been planned along the corridor outside of residential zones. The toll road would help the corridor achieve its projected share of total county industrial/office development but would not interfere with residential activity patterns.

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* A detailed discussion of DAAR corridor development impacts is found below in the section dealing with economic and land use impacts.

Distribution of Impacts. The community impacts associated with the toll road or TSM -- including perceptual barriers, land acquisition, increases in noise levels, degradation of visual quality, etc. -- would not be concentrated on a particular ethnic, minority, or income group. The edges of certain subdivisions close to the proposed road, however, would experience the majority of community-related effects. These subdivisions are Reflection Woods in Herndon, Sun Valley in Difficult Run, and Cinnamon Creek and Wolftrap Woods in Wolftrap. Although the community impacts would be concentrated in these subdivisions, the project-related effects are not expected to significantly disrupt community character or cohesion.

General Perception of the Community. Most community impacts attributable to the toll road or TSM alternative are not expected to cause modifications in the general perception of the communities in the study area by either residents or those persons living in other parts of the county. The toll road, however, may intensify development pressures in North Frying Pan and in Browns Mill. If these pressures give way to larger populations at greater densities, the character of these two communities may be altered -- from a suburban/rural to a suburban/urban area -- and along with it, the perception of the community.

The TSM alternative is not expected to have any effects on the perception of communities in the study area.

Economic and Land Use Impacts

Construction-Related Impacts. Beneficial construction impacts could stem from three sources: (1) the purchase of construction equipment and materials locally; (2) the direct construction labor force (an average of 200-250 employees over 30 months for the toll road) and (3) short-term increases in local sector employment caused by the increased spending of construction workers. For each category, the greatest benefits would be derived from the toll road since this alternative would require the greatest investment in capital and labor. The TSM would have only marginal construction-related economic impacts associated with the building of ramps and park-n-pool lots. The no-build would not have any construction-related economic impacts.

The only negative economic impact associated with construction would be caused by the acquisition of property needed for the highway, ramps, maintenance yard, park-n-pool lots, etc. No homes or businesses would be involved in any of this acquisition and the loss to the county's tax rolls would be infinitesimally small -- compared to county assessments of $13 billion -- even under the toll road alternative, which requires the greatest land acquisition (Table IV-8).

All the alternatives would be financed through some form of user charges. Under the toll road option, previous analyses indicated that anticipated toll revenues would be more than adequate to cover toll road operating and debt service costs.* The TSM alternative as well as many of the road improvements planned under the no-build, would be financed by the General Fund of the Virginia Department of Highways, which is itself derived primarily from gasoline taxes. Thus, under none of the alternatives would the general public be asked to bear directly any costs associated with the proposed DAAR corridor road improvements.

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* Dulles Toll Road Study, 1979, JHK & Associates. Before final design of the toll road is initiated, a reexamination of the key assumptions should be undertaken to ensure that toll revenues would cover all costs throughout the useful life of the project.

Table IV-8
**Construction Impacts**

| Impact Category | Alternative: Toll Road | Alternative: TSM |
|---|---|---|
| Construction Costs | $33,504,000 | $3,904,700 |
| Direct Construction Labor (person/months) | 6,000-7,500 | 720 |
| Average Monthly Employees | 200-250 | 40 |
| Direct Operating Labor (persons) | 50-60 | 0 |
| Right-of-Way Acreage Required (acres) | 20.3 | 5.5 |
| Assessed Value of Acreage | $18,500 | $1,968 |

Since the road design and construction schedule will not be affected by the METRO, economic construction impacts are assumed to be the same for both the with-METRO and without-METRO options.

Regional Impacts. While it is not anticipated that any of the alternatives considered for the DAAR corridor would affect total regional growth within the Washington, D.C. SMSA, the alternatives may influence the pattern of that growth within the region, particularly within the DAAR corridor itself. The only impact of regional consequence would be the rather insignificant increase in regional employment associated with job opportunities provided by the toll road operation (approximately 50-60 jobs) and the jobs generated in the local service sector by the spending of toll road employees.

Impacts Along the DAAR Corridor. The employment forecasts developed by the Metropolitan Washington Council of Governments (COG) in conjunction with both Fairfax and Loudoun Counties assumed that the toll road would be built (Table IV-9). Whether the low, medium or high employment estimate is reached will largely be a function of the strength of regional growth. However, the ability of the counties to attract their expected share of the different regional growth scenarios will depend in part upon the provision of high speed access afforded by the toll road alternative.

In both counties, a receptive economic climate exists to attract economic growth. In the Fairfax DAAR corridor, there is ample suitably zoned land adjacent to the road (2600 acres). The land lies directly west of one of the region's largest concentrations of office/retail activities (Tysons Corner) where land is fast becoming scarce; is considered a prestigious location where development is actively being promoted; is close to Fairfax's County's highly skilled labor force (Table IV-10); and is close to Dulles Airport, an additional advantage. The Loudoun DAAR corridor, likewise, has an abundance of

Table IV-9
**Office and Industrial Employment Growth*—1980-2000**
**Washington, D.C. SMSA, Fairfax and Loudoun Counties and DAAR Corridor**

| | Low | Medium | High |
|---|---|---|---|
| Washington, D.C. SMSA | 355,800 | 413,700 | 467,000 |
| Fairfax County | 89,400 | 131,000 | 170,100 |
| Fairfax County DAAR Corridor | 18,700 | 24,600 | 35,300 |
| Loudoun County | 9,500 | 14,500 | 16,400 |
| Loudoun County DAAR Corridor | 5,400 | 7,600 | 9,100 |

Note: * Based on Metropolitan Washington Council of Governments Round II Cooperative Forecasts and factors provided by Fairfax County Office of Comprehensive Planning.

land (4600 acres less about 200 acres which might be required for airport expansion); a skilled blue collar labor force (Table IV-10) which meets the labor requirements of industrial firms; proximity to Dulles Airport, and the availability of water and sewer services (assuming that any potential sewer treatment problems can be resolved). In both areas, the missing element is high speed access, which would be provided by the toll road alternative. Since neither the TSM nor the no-build alternatives offer the level of accessibility afforded by the toll road, it is likely that if the toll road alternative were not implemented, the corridor would not be able to attract its share of regional growth indicated by COG projections. Due to the attractiveness of the DAAR corridor, some office and industrial development would still occur there if the toll road were not built, but many of the firms who would otherwise opt for a DAAR location might be expected, instead, to seek other sites affording better highway access. Fairfax County might retain a portion of these "potential DAAR activities" since it can offer alternative sites either in existing centers (although land is becoming scarce) or in the I-66 corridor (upon the opening of the entire facility).

Loudoun is not as fortunate as Fairfax in this regard, however, since the DAAR corridor offers the best industrial locations in Loudoun County. Moreover, the FAA is moving to bar backtracking (going west on the DAAR, through the airport, in order to use the airport road and ramps heading east) so that businesses and residents of Loudoun who now utilize the existing airport road will no longer be allowed to, thereby reducing even further the accessibility to that area. Without the toll road then, the two counties would lose some of their forecasted share of regional employment growth to competing counties, particularly Montgomery and Prince Georges. Should this occur, out-commuting from both counties could be expected to rise somewhat as residents look elsewhere for job opportunities.

With the exception of the Crowells Corner area in North Frying Pan and the Hattontown area in Browns Mill, population growth in the corridor is likely to be unaffected by the project alternatives.

Table IV-10
**County Resident Labor Force by Occupation**

| | Fairfax County 1975 | Loudoun County 1978 |
|---|---|---|
| White Collar | 75.8% | 48.4% |
| Professional/Managerial | (46.6%) | (28.6%) |
| Clerical | (21.9%) | (14.8%) |
| Sales | (7.3%) | (5.0%) |
| Blue Collar | 20.0% | 51.6% |
| Craftsmen | (10.8%) | (13.6%) |
| Operatives | (3.2%) | (8.4%) |
| Laborers | (1.2%) | (5.7%) |
| Farm | – | (7.5%) |
| Service | (4.4%) | (10.8%) |
| Private Household | (0.4%) | (5.6%) |
| Not Reported | 4.2% | 0.0 |
| Total Percent | 100.0% | 100.0% |
| Total Labor Force | 218,200 | 26,030 |

Source: Washington Center for Metropolitan Studies, *Trends Alert*, 1975; Loudoun County Department of Economic Development.

This is because most residential land is either developed, in the process of being developed, or is subject to environmental constraints (Figure III-4). In the two areas cited, however, the toll road might create pressure for more intense development than is currently envisioned in the Fairfax County Plan. Analysis indicates that even if density in these two areas doubled, corridor population would increase by only 6.7 percent over total build-out population (when all land is developed) and student population would remain virtually unchanged (Table IV-11). The impact on student population would be marginal because in Hattontown a change in usage intensity would result in a shift to a different form of housing containing smaller households and significantly fewer students per household. In Crowells Corner so few acres are involved as to make the difference in density negligible.

Of the various kinds of public infrastructure needed to serve development, only sewer treatment capacity might be affected by the project alternatives. Since none of the alternatives would significantly alter school populations, the number and location of school facilities needed within the corridor would be unaffected. Likewise, both counties anticipate more than adequate supplies of water and solid waste disposal acreage to accommodate growth expected under any of the alternatives.

Both counties may encounter problems with sewer capacity, however. Fairfax County is expected to reach its sewer capacity limit during the early 1990s while Loudoun may be approaching its limit in the near future. In both instances, potential capacity problems are county-wide, and solutions are now being sought. Thus, although DAAR corridor growth might be affected by sewer capacity constraints, the corridor share of county growth should not be affected. On the other hand, some of the counties' expansion in sewer services would be directly attributed to that portion of county growth that would occur only if the toll road is built. Whether or not such "toll-road-related" sewer capacity expansions would be significant or even undesirable would need to be assessed in terms of plant design, funding mechanisms, legal requirements, and environmental problems of the expansion as well as the characteristics of the particular development the expansion is meant to serve.

Table IV-11
**Population Impact of Toll Road—1980 to Build-Out**

| | Hattontown Area | Crowells Corner Area | Total |
|---|---|---|---|
| Planned | | | |
| Total | 8,200 | 550 | 8,750 |
| School | 2,400 | 160 | 2,560 |
| Double Density | | | |
| Total | 12,900 | 1,100 | 14,000 |
| School | 2,300 | 320 | 2,620 |
| Total Road Impact | | | |
| Total | 4,700 | 550 | 5,250 |
| School | -100 | 160 | 60 |

Source: Derived from information appearing in *Fairfax County Standard Reports, 1980* and *Fiscal Plan, 1977*, Office of Comprehensive Planning.

Although sewer services are typically self-financing out of user charges, it is possible that the costs involved with providing these services would result in a burden on existing residents and firms. However, user charges can take many forms, including allocation of additional costs only to additional users and charging special connection fees to users who require higher or special services. Consequently, it is not a foregone conclusion that existing development would have to pay for new development even if expansion costs were high. Moreover, since residential use (100 gallons/person/day) is greater than office use (30 gallons/employee/day),* it is quite likely that the major county sewer expansion would be undertaken more in response to population growth (marginally affected by the toll road) rather than to employment growth (affected by the toll road).

In terms of county administered services, both counties would be in a better fiscal position with the toll road than without. Population growth associated with the toll road would be small, having only a minimal effect on school costs -- the major residential tax burden. At the same time, the toll road is considered essential for the ultimate high quality office and industrial development envisioned for the DAAR corridor. Since on the basis of per dollar revenues generated, commercial and office activities generally provide a surplus of $0.65 while residential development results in deficits of about $0.47 on the average,** the counties should be able to utilize the surplus engendered by toll road economic growth to offset the costs associated with population growth expected to occur irrespective of corridor road network improvements.

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* Fiscal Impact Model for Fairfax County, 1977, Fairfax County.

** Based on analyses conducted by the Fairfax County Office of Comprehensive Planning.

Table IV-12

**Summary of Impacts of Project Alternatives on Historic Resources in the Primary Impact Area***

| Type of Impact | Site of Historic Resources | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sunset Hills | | | A. Smith Bowman Distillery | | | Plantation | | | Wolf Trap Farm | | | Filene Center | | | Ash Grove | | | Pleasant Grove Methodist Church | | |
| | Alternative | | | Alternative | | | Alternative | | | Alternative | | | Alternative | | | Alternative | | | Alternative | | |
| | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build |
| Demolition or relocation of the structure | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Acquisition of property from the site | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Weakening the structure during roadway construction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in ambient noise levels during road construction | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | -1 | 0 | 0 | -1 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 |
| Changes in ambient noise levels due to vehicular traffic during operation | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | -1 | -1 | 0 | -2 | -2 | 0 | -1 | -1 | 0 | 0 | 0 | 0 |
| Changes in visual quality attributable to the introduction of a new road or ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Change in accessibility to the site | +1 | +1 | 0 | +1 | +1 | 0 | +1 | +1 | 0 | +1 | +1 | 0 | +1 | +1 | 0 | +1 | +1 | 0 | +1 | +1 | 0 |
| Disturbance of the setting of the site | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | -2 | -2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note * Primary impact area is defined as a one-half-mile-wide band on either side of the outer boundary of the right-of-way of the proposed toll road.

Key to Ratings: -2 - Significant adverse impact
- -1 - Some adverse impact
- 0 No impact
- +1 - Some beneficial impact
- +2 Significant beneficial impact

If the toll road were not constructed, both counties would stand to lose some portion of their anticipated economic development to other jurisdictions. To the extent that this might occur, residents in both Loudoun and Fairfax Counties might face somewhat higher tax burdens than if the toll road were built.

If METRO is built in conjunction with the toll road, it would both complement and supplement the accessibility provided by the toll road and therefore serve to reinforce and further promote the development of the corridor. In fact, since it would improve the corridor's competitive position with regard to other locations which would provide only highway access, it is possible that with METRO the corridor would attract an even greater share of regional growth than is now anticipated. At the same time, rapid transit has been found to have growth-inducing effects if other economic conditions in the area are favorable. Consequently, should the toll road not be built, any development resulting from the with-METRO options would be attributable to METRO rather than to the other project alternatives.

## C. HISTORIC, ARCHAEOLOGICAL, AND RECREATIONAL RESOURCES AND VISUAL QUALITY

### Historic Resources

Table IV-12 summarizes the potential effects of the project alternatives on historic resources in the primary impact area. Eight categories are contained in the table to encompass the range of effects that each of the alternatives may have on the seven historic sites. These impacts are described below.

Demolition or relocation of the structure. None of the project alternatives would involve the demolition or relocation of any of the seven historic sites.

Acquisition of property from the site. None of the project alternatives would involve the acquisition of property from the historic sites.

Weakening the structure during roadway construction. There would not be a need to perform any blasting to build the toll road or ramps under the toll road or TSM alternative. Vibration or local geological disturbances from other construction activity would not affect any of the seven historic sites.

Changes in ambient noise levels during roadway construction. Noise from building the toll road or ramps would come from construction equipment such as earth moving machines, jackhammers, and concrete trucks. Some perceptible increases in noise levels over existing conditions could be expected under the toll road alternative at the three Wolf-Trap-related properties (Plantation, Farm, Filene Center) and at Ash Grove.

The Wolf Trap properties (especially the Filene Center) and Ash Grove are closer to the right-of-way than the other historic sites and might be expected to experience some noticeable increase in noise due to construction of the toll road. (Ash Grove, located near the site of a proposed ramp at Route 7, would also perceive noise increases under the TSM alternative.) It is not expected that the short-term increases in noise due to construction would interfere with most of the performances at Wolf Trap Farm Park since these events are usually scheduled in the evenings and on weekends. Some perceptible increases in noise due to construction, however, might be noticeable to visitors attending park events during a weekday.

Changes in ambient noise levels due to vehicular traffic during operations. Perceptible increases in noise levels over existing conditions would be expected at the three Wolf Trap sites and at Ash Grove in the toll road and TSM alternatives. Increases in noise would be most disruptive and would be expected to exceed Federal Highway Administration (FHWA) noise levels at "sites for which serenity and quiet are of extraordinary significance" such as the Filene Center. Noise abatement measures such as berms or other barriers could mitigate some of these adverse impacts.

Changes in visual quality attributable to the introduction of a new road or ramp. The outer parallel lanes and ramps would not be in the line of sight of Sunset Hills, A. Smith Bowman Distillery, the Filene Center*, or Pleasant Grove Methodist Church. The toll road would probably not be seen from the other historic structures -- Plantation, Wolf Trap Farm, and Ash Grove -- either, since the thickly treed area between these sites and the roadway would block out the view to the road.

Change in accessibility to the site. With the exception of the Filene Center and Wolf Trap Farm Park there are no provisions for regular visits by the public to the seven historic sites. No regularly scheduled tours of the sites are available to the interested public. As a result, virtually all of the trips to the five sites other than Wolf Trap Farm and the Filene Center are made by residents or friends or (in the case of the A. Smith Bowman Distillery) employees.

The toll road and, to a lesser degree, the TSM alternatives would generally improve access to the historic sites. Travel times from other parts of the county to the sites would often be shorter than with the no-build alternative and no localized congestion problems attributable to the toll road or TSM alternatives are expected.

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* The DAAR can be seen just in front of the entrance to Filene Center but not inside the facility itself.

Table IV-13
**Summary of Impacts of Project Alternatives on Recreational Resources in the Primary Impact Area***

| Type of Impact | Site of Recreational Resources | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bruin Park | | | Chadon Park | | | Difficult Run Stream Valley Park | | | Lake Fairfax Park | | | Reston Golf & Country Club | | |
| | Alternative | | | Alternative | | | Alternative | | | Alternative | | | Alternative | | |
| | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build |
| Demolition or relocation of recreational facility | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Acquisition of property from site of recreational resource | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in ambient noise levels during roadway construction | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in ambient noise levels due to vehicular traffic during operation | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in visual quality attributable to the introduction of a new road or ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in accessibility to the site | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +1 | +1 | 0 | 0 | 0 | 0 |
| Disturbance of the setting or recreational character of the site | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Type of Impact | Site of Recreational Resources | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reston South Golf Course | | | Spring Lake Park | | | Washington and Old Dominion Regional Park | | | Wolftrap Stream Valley Park | | | Wolf Trap Farm Park | | |
| | Alternative | | | Alternative | | | Alternative | | | Alternative | | | Alternative | | |
| | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build | Toll Road | TSM | No-Build |
| Demolition or relocation of recreational facility | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Acquisition of property from site of recreational resource | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in ambient noise levels during roadway construction | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 |
| Changes in ambient noise levels due to vehicular traffic during operation | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | -2 | -2 | 0 |
| Changes in visual quality attributable to the introduction of a new road or ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Changes in accessibility to the site | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +1 | +1 | 0 |
| Disturbance of the setting or recreational character of the site | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -2 | -2 | 0 |

Note: * Primary impact area is defined as a one-half-mile-wide band on either side of the outer boundary of the right-of-way of the proposed toll road.

Key to Ratings:
- -2 = Significant adverse impact
- -1 = Some adverse impact
- 0 = No impact
- +1 = Some beneficial impacts
- +2 = Significant beneficial impacts

Disturbance of the setting of the site. Three of the historic sites are located in suburban areas: Sunset Hills is situated off Reston Avenue; the A. Smith Bowman Distillery off Sunset Hills Road; and Pleasant Grove Methodist Church off Lewinsville Road. These three roads are major county through streets which in 1977 carried between 7,600 and 18,200 trips daily. Neither the increases in traffic on these links associated with the toll road and TSM alternatives, nor development of the toll road or ramps themselves are expected to affect the setting of these sites.

The milieu of the other four historic sites -- Wolf Trap Farm, the Filene Center, Plantation, and Ash Grove -- is essentially rural: Wolf Trap Farm and the Filene Center are set back far from Trap Road on park property; the Plantation is on Trap Road, a local, usually lightly traveled road; and Ash Grove is situated on a privately owned road that is closed to the public. Increased vehicular noise associated with the toll road and TSM alternatives would be most disquieting at the Filene Center. Noise abatement measures could mitigate some of this disturbance.

## Archaeological Resources

Since there are no significant archaeological sites within the right-of-way of the proposed outer parallel lanes and alternatives, the toll road and TSM will have no effect on archaeological resources.

## Recreational Resources

Table IV-13 summarizes the potential effects of the project alternatives on recreational resources in the primary impact area. Seven categories are contained in the table to encompass the range of effects that each of the alternatives may have on the ten recreational sites. These impacts are described below.

Demolition or relocation of a recreational facility. None of the project alternatives would involve the demolition or relocation of a facility on any of the ten recreational sites.

Acquisition of property from the site of a recreational resource. None of the project alternatives would involve the acquisition of property from the recreational sites.

Changes in ambient noise levels during roadway construction. The three recreational facilities closest to the right-of-way of the proposed toll road -- Difficult Run Stream Valley, Washington and Old Dominion Regional, and Wolf Trap Farm Parks -- would be expected to record a perceptible increase in noise over existing conditions that would be attributable to construction activity under the toll road alternative. At Difficult Run and Washington and Old Dominion, these increases would be noticeable only along the outer portion of each park that is adjacent to the proposed roadway and would not be expected to affect the noise levels in the majority of the parks' land area.

The short-term increases in noise at Wolf Trap would not generally coincide with performances there since the events are usually scheduled in the evenings and on weekends. Some perceptible increases in noise due to construction, however, might be noticeable to visitors attending park events during a weekday.

Changes in ambient noise levels due to vehicular traffic during operation. Visitors at the same three recreational facilities noted immediately above would be expected to perceive increased noise levels due to increased vehicular traffic under the toll road and TSM alternatives. Again, the increases would be noticeable principally along the boundaries of these parks that are near the right-of-way of the proposed road. The increases at Difficult Run Stream Valley Park are not projected to exceed design noise levels for recreational activity, under the toll road or TSM alternatives. Although increases in noise in excess of FHWA design levels would be registered at the sections of the Washington and Old Dominion Regional Park nearest the DAAR or outer parallel lanes under the toll road and TSM alternatives, noise barriers could abate these marginally significant increases.

Increases at Wolf Trap Farm Park's amphitheatre, however, would be expected to be most disruptive. The amphitheatre is classified as a facility for which quiet and serenity are especially important, and increases under both the toll road and TSM alternatives would be expected to exceed FHWA design noise levels. Noise abatement measures such as noise control barriers could mitigate some of these serious adverse impacts.

Changes in visual quality attributable to the introduction of a new road or ramp. The visual quality associated with the recreational resources is not expected to be noticeably affected by either the toll road or TSM alternatives.

Changes in accessibility to the site. Under the toll road and TSM alternatives, general intracounty travel time is expected to be reduced. The recreational facilities that would benefit most by this improved accessibility are those serving the county or region, such as Lake Fairfax and Wolf Trap Farm Parks. Accessibility to facilities which cater to a more local clientele, such as those whose service area extends to 3/4-mile or to the boundaries of a planning district, would not be noticeably affected by the toll road or TSM alternatives.

Disturbance of setting or recreational character of the site. The principal source of disturbance of the recreational setting by the toll road or TSM alternatives would come from increased noise levels. This noise would affect areas near the proposed roadway -- portions of Difficult Run Stream Valley Park, and, most significantly, Wolf Trap Farm Park's amphitheatre.

Visual Quality

The overall adverse visual impacts of the toll road and ramps would be minimal. The existing roadway, the DAAR, represents the most significant visual feature that has affected the natural landscape, and locating the parallel lanes and ramps alongside the DAAR would usually not result in a serious degradation of the visual quality of the area. In particular locations, however, especially near some ramps and park-n-pools lots, the project alternatives would represent a somewhat disruptive visual incursion into the surroundings. The proposed toll road would also reduce the depth of buffer strip of trees by about 70 feet along much of its length. This would sometimes result in heightening the presence of the road in the surrounding environs.

Section 1: Sully Road to Reston Avenue. Much of this western section of the road has a sufficiently deep buffer of trees along the right-of-way to shield the view of the toll road. Changes in visual quality that would occur include:

- The distance from about 20 townhouses of the Reflection Woods subdivision abutting the right-of-way would be reduced by approximately 70 feet, heightening the road's visual presence and representing a moderately adverse impact.

- The playing fields of the Hutchison Elementary School, which now have a clear view of the DAAR, would be brought closer visually from about 275 to 200 feet at the western edge of the school property. One section of the ramp at Centreville Road would bring the road about 50 feet closer to the school's playing field before connecting with the existing ramp. The visual impact of the parallel lanes and ramps would be marginal.

o The toll road or TSM would bring the roadway closer to a few scattered farmhouses and would cause a minor deterioration in visual quality from these homes.

Section 2: Reston Avenue to Hunter Mill Road. The planned residential community of Reston was designed taking into account the ultimate implementation of the parallel lanes and its present layout minimizes any adverse visual effects of the toll roads or ramps. Sunset Hills Road to the north and Sunrise Valley Drive to the south of the DAAR parallel the airport road and serve as visual buffers to the highway. Offices and light industrial manufacturing enterprises are located on either side of the DAAR between Sunset Hills Roads and Sunrise Valley Drive and, overall, the viewshed of these sites would not be sensitive to the parallel lanes or ramps. The visual quality of particular locations that would be affected by the toll road or TSM are:

o The ramps at Wiehle Avenue would bring the highway considerably closer to the light industrial buildings on either side of the avenue (from about 250 feet to 25 feet at the point where the ramp joins Wiehle Avenue). The orientation of the buildings, whose backs are toward the DAAR, would tend to reduce the potentially adverse visual effect (Figure IV-4).

o The toll road maintenance facility could be designed to be sheltered from both the toll roads and Sunset Hills Road by retaining existing tree cover and therefore should not constitute an adverse visual impact.

o The office developments on the south side of the DAAR off Roland Clarke Place and Association Drive would be brought about 70 feet closer to the highway. Since this area is already disturbed and tree cover would obstruct the view of the roads, the visual quality of the area would not be significantly affected.

Section 3: Hunter Mill Road to Route 7. A large portion of this eastern section of the DAAR corridor consists of forested areas or pastureland with residential development some distance away. Around Beulah Road and east of Wolf Trap Farm Park for the Performing Arts, the housing developments abut the right-of-way and the parallel lanes would represent a moderate to significant adverse visual impact for these homes. In particular the following changes in visual quality would occur:

- The distance between the homes in the Cinnamon Creek subdivision would be reduced from about 250 feet to 180 feet at its closest point (Figure IV-5). Existing tree cover blocks most of the DAAR from the viewshed of this subdivision and care should be taken to preserve this buffer during construction of parallel lanes to minimize adverse visual impacts.

- In the Sun Valley subdivision, the existing tree cover is thinner and the parallel lanes would create a significantly adverse visual impact by bringing the road from about 250 to 175 feet away at its closest point (Figure IV-5). Approximately six existing homes plus several under construction would be affected most seriously.

- The view from Wolf Trap Farm for the Performing Arts would not be affected by the toll road or TSM. The DAAR is not visible from the amphitheatre or the park's other recreational areas and the parallel lanes would not bring the highway within the viewshed of these portions of the park. The DAAR is and the parallel lanes would be visible to Wolf Trap's parking lots but this is not considered an adverse visual impact (Figure IV-6).

- The distance between the homes in the Wolftrap Woods subdivision would be reduced by about 60 feet to within 150 feet of the road at its nearest point. Existing tree cover and

Figure IV-4
**Photomontage of Proposed Toll Road (Looking West from Wiehle Avenue)**

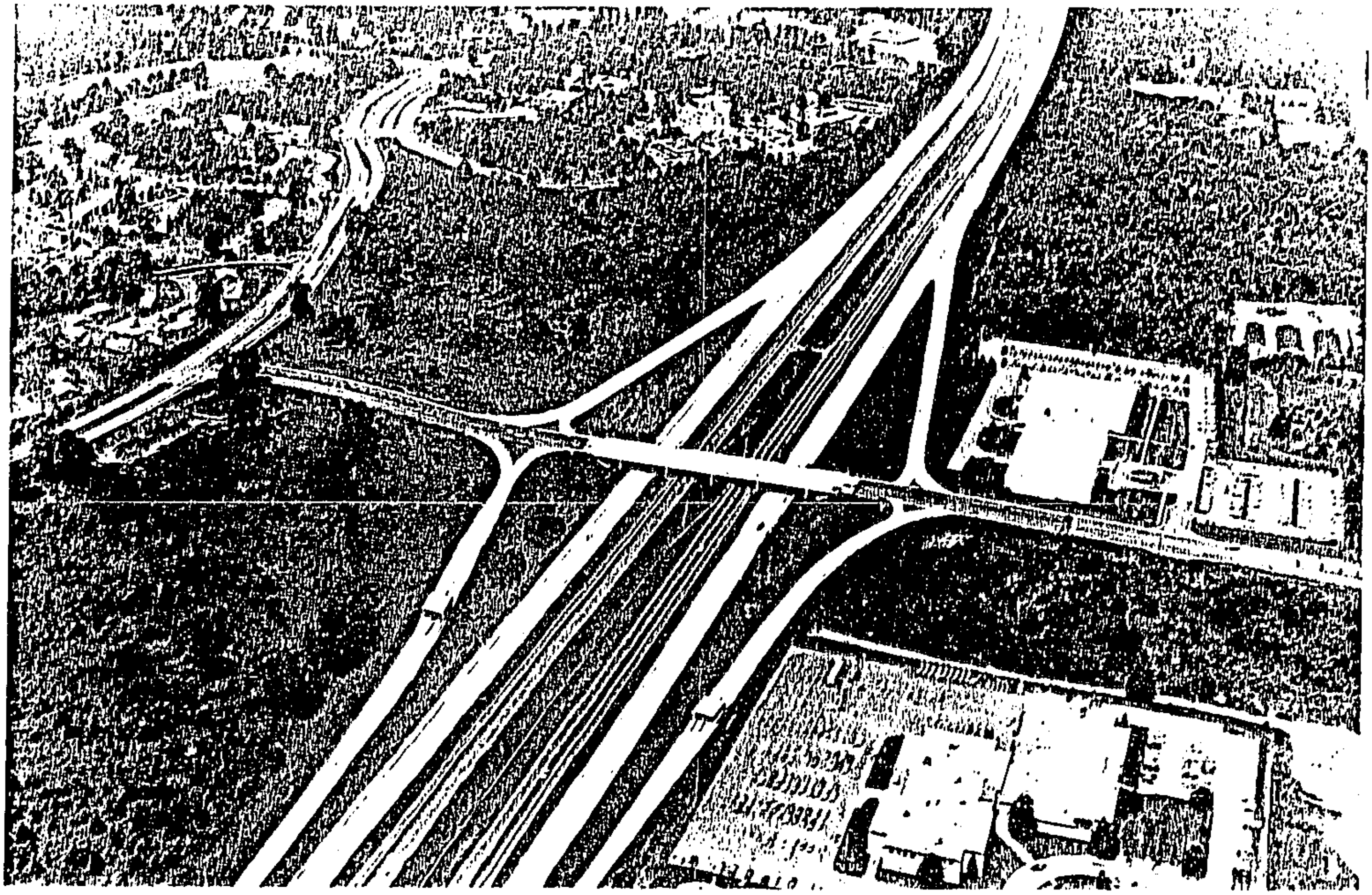


Figure IV-5
**Photomontage of Proposed Toll Road**
**(Looking East from Beulah Road)**

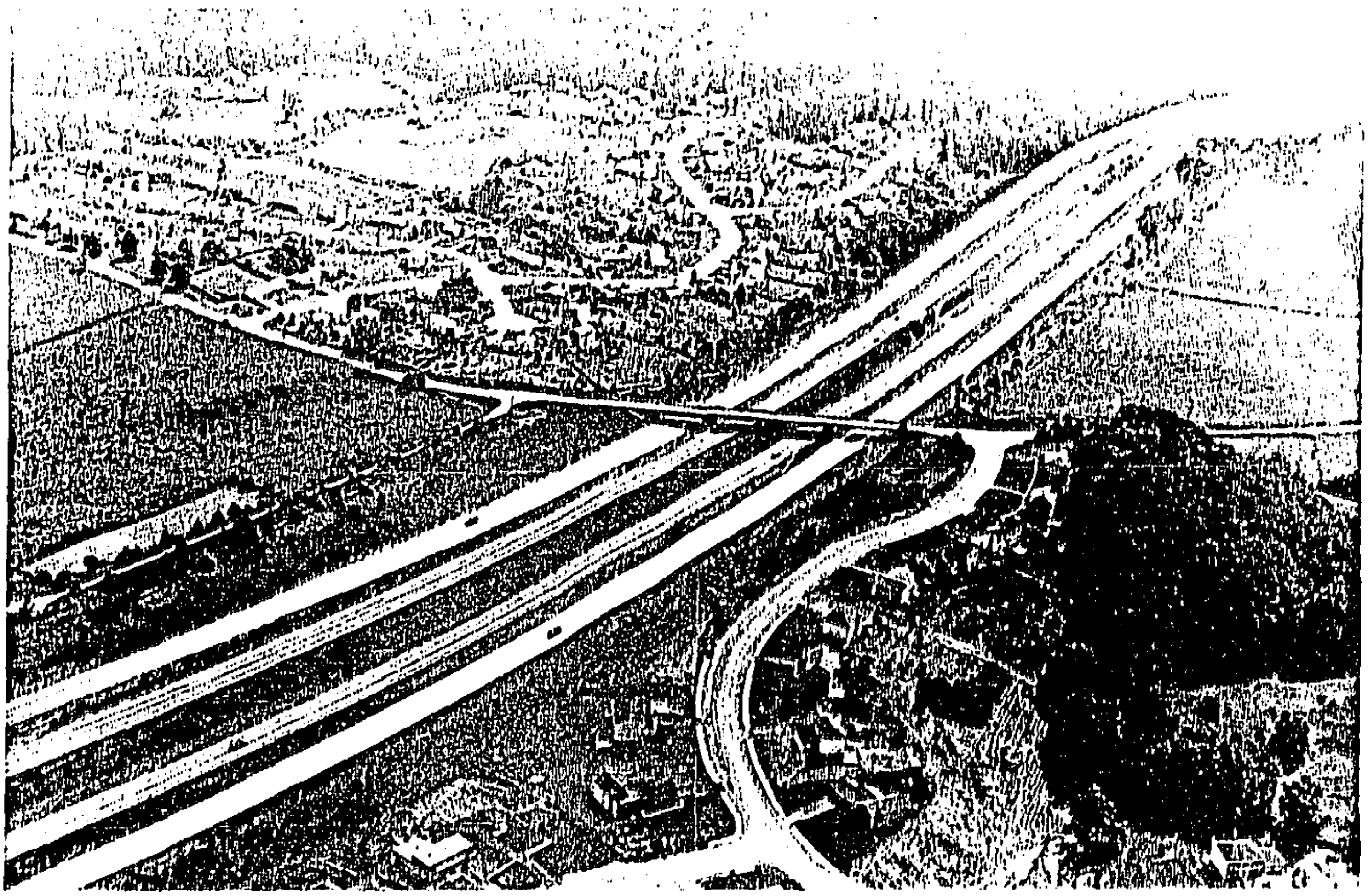
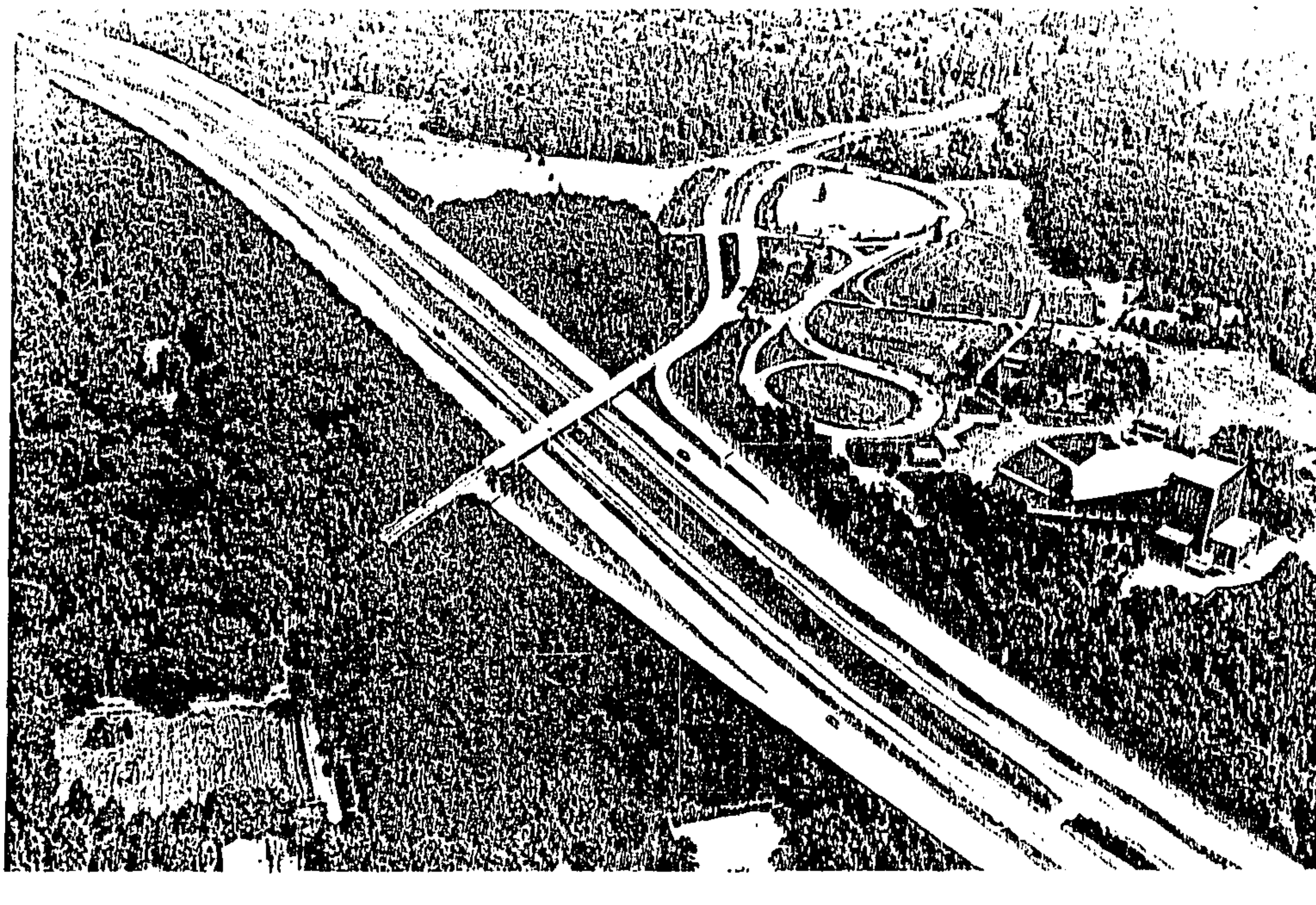


Figure IV-6
**Photomontage of Proposed Toll Road**
**(Looking North to Wolf Trap Farm Park)**



differences in elevation should be sufficient to minimize potential visual intrusion of the road into the subdivision.

Mitigating Measures

A number of mitigating measures are recommended to minimize the potential for adverse visual impacts of the toll road, ramps, and associated facilities.

- The proposed highway design should be compatible with the natural landscape as much as possible.

- Care should be taken to minimize the reduction of the depth of existing tree cover during construction, especially where the buffer of trees blocks the view of the road from sensitive visual receptors.

- Selected landscape screening to supplement the existing natural buffer strips should be provided, especially at those subdivisions or community facilities near the right-of-way.

- Noise barriers should be designed to blend harmoniously with the local landscape. Recommended types include landscaped earth berms or native timber or stone walls.

## D. AIR QUALITY, NOISE, AND ENERGY

### Air Quality

Construction and operation of the proposed toll road would have direct and indirect effects on the air quality of the area immediately adjacent to the project corridor, and potentially on a more extensive region affected by motor vehicle activity associated with the construction and operation of the facility. Direct effects would stem from emissions generated during construction of the road and from vehicles traveling along it during its operation. Indirect effects would include the impact of emissions from motor vehicles traveling to and from the toll facility. These latter effects are termed "indirect" since the emissions do not emanate directly from the toll road.

Prediction Methodology. The carbon monoxide (CO) concentration at a given receptor location depends on several factors: pollutant source strength, wind speed, wind direction, dispersion parameters of atmospheric turbulence, relative position of the receptor to the source, and surrounding site geometry. Over the last few years, several predictive mathematical models have been developed which relate CO concentrations to the above parameters. The Virginia Highway and Transportation Research Council's AIRPOL-4A Gaussian dispersion model (approved by FHWA), together with EPA MOBILE 1 vehicular emission factors, was used to estimate microscale CO concentrations at ten worst case representative locations in the project study area (Figure III-6). The estimates were based on worst case meteorological conditions; design hour traffic volumes and corresponding capacity constrained speeds; and the second highest background CO concentration recorded at the Virginia Air Pollution Control Board's Balls Hill Road monitoring station in 1979 which was "rolled back" (Table IV-14) to correspond with anticipated 1985/2000 network CO pollutant burdens presented in Table IV-15. Mesoscale carbon monoxide, hydrocarbon, and nitrogen oxide pollutant burdens, determined on a link by

Table IV-14
**Background Carbon Monoxide Concentrations**

| Year and Network | Background CO (ppm)* | |
|---|---|---|
| | 1-Hour | 8-Hour |
| 1977 Base Year | 11.9 | 8.4 |
| 1985 No-Build | 6.2 | 4.3 |
| 1985 TSM | 5.7 | 4.0 |
| 1985 Toll Road | 6.0 | 4.2 |
| 2000 No-Build with METRO | 3.4 | 2.4 |
| 2000 No-Build without METRO | 3.5 | 2.4 |
| 2000 TSM with METRO | 3.3 | 2.3 |
| 2000 TSM without METRO | 3.3 | 2.3 |
| 2000 Toll Road with METRO | 3.5 | 2.5 |
| 2000 Toll Road without METRO | 3.7 | 2.5 |

Note: * All 1985/2000 background carbon monoxide concentrations were determined by "rollback" of 1979 monitored data (1-hour, 11.9 ppm; 8-hour, 8.3 ppm) at Balls Hill Road; 1977 background carbon monoxide concentrations correspond to actual data monitored at Balls Hill Road in 1977.

Table IV-15
**Carbon Monoxide Estimates for Microanalysis Area (PPM)**

| Year and Network | Beulah Road | | Centreville Road | | Hunter Mill Road | | Reston Avenue | | Springfield Bypass | | Sully Road | | Trap Road | | Wiehle Avenue | | Crowell Road | | Baron Cameron Avenue, Route 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour | 1-Hour | 8-Hour |
| 1977 Base | 13.0 | 8.8 | 12.2 | 8.6 | 12.7 | 8.7 | 12.6 | 8.7 | 13.2 | 8.8 | 13.4 | 9.0 | 13.2 | 8.9 | 13.1 | 9.0 | 13.3 | 9.0 | 15.1 | 9.8 |
| 1985 No-Build | 6.6 | 4.5 | 6.3 | 4.4 | 6.5 | 4.4 | 6.5 | 4.5 | 6.7 | 4.5 | 6.9 | 4.6 | 6.7 | 4.5 | 6.5 | 4.5 | 6.9 | 4.6 | 8.3 | 5.0 |
| 1985 TSM | 6.3 | 4.3 | 5.8 | 4.1 | 6.1 | 4.2 | 6.0 | 4.2 | 6.2 | 4.2 | 6.4 | 4.3 | 6.4 | 4.3 | 6.1 | 4.2 | 6.5 | 4.4 | 7.6 | 4.6 |
| 1985 Toll Road | 6.9 | 4.6 | 6.2 | 4.3 | 6.5 | 4.4 | 6.5 | 4.5 | 6.6 | 4.5 | 6.6 | 4.5 | 7.1 | 4.7 | 6.4 | 4.5 | 6.9 | 4.6 | 7.4 | 4.8 |
| 2000 No-Build with METRO | 3.7 | 2.6 | 3.5 | 2.5 | 3.6 | 2.5 | 3.6 | 2.5 | 3.8 | 2.6 | 4.0 | 2.7 | 3.8 | 2.6 | 3.7 | 2.5 | 3.8 | 2.6 | 4.5 | 2.9 |
| 2000 No-Build without METRO | 3.8 | 2.6 | 3.6 | 2.5 | 3.7 | 2.5 | 3.7 | 2.5 | 3.9 | 2.6 | 4.1 | 2.7 | 3.9 | 2.6 | 3.7 | 2.5 | 3.9 | 2.6 | 4.7 | 2.9 |
| 2000 TSM with METRO | 3.8 | 2.5 | 3.4 | 2.4 | 3.7 | 2.5 | 3.6 | 2.4 | 3.7 | 2.5 | 4.0 | 2.6 | 3.9 | 2.5 | 3.6 | 2.5 | 3.8 | 2.6 | 4.2 | 2.7 |
| 2000 TSM without METRO | 3.9 | 2.5 | 3.4 | 2.4 | 3.7 | 2.5 | 3.6 | 2.4 | 3.8 | 2.6 | 3.9 | 2.5 | 4.0 | 2.6 | 3.6 | 2.5 | 3.8 | 2.6 | 4.3 | 2.7 |
| 2000 Toll Road with METRO | 4.4 | 2.8 | 3.6 | 2.6 | 3.9 | 2.7 | 3.9 | 2.7 | 4.2 | 2.8 | 4.1 | 2.7 | 4.5 | 2.9 | 4.0 | 2.7 | 4.0 | 2.8 | 4.2 | 2.9 |
| 2000 Toll Road without METRO | 4.7 | 2.9 | 3.8 | 2.6 | 4.2 | 2.7 | 4.2 | 2.7 | 4.4 | 2.8 | 4.3 | 2.7 | 4.9 | 2.9 | 4.2 | 2.8 | 4.2 | 2.8 | 4.4 | 2.9 |

link basis for the entire study area traffic network, were estimated using EPA MOBILE-1 emission factors. The emission factors were computed using vehicle operating conditions of 20.6 percent cold start and 27.3 percent hot start and were based on the implementation of an inspection and maintenance program with mechanic training on January 1, 1983 with a 20 percent stringency factor.

Microscale CO Impacts. Microscale CO concentrations were estimated at ten worst case representative locations within the impact area for the six project alternatives in 1985 (the project opening year) and in 2000 (the project design year) (Table IV-15). In all future cases, estimated CO concentrations did not exceed either the one-hour or eight-hour standards for CO. Future CO levels are estimated to be well below those found for the base year (1977).

Mesoscale Carbon Monoxide (CO), Hydrocarbon (HC), Nitrogen Oxide ($NO_x$) Impacts. Mesoscale CO, HC and $NO_x$ pollutant burdens, estimated on a link by link basis for project alternatives in 1985 and 2000, are presented in Table IV-16. While all pollutant burdens would be expected to decrease from 1977 base year levels, the greatest reductions would occur for the no-build and TSM alternatives with METRO. The small increases in CO, HC and $NO_x$ pollutant burdens in 1985/2000 due to the operation of the proposed toll road represent an insignificant change in emissions when viewed in a regional context. For example, the difference in the HC pollutant burden due to operation is less than 0.11 percent, based on AQCR VII 1977 total of 61,050 tons per year. Ambient concentrations of ozone are proportional to regional burdens of hydrocarbons and nitrogen oxides. The 73 percent overall decrease in HC burden over base year conditions would significantly contribute to the anticipated attainment of the standard for ozone in AQCR VII.

Construction Impacts. No demolition would be required for construction of the toll road or TSM alternatives. Clearing of a total of approximately 356 acres of land would be necessary for the toll

Table IV-16
**Carbon Monoxide, Hydrocarbon and Nitrogen Oxide ($NO_x$) Pollutant Burden Estimates**

| Year and Network | Network Daily Vehicle Miles Traveled | Network Average Daily Speed | Emission Burden (tons/year) | | |
|---|---|---|---|---|---|
| | | | CO | HC | $NO_x$ |
| Base Year (1977) | 3,711,431 | 38.8 | 75,154.2 | 9,259.0 | 7,561.1 |
| 1985 No-Build | 4,884,787 | 36.5 | 39,245.2 | 4,141.7 | 6,424.0 |
| 1985 TSM | 4,911,257 | 36.3 | 38,901.3 | 4,120.5 | 6,439.7 |
| 1985 Toll Road | 4,953,422 | 37.9 | 39,324.0 | 4,138.0 | 6,585.7 |
| 2000 No-Build with METRO | 7,020,800 | 33.1 | 22,564.3 | 2,395.9 | 6,895.6 |
| 2000 No-Build without METRO | 7,151,200 | 32.8 | 22,912.1 | 2,433.8 | 7,019.7 |
| 2000 TSM with METRO | 7,161,800 | 34.1 | 22,584.4 | 2,414.5 | 7,038.7 |
| 2000 TSM without METRO | 7,205,400 | 33.2 | 22,673.4 | 2,430.2 | 7,069.7 |
| 2000 Toll Road with METRO | 7,201,600 | 35.1 | 23,112.9 | 2,425.8 | 7,158.0 |
| 2000 Toll Road without METRO | 7,435,700 | 34.8 | 23,992.6 | 2,497.0 | 7,437.6 |

road alternative, however. Fugitive dust from land clearing operations includes emissions generated from excavation, hauling, dumping, spreading, grading, compaction, wind erosion, and traffic over unpaved areas. The EPA has suggested an overall emission rate of approximately 1.2 tons of particulate per acre per month of active construction, from all phases of land clearing operations with no fugitive dust control measures. However, this is a national estimate and actual emissions would vary widely depending on the extent and nature of the clearing operations, the type of equipment employed, the physical characteristics of the underlying soil, the speed at which construction vehicles are operated, and the type of fugitive dust control methods employed. Due to relatively limited land clearing activities that would take place and fugitive dust control measures to be employed, the actual emission rate from clearing operations at the construction site is expected to be significantly lower than this national estimate.

Increases in ambient concentrations of particulate matter due to these emissions are difficult to quantify precisely due to inaccuracies in determining actual total emissions and the wide range of size of the particles emitted. Since a large proportion of the fugitive dust generated by land clearing and construction activities is of a relatively large particle size, much of the fugitive dust is expected to settle to the ground within a short distance from the construction site and not significantly affect nearby residential or community facilities. Dust control measures (see "Mitigating Measures" below), such as watering of affected areas and the use of dust covers for trucks, can insure that no more than minimal increases in ambient concentrations of particulate matter would occur.

Gaseous hydrocarbon and nitrogen oxide emissions from the private vehicles of construction workers, from construction equipment at the site, and from traffic in the vicinity of the site, would have little observed impact on local air quality. The primary influence of these emissions is on regional concentrations of ozone. The very small localized increases in hydrocarbon and nitrogen oxides emissions during the construction process caused by these sources are insignificant when compared to total regional burdens of these pollutants, and would be expected to have a negligible effect on regionwide concentrations of ozone.

Concentrations of carbon monoxide tend to be a localized phenomena. Some small increase in ambient concentrations could be expected due to decreased vehicle speeds in the vicinity of the construction site, emissions from the private vehicles of construction workers, and from construction vehicles at the site. Since emissions of carbon monoxide increase as vehicle speed drops, disruptions in existing traffic due to construction and land clearing activities should be minimized. This would be accomplished, wherever feasible, by providing for maintenance of the existing number of lanes of through traffic. Emissions from construction vehicles would not be a major source of carbon monoxide since most construction equipment is diesel-powered and emits relatively low amounts of carbon monoxide.

Mitigating Measures. The Virginia Air Pollution Control Board regulations prohibit open burning under special circumstances upon declaration of an Air Pollution Episode (Alert, Warning, or Emergency State); require control of fugitive dust; and require that all reasonable precautions be taken to prevent particulate matter from becoming airborne. Compliance with these regulations would be assured by specification in the project documents and application of various control measures during land clearing for and construction of the proposed toll road or TSM. These measures -- which include applying asphalt, oil, or water on dirt roads to control dust, and covering or treating open equipment for conveying or transporting materials likely to become airborne and create objectionable air pollution -- should insure significant reduction in fugitive dust emissions.

Consistency with the State Implementation Plan. The project alternatives have been evaluated by the Virginia Air Pollution Control Board. As indicated by their review, construction and operation of either the TSM or toll road would cause no violations of the NAAQS for CO, would contribute to the attainment of the ozone standard in AQCR VII, and is consistent with the control strategies in both the existing Virginia State Air Quality Implementation Plan and proposed revisions.

## Noise

Exterior noise levels in the DAAR corridor due to the operation of the toll road or TSM were determined using the Federal Highway Administration's STAMINA 1.0 computer version of its Highway Traffic Noise Prediction Model. The estimated noise levels were then compared with FHWA design noise levels and existing noise levels to determine noise impacts of the highway section.

Noise Impacts. Applicable FHWA noise standards require the achievement of design noise levels for five land use/activity categories (Table IV-17). Project base year (1977) and design year (2000) unabated exterior noise level predictions for the alternatives under detailed study -- no-build with METRO, TSM with METRO, and toll road with METRO -- developed for the entire corridor using the aforementioned FHWA noise prediction model are summarized for the noise monitoring locations in Table IV-18. The distances to the equivalent noise level ($L_{eq}$) = 67 dBA contours and ($L_{eq}$) = 57 dBA contours at Wolf Trap Farm Park are tabulated for the year 2000 toll road and TSM alternatives in Table IV-19 and presented in Figures IV-7 through IV-10 for the toll road alternative. Predicted traffic noise levels for the project design year were compared with existing noise level predictions (project base year, 1977) and with the design noise levels contained in Table IV-17. Referring to Table IV-18, it can be seen that design year noise level predictions would increase at all monitoring sites over base year values. While design year no-build and TSM noise levels are comparable (within ± 1 dBA), design

Table IV-17
**Design Noise Level/Activity Relationships**

| Activity Category | Design Noise Levels –dBA* | | Description of Activity Category |
|---|---|---|---|
| | $L_{eq}$ (H) | $L_{10}$ (H) | |
| A** | 57 (Exterior) | 60 (Exterior) | Tracts of land for which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheatres, particular parks or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. |
| B** | 67 (Exterior) | 70 (Exterior) | Picnic areas, recreation areas, playgrounds, active sports areas, and parks which are not included in Category A and residences, motels, hotels, public meeting rooms, schools, churches, libraries, and hospitals. |
| C | 72 (Exterior) | 75 (Exterior) | Developed lands, properties or activities not included in Categories A or B above. |
| D | – | – | For requirements on undeveloped lands, see paragraphs 11a and c of *FHPM 7-7-3.* |
| E† | 52 (Interior) | 55 (Interior) | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums. |

Notes: * Either $L_{10}$ or $L_{eq}$ (but not both) design noise levels may be used on a project.

** Parks in Categories A and B include such lands (public or private) which are actually used as parks as well as those public lands officially set aside or designated by a government agency as parks on the date of public knowledge of the proposed highway project.

† See Paragraphs 8c, d, and e of *FHPM 7-7-3* for method of application.

Source: U.S. Department of Transportation, Federal Highway Administration. *Federal-Aid Highway Program Manual (FHPM) Volume 7, Chapter 7, Section 3 – Procedures for Abatement of Highway Traffic Noise and Construction Noise,* Transmittal 192, May 14, 1976, HEV-21.

Table IV-18
**Exterior Design Noise Level Predictions (Unabated)**

| Site | Location | Receptor Distance from Roadway (feet) | 1977 Base Year | 2000 No-Build | 2000 TSM | 2000 Toll Road |
|---|---|---|---|---|---|---|
| 1 | Berea Church, Leesburg Pike | 25 | 70/45* | 71/46* | 69/44* | 71/46* |
| 2 | Laurel Court | 25<br>50 | 71<br>70 | 73<br>72 | 74<br>72 | 77<br>76 |
| 3 | Bois Avenue | 30<br>60 | 69<br>68 | 72<br>71 | 73<br>72 | 76<br>75 |
| 4 | Wolf Trap Farm Park | 30<br>10 | 69<br>73 | 73<br>75 | 73<br>76 | 76<br>78 |
| 4 | Wolf Trap Farm Park | 25<br>50 | 71<br>70 | 73<br>72 | 74<br>72 | 77<br>76 |
| 5 | Cinnamon Creek Drive | 200<br>225 | 65<br>66 | 68<br>67 | 68<br>67 | 72<br>71 |
| 6 | Squaw Valley Drive | 60<br>226 | 69<br>65 | 71<br>68 | 72<br>68 | 76<br>72 |
| 8 | Crowell Road | 40 | 60 | 64 | 65 | 65 |
| 9 | Fox Mill Road | 30 | 58 | 60 | 60 | 59 |
| 10 | Aiken Place | 50** | 67 | 68 | 67 | 69 |
| 11 | Sully Plantation | 25 | 67 | 70 | 70 | 70 |
| 12 | Near Floris United Church | 25 | 64 | 67 | 67 | 66 |
| 13 | Sterling Middle School | 75 | 62 | 64 | 64 | 64 |
| 14 | First Baptist Church | 25 | 64 | 67 | 66 | 66 |
| 15 | Stream Valley Park, Lawyers Road, Raccoon Ridge and Birdfoot Lane | 25 | 60 | 64 | 64 | 64 |
| 16 | Near Forestville Methodist Church | 25 | 65 | 66 | 66 | 66 |
| 17 | Spring Hill Elementary School, Lewinsville Road | 25 | 64 | 67 | 67 | 66 |
| 18 | Near St. Paul's Lutheran Church, Idlywood Road and Leesburg Pike | 25 | 69 | 71 | 71 | 70 |
| 19 | Near McLean Presbyterian Church | 25 | 66 | 69 | 69 | 70 |
| 20 | Near Trinity Church and School | 25 | 68 | 69 | 68 | 69 |

Notes: * Interior noise level at Berea Church, assuming 25 dBA noise reduction for masonry structure.
** From fence.

Table IV-19
**Distance to $L_{eq}$ = 67 dBA Contour (Unabated) in Feet**

| Location | 2000 Toll Road | | 2000 TSM | |
|---|---|---|---|---|
| | Eastbound | Westbound | Eastbound | Westbound |
| Sully Road to Centreville Road | 380 | 380 | 250 | 250 |
| Centreville Road to Springfield Bypass | 420 | 420 | 300 | 300 |
| Springfield Bypass to Reston Avenue | 500 | 500 | 300 | 300 |
| Reston Avenue to Wiehle Avenue | 500 | 500 | 300 | 300 |
| Wiehle Avenue to Hunter Mill Road | 600 | 600 | 300 | 300 |
| Hunter Mill Road to Beulah Road | 640 | 640 | 300 | 300 |
| Beulah Road to Trap Road | 640 | 640 | 300 | 300 |
| Trap Road to Leesburg Pike | 640 | 640/4,000* | 300 | 300/1,770* |

Note: * Distance to the $L_{eq}$ = 57 dBA contour (unabated) at Wolf Trap Farm Park for design hour (5-6 P.M.) traffic conditions in year 2000.

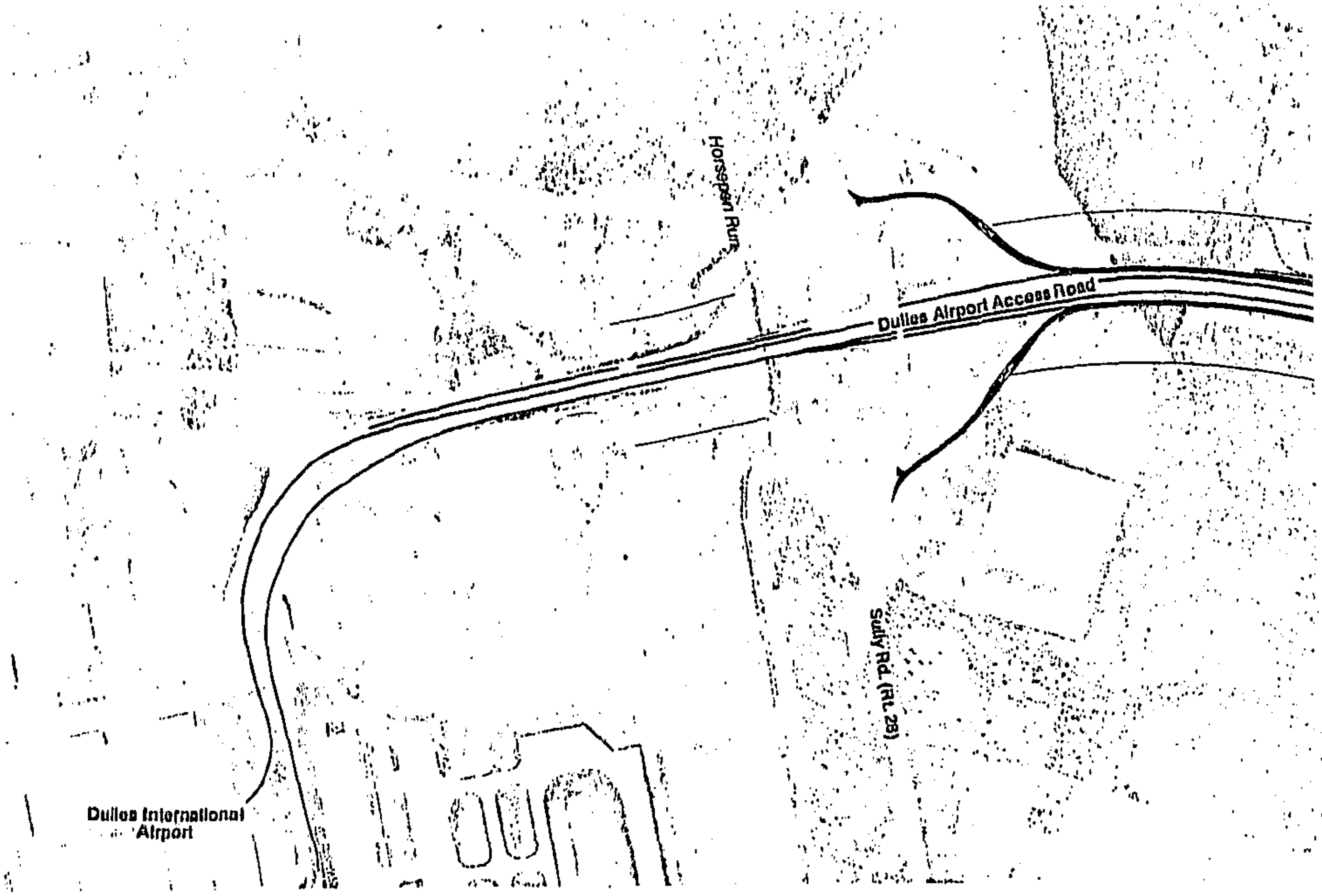
year toll road noise levels would be expected to increase along the DAAR corridor from 4 to 6 dBA over no-build conditions.

Based on the noise contour analysis presented above it was determined that the FHWA design noise level of $L_{eq}$ = 67 dBA would be exceeded at 261 residential structures along the corridor under the toll road alternative and 31 residences under the TSM alternative. Noise impacts requiring either full or partial abatement could be expected at these structures.

Although a detailed noise analysis has been performed only for the with-METRO alternatives, results of a similar analysis for the without-METRO options would be essentially the same as those presented above. This is due to the nature of the traffic noise prediction process which employs design hour traffic conditions to estimate worst case noise levels. During the design hour, the without-METRO alternatives would experience slight increases (less than 8 percent) in traffic volumes when compared to the corresponding volumes anticipated under the with-METRO alternatives. Assuming that all other parameters in the FHWA Highway Traffic Noise Prediction Model remain the same (i.e., speed, vehicle classification, etc.), an increase in traffic volumes of approximately 10 percent would be required to increase noise levels one decibel. However, since design hour capacity constrained speeds decrease as traffic volumes increase, the resulting noise levels for the without-METRO alternatives can therefore be expected to be within approximately one-half of one decibel of the noise levels for the corresponding with-METRO options.

Evaluation of Alternative Abatement Measures. Three alternative noise abatement measures were evaluated for each of the project alternatives to assess their effectiveness in reducing the predicted unabated design year noise levels in the DAAR corridor to acceptable levels according to the FHWA noise standards. The predicted design year noise levels are shown in Figures IV-7 through IV-10

Figure IV-7
**Noise Contours and Barrier Locations for Toll Road Alternative (Dulles Airport to East of Monroe Street)**



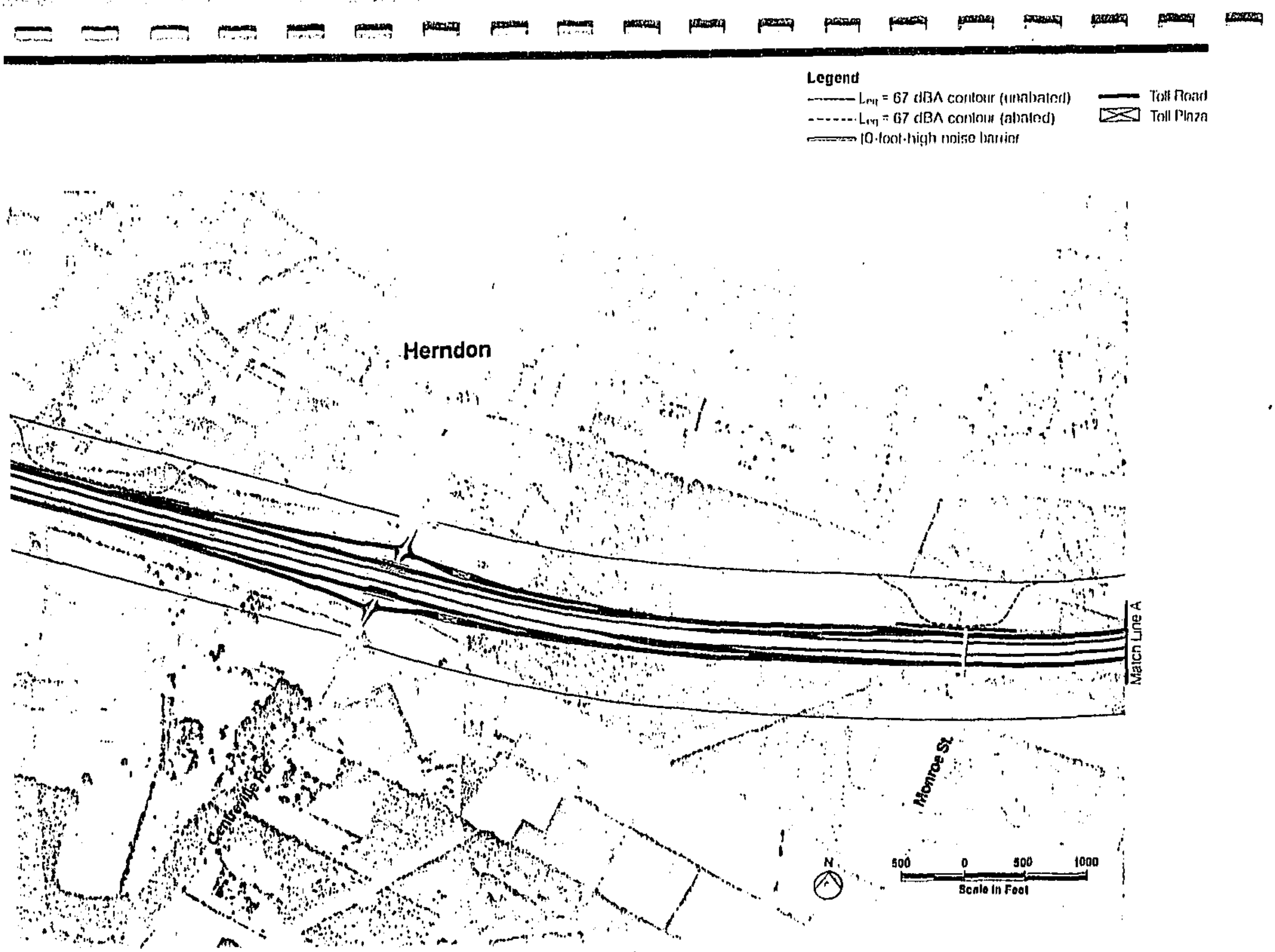
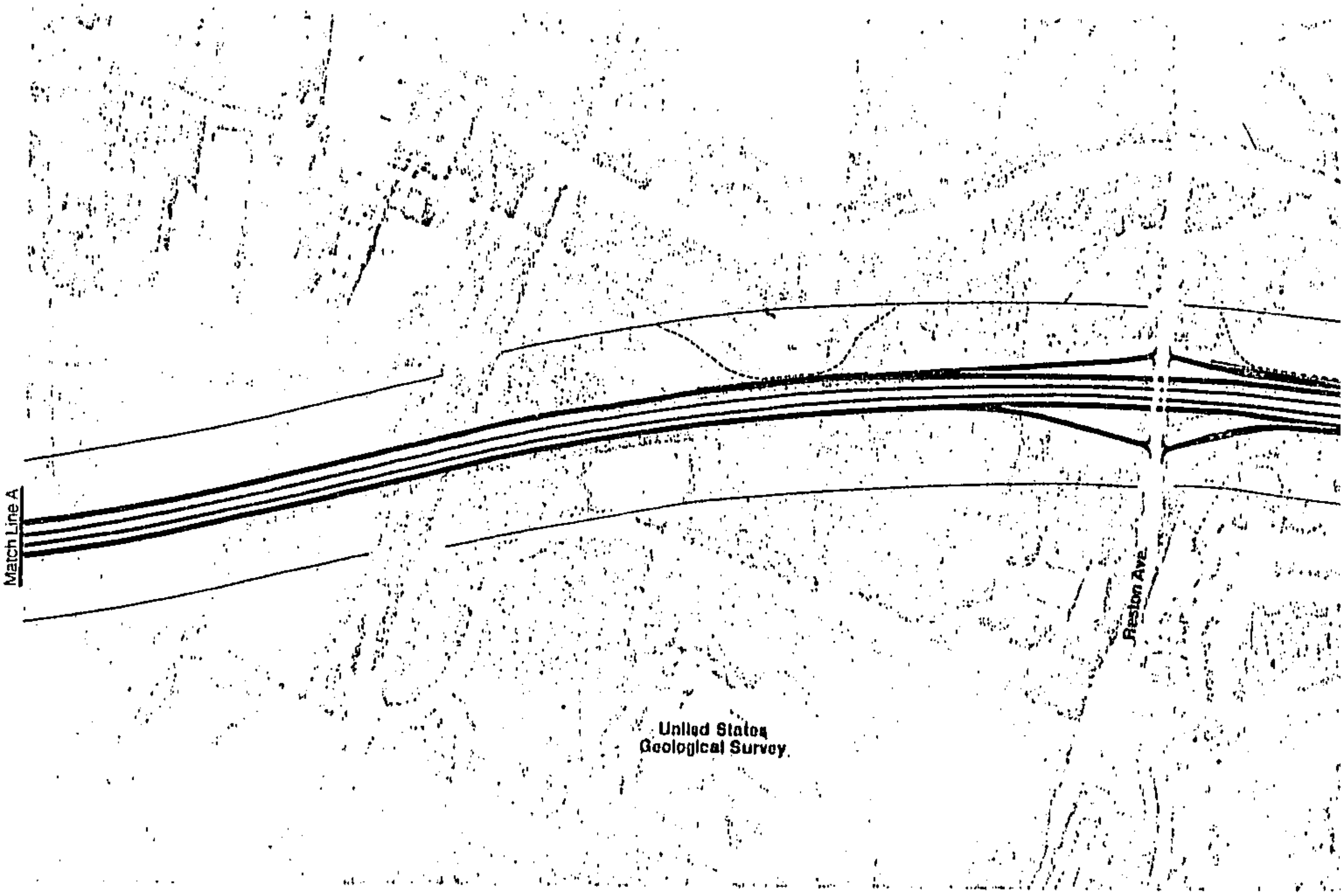
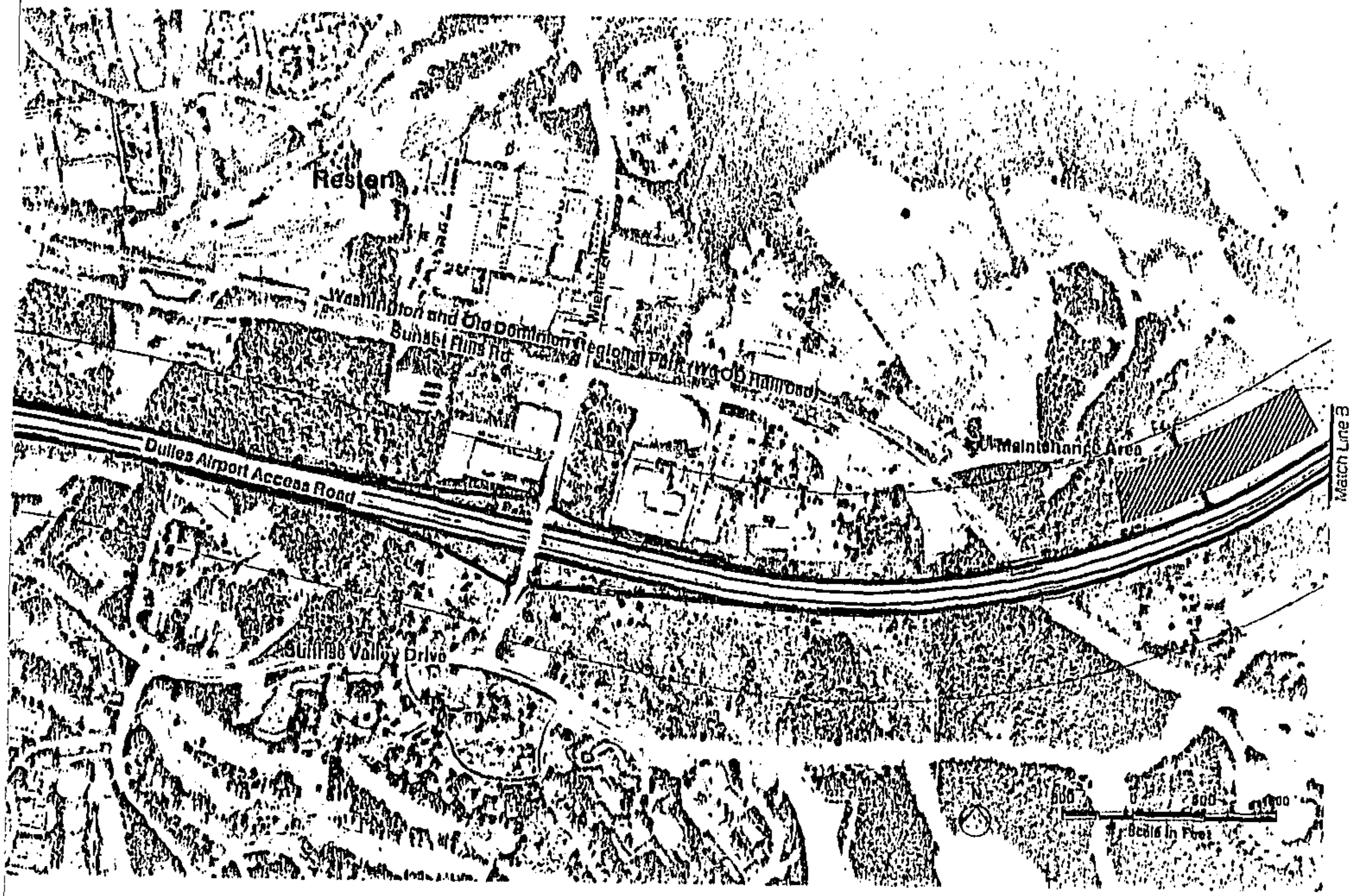

Legend
Leq = 67 dBA contour (unabated)
Leq = 67 dBA contour (abated)
10-foot-high noise barrier
Toll Road
Toll Plaza
Herndon
Centreville Rd
Monroe St.
Match Line A
N
500 0 500 1000
Scale in Feet

Figure IV-8
**Noise Contours and Barrier Locations for Toll Road Alternative (East of Monroe Street to West of Hunter Mill Road)**



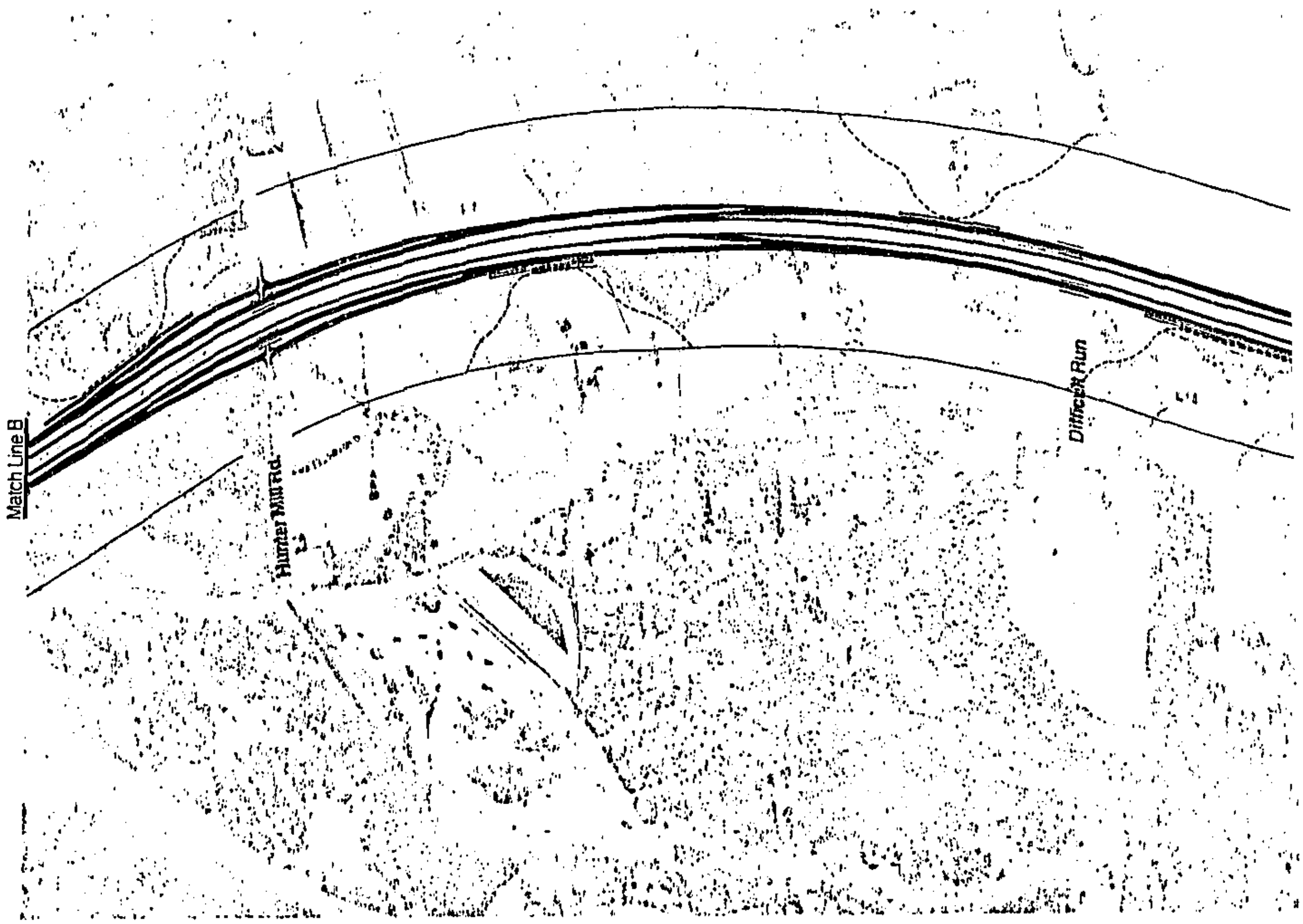
Legend

Leq = 67 dBA contour (unabated)
Leq = 67 dBA contour (abated)
10-foot-high noise barrier
Toll Road
Toll Plaza




POOR COPY

Figure IV-9
**Noise Contours and Barrier Locations for Toll Road Alternative**
**(West of Hunter Mill Road to West of Route 7)**



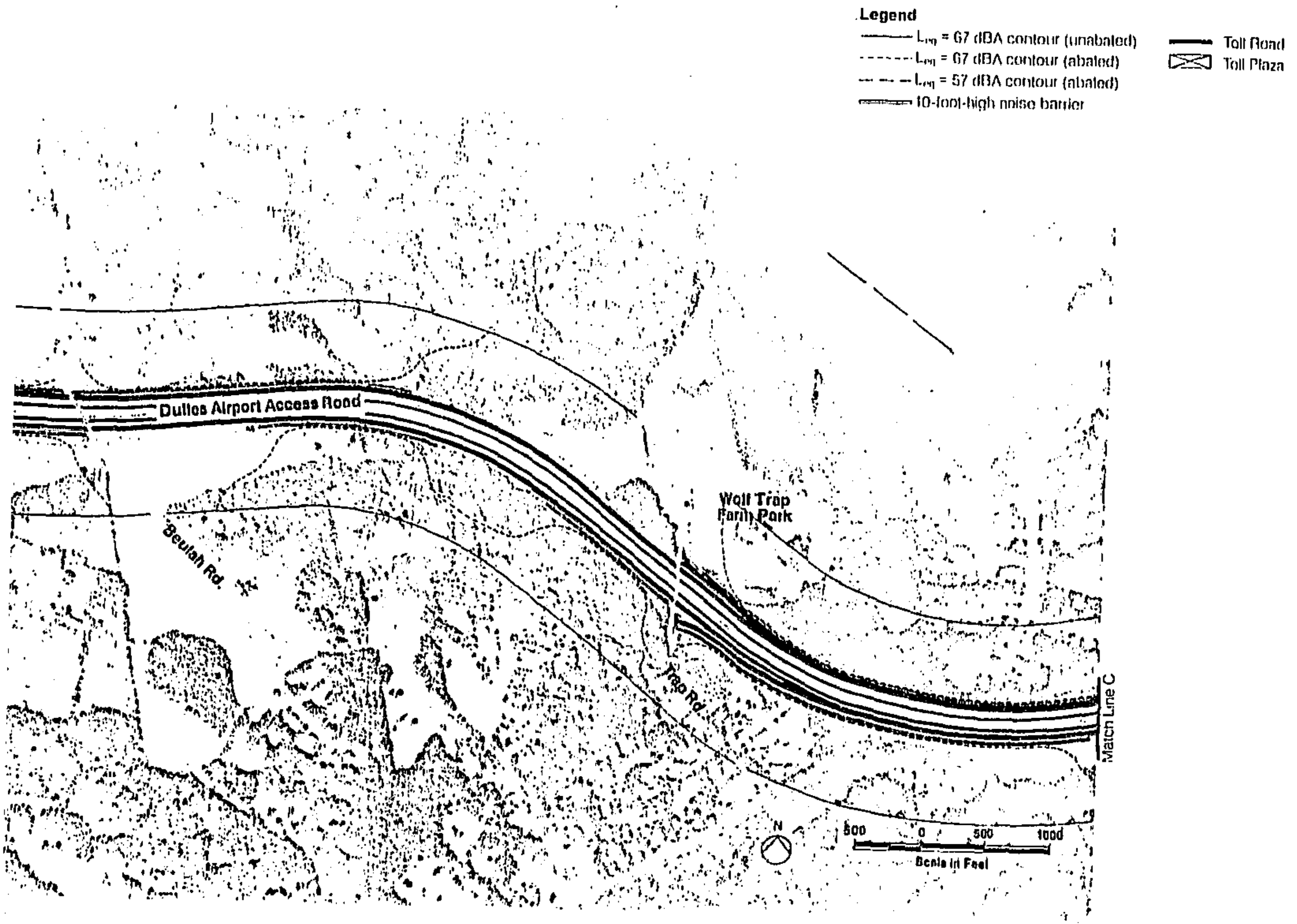
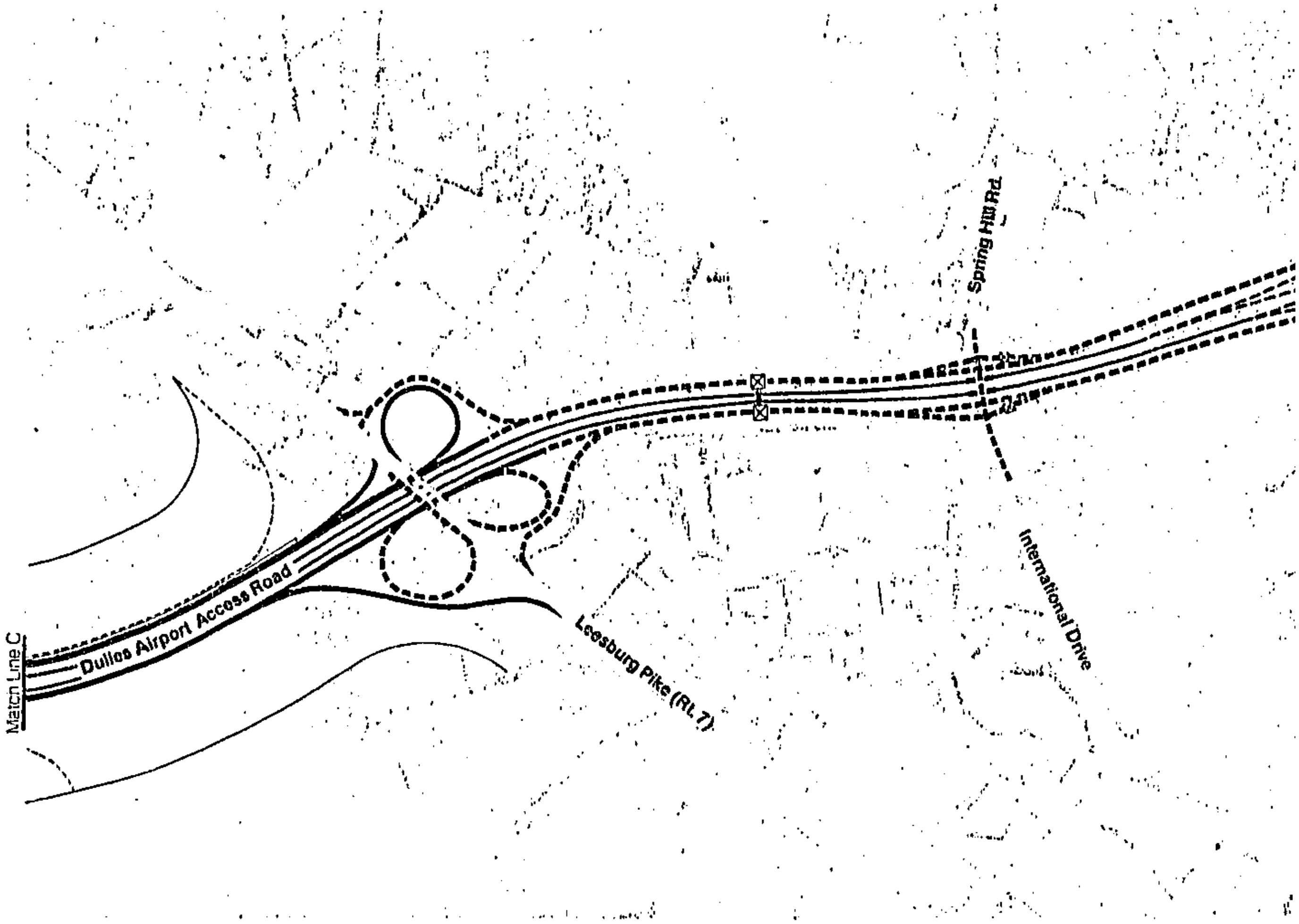
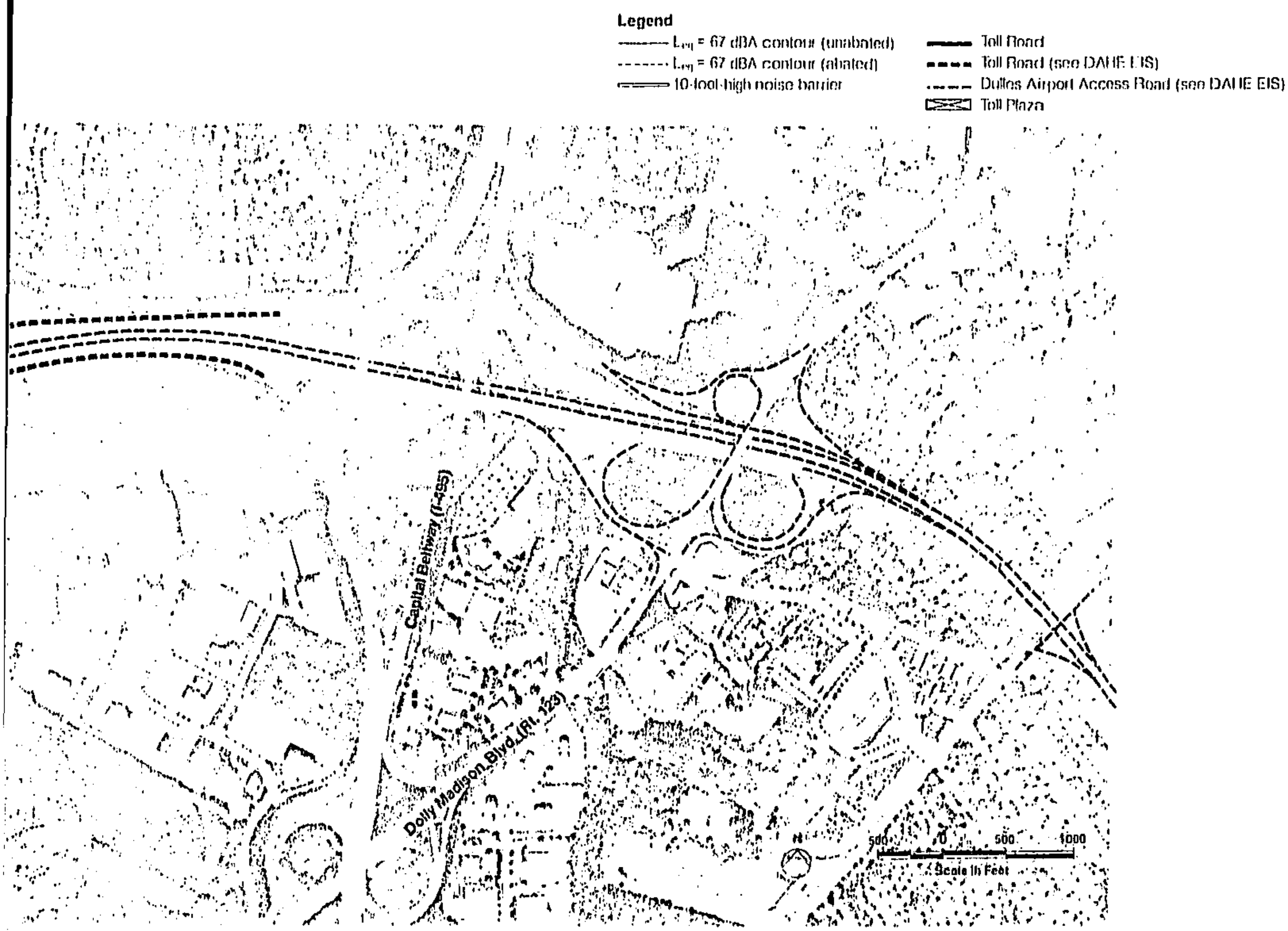

Legend
$L_{eq}$ = 67 dBA contour (unabated)
$L_{eq}$ = 67 dBA contour (abated)
$L_{eq}$ = 57 dBA contour (abated)
10-foot-high noise barrier
Toll Road
Toll Plaza
Dulles Airport Access Road
Beulah Rd.
Wolf Trap Farm Park
Trap Rd.
Match Line C
N
500 0 500 1000
Scale in Feet

Figure IV-10
**Noise Contours and Barrier Locations for Toll Road Alternative (West of Route 7 to Route 7)**




Legend
$L_{eq}$ = 67 dBA contour (unabated)
$L_{eq}$ = 67 dBA contour (abated)
10-foot-high noise barrier
Toll Road
Toll Road (see DAHE EIS)
Dulles Airport Access Road (see DAHE EIS)
Toll Plaza
Capital Beltway (I-495)
Dolly Madison Blvd. (Rt. 123)
N
500 0 500 1000
Scale in Feet

for the toll road alternative and summarized for the noise monitoring locations in Table IV-18. These alternative abatement measures are discussed below.

Traffic Management Measures. The FHWA suggests a number of traffic management strategies as possible noise abatement measures. These are:

- o traffic control devices and signing for prohibition of certain vehicle types,
- o time/use restrictions for certain vehicle types,
- o modified speed limits, and
- o exclusive lane designations.

All of the above traffic management measures except modified speed limits and exclusive lane designations are implicit in the TSM alternative and are therefore reflected in the design year noise level predictions for that alternative.

Alteration of Vertical or Horizontal Alignment. Alteration of the alignment of the toll road was considered. While the impact on noise levels within the corridor associated with a horizontal alignment change would be negligible (due to the limited right-of-way), depressing the proposed facility could reduce noise levels along the depressed sections from 2 to 3 dBA depending on receptor distance from the edge of the traffic lanes.

Noise Barriers. A barrier analysis was conducted to determine the attenuation obtainable through the construction of 10-foot high thin wall noise barriers of various lengths along the proposed outer parallel lanes under the toll road alternative and along the DAAR under the TSM alternative (Table IV-20). Abatement through barrier construction is not possible at affected structures along the corridor

Table IV-20
**Noise Abatement Potential**

| Roadway/Direction | Barrier Location | Barrier Length (Feet) | No. of Affected Residences for Which Abatement Could be Provided |
|---|---|---|---|
| 2000 Toll Road | | | |
| Westbound | East of Sully Road | 1,500 | 55 |
| Westbound | East of Sully Road | 730 | 3 |
| Westbound | Crossover Monroe | 1,050 | 9 |
| Westbound | East of Reston Avenue | 1,770 | 5 |
| Westbound | West of Reston Avenue | 1,130 | 4 |
| Eastbound | East of Reston Avenue | 1,120 | 3 |
| Eastbound | East of Hunter Mill Road | 860 | 6 |
| Westbound | West of Beulah Road | 650 | 2 |
| Westbound | West of Hunter Mill Road | 1,270 | 5 |
| Westbound | West of Route 7 | 3,540 | 32 |
| Westbound | Wolf Trap Farm Park | 2,000 | Not applicable |
| Westbound | East of Beulah Road | 2,780 | 59 |
| Westbound | West of Beulah Road | 1,150 | 4 |
| Eastbound | West of Beulah Road | 2,700 | 23 |
| Eastbound | East of Beulah Road | 1,370 | 5 |
| Eastbound | West of Trap Road | 1,270 | 9 |
| Eastbound | Plantation | 3,430 | 22 |
| Eastbound | West of Route 7 | 1,100 | 5 |
| Total | | 29,420 | 251 |
| 2000 TSM (DAAR) | | | |
| Westbound | Sully Road | 1,300 | 20 |
| Eastbound | West of Trap Road | 270 | 1 |
| Eastbound | East of Trap Road | 1,340 | 1 |
| Eastbound | East of Trap Road | 1,335 | 2 |
| Westbound | East of Trap Road | 1,450 | 4 |
| Westbound | Wolf Trap Farm Park | 1,750 | Not applicable |
| Westbound | West of Beulah Road | 1,190 | 2 |
| Total | | 8,635 | 30 |

not included in Table IV-20 due to the presence of crossroads and access ramps. Several barriers included in Table IV-20 have been eliminated from further consideration due to excessive costs with respect to number of receptors protected. The abated $L_{eq}$ = 67 dBA contours assuming construction of the 10-foot high finite length barriers likely to be incorporated in the project are shown in Figures IV-7 through IV-10 for the toll road alternative. Construction of the proposed 10-foot high barriers likely to be incorporated in the project would effectively reduce design year noise level estimates below the $L_{eq}$ = 67 dBA design level at 243 of the 261 impacted residences along the corridor under the toll road alternative and 25 of the 30 affected structures under the TSM alternative.

In addition to the corridor analysis discussed above, a separate barrier analysis was conducted at Wolf Trap Farm Park. The results of this analysis are summarized for selected receptor locations (50, 200, 500, 1000 and 2000 feet from the proposed roadway) in Table IV-21 and illustrated in Figure IV-11 for the toll road alternative. While the proposed 10-foot high noise barrier would be effective in reducing design year noise estimates below the $L_{eq}$ = 67 dBA design level, at Filene Center they would not contribute to the achievement of the $L_{eq}$ = 57 dBA design level (the standard for amphitheatres and tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need). This is because the $L_{eq}$ = 57 dBA contour (unabated) is located approximately 4000 feet from the proposed toll road, where a finite barrier would provide less than a 2 dBA reduction. It should be noted, however, that the aforementioned design year noise level estimates are based on design hour traffic conditions (the 30th highest hour of the design year, usually occuring between 5 and 6 P.M.) and not on conditions found on an average day during the hours of an evening performance at Wolf Trap Farm Park (8:30 P.M. to 12 P.M.). Based on diurnal traffic count data recorded along the DAAR at Wolf Trap Farm Park in June 1980, hourly equivalent noise levels near Filene Center during evening hours could be expected to be from 3 to 6 dBA lower than the levels during the peak 5-6 P.M. period. Under these typical evening conditions, the 2000 design year $L_{eq}$ = 57 dBA contour (unabated) would

Table IV-21
**Noise Attenuation Using Noise Barriers at Wolf Trap Farm Park**

| Receptor Distance (Feet) | Attenuation with Barrier (dBA)* | Noise Level Estimates (dBA) | | | |
|---|---|---|---|---|---|
| | | Design Hour | | Typical Evening Hour | |
| | | Unabated | Abated | Unabated | Abated |
| 2000 Toll Road | | | | | |
| 50 | 11 | 76 | 65 | 70-73 | 59-62 |
| 200 | 8 | 72 | 64 | 66-69 | 58-61 |
| 500 | 6 | 68 | 62 | 62-65 | 56-59 |
| 1,000 | 4 | 65 | 61 | 59-62 | 55-58 |
| 2,000 | 2 | 60 | 58 | 54-57 | 52-55 |
| 2000 TSM | | | | | |
| 50 | 10 | 72 | 62 | 66-69 | 56-59 |
| 200 | 8 | 68 | 60 | 62-65 | 54-57 |
| 500 | 6 | 65 | 59 | 59-62 | 53-56 |
| 1,000 | 4 | 62 | 58 | 56-59 | 52-55 |
| 2,000 | 2 | 56 | 54 | 50-53 | 48-51 |

Note: * Assuming 10-foot high thin wall, 2,000-foot barrier.

Figure IV-11
**Noise Contours and Barrier Location for Toll Road Alternative at Wolf Trap Farm Park**

**Legend**
$L_{eq}$ = 67 dBA contour (unabated)
$L_{eq}$ = 67 dBA contour (abated)
$L_{eq}$ = 57 dBA contour (abated)
10-foot-high noise barrier

occur approximately 1300 feet to 2000 feet from the proposed parallel lanes under the toll road alternative and 800 to 1100 feet from the DAAR under the TSM alternative. Construction of a 10-foot high finite barrier could effectively reduce design year noise levels at Filene Center below 57dBA during typical evening performance hours under the TSM alternative. Under the toll road alternative the $L_{eq}$ = 57dBA contour would fall from approximately 300 to 1300 feet depending upon the hour of analysis.

Proposed Noise Abatement Measures. Based on the preceding analysis of alternative noise abatement measures, the construction of noise barriers is recommended for incorporation in the design of the TSM or toll road alternatives at locations where the overall benefits of abatement outweigh possible adverse effects and other conflicting values such as economic reasonableness, highway safety, and neighborhood desires. The proposed barriers could be constructed out of any one of several different types of materials: woods, metals, concrete, masonry, plexiglass, etc. or combinations of the above. The estimated cost of the proposed noise barriers likely to be incorporated in the project is approximately $3,694,740 for the toll road alternative and $634,410 for the TSM alternative. If it subsequently develops during final design that these conditions have substantially changed, the abatement measures might not be provided. A final decision on the installation of the abatement measures will be made upon completion of the project design and public involvement processes.

Construction Noise. In response to the detailed provisions of the FHWA noise standards, which require that land uses activities that may be affected by noise from construction of a highway section be identified and that contract plans and specifications be drawn to minimize or eliminate adverse construction noise impacts, the VDHT has issued special provisions for noise control (Table IV-22). These specifications require that construction operations be performed in such a manner that the maximum allowable construction noise levels are not be exceeded. The maximum allowable

Table IV-22
**Maximum Allowable Construction Noise Levels**

| Distance from Right-of-Way Line to Point of Reception (Feet) | Maximum Allowable Noise Levels for Residences, Hospitals, Nursing Homes, Schools, Churches, Libraries, Offices, Parks, Picnic Areas, Recreational Areas, Playgrounds, Active Sports Areas (dBA) | | Maximum Allowable Noise Levels for Commercial and Industrial Areas (dBA) |
|---|---|---|---|
| | 6 A.M. to 8 P.M. | 8 P.M. to 6 A.M. | All Times |
| 0–53 | 88 | 73 | 93 |
| 54–59 | 87 | 72 | 92 |
| 60–67 | 86 | 71 | 91 |
| 68–75 | 85 | 70 | 90 |
| 76–84 | 84 | 69 | 89 |
| 85–94 | 83 | 68 | 88 |
| 95–106 | 82 | 67 | 87 |
| 107–119 | 81 | 66 | 86 |
| 120–133 | 80 | 65 | 85 |
| 134–149 | 79 | 64 | 84 |
| 150–167 | 78 | 63 | 83 |
| 168–188 | 77 | 62 | 82 |
| 189–211 | 76 | 61 | 81 |
| 212–239 | 75 | 60 | 80 |
| 240–272 | 74 | 59 | 79 |
| 273–308 | 73 | 58 | 78 |
| 309–334 | 72 | 57 | 77 |
| 335–375 | 71 | 56 | 76 |
| 376–421 | 70 | 55 | 75 |

construction noise levels are not applicable to blasting or pile-driving operations performed between 7 A.M. and 7 P.M. General contractors for the toll road project would be required to comply with these special provisions.

Construction activities along the DAAR corridor should have a short-term noise impact on sensitive receptors in the immediate vicinity of the construction site. The extent of construction-associated noise impact depend upon the nature of the highway segment, the construction scheduled, and the noise characteristics of the construction equipment.

In general, construction noise impacts occur only during daytime working hours of 7 A.M. to 7 P.M. and should be highest during the clearing and excavation phases of construction when blasting operations accompanied by heavy daily truck flows occur. The noisiest equipment likely to be employed in the construction of the toll road would be impact equipment (pile drivers, jack hammers, and rock drills), and earth moving equipment (back hoes, tractors, scrapers, graders, and other heavy duty diesel trucks). Average noise levels measured in dBA at 50 feet for typical construction equipment range from 80 dBA for a compactor to 101 dBA for a pile driver/extractor.

Requests for Exceptions. Noise abatement measures other than noise barriers are more difficult to apply because of the limited ability to acquire additional right-of-way as buffer zones, and the impossibility of altering roadway grades. Possible exceptions to the design noise levels may therefore be requested for those portions of the corridor where it does not appear that abatement measures are feasible or cost effective. The supporting information required by the FHWA noise standards will be prepared after reviewing comments received at the joint Location and Design Public Hearing.

Table IV-23
**Operational Energy—Annual Fuel Consumption**

| Year and Network | Network Daily Vehicle Miles Traveled (VMT) | | | Network Daily Vehicle Hours Traveled | | | Network Average Daily Speed | | | Annual Fuel Consumption (Gallon x $10^3$) | Annual Average (VMT/gallon) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cruising | Stop & Go | Total | Cruising | Stop & Go | Total | Cruising | Stop & Go | Total | | |
| Base Year (1977) | 2,967,078 | 744,353 | 3,711,431 | 67,317 | 28,399 | 95,716 | 44.1 | 26.2 | 38.8 | 97,362 | 13.9 |
| 1985 No-Build | 3,867,575 | 1,017,212 | 4,884,787 | 92,273 | 41,552 | 133,825 | 41.9 | 24.5 | 36.5 | 90,774 | 19.6 |
| 1985 TSM | 3,927,340 | 983,917 | 4,911,257 | 91,823 | 43,627 | 135,450 | 42.8 | 22.6 | 36.3 | 90,706 | 19.8 |
| 1985 Toll Road | 3,978,311 | 975,111 | 4,953,422 | 90,691 | 39,979 | 130,670 | 43.9 | 24.4 | 37.9 | 92,192 | 19.6 |
| 2000 No-Build with METRO | 5.374,155 | 1,646,592 | 7,020,747 | 135,522 | 76,540 | 212,062 | 39.7 | 21.5 | 33.1 | 104,955 | 24.4 |
| 2000 No-Build without METRO | 5,469,368 | 1,672,776 | 7,142,144 | 138,700 | 76,179 | 214,879 | 39.4 | 22.0 | 33.2 | 106,664 | 24.4 |
| 2000 TSM with METRO | 5,572,600 | 1,601,388 | 7,173,988 | 138,000 | 72,514 | 210,514 | 40.4 | 22.1 | 34.1 | 106,448 | 24.6 |
| 2000 TSM without METRO | 5,567,293 | 1,650,893 | 7,218,186 | 139,405 | 77.773 | 217,178 | 39.9 | 21.2 | 33.2 | 107,111 | 24.6 |
| 2000 Toll Road with METRO | 5,642,487 | 1,559,042 | 7,201,529 | 136,356 | 68,656 | 205,011 | 41.4 | 22.7 | 35.1 | 107,213 | 24.5 |
| 2000 Toll Road without METRO | 5,843,617 | 1,592,075 | 7,435,692 | 741,702 | 72,052 | 213,754 | 41.2 | 22.1 | 34.8 | 111,065 | 24.4 |

## Energy

The energy requirements and conservation potential associated with the project alternatives were estimated by separating the project into its operation, construction, and maintenance phases.

Vehicle fuel consumption was computed by estimating for each link in the traffic network the number of vehicle miles traveled at a constant speed, in a stop-and-go mode, and idling at a stop for four vehicle types: passenger cars, light duty trucks, and heavy duty gas and diesel trucks. Adjustment factors for ambient temperature, light-duty vehicle weight, and improved operating efficiency were incorporated into the model which estimated vehicle operating fuel consumption.

Table IV-23 shows annual fuel consumption associated with vehicles traveling in the impact area for the base year (1977), opening year of the toll road (1985), and design year (2000). As can be seen from the table, annual operational fuel consumption is projected to increase from 97 million gallons of gasoline in 1977 to between approximately 105 and 111 million gallons in year 2000, depending on the particular project alternative. The toll road alternative would consume the most energy (followed by the TSM), while the no-build would be most energy efficient. The higher projected fuel consumption associated with the toll road can be explained by the greater number of vehicle miles traveled but the only marginally improved speeds in the toll road alternative compared to the TSM and no-build.

In each alternative, implementation of the METRO extension to the airport would result in a savings in operational fuel consumption. The amount of energy saved annually would range from 663,000 gallons of gasoline under the TSM (0.6%) to 3,842,000 gallons under the toll road alternative (3.4%).

Table IV-24
**Total Energy Consumed Over the Design Life for Each Alternative**

| Case | Fuel Consumption* | Construction | Maintenance | Total | Total |
|---|---|---|---|---|---|
| | (Btu's x $10^7$) | | | | (Gallons x $10^3$) |
| No-Build with METRO** | 18,488,450 | – | 726 | 18,489,176 | 1,479,134 |
| No-Build without METRO | 18,509,813 | – | 726 | 18,510,539 | 1,480,843 |
| TSM with METRO** | 18,537,056 | 3,622 | 755 | 18,541,433 | 1,483,314 |
| TSM without METRO | 18,545,344 | 3,622 | 755 | 18,549,721 | 1,483,977 |
| Toll Road with METRO** | 19,006,381 | 51,990 | 1,452 | 19,059,823 | 1,524,785 |
| Toll Road without METRO | 19,054,406 | 51,990 | 1,452 | 19,107,848 | 1,528,627 |

Notes: * Fuel consumption is equal to gallons of gasoline x 1.25 x $10^5$ Btu/gallon.

** Energy associated with METRO fuel consumption, construction, and maintenance is not included in these estimates.

Construction energy is another component of the total energy consumption associated with the project alternatives. Construction estimates include energy requirements for new roadway pavement and pavement demolition; new bridge structures; guard rails; clearing and grubbing operations; drainage, including pipes and culverts; fencing; signs; erosion control; and maintenance of traffic. Energy requirements are estimated at $5.2 \times 10^{11}$ Btu's for construction of the toll road alternative and $3.6 \times 10^{10}$ Btu's for construction of the TSM alternative. From a construction energy standpoint, the TSM alternative would require only 7 percent of the energy that would be required to construct the toll road. The no-build scheme would obviously require no expenditure of construction energy.

Maintenance energy estimates for the toll road, TSM, and no-build alternatives were computed on a per mile basis and summed over the 15-year design period of the facilities. Maintenance of the toll road alternative would require $1.45 \times 10^{10}$ Btu's of energy (for the toll road and DAAR) over the 15-year design life. Maintenance of the TSM alternative would require $7.55 \times 10^{9}$ Btu's of energy (for the DAAR and additional ramps), approximately 52 percent of the toll road alternative. The no-build alternative would require $7.26 \times 10^{9}$ Btu's of energy for maintenance of the Dulles Airport Access Road over a 15-year period. This represents approximately 50 percent of the energy required for maintenance of the toll road alternative.

Energy resources required for the construction, operation, and maintenance of each of the project alternatives for a 15-year design life are shown in Table IV-24. This table indicates the total amount of energy consumed over the design life of the proposed facility. It assumes the continued introduction of new vehicles which meet the National Health and Transportation Safety Act Passenger Automobile Average Fuel Economy Standards and takes potential construction and maintenance energy conservation measures into account. The yearly vehicle miles of travel estimates upon which the operational energy impacts are based however, are price inelastic and do not consider the possible reduction in highway travel due to increases in the cost of gasoline. The estimate of total energy resources committed to the operation of the proposed facility thus represents a conservative upper bound which is unlikely to be exceeded.

As can be seen from Table IV-24, energy requirements for vehicles traveling throughout the impact area would represent virtually the entire amount of energy consumption for all the alternatives — over 99 percent of the total. The toll road with its higher vehicle miles traveled and only marginally improved average speed would thus require the greatest amount of energy while the no-build would be most energy conservative, consuming about 3 percent less energy than under the toll road alternative. Implementation of the METRO would result in a relatively marginal savings in energy consumption in each alternative, ranging from 0.04 percent in the no-build to 0.2 percent in the toll road alternative.

## E. WATER RESOURCES AND ECOLOGY

The construction and operation of the proposed Dulles Toll Road would have varying degrees of short- and long-term impacts. The TSM would have substantially less construction activity and fewer adverse impacts on water resources and ecology than the toll road alternative. The impacts of the alternatives on water resources are summarized in Tables IV-25 and IV-26.

### Construction Impacts

Erosion, Sedimentation, and Drainage Impacts. Construction of highway facilities can cause erosion in exposed areas. Construction operations that contribute to erosion are clearing and grubbing, construction of haul roads, earth moving and grading, ditch construction, and foundation excavations. Sediment transported by storm water runoff to nearby drainage ditches from the denuded construction

Table IV-25
**Estimated Increase in Peak Flows as a Result of the Toll Road Alternative at the Proposed Roadway Crossings**

| Stream | Drainage Area (Acres) | Percent Increase in Peak Flows | | |
|---|---|---|---|---|
| | | 2.33* | 25* | 100* |
| Wolftrap Creek | 2,265 | Nil | Nil | Nil |
| Old Courthouse Spring Branch | 736 | Nil | Nil | Nil |
| Difficult Run | 19,584 | Nil | Nil | Nil |
| Colvin Run | 154 | 9 | 7 | 6 |
| Smilax Branch | 218 | 8 | 8 | 8 |
| Sugarland Run | 666 | 3 | 3 | 2 |
| Sugarland Head Run | 262 | 8 | 8 | 8 |
| Copper Branch | 230 | 5 | 6 | 5 |

Note: * Indicates recurrence interval in years.

Table IV-26
**Estimated Runoff Pollution Loadings in the Study Area**

| Pollutant | Daily Production of Water Pollutants (mg/vehicle mile) | Annual Pollutant Loadings (kilograms) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1977 Base Year | In Year 2000 With METRO | | | In Year 2000 Without METRO | | |
| | | | No-Build | TSM | Toll Road | No-Build | TSM | Toll Road |
| Chemical Oxygen Demand | 85.3 | 113,585 | 218,588 | 222,979 | 224,216 | 222,649 | 224,337 | 231,507 |
| Suspended Solids | 161.2 | 214,653 | 413,087 | 421,386 | 423,724 | 420,762 | 423,951 | 437,502 |
| Floatable Solids | 5.3 | 7,057 | 13,582 | 13,855 | 13,931 | 13,834 | 13,939 | 14,384 |
| Settleable Solids | 58.4 | 77,765 | 149,654 | 152,661 | 153,508 | 152,435 | 153,590 | 158,499 |
| Oil | 13.0 | 17,311 | 33,313 | 33,983 | 34,171 | 33,932 | 34,190 | 35,282 |
| Chromium | 0.01 | 13.3 | 25.6 | 26.1 | 26.3 | 26.1 | 26.3 | 27.1 |
| Copper | 0.09 | 120 | 231 | 235 | 237 | 235 | 237 | 244 |
| Zinc | 0.99 | 1,318 | 2,537 | 2,588 | 2,602 | 2,584 | 2,604 | 2,687 |
| Lead | 2.44 | 3,249 | 6,253 | 6,378 | 6,414 | 6,369 | 6,417 | 6,622 |
| Nickel | 0.08 | 107 | 205 | 209 | 210 | 209 | 210 | 217 |
| Total Phosphorus | 0.13 | 173 | 333 | 340 | 342 | 339 | 342 | 353 |
| Total Nitrogen | 4.58 | 6,099 | 11,737 | 11,972 | 12,039 | 11,955 | 12,045 | 12,430 |
| Estimated Traffic Volume (vehicle miles per day) | – | 3,711,600 | 7,020,800 | 7,161,800 | 7,201,600 | 7,151,200 | 7,205,400 | 7,435,700 |

site can cause damage to culverts and increase the turbidity, suspended solids concentrations, and sediment deposition in streams.

The construction of the toll road would require culverts at the stream crossings except at Difficult Run, which would need an expanded bridge to accommodate the toll road. The construction of the culverts may change the hydraulic characteristics of the streams and create bottom scour and bank cutting if flow velocities are increased.

Since most of the toll road would be constructed in highly erodible soils, erosion control measures such as the use of straw bales, seeding, mulching, and other measures indicated in the VDHT Manual on Erosion and Sedimentation Control would be applied to minimize the erosion in the disturbed area and the amount of sediments that would reach streams. Minimization of the land area exposed during construction would reduce the erosion impact.

Impacts on Groundwater. Excavation for the proposed toll road might increase the susceptibility of the groundwater table to pollution as a result of accidental oil or gasoline spills from construction equipment. Careful selection and operation of equipment would minimize the risk of accidental spills. Spills would be controlled immediately by containment and off-site disposal. Runoff should be directed away from the existing wells to protect them from direct contamination.

If dewatering operations are required during construction, they may reverse the local groundwater gradient affecting the water levels of at most five wells located very close (within tens of meters) to the dewatering well points. This disruption would be of a temporary nature and the static level of the water table would recover shortly after dewatering operations stop.

Impacts on Surface Water Quality and Ecology. Construction activities can affect surface water quality by the introduction of waste products such as spent lubricants and rinse water from construction machinery. As previously noted, construction can also cause higher turbidity and suspended solids concentrations in the streams, and siltation and nutrient loading in adjacent watersheds.

Siltation can lead to destruction of fish spawning beds and habitats occupied by bottom-dwelling organisms, restriction of light penetration and photosynthesis, and lower dissolved oxygen concentrations resulting in fish kills. The aquatic communities in the study area have developed significant adaptations in response to heavy siltation and both fish and macrobenthic communities usually recover rapidly once the source of siltation is controlled. Potential siltation problems can be avoided through proper erosion control measures indicated in the VDHT Manual on Erosion and Sedimentation Control.

## Long-Term Impacts

Impact of Runoff. The increase in paved areas for the construction of the parallel roadways and interchanges would increase runoff rates and peak discharges by reducing the amount of water from precipitation that otherwise would infiltrate the ground or be retained in depressions or by vegetation. As seen in Table IV-25, the increase in peak discharges as a result of increases in impervious surface area is much higher in small drainage basins such as Colvin Run, Smilax Branch, Sugarland Head Run, and Copper Branch than in large streams such as Difficult Run. The increase in peak discharges may increase flood hazards locally in the vicinity of the road crossings. The increase in impervious cover area may also result in a decrease of low flow between storms since larger impervious areas would decrease the natural recharge of the groundwater table which feeds streams. This effect would be more pronounced in small watersheds such as Smilax Branch, Colvin Run, Sugarland Head Run, and Copper Branch.

Control measures for flooding problems might include impoundments and detention ponds. These measures would reduce the flood flow peaks by their storage effect and would also control the siltation by settling suspended solids.

Groundwater. Approximately 50 percent of the toll road would extend over soil of low permeability such as clays and silts. These soils are also characterized by a relatively high rate of absorption of ions of pollutants, which tends to protect the groundwater table from pollutants conveyed by runoff waters. Also, the pollutants resulting from highway runoff would be discharged to drainage ditches and streams where the flows would be diluted. Consequently, it is expected that the quantities of materials entering the groundwater table would be insignificant.

Surface Water Quality. The principal long-term impact of the toll road on water quality would be the change in quality of storm water runoff and its effect on the receiving waters. Storm water runoff becomes polluted from numerous sources, including vehicles and litter. The pollutant loads for the 1977 base year as well as those for the year 2000 no-build, TSM, and toll road alternatives -- with and without METRO -- were estimated based on projections of average daily traffic in Fairfax and Loudoun Counties.

The estimated pollutant loadings released to the study area in the year 2000 would be approximately double the 1977 loadings whether or not the project is built. The increase in traffic-related pollutant loadings for the various alternatives compared to the no-build alternative without METRO is shown below. The traffic-originated pollutant loading rates are shown in Table IV-26.

INCREASE IN HIGHWAY-ORIGINATED-POLLUTANT LOADINGS COMPARED TO YEAR 2000 NO-BUILD WITHOUT METRO

| | 1977 | No-Build | TSM | Toll Road |
|---|---|---|---|---|
| With METRO | (not applicable) | -0.019 | 0.001 | 0.007 |
| Without METRO | -0.51 | 0 | 0.008 | 0.04 |

As can be seen from the table, the with-METRO option would reduce the vehicle miles traveled for the alternatives, resulting in reduced pollutant loadings of approximately 3.3 percent for the toll road alternative and 0.6 percent for the TSM. The toll road without METRO would result in the highest increase in traffic-related pollutant loadings (approximately 4 percent higher than the no-build without METRO). This incremental change is insignificant compared to the increase of pollutant loadings in the year 2000 over 1977, regardless of alternative.

The mitigation of pollutants originating from highways may be achieved by a combination of the following measures:

- o reduction in additives to gasoline, particularly lead (since all new cars use unleaded fuel, the lead concentration should decrease in the future);
- o frequent surface sweeping; and
- o storm runoff detention in sedimentation basins.

Impacts on Ecology. Habitat alteration resulting from the construction and loss of grass and forest land would drive many natural occupants, such as birds and large mobile mammals, to seek new dwellings in less disturbed areas. Those members lacking in mobility would probably be unable to escape during clearing operations and earth moving. Most likely to be affected in this manner would be small mammals, reptiles, amphibians and the natural flora.

There are no endangered species in the immediate project area that would be affected by alterations associated with the toll road alternative, nor are there any endangered species located in the proximity of the planned interchanges.

Some loss of Forest Wetlands located in Difficult Run, Old Courthouse Spring Branch, Wolftrap Creek, and Copper Branch would occur because of construction of the toll road. As discussed in the section on construction impacts, above, the Aquatic Beds wetlands located in the Wolftrap Creek, Old Courthouse Spring Branch, and Difficult Run floodplains could be protected through effective erosion control measures during construction of the toll road.

No long term impacts on aquatic life are expected to result from the toll road or TSM alternatives.

Comparison of Alternatives

The toll road, in comparison with the no-build, would result in those adverse impacts associated with construction activities such as excavation and fill: additional runoff; increased highway-related pollutant loadings; and loss of small acreage of forest lands and forest wetlands. The TSM alternative would involve substantially less construction than the toll road alternative and would result in fewer water resources and ecology-related impacts. The with-METRO options would reduce somewhat the traffic-related pollutant loadings of both the TSM and the toll road alternatives.

Permit Requirements

Permit regulations and related requirements applicable to the toll road alternative include:

- Subaqueous Bed Permit: This permit requirement applies to the use of subaqueous beds which are the property of the State of Virginia and/or the use of wetlands.

- 401 Certification: Any discharger applying for a federal permit under Public Law 92-500 is required by Section 401 to obtain state certification that the discharge will comply with the sections that deal with effluent water quality.

- Section 404 Permit: Discharge of dredged fill material into navigable water is authorized by Section 404 of Public Law 92-500, and the permit is issued by the U.S. Army Corps of Engineers (only if dredging and/or fill is required during construction).

Only Difficult Run would require a Section 404 Permit because it has a drainage area larger than 5 sq. mi. at the proposed toll road crossing, and the required fill volume in its flood plain for the construction of the toll road might (pending more detailed roadway design) exceed 200 cubic yards.

The construction activities at Difficult Run, Wolftrap Creek, Old Courthouse Spring Branch, Sugarland Branch, and Copper Branch would be carried out on federally-owned lands and, hence, require compliance with Executive Order 11988 which relates to floodplain management. In accordance with the Executive Order, this determination is based on Flood Hazard Boundary and Flood Insurance Rate Maps for Fairfax County Virginia, issued by the Department of Housing and Urban Development on May 14, 1976, and/or on Fairfax County Floodplain Maps. This Executive Order requires agencies to "take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains," and to be consistent at a minimum with the intent of the standards and criteria promulgated under the National Flood Insurance Program.

The National Flood Insurance Program established a standard which limits the increase of the 100-year flood level as a result of construction in the floodplain to less than one foot. Data concerning the increase of the 100-year flood level as a result of the toll road construction must be developed prior to approval for implementation of the project.

Executive Order 11990, which relates to wetlands, applies to Old Courthouse Spring Branch, Wolftrap Creek, Difficult Run, and Copper Branch. The flood plains of these streams are designated as Forest Wetlands and Aquatic Beds.

On November 25, 1980, an interagency early coordination meeting was held with federal and state agencies concerned with water quality and ecology. At that meeting, representatives of the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the Virginia Water Control Board noted that the TSM alternative would require substantially less construction than the toll road alternative and would result in fewer water-resources- and ecology-related impacts.

## F. SUMMARY COMPARISON OF ALTERNATIVES

Table IV-27 summarizes the major impacts associated with the project alternatives.

Table IV-27
**Summary Comparison of Alternatives**

| Impact | Alternative | | |
|---|---|---|---|
| | No-Build | TSM | Toll Road |
| Cost | 0 | $3.9 million (Construction limits, Route 28 to Route 7) | $33.5 million (Route 28 to Route 7) |
| <u>Transportation</u> | | | |
| Vehicle miles of travel | 7,020,800/7,151,200* | 7,161,800/7,151,200* | 7,201,600/7,435,700* |
| Vehicle hours of travel | 212,070/218,130* | 210,170/216,810* | 205,010/215,750* |
| Average speed | 33.1/32.8* | 34.1/33.2* | 35.1/34.8* |
| Percent of total miles at LOS E&F | 26.3/27.4 | 27.7/28.0 | 22.3/23.2 |
| <u>Socioeconomic and Land Use Resources</u> | | | |
| Displacement/relocation | 0 | 0 | 0 |
| Establishment of physical barriers | None | None | None |
| Right-of-way requirements (acres) | 0 | 5.5 | 20 |
| Assessed value of acreage | 0 | $1,968 | $18,500 |
| Changes in social activity patterns | None | None | None |
| Major subdivisions affected | None | Reflection Woods, Sun Valley, Cinnamon Creek, Wolftrap Woods | Reflection Woods, Sun Valley, Cinnamon Creek, Wolftrap Woods |
| Intensification of projected residential development trends | None | None | In Hattontown and Crowells Corner areas |
| Construction employment | 0 | 40 | 200-250 |
| Construction labor (person-months) | 0 | 720 | 6,000-7,500 |

Note: * With METRO/without METRO.

Table IV-27 (continued)

| Impact | Alternative | | |
|---|---|---|---|
| | No-Build | TSM | Toll Road |
| Operation and maintenance employment | 0 | 0 | 50-60 |
| Would aid in attracting projected share of regional employment growth | No | No | Yes |
| Would aid in reducing commuting out of county for work | No | No | Yes |
| Would intensify demand for schools | No | No | No |
| Would intensify demand for sewers | No | No | Yes |
| Would intensify demand for water | No | No | No |
| Would intensify demand for solid waste management facilities | No | No | No |
| Impact on counties' fiscal position | None | None | Some improvement |
| Historic, Archaeological, and Recreational Resources | | | |
| Demolition/relocation/taking of property | None | None | None |
| Changes in noise levels | Increase over base year | Within ±1 dBA of no-build | 4-6 dBA more than no-build. Significant adverse impact at Wolf Trap Farm Park if vehicle-related noise is unabated. Noise barrier could reduce levels to below no-build and base year but could not meet FHWA design noise level standard of 57 dBA for amphitheatres or wilderness preserves. |
| Changes in accessibility to facilities | None | Improvement in off-peak hours and on weekends to sites with countywide service area | Improvement to sites with countywide service area |

Table IV-27 (continued)

| Impact | Alternative | | |
|---|---|---|---|
| | No-Build | TSM | Toll Road |
| **Air, Noise, Energy** | | | |
| Microscale CO | No violations of 1- and 8-hour NAAQS CO standards | No violations of 1- and 8-hour NAAQS CO standards | No violations of 1- and 8-hour NAAQS CO standards |
| Mesoscale (Year 2000) | | | |
| CO | 22,564/22,912* | 22,584/22,673* | 23,113/23,993* |
| HC | 2,396/2,434* | 2,414/2,430* | 2,426/7,158* |
| $NO_x$ (tons/year) | 6,896/7,020* | 7,039/7,070* | 7,158/7,438* |
| Consistent with State Air Quality Implementation Plan | Yes | Yes | Yes |
| Noise levels (Year 2000)... | Increase over base year values at all sites | ±1 dBA over no-build alternative | 4-6 dBA increase over no-build alternative |
| Number of (noise) affected residences | N/A | 30 | 261 |
| Preliminary cost estimate of noise barriers likely to be incorporated in project | N/A | $634,410 | $3,694,740 |
| Total energy consumed over design life of facility | | | |
| (gallons x $10^3$) | 1,479,134/1,480,843* | 1,483,314/1,483,977* | 1,524,785/1,528,827* |
| (Btu's x $10^7$) | 18,488,450/18,509,813* | 18,537,056/18,545,344* | 19,006,381/19,054,406* |

Notes: * With METRO/without METRO.
N/A = Not applicable

Table IV-27 (continued)

| Impact | Alternative | | |
|---|---|---|---|
| | No-Build | TSM | Toll Road |
| Water Resources and Ecology | | | |
| Runoff | None | Negligible | Increase of 8-9% in small drainage basins; possibility of increased localized flood hazards in the vicinity of the road crossing; control measures could resolve this problem. |
| Groundwater quality | None | None | None |
| Annual pollutant loadings (% Increase over 2000 no-build (without METRO) | Not applicable/-0.51* | 0.1/0.8* | 0.7/4* |
| Existence of endangered species | None | None | None |
| Permits | None | None | Subaqueous bed permit, state water quality certification (Section 401), U.S. Army Corps of Engineers discharge permit (Section 404) |

Note: * With METRO/without METRO

## V. LIST OF AGENCIES, ORGANIZATIONS, AND OFFICIALS TO WHOM COPIES OF EIS ARE SENT

The Draft Environmental Impact Statement is being distributed to the following federal, state, regional, and local agencies for their review and comment.

Federal

- Council on Environmental Quality
- U.S. Department of Agriculture
- U.S. Department of the Army, Corps of Engineers, Baltimore
- U.S. Department of Commerce, Environmental Affairs
- U.S. Department of Energy
- U.S. Department of Health and Human Services, Office of Environmental Affairs
- U.S. Department of Housing and Urban Development
- U.S. Department of the Interior
    - Fish and Wildlife Service
    - Geological Survey
    - National Park Service
- U.S. Department of Transportation
    - Federal Highway Administration
    - Office of Environment and Safety
    - Urban Mass Transportation Administration

Commonwealth of Virginia

Air Pollution Control Board
Commission of Arts and Humanities
Commission of Game and Inland Fisheries
Commission of Outdoor Recreation
Council on the Environment
Department of Agriculture and Commerce
Department of Conservation and Economic Development
Department of Health
Department of Planning and Budget
Division of State Parks
Historic Landmarks Commission
Institute of Marine Science
Office of Emergency and Energy Services
Research Center for Archaeology
Soil and Water Conservation Commission
Water Control Board

Regional

Metropolitan Washington Council of Governments
Northern Virginia Regional Parks Authority
National Capital Planning Commission
Northern Virginia Planning District Commission
Regional Coordinator for Mid-South States

Local

Fairfax County - County Executive
Loudoun County - County Administrator
Town of Herndon - Town Manager

## VI. COMMENTS AND COORDINATION

### A. AGENCY CONTACTS

During the course of the environmental studies for the proposed Dulles Toll Road and alternatives, over 30 county, state, regional, and federal agencies were contacted. The purposes of the contacts were to inform the agencies about the environmental studies; collect data; and/or to obtain comments on specific areas of interest pertinent to the analyses. The agencies contacted during the study are listed below.

<u>Fairfax County</u>

Division of Solid Wastes
Division of Property Management
Division of Wastewater Treatment
Economic Development Authority
Environmental Management
Forestry Office
History Program
Office of Archaeology
Office of Comprehensive Planning
Office of Research & Statistics
Office of Transportation
Park Authority
Police Department

Fairfax County (Continued)

Recreation and Community Services
School Facilities Planning Services
Zoning Evaluation Branch

Herndon Office of Planning

Loudoun County

Department of Economic Development
Department of Planning & Zoning
Office of Technical Services
Sanitation Authority

Commonwealth of Virginia

Air Pollution Control Board
Commission of Game and Inland Fisheries
Council on the Environment
Department of Conservation and Economic Development
Department of Health
Historic Landmarks Commission
Institute of Marine Science
Soil and Water Conservation Commission
Water Control Board

Regional

Metropolitan Washington Council of Governments
National Capital Planning Commission
Northern Virginia Regional Parks Authority

Federal

U.S. Soil Department of Agriculture Conservation Service
U.S. Department of the Army, Corps of Engineers
U.S. Department of Commerce, National Oceanic and Atmospheric Administration
U.S. Department of Health and Human Services
U.S. Department of Housing and Urban Development
U.S. Department of the Interior
Fish and Wildlife Service
Geological Survey
National Park Service
U.S. Environmental Protection Agency

B. PUBLIC INFORMATION PROGRAM

The object of the public information program was to establish communication between the project sponsors, VDHT and FAA, and the public by providing the mechanisms for dialogue. To achieve this aim, activities focused on two areas: (1) providing information on the concept of the Dulles Toll Road and alternatives and on the purpose and content of the associated environmental studies; and (2) eliciting suggestions, comments, and questions from individuals and interest groups.

The initial output of the program was a public information meeting held on April 29, 1980 in Vienna, Virginia. The meeting opened with an audiovisual presentation on the project's history, the alternatives being considered, and the EIS studies underway. A question and answer period followed during which approximately 30 persons spoke, addressing comments and questions to a panel composed of representatives of VDHT, FAA and the project's consultants.

In addition to the audiovisual presentation, a bulletin was distributed to the meeting's attendees. The handout summarized information about the project and provided a map of the study corridor in a regional context.

A questionnaire was also distributed at the public meeting. Its purpose was to elicit comments on the public's perceptions and concerns regarding the various transportation, environmental, socioeconomic, engineering, and cost considerations raised by the project alternatives. The questionnaire return was fairly light despite the fact that more than 200 people attended the public meeting.

In December 1980, a newsletter was prepared and mailed to approximately 225 individuals and community organizations on the project mailing list. Intended to provide an update on the project, the newsletter:

- defined the newly introduced additional project alternatives and repeated descriptions of the original alternatives for context;

- summarized the feedback received through the public meeting and the questionnaire;

- provided a revised schedule for the environmental study process;

- reported on the status of the environmental study tasks; and

- provided a project plan of the study corridor.

In the course of the public information program, comments were made by over 75 people, including approximately 30 persons at the initial informational meeting and almost 50 persons who returned the project questionnaire and wrote letters with comments and suggestions. Of this latter group, 38 questionnaires and letters were properly and adequately completed.

As noted in the project newsletter, the major areas of concern expressed at the meeting and articulated on the questionnaires included the possible adverse effects of the proposed project on:

- regional air quality;

- communities adjacent to and near the DAAR;

- development potential of the area to be served by the proposed project;

- Wolf Trap Farm Park;

- energy consumption; and

- noise levels in the study corridor.

Aspects of economic and residential development, transportation needs, and ramp locations were most often indicated as issues of concern by questionnaire respondents, while meeting attendees also raised the issues of METRO development, the range of project alternatives, and potential expansion of the Dulles Airport.

The public information program extends through the public hearing phase. In this phase, consultant representatives will participate with the aid of graphic presentations summarizing the major EIS findings.

## VII. LIST OF PREPARERS

Following are the resumes of those individuals involved in the preparation of the Draft Environmental Impact Statement.

| Name, Firm,* and Task | Years of Experience | Education |
|---|---|---|
| James O. King (PB), Project Manager | 22 years of experience in transportation, environmental studies, and urban planning | Hampton Institute, 1952, B.S. Civil Engineering; New York University 1970, Master of Urban Planning |
| Melvin Kurtz (PB), Design | 33 years of experience in civil engineering | Purdue University 1948, B.S. Civil Engineering |
| Ronald E. Tadross (PB), Traffic and Transportation | 20 years of experience in transportation planning and engineering | Polytechnic Institute of Brooklyn, 1961, B.S. Civil Engineering |
| Morris J. Rothenberg (JHK), Traffic and Transportation | 23 years of experience in traffic and transportation engineering | Cornell University, 1955, B.S. Civil Engineering; Yale University, 1957, Highway Certificate in Traffic Engineering |

* Firm affiliations are Parsons Brinckerhoff Quade & Douglas (PB); JHK & Associates (JHK); James R. Reed & Associates (JR); and Virginia Department of Highways and Transportation (VDHT).

| Name, Firm, and Task | Years of Experience | Education |
|---|---|---|
| Neal Pedersen (JHK), Traffic and Transportation | 6 years of experience in transportation engineering | Bucknell University, 1974, B.S. Civil Engineering, B.A. Urban Studies; Northwestern University, 1976, M.S. Civil Engineering |
| Harvey E. Fialkoff (PB), Deputy Project Manager, Socioeconomic and Land Use Resources | 5 years of experience in urban planning and socioeconomic studies | Touro College, 1975, B.A.; Columbia University, 1977, M.S. Planning; 1980, M. Phil. Planning |
| Robert A. Michalove (PB), Air, Noise, Energy | 11 years of experience in environmental engineering and transportation planning | Cornell University, 1970, B.S. Environmental Systems Engineering; University of South Carolina, 1972, M.S. Transportation Engineering |
| Erez Sela (PB), Water Resources | 10 years of experience in water resources engineering | Hebrew University, Jerusalem, 1971, B.S.; 1973, M.S.; Polytechnic Institute of New York, Ph.D. candidate, Water Resources Engineering |

| Name, Firm, and Task | Years of Experience | Education |
| --- | --- | --- |
| James R. Reed (JR), Ecology | 16 years of experience in biology and ecology | Harvard College, 1962, B.S. Biology; Cornell University, 1964, M.S. Vertebrate Zoology; Tulane University, 1966, Ph.D. Biology |
| Joyce Barton (JR), Ecology | 4 years of experience in biology | Virginia Commonwealth University, 1975, B.S. Biology |
| Judith H. Versenyi (PB), Public Participation | 3 years of experience in citizen participation | Bucknell University, 1976, B.A. Political Science, Biology; New York University, candidate for Master's degree in Urban Planning |
| Rena Frankle (PB), Editing | 12 years of experience in technical writing and editing | Brooklyn College, 1960, B.S. Chemistry |
| Steven L. DeCandia (PB), Graphics | 10 years of experience in graphic arts | School of Visual Arts |
| Cary B. Adkins, Jr. (VDHT) | 8 years of experience in transportation engineering, 3 years of experience in environmental engineering (noise and energy analyses) | Virginia Polytechnic Institute, 1968, B.S. Civil Engineering; Georgia Institute of Technology 1971, M.S. Civil Engineering |

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