Dulles Corridor Rapid Transit Development Feasibility Report

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Prepared by
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PREFACE

The United States Congress in Section 15 of Public Law 98-443, the Civil Aeronautics Board Sunset Act of 1984, directed the Department of Transportation to "study the feasibility of constructing a rail rapid transit line between the West Falls Church, Virginia station of the Washington, D.C. metrorail system and Dulles International Airport in Virginia. The study shall include, but need not be limited to, a study of the feasibility of heavy rail, light rail, monorail, magnetic levitation systems and any other appropriate transportation systems". This report, prepared by a team of consultants and funded by the Urban Mass Transportation Administration, studied the feasibility of a representative system for the Corridor.

Because of the expressed interest of a number of private groups in building a rail transit facility to Washington Dulles International Airport, the study also presents an opportunity to illustrate how a major transit facility might be developed as a cooperative venture between local governments and the private sector, with no direct Federal support. This report used the Dulles Corridor as a test case to examine the feasibility of using a private/public partnership as a method of planning, constructing, financing and operating a rail system. This report found that this approach was feasible and offers substantial cost savings.

In preparing this report, the Study Team was ably assisted by the Dulles Airport Access Task Force which is comprised of community leaders and prominent citizens selected by Congressman Frank Wolf, Fairfax County Board of Supervisors Chairman John Herrity, Loudoun County Administrator Philip Bolen and the U.S. Department of Transportation. This group provided a valuable local perspective for this study. Their comments, suggestions and reviews of the report were invaluable.

The congressional direction is for a feasibility study of various fixed guideway alternatives. Due to the limited time period allowed, the approach taken was to review the technologies listed in the Act and select the one that appeared to be most appropriate for the corridor. This technology was considered the representative guideway. Since other technologies were not thoroughly studied, one or more of them may, in fact, be more appropriate for the corridor.

The selection of a technology and its detailed specification is a local matter and beyond the scope of this study.

Furthermore, no assessment was made of non-guideway transportation projects, such as a Transportation Systems Management (TSM) approach using buses.

This study assesses the feasibility of a fixed guideway system in the Dulles Corridor. It is in no way comparable to any of the steps normally required in UMTA's Major Capital Investment Policy, such as alternatives analysis, nor is the study indicative of a Federal conclusion that the corridor represents a transit priority in the area. Establishing priorities for transit investments is a local decision.

This study is intended for a general audience, therefore, much material of a technical nature has been omitted. Since this is a feasibility analysis, the study did not go into the depth of analysis that would be required in making a final decision on a particular proposal. For example, definitive construction costs would require a specific design for all stations and other structures that were beyond the scope of this study.

Finally, the study assessed the feasibility that beneficiaries, both users and non-users, could finance such a project. In some cases the availability of Federal discretionary grants for up to 80 percent of project costs has led to project proposals with little or no benefits, and perhaps to the overdesign of such facilities. This experience, along with increasing federal fiscal constraints has lead to the questioning of and limited funding of "new starts" by UMTA. In the future, feasibility may be defined as the ability of local governments and the private sector to finance projects. This study examined the feasibility of a public/private partnership as a method of financing, building and operating a rail system. It must be remembered, however, that the decision to develop any additional transportation investments in the corridor is a local decision.

The study may be of significant use to the local jurisdictions as they consider alternatives and options in the corridor. A draft Request-for-Proposal is included which could be helpful to the local jurisdictions. The process identified in this study should encourage other communities around the United States to look at local and private financing options before looking to Washington for Federal assistance.

DULLES CORRIDOR RAPID TRANSIT DEVELOPMENT FEASIBILITY REPORT

EXECUTIVE SUMMARY

In responding to the congressional mandate to examine the feasibility of a rail line in the Dulles corridor, this study developed an innovative public/private partnership approach. This approach minimized risks and costs to the local governments, resulting in a project that would be feasible for users and others who benefit from the system to finance it.

The study found that a private firm, operating under an agreement with local governments, could construct and operate the system for a net present value of $119,374,000, while a local public project would require $181,278,000. These two figures represent the local revenues required to construct and operate the system described in the report to the year 2005, with all cash payments in the future discounted to the present.

No recommendations are made regarding the source of the pledged revenues required. However, the non-user beneficiaries are identified and possible mechanisms for assessing them for the service are discussed. Obviously, implementing new user fees or taxes would require a variety of legislative actions and would need to be carefully studied.

The study also developed a procurement approach which could be used to implement the private sector approach. This approach would reduce costs through competition while contractually transferring the risks of cost overruns and performance to the private sector.

This study has determined that a rail transit line is feasible, using the approach developed. This finding does not constitute a Federal endorsement of a rail line in the corridor. The decision to pursue a rail alternative is a local decision based on local priorities and interests.

BACKGROUND

The Dulles International Airport Access Road was constructed in 1962. Since that time, activity at the airport as well as residential and commercial development within the corridor has rapidly expanded. This growth has lead to increased traffic congestion and the call for improved transportation facilties to serve the area. Traffic during peak periods is already congested on the recently opened toll road.

In response to these pressures, the United States Congress directed the Department of Transportation to explore the feasibility of rail rapid transit to Washington Dulles International Airport.

The private sector has also taken the initiative to propose transit improvements within the Dulles Corridor. A proposal made in 1984 by private sector interests called for the design, construction and operation of a light rail line without direct Federal financial support. A private sector proposal in 1985 tied the development of a rail line in the corridor with a lease of the median strip of the Dulles Access Road and a lease of Federally owned land at the airport.

In assessing the feasibility of a major rail project, the current Federal transit capital assistance program was not considered as a potential source of funds. Funding authorized under the Stark-Harris legislation to build the Washington Metropolitan Area Transit Authority (WMATA) Metrorail is not adequate to complete the presently proposed 103 mile system. From a national perspective, Federal funds for discretionary grants are adequate to build only a fraction of the projects the Congress has chosen to fund. In light of the urgent need to reduce Federal spending, it is unlikely that additional funds for the Dulles project will be authorized.

Since the Federal Government pays up to 80 percent of the construction costs, many areas have sought funding for projects that are not cost-effective. Moreover, cost overruns for such projects have been a recurring problem. Finally, patronage of such systems is often below the forecasts prepared locally to be used to support grant applications. Faced with low ridership and excessive costs, a number of operators have actually reduced bus service to maintain rail services. Thus, Federal funds to enhance transit services have actually resulted in reduced service. Experience to date with federally funded rail projects has led to the questioning of the benefit of Federal discretionary funds for such projects.

The Dulles Corridor study team was aware that Federal funds likely would not be available, and developed an approach to reduce costs and risks to make a project feasible solely in terms of local resources. The approach was based on utilization of the private sector to design, build, finance and operate the proposed transit system. In addition, the study identified several mechanisms with which to assess beneficiaries of the proposed transit project, both users and non-users, for the improvements.

STUDY APPROACH

The study team conducted a review of technologies to identify a viable representative transit system which, while perhaps not optimal, could adequately serve the transit market of the corridor yet represent a relatively low cost alternative. The reasons for selecting only a representative option rather than identifying a specific technology are several. First, the ultimate decision on technology and other system specifications is the right and responsibility of the local community. The study team's approach reaffirms that right. Secondly, if the private sector develops corridor transit improvements, they must be free to define much of the system specifics because they are assuming the risk of performance and cost control. Thirdly, the local community or private sector may have policy objectives or opportunities outside the study which could effect the selection of the technology.

After identifying a representative technology, further analysis determined the capital and operating costs of the system. Using system performance specifications, local population and employment projections, the projected ridership and revenues were determined. To finance the system, a private/public partnership was developed. Under private/public partnership, public services are provided by the private sector. This approach typically reduces the time of implementation, minimizes institutional redtape, results in lower construction and operating costs, minimizes the risks of cost overruns to the public sector and often results in the elimination of or at least a lowering of direct local government financing costs. Although not traditionally used to develop transit improvements, the private/public approach is more commonly utilized in developing municipal power projects and other major capital improvements programs. Given current fiscal constraints and the apparent advantages of utilizing private/public partnerships, the consultant's analysis focused on the practical feasibility of the private sector taking a greater role in providing mass transportation improvements.

The study effort also examined ways in which to capture the value of benefits generated by the development of rapid transit service which accrue to non-transit users. This concept means that the costs of the proposed transit improvements could be borne by those accruing benefits; both transit users and non-users. Non-users who benefit from corridor transit improvements include the airlines, property owners, developers who benefit from improved access, employees who have greater access to increased employment opportunities, other travelers in the corridor who choose to or must use their cars and subsequently enjoy less traffic congestion, employers who have a greater labor force to draw upon and others. Several mechanisms to capture the value of these non-user benefits were examined in search of sources of non-project revenues sufficient to ensure the financial feasibility of the proposed transit improvements.

In addition to testing the private development potential of the Dulles Corridor, this study effort has produced a new procurement device with potentially wider applicability. The development prospectus - or Request for Proposal will be a model for soliciting private sector involvement in transit service outside the specific context of the Dulles Corridor. The following figure illustrates the overall study approach.

The capital cost of the proposed transit improvements is estimated to be approximately $143,500,000 in 1985 dollars. The estimated year 2000 annual operating cost is projected to be approximately $4.9 million (1985 dollars) under full operation. Peak period train operations were costed at ten minute headways with feeder bus service provided in the ten to twenty minute range at each station. Travel time from West Falls Church to Dulles is estimated to be approximately 21 minutes. The ridership estimate is 14,000 riders per day by year 2000, which was used in the financial feasibility analysis.

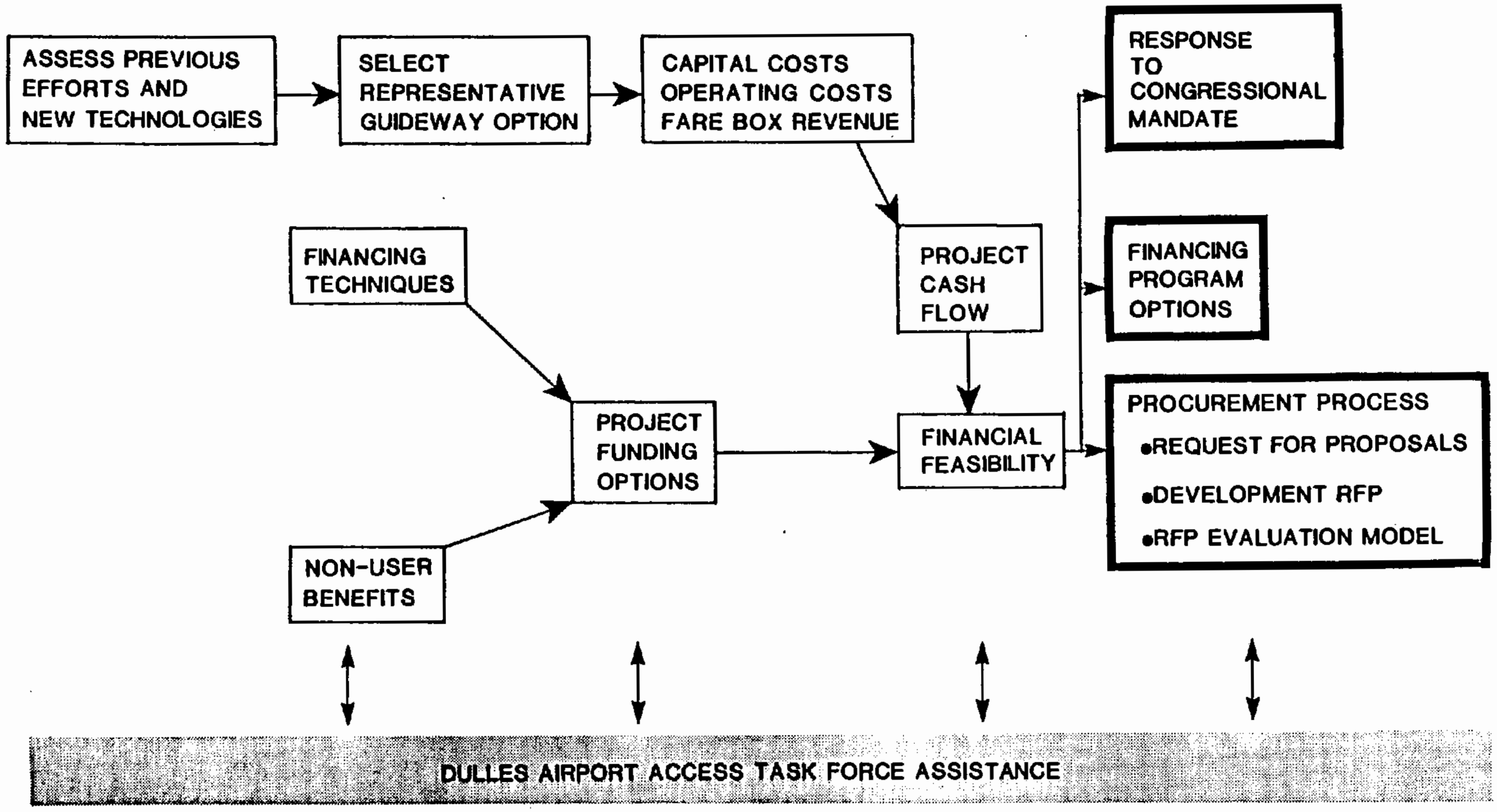
PRIVATE SECTOR ROLE

Over the past forty years the transit industry has been caught in an accelerating trend of public ownership, cost overruns involving major capital improvement projects, operating costs which have increased faster than inflation and increasing subsidy of transit fares. The availability of Federal assistance has contributed to these problems by freeing the industry from the need for careful financial control. The current administration is committed to eliminating discretionary capital grants for new start projects and eliminating operating assistance.

The financing concept behind this analysis attempts to overcome these problems by utilizing the efficiencies of private/public partnership in design, construction, financing and operation of the proposed system and upon the concept that those benefiting from the proposed system should pay for the improvements.

The current transit system development process is based upon a series of sequential planning and approval steps of increasing detail. This process has been designed to insure prudent public decisionmaking. Under a private/public partnership, this complex process would change significantly, removing many

DULLES CORRIDOR
STUDY APPROACH



of the reviews and delays necessarily resulting from the requirement to achieve both local and Federal approval. The reviews would be replaced by contractural obligations and performance specifications. The private sector would have to satisfy itself that costs, ridership forecasts and other details were such as to yield them a profit from the project. Sponsoring governments would also have to assure themselves that their costs to secure the service were justified. The private/public partnership will result in lower cost of service through the selection of the lowest cost project that is feasible, full utilization of tax benefits by the private sector, lower capital cost by minimizing reviews, approvals and delays, and lower operating costs through increased labor productivity and management efficiency. Finally, private sector style procurement increases competition. The risk of cost overruns and increasing operating costs are contractually transferred to the private sector while eliminating or at least greatly reducing the public sector's exposure to risks.

Major public expenditures in services and facilities yield windfall benefits to property owners and others that are not necessarily users of the improvements. This research effort has attempted to identify the groups which would benefit from the proposed transit improvements. Certainly, the transit users will enjoy the benefits of easier travel. They, in turn, will pay a fare for such services. Non-users will also benefit from these proposed improvements. Groups such as airport users, airlines, property owners, auto travelers within the corridors, the Toll Road Authority and the community in general will benefit from the improvements. The intent of this effort was to identify beneficiaries and the mechanisms which could be used to transfer the value of non-user benefits to help pay for the improvements.

COMPARATIVE ANALYSIS OF FINANCING ALTERNATIVES

The study examined two financing alternatives: (1) private sector ownership with a contractual agreement with the local governments to provide a specific level of service for a stipulated service fee; and (2) public sector approach, based on financing the entire system cost through dedicated tax sources. The analysis showed that the private sector approach required much less of a contribution from the public sector than did the purely public approach.

The private sector financing assumes a 25% equity contribution by the owner with the remaining funds provided by Industrial Development Bonds (TDB) and vendor financing. The current tax reform proposals could impact the use of IDBs, but the change would effect both public and private development costs. The cost of financing was assumed as 10 percent. If tax changes increased or decreased interest rates, these costs would vary accordingly.

In terms of aggregate present value cost, the financing alternatives are even more starkly contrasted. A comparison of actual cash expenditures under the alternative development structures results in present value cost of:

o	Private sector development	$119,374,000
o	Public sector development	$181,278,000

The present value of the net required payments under the alternative financing options leads to an important conclusion. Private sector development is significantly less expensive than a pure local public development. Private ownership of the Dulles system would lead to an aggregate present value savings of just less than $62 million, or 34.3 percent of the public sector cost. Therefore, private ownership is a more economic investment in transit and payment of the service fee is a more efficient use of public resources.

Further, given the current level of national funding assistance, privitazation may be the only form of cost reduction available to local governments interested in developing new transit facilities. It may also be the only form of financing available to insure implementation.

SUMMARY AND CONCLUSIONS

Based upon the study findings:

- o Light rail transit represents a viable rail transit system for the Dulles Corridor and is financially feasible, under a private/public (local) partnership based on several financing scenarios;

- o Private/public partnerships are effective in reducing costs of service through reduced capital costs, reduced operating costs, lower direct financing costs and full utilization of tax benefits. The partnership also offers an excellent approach for funding major transit projects in the future with Federal resources dwindling;

- o Non-user benefits are significant and, if effectively captured, could make a substantial contribution to the financial feasibility of the proposed project; and

- o The proposed procurement approach increases private sector competition while contractually transferring the risks of cost overruns and performance to the private sector.

This study recognizes the unique role of the local governmental jurisdictions in this process by acknowledging their responsibility for system specification, selection of value capture mechanisms and in the decision on whether or not to pursue the procurement approach developed in the study.

Finally, the study has identified a feasible rail option for the corridor. Before any system is built, a more detailed assessment of costs and ridership, either by the public or private sector, would be required. Should such an assessment indicate to the local jurisdiction that a rail transit system would meet the service needs of the corridor, the process developed in the report should be carefully considered.

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CHAPTER ONE: SELECTION OF REPRESENTATIVE GUIDEWAY

The study team's initial effort in assessing the feasibility of rail rapid transit between West Falls Church and Dulles Airport was an assessment of a variety of guideway options. These efforts were assisted by a review of prior studies for the Dulles Corridor and a review of the characteristics and needs of the Corridor.

This chapter outlines the alternative guideway options reviewed and their relative costs. It identifies the guideway selected for study in greater detail.

DULLES CORRIDOR CHARACTERISTICS

Existing Road and Land Use

The Dulles Airport Access Road (DAAR) is a divided highway of approximately 16 miles, extending from its intersection with Interstate 66 near the West Falls Church metrorail station to Washington Dulles International Airport. The initial portion of the Access Road runs from the Capital Beltway, Interstate 495, to Dulles Airport and is restricted to airport traffic. Flanking toll roads were constructed by the Commonwealth of Virginia for local traffic and opened in 1984.

Anticipated Growth and Development

The communities and activity centers along the DAAR rank as some of the region's fastest growing. From Tysons Corner - the "downtown" of Fairfax County - to the comprehensively planned community of Reston, the incorporated town of Herndon, eastern Loudoun County/Route 28, and Dulles Airport, each has staggering statistics of growth and development.

Tysons Corner: As of January 1985, recently completed, under construction, and planned office space for lease was estimated to total 6,956,000 square feet. Of the total inventory of Fairfax County office space, estimated at 32.1 million square feet as of July 1984, over 17 million square feet is located at Tysons.

Reston: Conceived as a new town in the early 1960s, Reston is now a maturing community of some 40,000 residents and over 700 businesses. Plans will soon be released for the Reston Town Center, which will comprise 450 acres north of the DAAR and will include 4.5 million square feet of office space, 200,000 square feet of retail, and 1,500 to 2,000 residential units.

Designed to be Reston's "downtown urban core" it will include restaurants, specialty shopping, offices, hotels, and residences combined with an urban park setting.

Town of Herndon: Last year the Town Council approved 1.87 million square feet of office and commercial space within the town's 4.4-square-mile limits. This is expected to add 1,550 apartments, townhouses and single-family homes to the Herndon stock of 4,730 units.

Route 28: The Center for Innovative Technology (CIT), to be located on the northeast corner of the Route 28/DAAR intersection, will serve as a bridge between university research projects and corporations using the resulting new technology. The 35-acre site was chosen due to its proximity to more than 800 high-tech companies within 20 miles of the site and will be the centerpiece of a 160-acre high technology business development.

Westfields, the International Corporate Center at Dulles, is a 1,000-acre project proposed to include 20 million square feet of commercial and office uses as well as support amenities. This project is located on Route 28, just south of Dulles Airport and Route 50, north of I-66. Phased over a ten to fifteen year period, the total project has an estimated real estate value of $2 billion.

General Motors Electronic Data Systems (EDS) has chosen a 202-acre site along Route 28 and McLearen, Wall and Centreville Roads due to have begun construction of 400,000 square feet of office space and a 75,000 square foot computer center in September 1985. By mid 1988, 2,000 to 3,000 employees could be working there.

The Hyatt Corporation is also planning a 300-room hotel at the southeast quadrant of Route 28 and the DAAR on land owned by developer Webb/Sequoia.

Eastern Loudoun County: The CIT development is only one of the many planned non-residential and residential uses along Route 28 and Leesburg Pike. Twelve major developments are in the stages of approval or under construction and range in scale and use from Xerox's Potomac Park development of 2,267 acres with 20 corporate headquarters and 1,800 housing units to the 72 acre, 600,000 square foot Nattack Mall; from the Ashburn Village community planned for 5,451 housing units and three million square feet of office and industrial space, to Broad Run, an office park on 26 acres.

Employment in the County is expected to quadruple in the next 25 years from a base of 20,000. Population, at 70,000 in 1985, is expected to double. With little growth planned for the western County, the majority of this growth will occur in eastern Loudoun County, implying a lifestyle similar to Fairfax and Montgomery Counties.

Washington Dulles International Airport: Since 1982, eight new airlines have initiated service at Dulles and 13 airlines have expanded service. As a result, a high of 3.6 million passengers was recorded in 1984. The goal is to double the 1982 count of 2.1 million commercial passengers by the end of 1985.

Dulles is situated on 10,000 acres. According to the Federal Aviation Administration the airport could, with an additional 900 acres for a fifth runway, accommodate 40 million annual passengers (MAP). A new midfield concourse to enhance hubbing operations and provide 12 to 24 more gates is in the planning stages.

Air cargo activity has risen over 90 percent since 1982, and the airport serves three major freight carriers: Airborne Express, Emery Worldwide, and Federal Express. Scheduled carriers have increased their cargo loads, and air cargo tonnage is expected to increase as more high-tech and manufacturing firms move near Dulles.

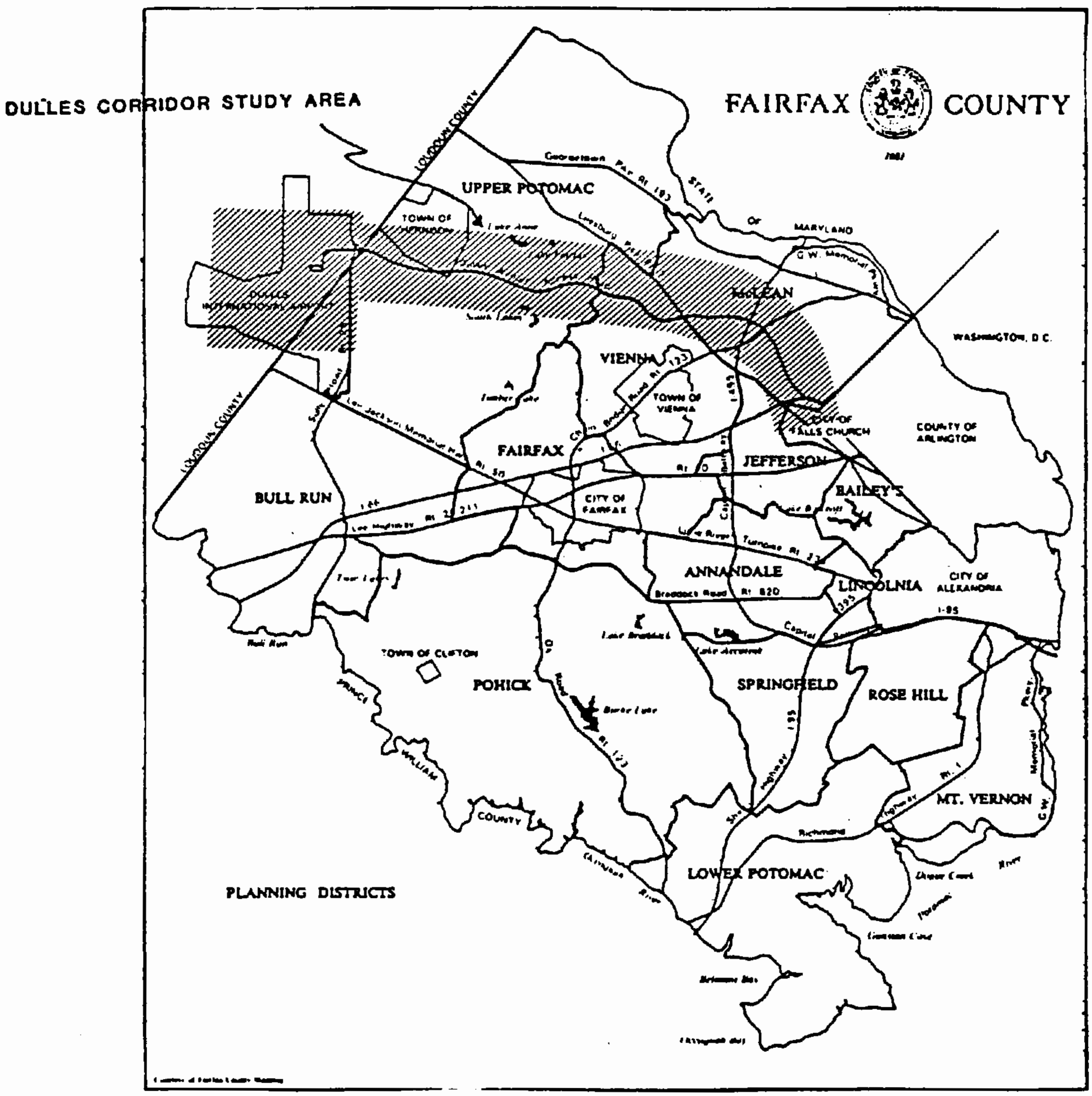
Regarding non-residential development and construction in the Dulles service area, it has been estimated that more than $4 billion worth of office space is under construction or in the planning stages along the area formed by the Dulles Toll Road, I-495 and I-66.

The above statistics mirror the tremendous change in population, land use and employment witnessed by Fairfax and Loudoun Counties in the last 5 to 10 years.

Fairfax County

Existing Land Use: Fairfax County (See Map 1.1), including the towns of Herndon, Clifton, and Vienna, comprises approximately 262,400 acres. Of this total, 29,059 acres are in roads, water, and small areas of land that cannot be developed, while 233,341 acres are classified into various zoning categories; 228,484 acres in County zoning categories and 4,857 acres in zoning categories associated with the towns of Herndon, Vienna and Clifton.

FAIRFAX COUNTY PLANNING DISTRICTS



MAP 1.1

Excluding the towns, most of Fairfax County's land is zoned for residential development. Of the 228,484 acres zoned under the County's ordinance, 211,591 acres, or 92.6 percent, is zoned for residential or residential-related use. Industrial zoned acreage accounts for 10,615 acres, or 4.6 percent, of the County's zoned acreage. The smallest zoned acreage is commercial-related accounting for 6,278 acres, or 2.8 percent, of the County's zoned acreage.

The Pohick Planning District contains the largest percentage of residential zoned acreage at 21.7 percent, or 45,956 acres. The Bull Run Planning District contains the largest percentage of industrial zoned acreage at 32.8 percent, or 3,485 acres. Finally, the Upper Potomac Planning District contains the largest percentage of commercial zoned acreage at 16.2 percent, or 1,019 acres.

Approximately 30.0 percent, or 68,607 acres, of zoned County land is vacant, a decline of 2.6 percent since 1983. More than 88 percent of the currently vacant land is zoned for residential development. Vacant land that is zoned for commercial use totals 2,057 acres, while vacant land that is zoned for industrial use totals 5,599 acres. The Pohick, Upper Potomac, and Bull Run Planning Districts have 69.5 percent (47,666 acres) of all vacant land in the County, while the Lincolnia and Baileys Planning Districts have only 0.9 percent (624 acres) of the County's vacant land.

Planned Land Use: As of January 1984, the County has 145,896 acres planned for residential sites. This represents approximately 62.5 percent of the County's total developable land. Developable land excludes land that is in roads and water. Land planned for commercial/industrial uses represents 6.8 percent of the County's total developable land, or more than 15,900 acres. Over 10,260 acres are planned for industrial use, while commercial-office and commercial-retail planned uses total 2,607 acres and 3,072 acres, respectively. Approximately 32,400 acres, or 13.9 percent, are planned for public parks and open space, and more than 24,600 acres, or 10.6 percent, are planned for public facilties, governmental areas, and institutional uses. The remaining 12,459 acres, or 6.2 percent, are primarily planned for private recreation and open space.

The outer areas of the County are expected to receive the largest proportions of the additional housing units. The Bull Run Planning District is planned to accommodate 31,657 additional units, while the Upper Potomac Planning District is planned to accommodate 26,321 additional units. These two Planning Districts, together with the planned units for the

Pohick Planning District (14,518 units) account for 57.2 percent of all the planned units in the County.

Loudoun County

Since 1960, Loudoun County (See Map 1.2) has been one of the fastest growing jurisdictions in the Washington metropolitan area, increasing in population by over 50 percent per decade. This trend is expected to continue into the 21st Century, at which time Loudoun is projected to have the greatest population increase of all the Washington area jurisdictions between 1982 and 2000, amounting to 86 percent. In 1980, population totaled 57,427. From 1985 to 2000, the population is estimated to increase by approximately 58 percent, employment by 80 percent, and the number of households by 66 percent.

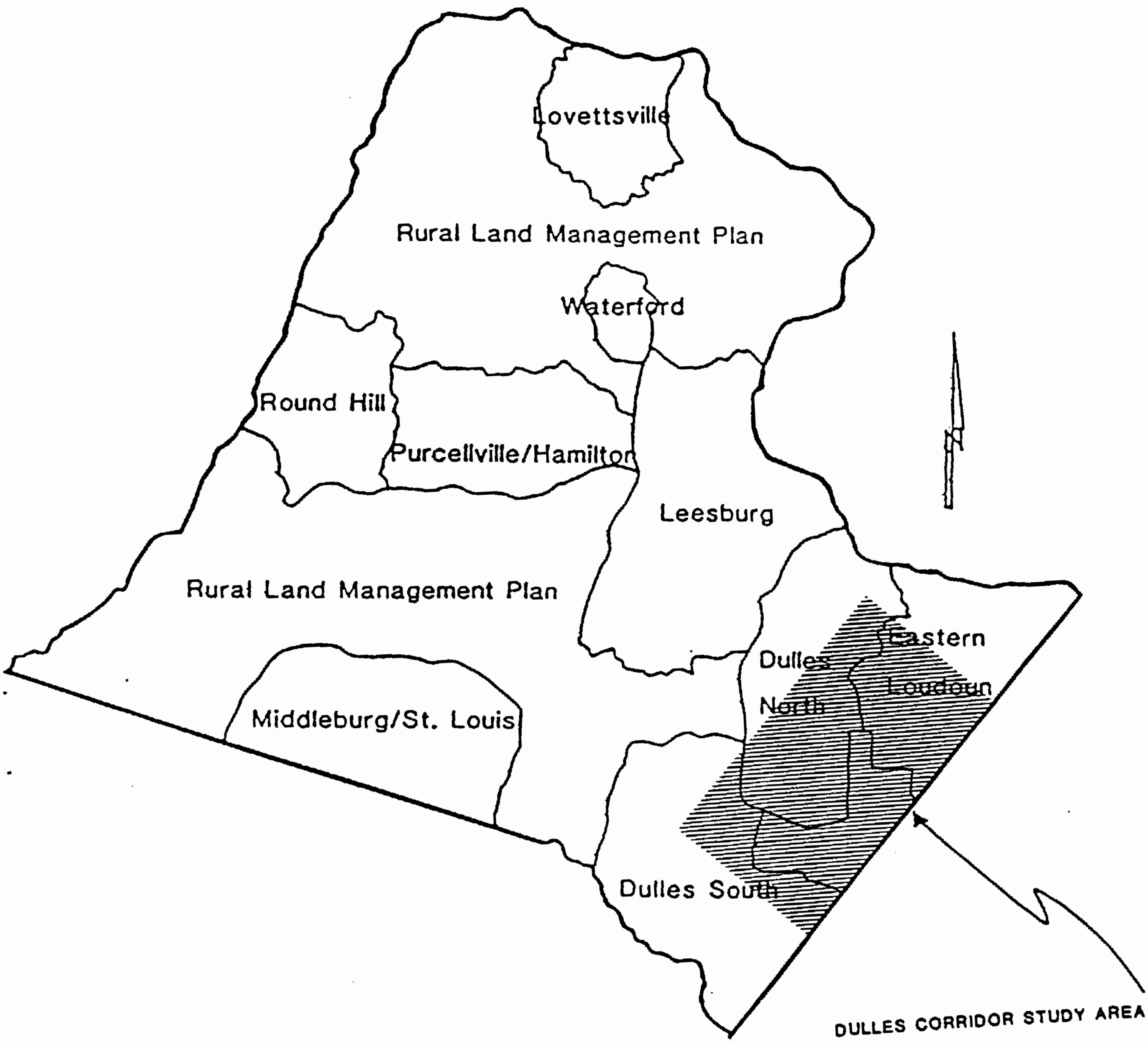
The outer suburban area of the Washington metropolitan region, which includes Loudoun County, represents the fastest growing area. When viewed over the 1980 to 2010 period, Loudoun County is expected to grow by 139 percent, the largest increase of all the jurisdictions in the Washington area. In terms of the total regional population increase, Loudoun accounts for an 11 percent share.

The majority of Loudoun County's household growth is projected to occur in the eastern portion of the County, particularly in the Route 7 Corridor. Large increases are also projected to occur in the area north and west of Dulles Airport. Forecasts show that all increases in Loudoun's household density will be confined mostly to the eastern Loudoun area where it is projected that between 100 and 500 households per square mile from 1980 to 2010 will be added. The remainder of the County is forecast to add less than 100 households per square mile between 1980 and 2010.

Conversely, the western towns have experienced slow growth and are not currently sharing significantly in the total countywide growth. The main reasons for this lack of growth are the lack of adequate water supplies in the towns, poor quality of the town's existing water supplies, and the market demands which are concentrated in eastern Loudoun County.

Located within the metropolitan Washington region, Loudoun is one of six counties to have experienced the rapid pace of development and population growth since the 1970's. It should be noted that according to the 1980 U.S. Census, the metropolitan Washington statistical area ranked seventh largest in the United States. In 1980, the metropolitan area had 2,988,200 residents, and by 1985, an increase of 138,400 residents is estimated. During this same period, Loudoun County is expected to add 12,400 new residents.

LOUDOUN COUNTY AREA PLAN LOCATION



MAP 1.2

Loudoun County's location in the rapidly growing metropolitan area is the principal reason for its population increase. The County Planning staff has identified several factors that will positively affect economic growth and development in the County, including:

- The presence of Dulles International Airport.
- The completion of the Dulles Toll Road which provides quick access to the Washington metropolitan area.
- The plans by the Virginia Department of Highways and Transportaton for the expansion of Route 28, a key roadway linking the County and the international airport with key metropolitan roads and interstate highways.
- The availability of over 9,000 acres of land zoned for industrial and office park development in the Route 28 and Washington Dulles International Airport Corridor.
- The availability of large acreages zoned for a variety of residential development categories in eastern Loudoun and the existing towns and villages.
- The availability of water and sewer service. Water and sewer service is either available or planned primarily in the County's eastern portion by the Loudoun County Sanitation Authority. The towns and villages currently have capacity available.
- An excellent school system.
- The availability of fire and rescue services.
- The presence of a skilled labor market pool for a variety of service, manufacturing, and research and development industrial activities in Loudoun County and the metropolitan area.

Planned Transportation Improvements Within the Dulles Corridor

The traffic impacts associated with the growth and development of western Fairfax and eastern Loudoun Counties can be summarized as follows:

For residential development:

- As new residential development occurs in western Fairfax and eastern Loudoun Counties, increasing demands will be placed on the existing transportation network in these areas. This network consists largely of unimproved rural roads, which are not capable of accommodating significant volumes of suburban traffic. There will be increasing needs for road improvements in these areas.

- Vehicle miles of travel (VMT) will increase as more dwelling units are built farther from the regional core and as the distances between residential, employment and shopping activities increases. This increase in VMT may be partially offset by continued development of non-residential activities (basically employment) in these outer portions of the counties.

- Non-radial travel will increase as the large sectors of the Counties lying between radial arterials develop. The radial highways spread farther apart with increasing distance from the regional core, as do the spokes of a wheel. As the areas between these radials develop, increasing non-radial travel demands will occur over longer distances.

For non-residential development:

- Radial travel to the regional core will continue. Although the core will experience a modest reduction in its relative share of regional employment, the number of jobs in the central area will continue to increase. The major radial travel corridors may be expected to experience additional travel demands as both inner area employment grows and outer area residential development continues.

- Cross-county travel will increase. As employment locations expand in the outer areas, commuter travel within and across each County will increase.

- Work trips into the Counties will increase. As Loudoun and Fairfax County employment assumes a larger share of the regional total, additional trips will be attracted to the area from other local jurisdictions.

- Reverse commuting trips will increase. The continued growth in number of jobs in western and southern Fairfax County and eastern Loudoun County will attract additional travel in the contraflow direction in peak hours.

- Travel in and around employment centers will intensify.

To accommodate this planned growth, some, but not all of the necessary road improvements are planned or proposed and/or being implemented. Funding of the primary and secondary road improvements is anticipated from the VDH & T Six-Year Traffic Improvement Program (TIP), Fairfax County Road Bonds, and private developer participation, including proffers.

Most improvements are local impact road widenings along sections of existing primary or secondary roads and arterials accommodating commuter traffic. Others are intersection improvements such as signalization or adding turning lanes to enhance volume flow.

The largest single project is the Springfield Bypass - a four-lane limited access highway/parkway from Route 7 in Leesburg, south through the Reston-Herndon area, crossing the Dulles Toll Road and connecting to Route 50. It then continues through southern Fairfax County to Route 1. A proposed $135 million Fairfax County Bond referendum in the fall of 1985 could fund a $57 million section from the Dulles Toll Road south to Route 50. Completion is expected post 1989.

Both counties recognize the critical need to widen Route 28 to four lanes; however, funding has not been proposed for the VDH & T six-year TIP or as a Fairfax County Bond project. VDH & T will be conducting community hearings to determine improvements and a Loudoun County Route 28 Corridor Study will be released mid-October 1985 to update traffic projections and necessary design improvements. Therefore, future funding is possible and may combine private and public sector participation.

Loudoun County has also determined the need to pave, widen to four lanes and extend Route 643 from Leesburg to the DAAR in order to alleviate east-west congestion projected in the Route 28 Corridor. However, no private developer or state funding has been allocated for this improvement.

Median Strip Geometry

The median of the Access Road was designed to accommodate possible future rail transit (Figure 1.1). Vertical and horizontal curves are long and gentle, and only occasional plantings or berms break up the view of vehicles on the opposite side. The Access Road crosses over seven (7) bridges, with a combined length of approximately 1,500 feet, and under ten (10) bridges. The piers of the overhead bridges are, in every case, in the median, and are on the order of three feet wide (Figure 1.2).

TYPICAL SECTION

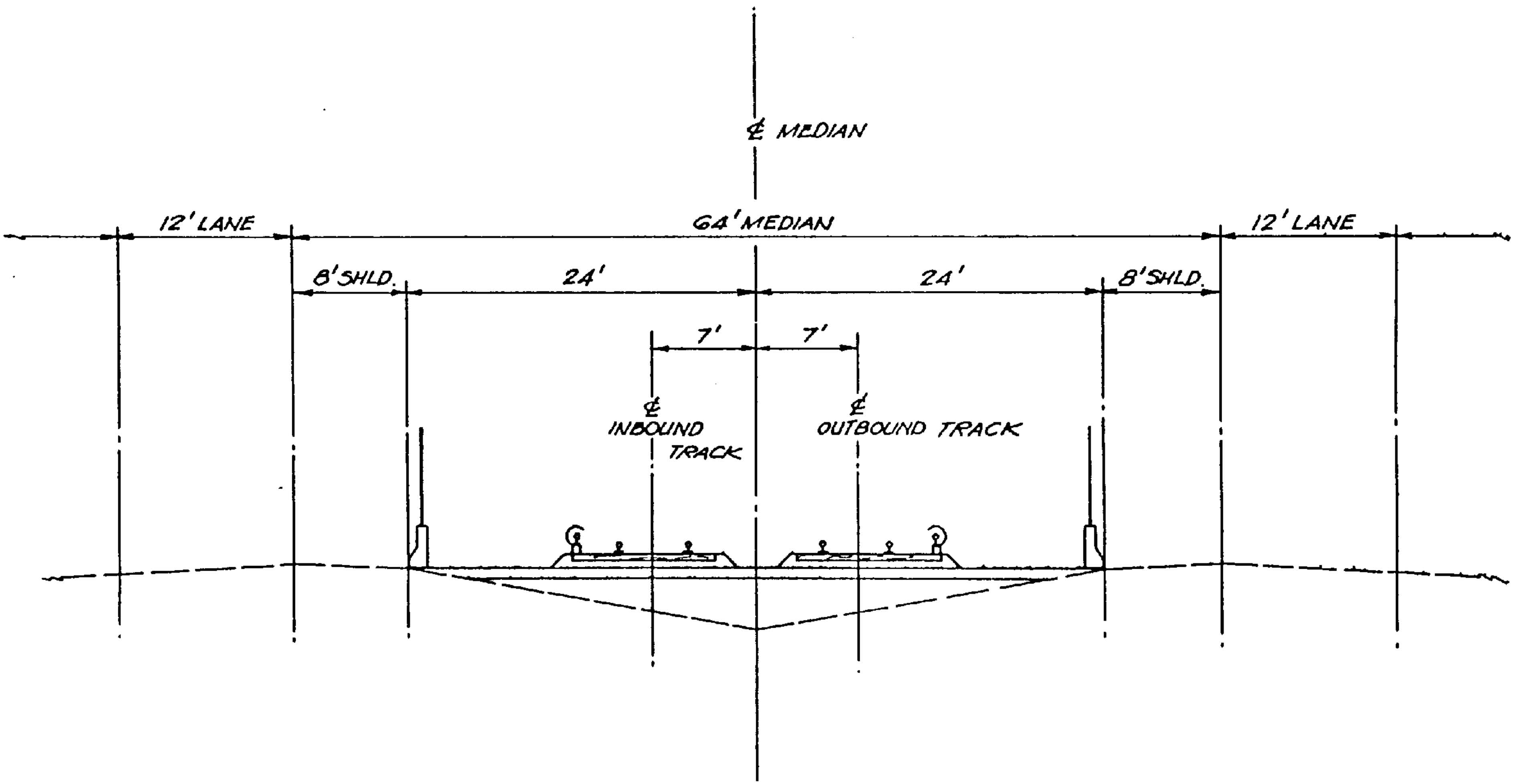


FIGURE 1.1

TYPICAL SECTION

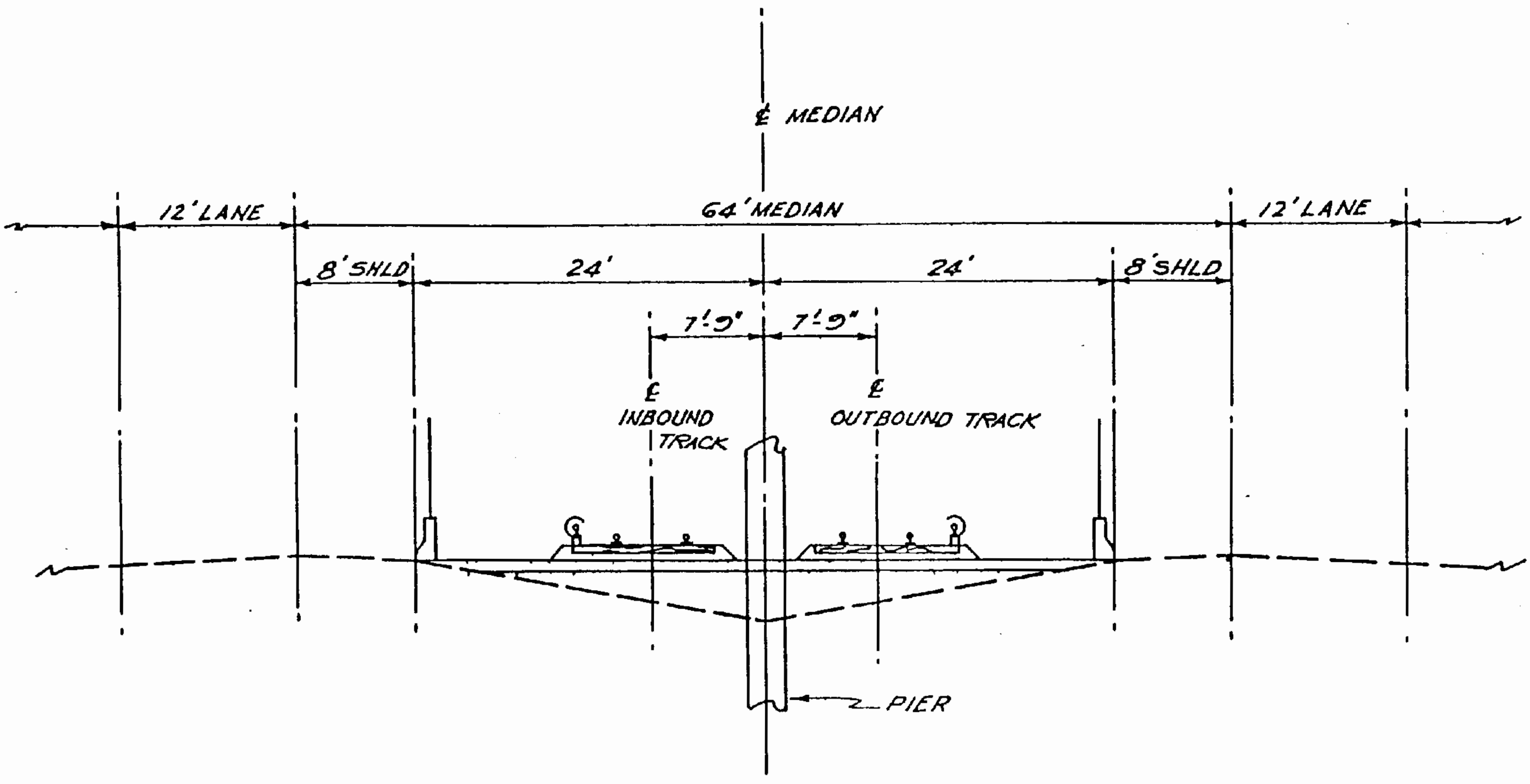


FIGURE 1.2

The median is discontinuous at the undergrade bridges, and those gaps would need to be bridged to carry a fixed guideway transit system. The guideway for such a system will fit on either side of the piers of overhead bridges without major alteration. Longitudinal surface drainage is provided in the bottom of a gently sloped "V" cross section in most cases, or in two channels in occassional "W" cross sections. Drop inlets every 500 feet carry surface runoff to underground drainage discharged beyond the new toll road. Any changes to the median to incorporate a transit system must necessarily modify the underground drainage as a prerequisite.

Starting at West Falls Church, the alignment has a slight curvature from right to left, including nine curves to the left and six curves to the right before arriving at the Dulles Airport terminal. (The Dulles Airport station is not included in that count.) This tendency in one direction more than the other suggests that uneven wear may occur on wheels if vehicles are constantly run in the same orientation. A simple loop track at the Dulles terminal, or a "Y" track should be considered as means of turning vehicles around.

PREVIOUS STUDIES

The feasibility of implementing rail transit service to Washington Dulles International Airport and for the developing communities along the DAAR has intrigued and challenged transportation planners and engineers for more than fifteen years. Eight studies have specifically analyzed and evaluated the engineering, operational and financial requirements for increasing the ground access capability of the DAAR and the related transportation network. They are:

- Dulles International Airport Access, Spring 1970, prepared by Robert G. Baxter, George Washington University;

- Dulles Airport Rapid Transit Service: A Feasibility Study, July 1971, by Day and Zimmerman;

- Dulles Airport Rapid Transit Study, 1973, George Washington University;

- Transit Service on the Dulles Access Road, 1976 by Don Cuming, George Washington University;

- Metrorail Alternatives Analysis, K Route, Draft and Final Reports, August 1978, by Peat Marwick Mitchell & Company;

- Dulles International Airport Access Study, 1978, prepared by Howard, Needles, Tammen and Bergendoff;

- Dulles Airport Access Road Outer Parallel Toll Road Final EIS, April 1982, by Parsons Brinckerhoff Quade & Douglas, Inc.; and

- Northern Virginia (NOVA Rail) Light Rail System Project, October 1984, by Parsons Brinckerhoff Quade & Douglas, Inc.

The studies were reviewed for the purpose of assessing their assumptions, level of detail and findings as they pertain to the Dulles Corridor Study. The specific data assessed were:

- travel patterns
- surveys
- existing services
- proposed improvements
- alignment, station location, supporting facilities
- costs and revenues

Chronologically, the primary focus of the earliest Corridor studies was to determine how to assure and enhance the ground access capability of the DAAR from downtown Washington, D.C. to the airport. The underutilization of the airport and its competitive disadvantage with National, due, in part, to National's accessibility and proximity to the region's employment and population base, were the concerns and valid reasons for considering rapid transit alternatives.

Only secondarily did these studies look at employment and population growth along the DAAR and surrounding activity centers in Fairfax and Loudoun Counties, and consider their impacts and influence on transit feasibility.

One early exception was the 1971 Day and Zimmerman Study of a Metrorail extension to Dulles. Five express and local service options were examined. Of the five, the local integrated service option proved to be the most effective in generating ridership and meeting operating costs.

In a later study, the 1978 WMATA Metro K-Route analysis considered a Dulles terminus based on Corridor development. However, this option was deemed infeasible due to cost and engineering constraints and not further studied. The Dulles Toll Road EIS in 1982 also considered a "with Metro" option. Based on the analysis of specific and detailed information about Corridor development and travel patterns, the transit line was deemed an asset to Corridor development.

The assumptions and forecasts used in the three studies were adequate at the time each was undertaken. However, the findings cannot be applied to the Dulles Corridor Study for each assumed that the line to Dulles would be part of the WMATA regional system with similar technology, station design and operations, and local share funding for the system. Nonetheless, these studies have been useful in defining the heavy rail alternative comparison for the study. Baseline engineering and environmental information from these studies is also being used.

The comparative analysis and use of findings from the other studies should also be limited. Many of the studies, particularly the University research papers, were too conceptual and researched with a single purpose in scope. Therefore, the base data and patronage forecasts were not developed at the level of detail which the Dulles Corridor Study demands to assess ridership, engineering feasibility or revenue projections adequately. Furthermore, most studies assumed major Federal funding for transit system start-up or operating subsidies; or there was no mention of cost, revenues or transit ownership at all.

This is not to say that these studies have not been useful to the development of the present issues and concept of rail transit in the DAAR Corridor. Most of the studies have built upon previous findings and technological advances and have been integrated into the base of knowledge we now have about the Corridor and transit needs for the airport and commuters using the DAAR.

However, physical and economic conditions have changed dramatically at the airport and within western Fairfax and eastern Loudoun counties. Regional and local population and employment densities have influenced commuting and travel patterns and the utilization of the airport. The Dulles Toll Road EIS was perhaps the first study to document these changes in the Corridor adequately.

Funding and financing mechanisms for public transit are undergoing radical change as well, invalidating many of the assumptions used for recommending a Metro extension or other rail transit. The NOVA Rail Study comes closest to defining the present day financial issues of airport access and transit services for communities along the DAAR. Prepared for the purpose of determining how to implement a cost-effective privately owned and operated light rail system, the NOVA Rail Study does serve as an important baseline study for the Dulles Corridor Study.

These previous efforts contain a considerable amount of useful and valid data for this study that have been used throughout all stages of research and analysis.

STUDY METHODOLOGY

By proceeding from the broad principles and concepts of transit corridor studies in general to the specific parameters of the Dulles Corridor, significant savings of time and effort have accrued. This methodology has allowed comparisons of capital costs for a variety of projects that provide order of magnitude unit cost estimates for this application even though details are not precisely defined.

The study has progressed from the broad Congressional mandate to the specific characteristics that define the project best suited to these circumstances. Where conditions or influences were initially unknown, they were assumed. Subsequent iterations of the necessarily cyclic analyses modified the assumptions or replaced them entirely with data from complementary efforts. Extensive use has been made of the associations and agencies that are associated with the Dulles Corridor as users and those that have technical interests. Many references permitted comparisons of guideway applications in terms of time, distance, and ridership as well as the technical sophistication relevant to operation and maintenance. Numerous technical publications provided catalogs of transit system characteristics and vehicle capabilities.

The study team's effort produced a detailed matrix (Figure 1.3) of potential guideway options and related technologies that showed the relative applicability or "appropriateness" of each of the candidate systems. A broad spectrum of operating characteristics, ridership capacity, and total cost became apparent. This distribution allowed the Task Force to discard the extremes from further consideration and concentrate on the options that appeared more likely to satisfy the circumstances posed for the Dulles Corridor.

"Feasibility" in this study is assessed in terms of the total system cost and benefit. As discussed in the following sections, the assessment has considered:

- guideway passenger capacity per hour over the distances involved;

- technological reliability and sophistication in terms of state-of-the-art;

DULLES CORRIDOR STUDY ALTERNATIVES SELECTION MATRIX

CHARACTERISTICS / SYSTEM ALTERNATIVE	EVALUATION CRITERIA: STATION FEATURES	EVALUATION CRITERIA: SERVICING FACILITIES	EVALUATION CRITERIA: SYSTEM RELIABILITY	EVALUATION CRITERIA: CAPITAL COST Million $/Route Mile (Total Line Cost)	EVALUATION CRITERIA: O&M COSTS (Thousands $/ Route Mile)	EVALUATION CRITERIA: TRIP TIMES (Min.)	SYSTEM DESCRIPTION: GUIDEWAY FEATURES	SYSTEM DESCRIPTION: VEHICLE DESCRIPTION
PEOPLE MOVER (AGT)	o Covered platforms o No support facilities	o Complete vehicle servicing o Maintenance-of-way o Storage area	o Very short haul o Low capacity o Low speed o Long trip time	o Current price history reflects short haul operation only o Detroit $90 million/mile	o Expected to equal or exceed high speed advanced technology	o 35	o 30 mph o Dual track guideway o Rubber tired o Power pickup from guideway o On board collection or controlled entry o Concrete guideway designed specifically for system	o Special purpose vehicles o Designed to meet demand
LIGHT RAIL DEMAND L.O.S.	o Open platforms with canopies 2 cars long o Parking at Reston, Hunter Mill, Rte. 28 Herndon o Select kiss & ride lanes Reston, Hunter Mill Rd. o Platforms capable of being lengthened o High level for WMATA compatibility	o Storage West Falls o Separate MOW forces o Service by agreement with WMATA (if possible)	o Proven technology	o $4.6 to $11.4 Note: Cost is dependent on level of service See building block estimate ($90 - $182 million)	o $249.1	o 21.5	o Ballasted single-track with passing tracks A block signals o Terminus West Falls Church Station o Turnouts to center platform stations o Expandable to 2 tracks o Machine collection No transfer to WMATA o Conform to existing median (minor grade changes) o Jersey barrier & fence o Ballasted timber ties o Cooper E-80 on structures o Structures for 2 tracks o Design speed 55 mph	o LRV's capable of single operation and train operation up to 4 units with one operator o 60 mph maximum speed o Third rail pickup o Operate either end
HEAVY RAIL	o Stations compatible with existing designs o Park & ride facilities o Full handicapped facilities o Kiss & ride at select locations	o WMATA facilities	o Proven technology o WMATA reliability	o $27.5 (Based on WMATA estimate of 4/82 for this corridor adjusted for private sector) ($440 million)	o $300	o 15.5 (Based on three intermediate stations)	o WMATA 2-track ballasted standard o Crossovers each station o Access existing system between East & West Falls Church o Standard WMATA fare collection o Conform to median o Jersey barrier & fence	o WMATA vehicles

FIGURE 1.3

DULLES CORRIDOR STUDY ALTERNATIVES SELECTION MATRIX

	EVALUATION CRITERIA						SYSTEM DESCRIPTION	
CHARACTERISTICS / SYSTEM ALTERNATIVE	STATION FEATURES	SERVICING FACILITIES	SYSTEM RELIABILITY	CAPITAL COST Million $/Route Mile (Total Line Cost)	O&M COSTS (Thousands $/ Route Mile)	TRIP TIMES (Min.)	GUIDEWAY FEATURES	VEHICLE DESCRIPTION
MONORAIL	• Elevated stations required • Covered platforms	o Complete vehicle servicing o Maintenance-of-way • Storage area	• Short haul • Low speed	o Current price history reflects short haul operation only o $12.0 ($192 million)	o $250	o 35	o Elevated dual rail guideway o Rubber-tired o Power pickup from guideway o On-board operation by operators with backup proximity override o Design speed 35 mph	o Six-car consist o Electric-powered o Rubber-tired vehicle o Bidirectional capability o Regenerative braking o In-cab communications and controls
HIGH SPEED ADVANCED TECHNOLOGY (300 MPH) • MAGLEV	• Covered platforms for 4 car unit • Security monitoring system o Full handicapped facilities	o Complete shop & yard facilities required o State-of-the-art vehicle servicing o Complete MOW department	• New untested technology in the United States	o $22.24 for Maglev (Based on recent High Speed Rail studies for Pennsylvania) (Based on long haul system with wide station spacing)	o $529.0 Maglev (Based on recent High Speed Rail studies for Pennsylvania) (Based on long haul system with wide station spacing)	o 7.9 Maglev (No intermediate stations)	o Maglev technology o Express service o One intermediate stop o 2 independent guideways o Terminus West Falls Church Station o Ticket machines o Controlled entry & exit o Manned change booth o Concrete guideways o Precise leveling on piled foundations o Conform to median geometry min. change o Design speed 300 mph restricted by alignment	o Specially designed o Functions as a single unit o Single end operation
HIGH-SPEED CONVENTIONAL TECHNOLOGY • Amtrak • TGV • Japanese, German	o Covered platforms for 4 car unit o Security monitoring system o Full handicapped facilities	o Complete storage facilities o Service facilities for daily maintenance o Agreement by contract for major repair	• Proven for long haul service only o Technology new to United States (except Amtrak)	o $16.02 TGV o $13.7 others (Based on recent High Speed Rail studies for Pennsylvania & Texas) Costs reflect construction of track and facilities (Based on long haul system with wide station spacing)	o $395.5 TGV o $333.7 others (Based on recent High Speed Rail studies for Pennsylvania) (Based on long haul system with wide station spacing)	o 10.5 TGV o 12.0 others (No intermediate stations)	o Amtrak high speed service or better o Catenary power supply o 2 tracks o CTC o 1 intermediate station o Terminus West Falls Church Station • Ticket machines • Controlled entry & exit o Manned change booth o Ballasted track concrete ties o Design speed 180 mph restricted by alignment	o Consist composed of AM-7 and Amfleet cars o TCV, Japanese and German vehicles similar

FIGURE 1.3
(cont'd.)

- o man/machine requirements related to speed and sophistication;
- o investor interest as reflected in potential station stops and ridership;
- o initial capital requirements for constructing the guideway and procuring equipment; and
- o operating and maintenance costs for comparable service by various systems.

Automated Guideway Transit - People Mover - Monorail

These alternatives are characterized in current and planned applications as for relatively short-haul situations of low capacity and light duty. Their speeds are generally moderate to accommodate unmanned, automatic control. Systems currently operating or under construction circulate through central business districts in loops, or shuttle between relatively close terminals. The slow speed typical of these systems suggests long trip times.

Very little, if any, of these systems is mass produced or available off-the-shelf. The guideways and vehicles are generally custom made for each application, and result in very expensive systems of unproven reliability. In some applications, most notably the Disney organization, the systems have proved highly reliable and satisfactory. The special nature of these systems does result in unfortunately high operation and maintenance costs, comparable to the high speed rail alternatives at the high end of the cost spectrum.

In Miami, a 2.1-mile "Metromover" system is scheduled to open in March 1986 to carry commuters from the Metrorail station around the central business district.

Jacksonville, Orlando, Tampa and Fort Lauderdale are also considering transit systems, most similar to the "Metromover" to carry people around the central business districts. The systems are designed to connect large parking garages and bus terminals with offices and stores.

- o Jacksonville is farthest along, and is seeking Federal assistance to begin a 2.5-mile people mover system.
- o Orlando is considering the construction of a 12.1-mile automated fixed guideway system from Disney World's Epcot Center to International Drive. The system would serve hotels and shopping malls that cater to tourists, and would be privately financed.

- Tampa is planning a people mover to connect parking garages with a bus terminal and downtown offices. A privately built automated people mover is near completion between a downtown parking garage and the Harbour Island development.

- Fort Lauderdale is studying a proposal to build a people mover to connect parking garages on interstate highways with downtown.

In Detroit, the 2.9-mile elevated people mover originally estimated as costing $138 million, is now expected to cost nearly $190 million. Construction problems and alignment changes have complicated the project. It is now expected to open in late 1986.

An Automated Guideway Transit (AGT) system is planned for Chicago's O'Hare Airport. This double-track system of about three miles is described as "ten times the size of typical airport people mover systems." One proposal for this system suggests vehicle cruising speeds of 30-50 mph, with fully automated, driverless vehicles.

The various Walt Disney enterprises have utilized people movers and monorail systems for many years. At Disney World in Florida, seven-car trains carry up to 12,000 visitors from the main parking lot to the ticket and transportation center each hour. From that point, a seven-mile monorail loop is served by 10 trains, each of five or six cars. An additional seven miles of guideway connects the older amusement area with Epcot Center, with six more miles planned.

Since early 1982 an automated Disney people mover has been shuttling people through a tunnel that connects three airport terminals, a hotel and a parking lot at Houston's International Airport. This system runs five and three-car trains along a mile and a half of guideway. The train stops nine times and completes the loop in seven minutes. This highly reliable system utilizes linear induction motors (LIM).

Light Rail

The common theme in the definition of Light Rail Transit (LRT) is the flexibility and adaptability to different ridership demands. The International Light Rail Commission defines light rail as:

"A form of rail transport that can be developed by stages ... Each development stage may be complete in itself, but should make it possible for development to continue to the next higher stage."

The "Guide to Public Transportation Terms and Definitions" defines light rail transit as:

"Steel wheel/steel rail transit constructed on city streets, semi-private right-of-way, or exclusive private right-of-way... LRT vehicles can be coupled into trains which require only one operator and often are used to provide express service."

Examples of existing systems that illustrate this flexibility are:

Boston	58.3 miles	(36.0 planned)
Buffalo	6.4 miles	
Calgary	13.8 miles	(11.5 planned)
Cleveland	13.2 miles	
Fort Worth	1.3 miles	
Newark	4.3 miles	
New Orleans	13.2 miles	
Philadelphia	83.5 miles	
Pittsburgh	3.0 miles	(7.5 planned)
San Diego	15.9 miles	(17.3 planned)
San Francisco	21.3 miles	
Seattle	1.6 miles	
Toronto	49.9 miles	

The popularity of light rail systems and their longevity (Boston began operating in 1897, Philadelphia in 1892) have resulted in sustaining industry that provides reproducible vehicles and equipment with considerable competition. Vehicle variations range from single "trolleys" to two- and three-section articulated combinations. The vehicles are universally powered by electric motors, with traction power taken either from an overhead catenary/pantograph system or a track-side third rail/shoe combination. In a few applications, vehicles are equipped with both pick ups.

Vehicles can be coupled in combinations of two or more, and frequently can be controlled from either end. This reversibility is helpful in shuttle situations. Maximum speeds vary by application, but are commonly stated as 50-55 mph.

Examples of recent vehicles are:

Builder	Speed	Seats	Standees	Sections
Duewag (Cologne)	62.5 mph	72	111	2
UTDC (Toronto)	50 mph	46	42	1
Kawasaki (SEPTA)	47 mph	51	45	1
Breda (Cleveland)	56 mph	84	92	2
Siemens (Edmonton)	50 mph	64	97	2

Many LRT applications are not in dedicated guideways and require coordination with street traffic. The vehicle operator is frequently assisted in these applications by track circuits or sensors that activate traffic lights and/or barriers. Control of the vehicle locomotion and brakes, as well as operation of the doors, is generally by a single operator in the lead vehicle of the train.

Some LRT systems now operating are the remains of old trolley or street car systems. Others are innovations specifically intended to provide transportation more economically than the heavier systems. In addition to the existing systems listed above, the following cities are currently planning LRT systems:

Detroit	15.0 miles	(36.0 miles future)
Portland	15.1 miles	
Sacramento	18.3 miles	
San Jose	20.0 miles	
Vancouver	13.2 miles	(7.4 miles future)

As indicated above, three operating LRT systems in the United States and one in Canada already are planning extensions. In addition, systems planned for Detroit and Vancouver anticipate extensions after their initial increments are operating.

The simplicity of light rail technology makes the basic system a relatively modest investment compared to other guideway options. The same simplicity provides for extension and expansion in reasonable additional cost packages, which can be planned and coordinated to preclude lost value as system parameters or characteristics are changed.

The passenger capacity of LRT systems is variable over a wide range, simply by changing the train consist or by modifying the run schedule to adjust the headway (time between trains) to accommodate demand. Cars can be run alone, or in trains of two to four cars as the demand varies, all with a single operator. These changes can be accomplished as the system matures and ridership increases, and can also provide the flexibility to respond to daily peaks and valleys in demand.

The adaptability of light rail technology to a wide range of situations ranging from shared right-of-way streets to exclusive, dedicated guideways lends itself to easy planning and apparent ready acceptance by the many communities that have tried it. The building block concept of system development assists many municipalities in acquiring rail transit they might not otherwise be able to afford.

Heavy Rail

The heavy rail transit systems in the United States have historically been separated from street traffic. A variety of means have been employed, including subway, at-grade guideway, and elevated structures. Systems currently operating and/or under construction in the United States are:

City	System Miles	No. of Cars
Atlanta	19	150
Baltimore	8	100
Boston	42.3	380
Chicago	88.5	1,200
Miami	21	40
New York	230*	6,000
Philadelphia	216**	387
San Francisco	72.6	447
Washington, D.C.	60.5	354

*excludes commuter rail and LRT.
**track miles.

Heavy rail systems require dedicated tracks separated from other modes of transportation because of safety requirements and the economics of the operation dictate the separation. Although the vehicles can be comparable to light rail systems, the greater ridership of many mass transit systems requires longer, wider vehicles capable of carrying the larger loads.

Because of apparent smaller demand, there are fewer manufacturers in the business. Unlike light rail systems that are very likely to buy vehicles used in one or more other systems, heavy rail systems frequently set their own design requirements to the extent that each system has vehicles unique to their specifications. Manufacturers currently or recently providing vehicles for heavy rail systems in the United States are:

City	Manufacturer
Atlanta	Franco-Belge and Kawasaki
Baltimore	Budd
New York	Bombardier
New York	Kawasaki
San Francisco	Rohr (no longer manufacturing)
Washington, D.C.	Rohr
Washington, D.C.	Breda

Time, distance and ridership loads of most heavy rail mass transit systems warrant the use of computerized automatic train control systems. These systems must be tailored to each specific situation in order that trains may be accelerated and decelerated at precisely the right locations to accommodate station separation and the train speed. The speed is itself a major control parameter, in that systemwide decisions must be made rapidly when trains are operating up to 60 miles per hour on very short headways. However, the systems are frequently "permissive" as opposed to "mandatory."

An appropriate example of a contemporary heavy rail transit system is the Metrorail project being constructed and operated by the Washington Metropolitan Area Transit Authority (WMATA). This regional system will operate to and beyond West Falls Church in 1986. Some of the system parameters that describe Metro include:

- Station platforms = 600 feet long
- Vehicles = 75 feet each
- Minimum train length = 4(75) = 300 feet
- Automatic fare collection system
- Automatic train control system
- No grade crossing
- No shared tracks

High Speed Rail - TGV and Maglev

The Amtrak Metroliner service between Washington, D.C. and New York is an example of a conventional train that exceeds 100 miles per hour for part of its run. The rolling stock is capable of those speeds but the tracks that are shared with freight operations establish the limit. This practical limitation frequently exists where efforts are made to upgrade a mixed-use system to a special purpose application. The investment in special guideways and equipment needed for speeds of 200 miles per hour or greater requires long trips that use the speed to best advantage.

The faster the vehicles are required to go, the more important it is that they travel in straight lines. Lateral or vertical motion induced by changes in direction or poor guideway alignment can cause considerable discomfort for passengers. Limitations of construction cost and geography can defeat the purpose for attempting to use high speed rail.

Most high speed rail applications utilize an overhead catenary system for the power source, as depicted in Figure 1.4. That is specifically true of the Amtrak Metroliner, the French TGV and the Japanese Shinkansen bullet train. As the figure indicates, those characteristics are compatible with typical sections for the Access Road median.

Another technology with high speed performance is the experimental magnetic levitation. Because Maglev systems are not constrained by steel wheels and rails, their forms can be quite different than the typical railroad or rail transit system. Figure 1.5 illustrates the construction of a two-track Maglev system in the Access Road median. The Budd vehicle that is assumed in this case rides over the top of the flat "T" shaped section, with bottom edges that wrap around and under the sides of the "T". In other applications, the vehicle rides within a broad, flat "U" shaped channel.

TYPICAL SECTION - HSR

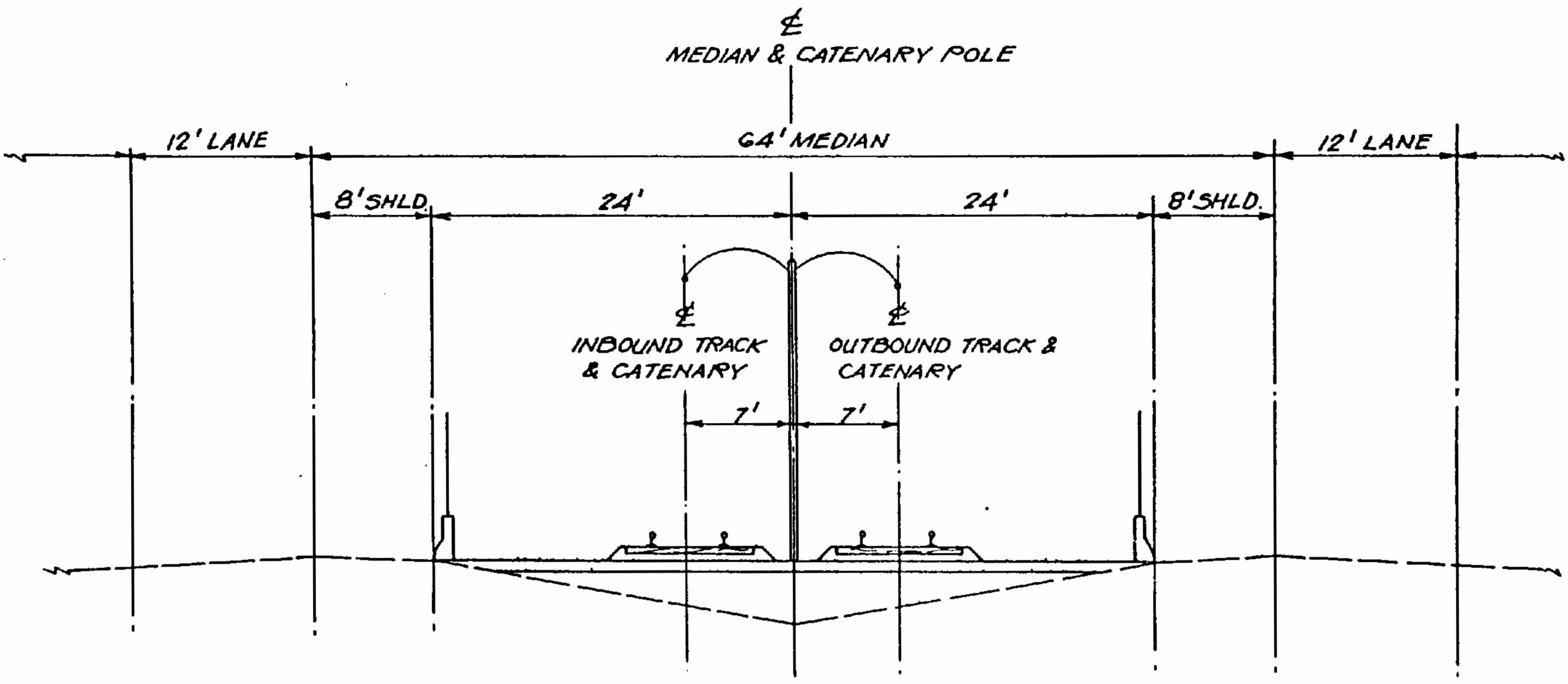


FIGURE 1.4

TYPICAL SECTION - MAGLEV

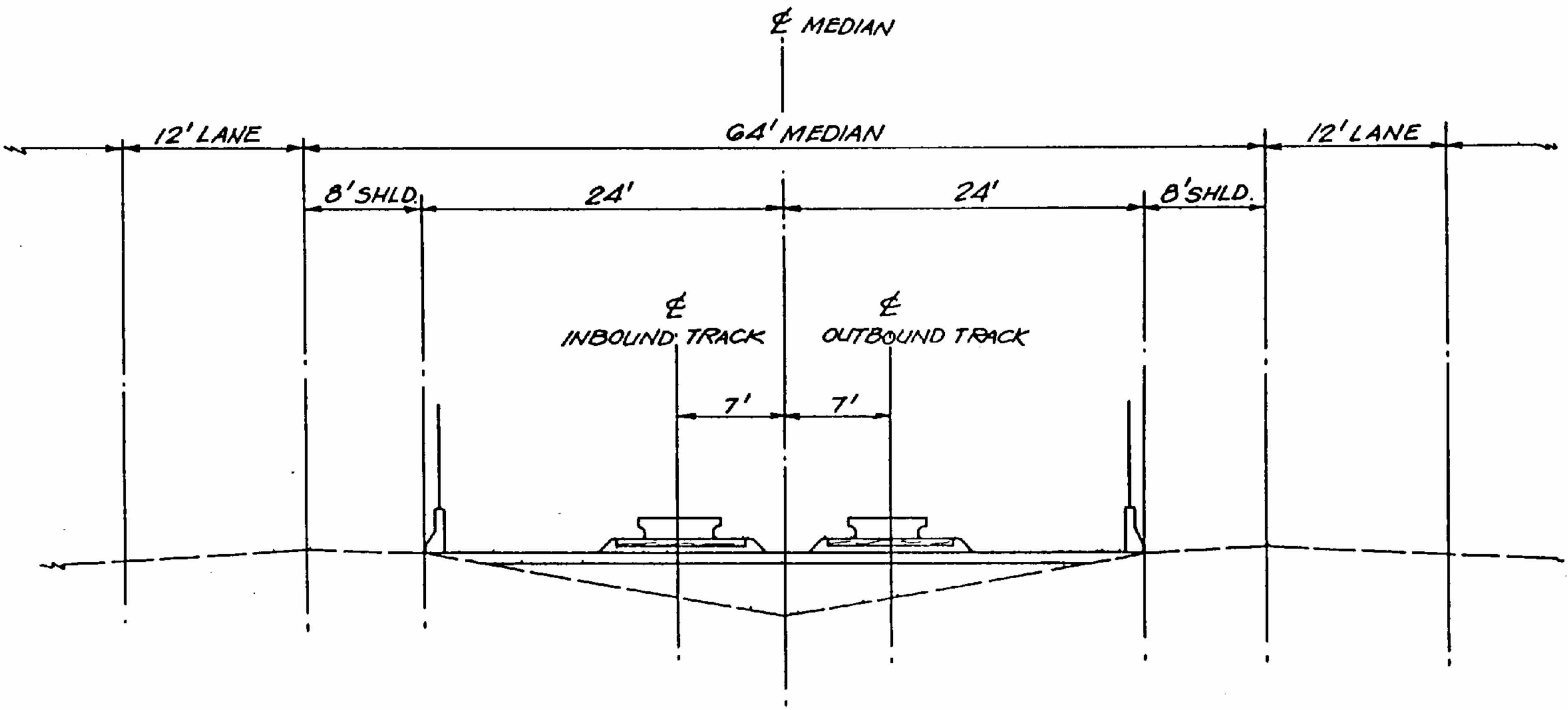


FIGURE 1.5

Human reflexes are inadequate at the speeds considered for these alternatives and must be replaced by pre-programmed computerized controls. These programs, like the electric track circuits they control, must be designed for each individual situation with sequential alarms and mandatory procedures that may not be bypassed.

Because both the infrastructure and vehicles for these systems are pushing the state-of-the-art, their tolerances are extremely demanding and their sophistication very advanced. The French TGV and Japanese Shinkasen have stretched the art of railroading to its limit, at a price that can be justified only as a major national investment for trips of considerable length. The Maglev represents a technology so new that it has not been confirmed by a full scale, practical application. The first cost for any of the high speed alternatives requires, in turn, that major annual investments be made to maintain the operating conditions needed to support the speed.

Unless the Japanese, German, or other Maglev developers market a commercially supportable system in a practical application, the Maglev concept should not be considered for the Dulles Corridor.

The high speed alternatives are so fast that they could complete the trip between West Falls Church and Dulles Airport in 12 1/2 minutes or less if there were no intermediate stops. Because speed is their primary advantage, it is logical to consider no intermediate stops if these systems are used.

PRELIMINARY COST COMPARISONS

Capital Cost Comparisons

As indicated on the evaluation matrix, data for comparison of capital costs were obtained from a variety of sources:

- o Trade publications, e.g., Mass Transit, which periodically feature new developments as well as tabulating industry performance.
- o Studies for other applications, e.g., High Speed Rail for Pennsylvania and Texas.
- o Studies specifically aimed at rail transit in the Dulles Airport Access Road median, e.g., the WMATA feasibility study.

Although these are the best data available for comparison on a parametric level, they represent orders of magnitude only. No specific extensions of costs should be attempted because of considerable differences in the infrastructure that constitutes the base investment (Figure 1.6). The cost of the first mile of a system necessarily includes all the system wide organization, and the unit cost for each mile of a system is quite difficult to determine. In comparisons made by the Study Team it was recognized that considerably greater investments would be required for infrastructure to support the more sophisticated guideway alternatives, but the Study Team has not attempted to establish fixed ratios. Although the magnitude of the base cost of infrastructure can not be isolated in every case, the austere alternatives will be far more attractive to potential investors.

(1) Maglev and LIM Type High Speed Rail

These new developments operate on the principle that a moving magnetic field in the guideway can induce a properly equipped vehicle to move. Hence, the linear induction motor (LIM) replaces the rotary motors in conventional electric-powered vehicles. Because they are not limited by friction of rotating machinery, Maglev and LIM systems can theoretically travel at extremely high speeds, limited primarily by our capability to switch the location of the magnetic field. This technology is expensive, and adds to the cost of the guideway that must be extremely precise.

An evaluation of alternatives for a 314-mile high speed rail system for Pennsylvania yielded unit costs of over $22 million per mile of system for the Maglev technology, for the situation in which stations were widely separated. Although this technology is rated at a maximum speed of 300 mph, the practical situation in a statewide run in Pennsylvania would restrict the average speed to just over 120 mph.

(2) TGV and Shinkansen High Speed Rail

These most sophisticated applications of steel wheels on steel rails are both very popular, working systems. This evaluation of application to the Pennsylvania situation yielded unit costs of $16 million per mile of system for the TGV. This comparison also found the TGV restricted to an average speed of 96 mph in France. The Shinkansen is slightly slower but also slightly less expensive than the TGV.

RAIL TRANSIT SYSTEM CAPITAL COSTS

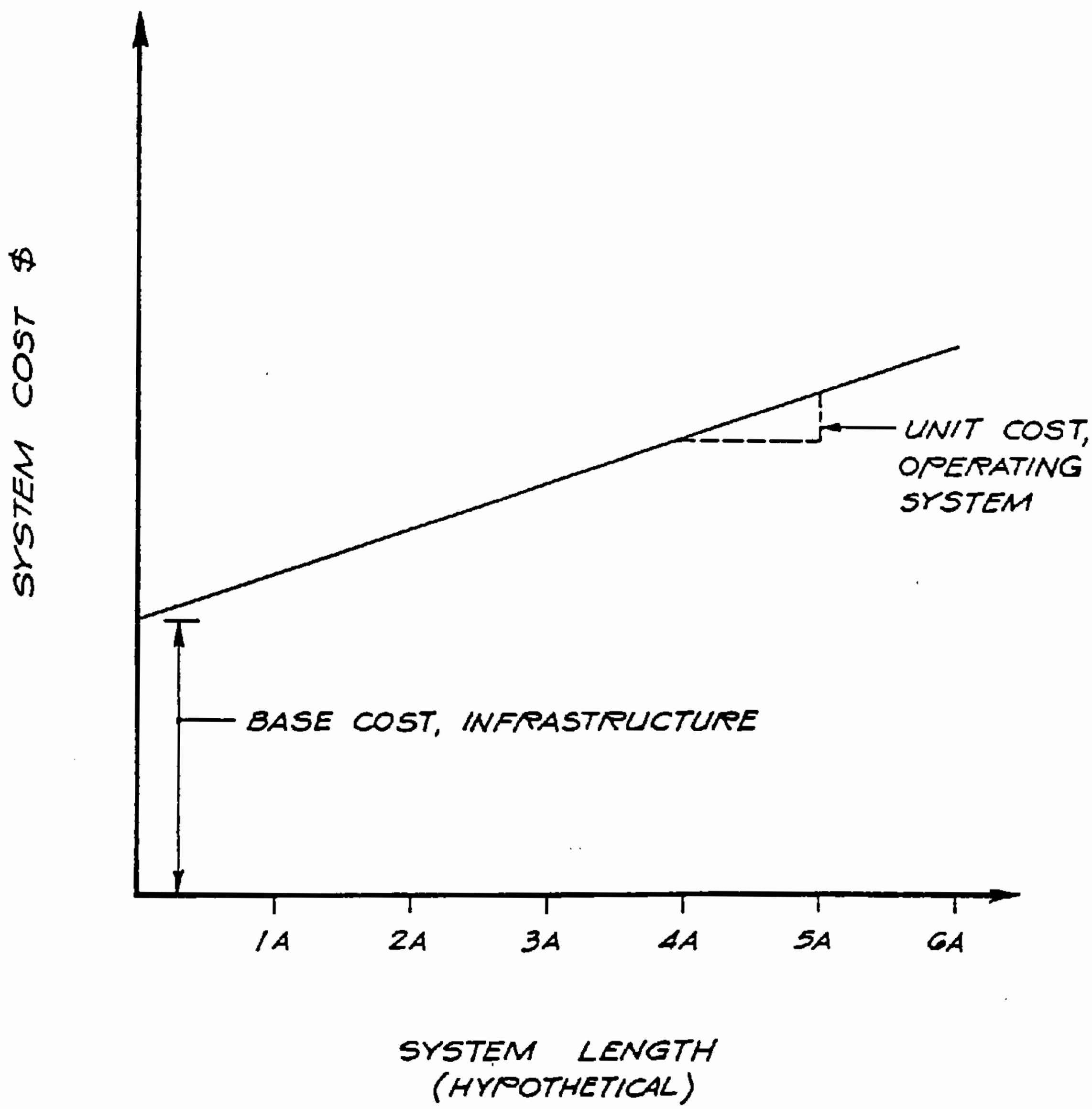


FIGURE 1.6

(3) Amtrak Type High Speed Rail

Upgrading an existing railroad for service of the type Amtrak provides on the Northeast Corridor would cost over $4 million per mile, without stations or vehicles, and permit an average speed of only 79 mph instead of the 110-120 mph the equipment is capable of, based on the Pennsylvania study. With stations and vehicles the unit cost is $5.17 million per mile.

(4) Washington Metro Type Heavy Rail (Private Sector Estimate)

The updated cost estimate for the WMATA feasibility study was $678,234,000 for the Dulles line. When adjusted for some changes in concept, a private sector heavy rail project, scaled down from WMATA standards it was estimated to cost $440 million ($1985), a unit cost of $27.5 million per mile (Figure 1.7a and 1.7b). This particularly high unit cost reflects both standards different from the other alternatives and very conservative cost estimating. Interpretation of the WMATA cost estimate specifically excluded:

o	Dulles Airport Station	$ 42.3 million
o	Real Estate	$ 13.5 million
o	40% Burden	$164.6 million

A smaller, but still expensive station was substituted at the airport at a cost of $10.6 million. Only three intermediate stations were included.

(5) Light Rail

Conceptual cost estimate based on approximate quantities and typical dimensions yield a unit cost of $4.6 million per mile (Figure 1.8). This estimate was accomplished in greater detail than the other estimates because more data were available. Six intermediate stations and 14 vehicles were assumed. In keeping with the LRT concept, it was assumed that a single track system with a passing track at each station, plain stations that are functional in nature, and a simple block signal system be used.

The range of potential additions or options for the light rail system includes a complete second track, computer assisted train control, aerial structures in the Dulles terminal vicinity, and 28 more vehicles (Figure 1.9). The refinements could raise the cost to $9 million per mile.

COST ESTIMATE BY WMATA

	(April 1982) Cost in Current Dollars	Cost In MP 1986 Dollars
At-Grade Line - 82,700 LF @ $900	$ 74,430,000	$104,946,000
Surface Station at Tysons Corner	7,500,000	10,575,000
Parking - 1,000 Spaces @ $2,500	2,500,000	3,525,000
Surface Station at Wolf Trap	7,500,000	10,575,000
Parking - 1,000 Spaces @ $2,500	2,500,000	3,525,000
Surface Station at Reston	7,500,000	10,575,000
Parking - 1,000 Spaces @ $2,500	2,500,000	3,525,000
Underground Station at Dulles	30,000,000	42,300,000
Parking - 1,000 Spaces @ $2,500	2,500,000	3,525,000
Stage Costs	125,000,000	176,250,000
Vehicles - 30 Cars @ $1,000,000 each	30,000,000	42,300,000
Sub-Total	$291,930,000	$411,621,000
Burdens @ 40%	116,772,000	164,648,000
Real Estate	9,000,000	13,500,000
TOTAL	$418,000,000	$590,000,000

With 15% Contingency $675,000,000 to $700,000,000

1. $700 million order of magnitude estimate
2. No provisions for vehicles with speeds of 100 MPH (stations too close together)
3. Includes contingency
4. Underground Dulles Station
5. Stations (surface) Tysons Corner, Wolf Trap and Reston
6. Length - 16 miles (surface)
7. Thirty (30) vehicles at $1.0 million/vehicle in current dollars
8. 1,000 parking spaces at each station
9. $9.0 million - real estate - for surface facilities

FIGURE 1.7a

COST ESTIMATE RECONFIGURED BY PBQ&D

	1986 Dollars
Line - 82,700 LF @ $900	$104,946,000
Dulles Station	42,300,000
Stage Construction	176,250,000
Sub-Total ($20 million/mile)	$323,496,000
Three (3) Stations (Tysons, Wolf Trap, Reston)	31,725,000
Three (3) Parking Lots @ 1,000 Spaces	10,575,000
Sub-Total ($23 million/mile)	$365,796,000
30 Vehicles @ $1,410,000	42,300,000
Sub-Total ($25 million/mile)	$408,096,000
Other Costs: Parking at Dulles	3,525,000
Real Estate (Stations)	13,500,000
Burdens	164,648,000
Sub-Total ($37 million/mile)	$589,769,000
15% Contingency	88,465,000
TOTAL ($42 million/mile)	$678,234,000

This estimate does not consider physical connection of tracks to Metro

FIGURE 1.7b

DULLES CORRIDOR STUDY
SYSTEM COSTS
AUSTERE, SINGLE TRACK LRT SYSTEM,
84,500 FT.
(1985 $)

Item	Quantity	Cost	Cumulative Cost	Comments
1. Earthwork & Subballast	83,000 LF	$ 5,955,250	$ -	
2. Bridges, Undergrade	1,527 LF	5,344,500	11,299,750	
3. Track, Ballasted	83,000 LF	6,593,520	17,893,270	Single Track
4. Track, Direct Fixation	1,527 LF	223,553	18,116,823	For Bridges
5. Sidings (8)	13,600 LF	1,500,384	19,617,207	With 14 Turnouts
6. Third Rail System	98,100 LF	4,717,816	24,335,023	
7. Power Substations	6 EA	2,100,000	26,435,023	
8. Barriers & Fences	169,000 LF	7,605,000	34,040,023	
9. Signals and Communications		400,000	34,440,023	
10. Fare Collection		400,000	34,840,023	Barrier Free, Self-Serve
11. Landscaping		120,000	34,960,023	($2,185,001/mile)
12. Stations (160-ft.)	8 EA	3,204,000	38,164,023	Without Parking, Kiss & Ride, etc.
13. Vehicles	14 EA	14,000,000	52,164,023	($3,260,251/mile)

NOTE: This System Does Not Include:

- Parking, Kiss & Ride, etc. at Stations
- Service and Inspection Yard
- Maintenance and Repair Shop
- Add $1,000,000 to Cost Per Mile

FIGURE 1.8

DULLES CORRIDOR STUDY
SYSTEM COSTS
LRT - BUILDING BLOCK ESTIMATE
(1985 $)

	Base Cost
Basic System	$ 52,164,023
Aerial Structures	20,905,500
Two-Track Operation	20,884,063
Trackwork ($6,112,303)	
Crossovers ($455,000)	
Third Rail System ($3,616,760)	
TPSS ($700,000)	
Train Control & Communications	5,350,000
Station Improvements	3,537,120
Lengthen ($3,137,120)	
Fare Collection ($400,000)	
Parking, Kiss & Ride	9,600,000
Yard Facilities	7,255,160
Shop & Equipment	1,860,000
Maximum Additional Vehicles (28 Additional)	28,000,000

Does not include cost of design, PM, CM, and agency coordination.

FIGURE 1.9

Factors Considered In Selecting An Option For Further Evaluation

Although the Congressional mandate allows consideration of an option with no intermediate stations, it is unlikely that local governments will be willing to permit the development and/or operation of a transit system between Dulles Airport and West Falls Church based soley on the economic advantages of the two terminals. It is more likely that the financial basis for such a venture will require the opportunities available at the several intermediate station areas under consideration.

The data used to compare the wide variety of guideway options were obtained from representative existing and planned projects, many of which were not directly comparable to the Dulles Corridor (Figure 1.10). As a rule, the high speed systems are considerably longer than the Dulles Corridor in order to capitalize on speed capabilities. Because of the significant investment in the systemwide safety and control capability, reducing the costs to a "per mile" basis is somewhat artificial and tends to yield unit costs lower than would be expected on a system as short as 16 miles.

In a somewhat similar situation at the other extreme of the guideway option spectrum, the people mover and automated guideway transit (AGT) systems have not generally been applied over distances as long as the Dulles Corridor. These special purpose guideways carry large numbers of passengers in some applications, but do not present unit costs directly comparable to 16- or 32-mile systems. There is no basis to expect significant economies of scale in extending these options to the Dulles Corridor.

As the cost and operating characteristics indicate, the several high speed rail options may cost four or more times the amount of the more conventional technologies, but would not be able to realize their potential in this Corridor because of the alignment variations. The need to stop, start, and reduce speed on curves for passenger comfort would probably reduce the trip times to about half of that expected by conventional means. Viewed in the other sense, modifying the Corridor in order to realize the tremendous speed capabilities of any of the high speed rail options would require an investment that private interests are not likely to consider (Figure 1.11).

The initial cost of maintaining any newly constructed systems being considered by this study should be relatively low because of the manufacturer's warrantees that should be required for all equipment. The comparisons made in this study, therefore, are based on the best available data on actual costs experienced on operating systems after the warranty period has expired. Specific differences in the maintenance costs discussed below relate to the relative sophistication of the equipment and the precision required in ancillary and support systems.

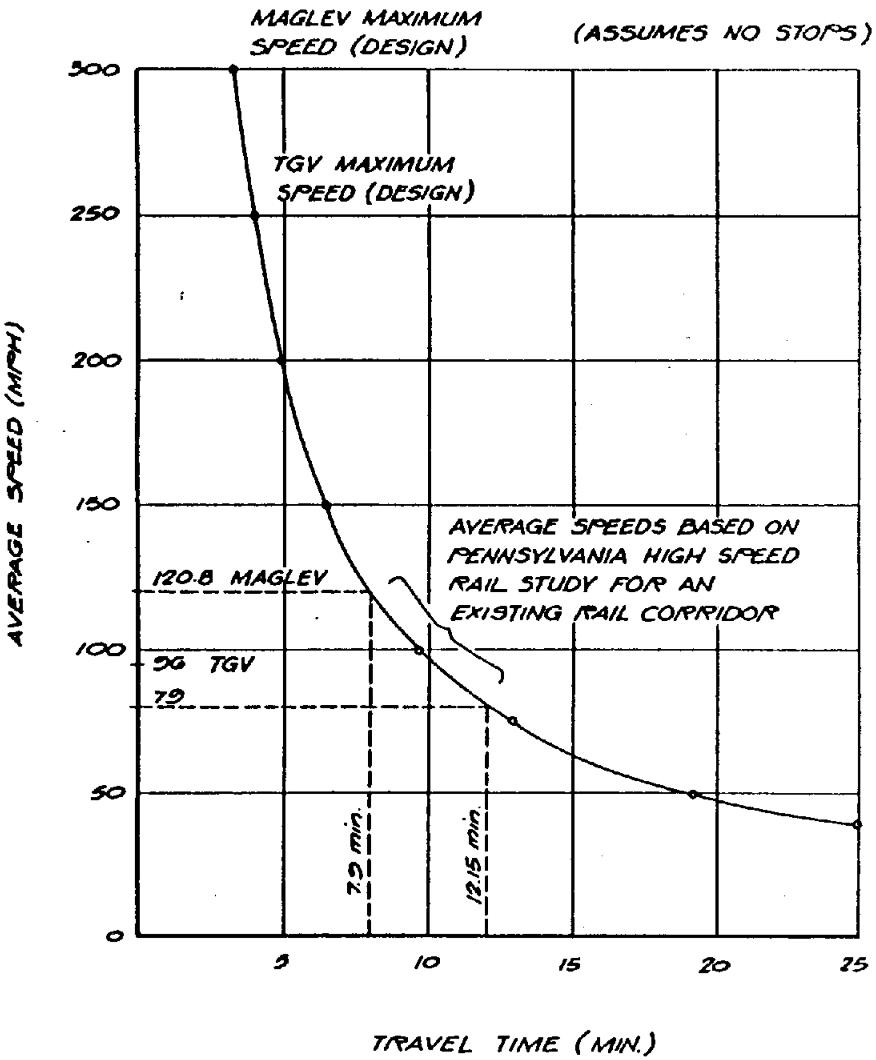
Operating and maintenance costs, in general, increase proportionally with the speed at which the transit system is intended to operate. Higher speeds require straighter, flatter guideways, and faster control systems more likely to be computer operated. The more sophisticated propulsion and control systems are designed specifically for each application, and rarely employ off-the-shelf hardware. Tolerances are much more stringent for the newer state-of-the-art technologies, but tnat does not necessarily increase reliability or maintainability.

Operating costs by themselves depend on the size staff required to provide a desired level of service, and the energy and material costs necessary to support the operation. In making these comparisons, it was recognized that the service plans of the alternative guideway options are not always comparable. However, the cost data are characteristic of the options and the relative costs provide a meaningful comparison.

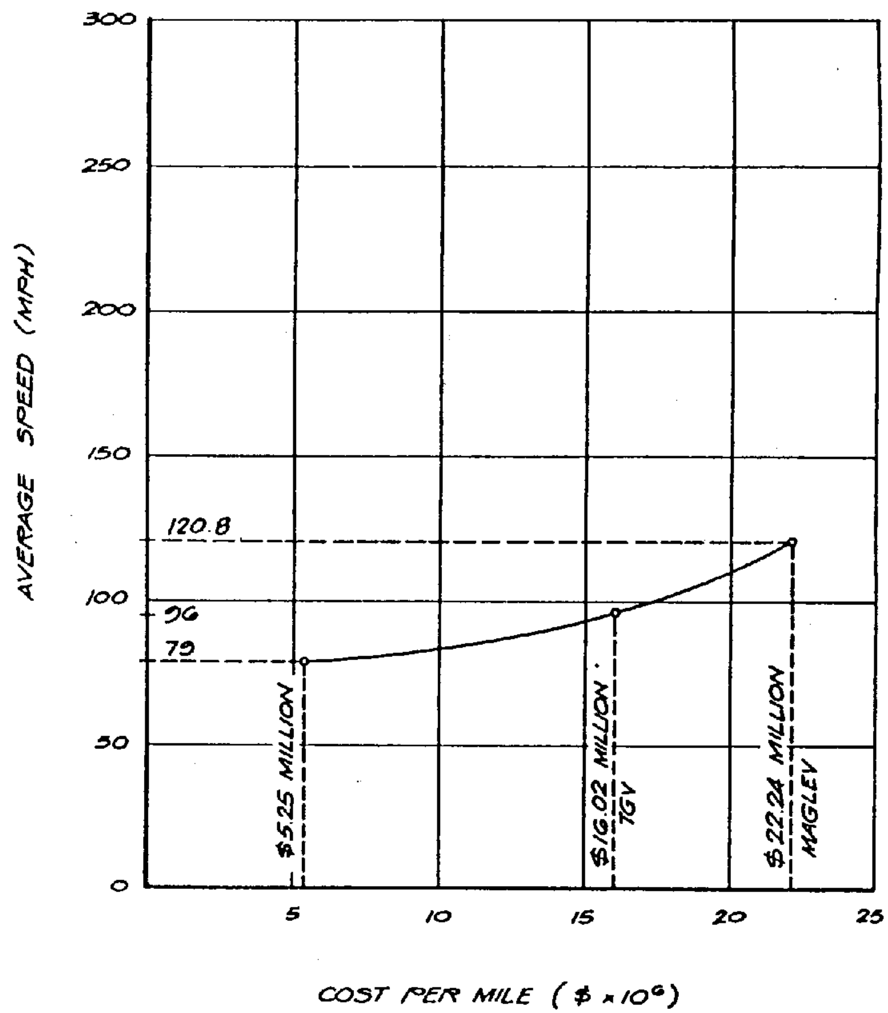
SUMMARY

- o The Dulles Corridor, as defined by the median of the DAAR and its extension to Interstate 66, is particularly well suited for a rapid transit system, having been designed with that possibility in mind. Vertical and horizontal clearances appear adequate.
- o Existing roads cross over or under the Corridor at 17 points between Dulles Airport and West Falls Church, and should allow for reasonably easy access to a transit system.

TRAVEL TIME FOR HIGH SPEED RAIL ALTERNATIVES



RELATIVE UNIT COST FOR HIGH SPEED RAIL ALTERNATIVES



- The capital costs of many options are too high for the ridership attracted, indicating the return on investment would not be attractive. This is particularly true of the high speed systems whose main advantage tends to rule out intermediate stations.

- Some guideway options appear to require extremely sophisticated equipment that is not presently in common use in the transit industry, and which might be of questionable reliability if used in the Dulles Corridor.

SELECTION OF REPRESENTATIVE GUIDEWAY

Based on this analysis, light rail transit was recommended as the representative guideway option for further analysis by the consultant team. The Task Force approved the selection based on:

- System reliability
- Minimal initial capital investment
- Service and performance characteristics compatible with corridor needs
- Competitive supply and construction markets
- Incremental upgrading capability
- Minimizes risk
  - financial
  - technical
- Off-the-shelf technology
- Rapid implementation capability
- Environmental acceptability

CHAPTER TWO: SYSTEM DEFINITION COSTS

System Description

As addressed in Chapter One, a broad range of alternative technologies were assessed. The Task Force's selection of light rail transit eliminated many technologies from further consideration but, due to the flexibility of light rail transit, many operating options remained. Light rail transit can operate in environments ranging from city streets with mixed traffic through increasing degrees of exclusive rights-of-way to totally access controlled subways or elevated facilities. One of the most appealing characteristics of LRT is its ability to be upgraded over time. This flexibility permits a minimum initial investment while the system can be upgraded as ridership or other conditions warrant.

In order to more clearly define the LRT system to be further analyzed, the study team examined the full range of LRT operating scenarios. The needs of and special characteristics of the Dulles Corridor were also closely reviewed.

Alternative scenarios for system maintenance were considered. The range of options included the subcontracting of all maintenance services to the construction and in house provision of all facilities and services required to operate and maintain the system. The recommended maintenance plan called for the construction of a light maintenance facility where day-to-day cleaning, inspection and minor maintenance could be performed. All heavy maintenance would be contracted out.

Traditionally, electrical power distribution for LRT is carried through a system of overhead wires and poles. This type of power distribution is required when LRT operates in mixed traffic flow or when pedestrians are permitted to cross operating tracks. Construction of the proposed LRT system within the Dulles Access Road right-of-way will result in an exclusive environment which would obviate the requirement for overhead power distribution. Overhead power distribution would be necessary if extended at grade beyond the exclusive DAAR right-of-way. The alternative to overhead power distribution is a third rail option as used by the WMATA system. The costs of third rail or overhead power distribution are similar. The ultimate decision concerning the type of power distribution used will be determined at the time of implementation. The study team's schematic design and capital cost estimate of the proposed LRT system was based upon a third rail power distribution system.

Another major choice made in defining the LRT system's operating concept is the level of the patron's boarding platform. LRT is capable of boarding passengers at the normal street curb level through stairs similar to a standard bus. It is also capable of boarding passengers from a platform which is level with the floor of the vehicle. High platform boarding is more convenient and efficient, but results in an increase in the capital cost of the project due to the added expense of the platforms. The project consulting team recommended that high platforms should be used in order to improve loading efficiency and convenience while maintaining compatibility with the WMATA system.

The system selected for detailed study included the following features:

- Double, ballasted track system, terminating in a single track at West Falls Church (16.2 miles);

- Terminals at Dulles Airport and West Falls Church, with intermediate, center platform stations to serve;

  - Route 128
  - Herndon
  - Reston
  - Hunters Mill Road
  - Wolf Trap Farm Park
  - Tysons/Route 7

  Actual location of the stations will be determined by local entities and the private developer.

- Five double crossovers and one equilateral turnout (latter at West Falls Church). One crossover outside the Dulles loop, the others spaced evenly along the Corridor for emergency use;

- One single turnout for access, and a service and inspection yard with repair shop, to be located in the Dulles Airport vicinity;

- Five traction power substations, each rated at 1,000 kw, to convert 34,500 volts alternating current to the traction power required by the selected vehicles. That power requirement is expected to be in the range of 600 - 750 volts direct current.

- A manual train control system utilizing automatic block track circuits;

- FM radio communications for communications with vehicles; dedicated wire communications to link stations, yard and system control;

- Each intermediate station will provide a 160-foot long high level platform (at vehicle plan level), overhead protection and a footbridge from outside the Toll

Road. Structural supports for the footbridge will incorporate stairs at each end; an intermediate support will be provided between the Access Road and Toll Road Platforms will be lighted and include an attendant's enclosure;

- Two self service fare card vending machines will be provided at each station;

- Parking lots to accommodate an average 600 passenger cars will be provided for each of the intermediate stations except Wolftrap;

- Twenty-one Light Rail Vehicles (LRV) will be provided. Each vehicle will be capable of operating independently, or in consists of 2-4 cars with a single operator, and will be capable of cruising at 70 mph in either direction when the guideway permits;

- The track at Dulles Airport will be a loop on elevated structures paralleling the existing road. The platform will be adjacent to the Deplaning Roadway. The elevated structure will permit pedestrians to pass underneath between the parking lot and the terminal. This alignment option represents a middle cost estimate from among the possible alternatives (subway, surface, or elevated). If such an alignment is ultimately proposed, the FAA and/or other appropriate regulatory bodies would be directly involved in its final selection and design;

- The system will be compatible with the Washington Metrorail system in basic parameters:

  - Tracks will be standard gauge (4'-8 1/2")
  - Rail will be 115 lbs./yd.
  - Track centers will be 14 feet or greater, except for yards and non-revenue tracks
  - Platform edge treatment may require minor modification to accommodate Metrorail vehicles
  - Power will be provided by a third rail system;

- A bumping post will be provided at the end of the system in West Falls Church, and at the end of each storage track;

- Access between the LRT station and the Metrorail station at West Falls Church will be by pedestrian tunnel under the Access Highway Extension, to the north entrance of West Falls Church Station or, if appropriate agreements can be reached between WMATA, local officials and the system developer, by a cross platform transfer; and

- o There will be no at-grade crossings of the LRT tracks.

Capital Costs

Conceptual cost estimates were prepared utilizing the "unit cost" estimating approach. Composite unit costs for items such as at-grade guideway, stations and trackwork were developed by one of the following methods:

- o By aggregating the quantities and unit costs of each item composing a typical section or

- o By utilizing historical cost data from recent similar projects.

The following composite unit cost categories were developed:

- o Guideway
- o Stations
- o Fencing
- o Barrier Wall
- o Landscaping
- o Ballasted Track
- o Direct Fixation Track
- o Contact Rail
- o Traction Power Cabling
- o Traction Power Substations
- o Train Control and Communications
- o Fare Collection
- o Yards and Shops

These unit costs were then extended against actual quantities of work to develop total construction costs. The costs are based on the following:

- Minimal yard and shop area for vehicle inspection and servicing;
- Sidewalks, parking and kiss-and-ride facilities at all stations; and
- Two "self service" fare card machines at each station.

- o Both high and low costs assume:

  - Eight "bare bones" concrete stations with minimum shelters and canopies, but no architectural finishes;
  - One pedestrian bridge at each station;
  - No elevators or escalators;

- 150 NMC contact rail with coverboard only in station areas;
- 115 RE rail with cross ties at 30-inch O.C.;
- Honor fare collection system similar to Calgary;
- Minimal necessary traction power equipment;
- Minimal necessary train communications equipment; and
- Fast track design-build construction with minimum governmental approvals.
- The highest cost estimate for the terminus at West Falls Church is utilized.

Utilizing the capital cost estimating approach and based upon the recommended system description, the 1985 constant dollar estimate of $143,500,000 was developed. The following table reflects the build up of costs:

LRT CAPITAL COST
(1985 $)

Activities	Cost
Clearing & Grubbing	$ 5,390,000
Drainage Structures	2,775,000
Safety Barriers & Fences	11,225,000
Bridges	5,345,000
Yard & Shop	560,000
Earthwork & Subballast & Paved Shoulder	5,025,000
Stations (7) (Including Landscaping)	4,910,000
Aerial Structure at Dulles Terminal	20,905,000
Pedestrian Tunnel at W.F.C.	1,060,000
Vehicles	21,150,000
Traction Power Substations & System	1,750,000
Trackwork	17,675,000
Pedestrian Bridges	565,000
Signals & Communication	700,000
Parking, Kiss & Ride (Including Landscaping)	8,879,500
Fare Card System	800,000
Construction	$106,714,500
Contingency	15,086,250
Agency Coordination	2,313,225
PM, CM, Design	17,349,185
	$143,463,200

ACTIVITIES	1986	1987	1988	1989	CONSTRUCTION COST
DEVELOP & ISSUE REQUEST-FOR-PROPOSALS					
BIDDERS DEVELOP & SUBMIT PROPOSALS					
EVALUATE PROPOSALS, AWARD CONTRACT					
CONTRACTOR MOBILIZATION					
SYSTEMWIDE DESIGN CRITERIA & STANDARDS					
CLEARING & GRUBBING					$5,390,000.
DRAINAGE STRUCTURES					2,775,000.
SAFETY BARRIERS & FENCES					11,225,000.
BRIDGES					5,345,000.
YARD & SHOP					580,000.
EARTHWORK & SUBBALLAST & PAVED SHOULDER					5,025,000.
STATIONS(7) (INCL. LANDSCAPING)					4,910,000.
AERIAL STRUCTURE AT DULLES TERMINAL					20,905,000.
PEDESTRIAN TUNNEL AT W.F.C.					1,060,000.
VEHICLES					21,150,000.
TRACTION POWER SUBSTATIONS & SYSTEM					1,750,000.
TRACKWORK					17,675,000.
PEDESTRIAN BRIDGES					565,000.
SIGNALS & COMMUNICATION					700,000.
PARKING, KISS & RIDE (INCL. LANDSCAPING)					8,879,500.
FARE CARD SYSTEM					800,000.
SYSTEM STATIC & DYNAMIC TESTS					
START-UP TRAINING & OPERATION					
REVENUE SERVICE					

LEGEND: DESIGN

PROCUREMENT & FABRICATION

CONSTRUCTION/INSTALLATION

DULLES RAIL TRANSIT SYSTEM
DESIGN & CONSTRUCTION SCHEDULE

AUGUST 29, 1985

Figure 1.8 in Chapter One illustrates the basic costs of the austere single track LRT system initially considered as a guideway option. Additional features were considered to upgrade the austere system. This menu of possible additional features and their costs are shown in Figure 1.9 also in Chapter One. Subsequent definition of the LRT system used for schematic engineering expanded the basic source data from which these two figures were extracted. The final definition of the proposed LRT system did not include all of the elements illustrated in either Figure 1.8 or Figure 1.9.

Operating Plan

The operating plan is a major input to patronage and operating cost estimation. It should be emphasized that the development of a final detailed operating plan is an iterative process, dependent on forecasts of patronage, operating revenue and capital cost. Issues of engineering and institutional feasibility will also shape the operating plan to be described at the time of implementation.

OPERATING AND MAINTENANCE COSTS
DULLES LRT SYSTEM
(1990 Costs in 1985 $)

Conducting Transportation:	Quantity	Unit Cost	Total Cost
1. Manager	1	$ 35,000	$ 35,000
2. Shift Supervisors	3	30,000	90,000
3. Dispatchers	3	25,000	75,000
4. Station Agents	23	17,500	402,500
5. Vehicle Operators	20	22,500	450,000
6. Clerk	1	17,500	17,500
7. Janitor	1	15,000	15,000
	52		$1,085,000

Direct Labor	$1,085,000
Overhead @ 65%*	705,250
Materials	100,000
Sub Total	$1,890,250

Maintenance of Equipment:	Quantity	Unit Cost	Total Cost
1. Manager	1	$ 35,000	$ 35,000
2. Inspector/Shift Supervisor	2	25,000	50,000
3. Body and Metal Work Repairman: (Doors, Windows, Floors, Seats)	2	19,000	38,000
4. Traction Motor and Electric Device Repair-man: (Motors, Contact Shoe, Lights, Signs)	2	23,000	46,000
5. HVAC Repairman: (Heaters, Blowers, A/C)	2	21,000	42,000
6. Mechanical Repairman: (Wheels, Axles, Couplings)	2	19,000	38,000
7. Signals/Communications and Controls Repair-man	2	25,000	50,000
8. Cleaners (Night Shift)	4	15,000	60,000
	17		$ 359,000

Notes: 1 per shift except for Manager and Cleaners

Direct Labor	$ 359,000
Overhead @ 65%*	233,350
Materials, expendable	200,000
Sub Total	$ 792,350

OPERATING AND MAINTENANCE COSTS
DULLES LRT SYSTEM
(1990 Costs in 1985 $)
(Continued)

Maintenance of Ways & Structure:	Quantity	Salary	Cost
1. Manager	1	$ 35,000	$ 35,000
2. Track and Structures Inspection/Maintenance	3	20,000	60,000
3. Power System Inspection/ Maintenance	2	25,000	50,000
4. Communication & Signal Inspection/Maintenance	2	27,500	55,000
	Direct Labor	$200,000	
	Overhead @ 65%*	130,000	
	Sub Total	$330,000	

General & Administrative:

1. Senior Managers: GM, Fin., Pers. & Adm.	3	$40,000	$120,000
2. Administrative Staff, 2 @ Section	6	15,000	90,000
			$210,000
	Direct Labor	$210,000	
	Overhead @ 65%*	136,000	
	Supplies, Mail Phone	10,000	
	Sub Total	$356,500	

Additional O & M Costs:

1. Char Service - Buildings, Stations, Fixed Facilities:
   Average Corridor Price 0.60/SF - Buildings
   5 Stations; 4 Buildings - $120,000

2. Utility Costs (Except Traction Power):
   5 Stations Plus Parking; 4 Buildings
   $10,000/month - $120,000

3. System Security:
   Assume 3/Shift X 3 Shifts = 9 + 2 = 11 Employees

11 X $25,000 Salary =	$275,000
12% Holidays =	33,000
Fringes @ 34% =	93,500
Add for Veh.; Equip. =	$450,000

OPERATING AND MAINTENANCE COSTS
DULLES LRT SYSTEM
(1990 Costs in 1985 $)
(Continued)

4. Insurance:
   Assume Operating/General Liability Insurance
   $275,000/Year

5. Contract Maintenance
   Allow $250,000/Year (1) Escalate - Conservative

6. Traction Power Service:
   Allow $300,000 Per Year
   (To Be Verified by VEPCO)

Recapitulation:

Conducting Transportation			$1,890,250
Maintenance of Equipment			792,350
Maintenance of Ways & Structures			330,000
General & Administrative			356,500
Char Service	120,000		
Utility Costs	120,000		
System Security	450,000		
Insurance	275,000		
Contract Maintenance		250,000	
Traction Power Utility Costs		300,000	
Total O & M Costs (1985 $)			$4,884,100

*Overhead:

Holidays, Vacation, Sick Leave = 12%
Fringe Benefits = 34%
Rent, Repair and Maintenance = 19%
65%

These costs are significantly lower than costs for similar service provided by a public authority. Among the reasons for the differences are a private sector compensation package, flexible work rules allowing reduced staffing levels and a private sector commitment to cost control.

Operating Costs

Operating costs were based upon patronage requirements, level of service, running times and hours of service. The following tables reflect the labor materials and supplies cost build-up for the operating cost estimate.

Travel Demand Estimates

The results of the ridership and revenue forecasts are important inputs to evaluating the feasibility of the proposed privately-financed and constructed light rail service between Dulles International Airport and the West Falls Church Metrorail station. Estimates of operating revenue provide the basis for evaluating the need for additional revenue sources to finance and operate the service. Ridership projections are needed both to design a cost effective and revenue maximizing service, and to permit realistic estimates of capital and operating costs. Ridership estimates for individual travel market segments will enable the communities involved, with the assistance of UMTA, to evaluate the ability of proposals to satisfy many diverse objectives.

The study team conducted a detailed review of transportation services currently available in the Corridor and has contacted representatives of many state/local agencies, Federal agencies and transportation providers, including:

- UMTA;
- FAA:
- WMATA;
- Washington Council of Governments (WashCOG);
- Virginia Department of Highways and Transportation;
- Fairfax County Office of Transportation;
- Fairfax County Office of Research and Statistics;
- Loudoun County Department of Planning; and
- Washington Flyer, Inc.

The review covered the highway system, fixed route transit services offered by WMATA and private operators, airport limousines and taxis, and other relevant services. Data concerning ridership on all existing travel modes in the Corridor, including highway traffic counts, ridership counts from WMATA and privately operated bus lines, ridership data on airport taxis and limousines, and other relevant travel data were examined. Fare and service levels for each of these travel modes have been collected from the appropriate agencies and/or operators. Previous studies of ridership on proposed transit lines in this Corridor, as well as studies of ridership on transit lines serving airports and regional shopping centers around the county were also collected and reviewed. In addition, studies by agencies such as WashCOG, which include forecasts of travel in the Dulles Access Road Corridor were examined.

The success of the proposed Dulles light rail line is dependent on its ability to tap a number of distinct market segments for ridership. These market segments face different sets of travel choices and can be expected to respond very differently to changes in fare and service levels represented by implementation of new service. In terms of function, the proposed line will provide access to Dulles Airport for passengers, visitors and employees, access to the Metro system for commuter and non-work travel from Fairfax and Loudoun County to downtown Washington and major Northern Virginia destinations (e.g., Pentagon, Rosslyn, Crystal City) and access to destinations within the Corridor served by the line for commuter and non-work trips made by persons residing within and to the east of the Corridor.

DULLES AIRPORT ACCESS STUDY
PRIMARY LOCAL DATA SOURCES

WMATA Metrobus route schedule 1984-85

WMATA Metrobus route passenger counts 1984-85

WMATA 1984 Metrorail passenger survey

Office of Research & Statistics, Fairfax County, Virginia, "1984 Standard Reports."

Loudoun County Department of Planning, Zoning & Community Development, "Population Analysis Technical Study,: January 7, 1985.

Office of Transportation, Fairfax County, Virginia, "Land Use, Travel, and Transportation Implementation in Fairfax County: Trends and Forecasts," January 1984.

Washington Council of Governments (COG) Round III Cooperative Socio-Economic Forecasts

Washington COG, "Employment Changes in Metrorail Station Areas 1976-1980," August 1984.

Washington COG, "Commercial Development Trends 1972-1982," December 16, 1983.

Washington COG, "Travel Findings Report Update: Changes in Travel Behavior," September 1983.

Washington COG, "Metrorail Area Planning," August 1983.

Washington COG, "1984 Beltway Cordon Count of Vehicular and Passenger Volumes," December 1984.

Washington COG, "Washington-Baltimore Airports Passenger Activity 1979-1984," February 1985.

Vollmer Associates, Dulles Toll Road Users Survey, 1985.

Dulles Airport Access Road Outer Parallel Toll Roads Environmental Impact Statement.

Howard Needles Tammen & Bergendoll, "Dulles International Airport Access Study," June 1978.

Peat, Marwick, Mitchell & Co., "Metrorail Alternatives Analysis," August 1978.

"Metrorail Alternatives Analysis K Route Draft Technical Report," October 14, 1977.

Day & Zimmerman, "Dulles Airport Rapid Transit Service Study," July 1971.

Regional Plan Association, "Urban Rail in America," 1980.

Washington COG, "Urban Transportation Planning Package - File 4a."

National Capital Region Transportation Planning Board and Washington COG, "Long Range Transportation Plan Re-evaluation," December 1982.

Washington COG, "Washington-Baltimore Regional Air Passenger Survey," September 1982.

Washington COG, "Washington-Baltimore Regional Air Passenger Survey: Analysis of Findings," February 1984.

U.S. Department of Transportation (D.O.T.) Transportation Systems Center, "An Analysis of Demand for Airport Bus Services at Washington National and Dulles International Airports," January 1984.

Washington COG, "Travel Times Between Activity Centers," March 1982.

The segmentation scheme used for the Dulles study included the following markets:

- o Airport passengers/visitors;
- o Peak period commuters travelling to downtown Washington;
- o Peak period commuters travelling to Rosslyn, Pentagon, and Crystal City;
- o Peak period commuters travelling within the Corridor including Dulles employees;
- o Peak period commuters travelling into the Corridor from destinations south and east (e.g., D.C., Arlington including Dulles employees);
- o Off-peak travel to and from destinations outside the Corridor;
- o Off-peak travel within the Corridor; and
- o Travel generated by new development within the Corridor, as well as new development associated with financing the light rail line.

In addition, the methodology segmented existing ridership by mode of access for the commuter markets. Because each "access market" is forecasted separately, estimates are provided of auto and bus access markets at each LRT station.

Two of the key considerations in market segment definition were discussed above. These were maximizing the utility of the forecasts for designing the facility, and the need to be able to take into account different behavioral responses of travellers to the proposed service improvements. Other factors were also considered in the market segmentation scheme, including:

- o Separation of travel by geographic area and trip purpose is important in calculating benefits to various user and non-user groups and political jurisdictions. For example, estimates of travel generated by new development near stations are important in devising plans for benefit-sharing or special assessment districts. Another example where it is important to separate travel within and beyond the Corridor is that although WMATA will not be operating the Dulles Line, a large number of transfers between the two systems may make some type of fare policy coordination desirable. Similar considerations apply to feeder/circulator bus service in the Corridor since the provider of this service is uncertain.

- o The availability of data on certain travel markets may not always be what is desired. That is, while segmentation of certain markets may be desirable from a technical standpoint, the available data may not support the most accurate estimates of ridership for the particular market segment. For example, the travel characteristics of airport users and airport visitors may differ, making it desirable to analyze separately these markets. However, for this study, visitors and passengers were being combined into a single market because of the lack of a separate data base on visitors.

Sources of the data used to forecast travel for each market segment are:

- o Airport passengers/visitors

  - 1981-82 Washington-Baltimore airport passenger survey
  - FAA and WashCOG forecasts for Dulles travel
  - Mode split data for National and other U.S. airports with transit service (e.g., Chicago O'Hare, Cleveland, Philadelphia, N.Y. Kennedy)

- o Peak period Washington commuters
- o Peak period Northern Virginia commuters

  - Base-year WMATA ridership counts
  - WashCOG and Fairfax County population and employment forecasts
  - Census journey-to-work data
  - Dulles Toll Road survey
  - VDH&T traffic counts

- o Peak period commuters travelling into the Corridor

  - WMATA base-year bus ridership counts for outbound service
  - WashCOG and Fairfax County employment forecasts
  - Census journey-to-work data
  - VDH&T traffic counts

- o Off-peak travel into and out of Corridor
- o Off-peak intra-Corridor travel

  - WMATA base-year bus ridership counts for Tyson's Corner and other suburban areas
  - WMATA on-board Metro survey (off-peak)
  - VDH&T traffic counts

The development of the forecasting model included estimation of elasticities of travel demand with respect to key transit and highway price and service characteristics and estimation of transit travel from new land development and transit services. The proposed LRT line would cause changes for Corridor riders in fares, travel time and out-of-vehicle time; and in the number of transfers faced during a trip. New transfers take a variety of forms, including the West Falls Church Metrorail station and the implementation of feeder and/or circulator bus service at Reston/Herndon and Tyson's Corner. The transfer at West Falls Church will require patrons to walk from the median of the DAAR at its intersection at I-66 via tunnel to the current WMATA bus drop off area.

It was assumed that current routing and scheduling of services in the Corridor would be modified in response to the availability of the new LRT service. This means, for example, that express buses currently providing service between Reston/Herndon and Washington would be terminated and feeder bus service would be implemented between those neighborhoods now served by the express bus service and the nearest LRT stations. Service frequency for current bus riders would be at least equivalent.

To the extent possible, forecasting relationships were developed by market segment to analyze the locations in the Corridor where the improvement in transit service represented by the proposed light rail line would attract new passengers. Certain relationships were relatively well-established, such as fare elasticities which are used by WMATA in developing revenue forecasts. Several other sources were used to estimate demand elasticities for service level variables, including:

- Cross-sectional analysis of U.S. Census journey-to-work data;
- Survey data, Metrorail impact studies, and modelling documentation reports from the Washington region; and
- Elasticities developed for airport access services.

In addition to elasticities, which were useful for estimating the incremental impact of service changes on base levels of transit ridership, trip generation rates and mode split data were collected for use in the forecasting process. Relationships identified in other transit-served parts of Northern Virginia through analysis of the UTPP journey-to-work data were used where base levels of transit ridership data were insufficient to apply the incremental method. In some cases, a combination of techniques were applied in order to check the output of different methods. Both incremental and synthetic methods were used, forecasting the currently served Reston-Washington and Reston-Northern Virginia markets. The results obtained by the two methods in this case were within

10% of each other. Understanding and explaining any differences between the methods will serve to enhance confidence in the final forecasts.

WashCOG's revised Round III forecasts (September 1985) were used for growth factoring since they include data for the entire region and are recognized as "official" forecasts. These forecasts include revisions requested by both Fairfax and Loudoun Counties in July and August, 1985, which increased the original Round III Population and Employment forecasts. These revisions were made on the basis of recent growth, which has been much greater than originally forecast. Current Corridor population is 175,783 with employment of 90,092. The year 2000 forecasts are 210,066 for population and 167,592 for employment.

The following tables provide the data sources used in the ridership projections (Table 2-1), the WashCOG Round III projections for population and employment (Table 2-2), the input assumptions used in the models (Table 2-3) and the ridership forecasts (Table 2-4 through 2-10).

TABLE 2-1

PRIMARY DATA SOURCES USED IN DEVELOPING RIDERSHIP FORECASTS

Data	Sources
Current WMATA Ridership	o WMATA Bus Operations o 1984 MetroRail Survey o WMATA Office of Planning and Development
Current Dulles Limousine/ Airport Bus Ridership	o Federal Aviation Administration o Washington Flyer, Inc. o WashCOG, 1981-1982 Baltimore-Washington Regional Airport Survey
Work Trip Modal Splits	o 1980 U.S. Census Journey-to-Work Survey
Household Income	o 1980 U.S. Census of Population and Housing o Fairfax County Office of Reseach and Statistics
Population, Household and Employment Forecasts	o WashCOG Round III Forecasts o Revised Round III Forecasts prepared by Bellomo-McGee, Inc. in cooperation with: - Fairfax County Office of Comprehensive Planning - Fairfax County Office of Research and Statistics - Fairfax City Office of Planning - Fall Church Planning Department - Loudoun County Office of Planning and Zoning
Dulles Passenger Forecasts	o FAA Metropolitan Washington Airports Engineering Department

TABLE 2-2
DULLES CORRIDOR STUDY REVISED ROUND III SOCIO-ECONOMIC DATA

ZONE	POPULATION 1985	POPULATION 2000	EMPLOYMENT 1985	EMPLOYMENT 2000
Dulles	1,143	3,106	6,154	8,341
Route 28	17,664	18,294	6,636	26,762
Herndon	16,992	26,914	4,105	10,738
Reston	53,741	73,567	14,955	32,986
Hunters Mill	18,664	20,520	2,312	3,680
Tyson's	31,706	33,412	49,022	78,131
W. Falls Church	35,873	34,253	6,908	6,954
CORRIDOR	175,783	210,066	90,092	167,592

TABLE 2-3

INPUT ASSUMPTIONS

Fare (In 1985 $):	$1.50 for all trips using the line between West Falls Church and Route 28 plus the WMATA zone fare for trips transferring at West Falls Church Station
	$3.50 for all trips to and from Dulles
	$100% of potential fare revenue is collected, no fare discounts

Light Rail Service:

Time of Day	Headway (Min.)	Cars/Train
6 a.m. - 9 a.m.	10	3
9 a.m. - 4 p.m.	12	3
4 p.m. - 7 p.m.	10	3
7 p.m. - 9 p.m.	12	3
9 p.m. - MID	15	3

Running Time (Inbound only shown)

Station	Peak Period Running Time (Min.)	Mileage
West Falls Church		
Tyson's Corner	5	4
Hunters Mill Road	10	8
Reston	13.5	10.9
Herndon	16	13.5
Route 28	18.5	15
Dulles Terminal	21	16.5

Bus Feeders:

	Headway (Min.)	
Station	Peak	Off Peak
West Falls Church	MetroRail Transfer	
Tyson's Corner	20	24
Hunters Mill Road	10	24
Reston	10	24
Herndon	20	36
Route 28	--	--
Dulles Terminal	--	--

TABLE 2-3

INPUT ASSUMPTIONS
-CONTINUED-

Bus System Modifications:

In developing patronage and operating revenue forecasts, it was assumed that those WMATA services which would be competing with the LRT system would either be modified or eliminated. It was also assumed that feeder bus service would be provided to and from LRT stations at Herndon, Reston, Hunters Mill Road and Tyson's Corner. This service would cover, at a minimum, the areas now covered by WMATA service, and headways would be equal to or better than those provided by WMATA. No assumptions were made concerning the provider of the feeder bus service.

Rail Transfer:

- A direct transfer will be available between the LRT system and MetroRail at West Falls Church.

Parking:

The following number of parking spaces will be available for LRT line users:

Tysons's Corner	300
Hunters Mill Road	500
Reston	800
Herndon	600
Route 28	800
TOTAL	3,000

Annualization factors:

- Annual ridership for non-airport passengers is 265 times daily ridership. This factor adjusts for differences in ridership between workday, holidays and weekends. Daily ridership is estimated for a typical workday.
- Annual ridership for airport passengers is 365 times daily ridership (airport forecasts are developed from annual passenger data) since airport traffic does not decline on the weekends to the same extent as general worktrips.

RIDERSHIP AND OPERATING REVENUE FORECASTS

Forecasts are presented in Tables 2-4 through 2-10. A brief description of each table is listed below:

<u>Table 2-4:</u>

Forecasts of total daily LRT line ridership and annual LRT line ridership (for each year between 1990-2010).

<u>Table 2-5:</u>

Forecasts of daily LRT line ridership and annual LRT line ridership of passengers travelling to or from Dulles Airport (for each year between 1990-2010).

<u>Table 2-6:</u>

Percent of peak period passengers to D.C. and Northern Virginia destinations boarding at each LRT line station.

<u>Table 2-7:</u>

Percent of peak period passengers travelling within the Corridor boarding and alighting at each LRT line station.

<u>Table 2-8:</u>

Percent of peak period passengers travelling into the Corridor alighting at each LRT station.

<u>Table 2-9:</u>

Rail transit modal splits at U.S. Airports.

<u>Table 2-10:</u>

Dulles Corridor Study ridership and revenue by market segment.

TABLE 2-4
ACCESS ROAD ALIGNMENT

DULLES CORRIDOR STUDY
ANNUAL LRT RIDERSHIP AND REVENUE FORECASTS

YEAR	DAILY RIDERSHIP	ANNUAL RIDERSHIP	(1985 $) ANNUAL REVENUE
1990	10,763	2,950,731	$5,146,280
1991	11,099	3,049,064	$5,361,044
1992	11,435	3,147,397	$5,575,809
1993	11,771	3,245,729	$5,790,574
1994	12,108	3,344,062	$6,005,338
1995	12,444	3,442,394	$6,220,103
1996	12,780	3,540,727	$6,434,868
1997	13,117	3,639,060	$6,649,632
1998	13,453	3,737,392	$6,864,397
1999	13,789	3,835,725	$7,079,162
2000	14,126	3,934,058	$7,293,926
2001	14,368	4,007,572	$7,471,464
2002	14,611	4,081,087	$7,649,002
2003	14,853	4,154,602	$7,826,540
2004	15,096	4,228,117	$8,004,078
2005	15,339	4,301,632	$8,181,616
2006	15,581	4,375,147	$8,359,154
2007	15,824	4,448,661	$8,536,693
2008	16,067	4,522,176	$8,714,231
2009	16,309	4,595,691	$8,891,769
2010	16,552	4,669,206	$9,069,307

TABLE 2-5
ACCESS ROAD ALIGNMENT

DULLES CORRIDOR STUDY
ANNUAL LRT AIRPORT RIDERSHIP AND REVENUE FORECASTS

YEAR	DAILY RIDERSHIP	ANNUAL RIDERSHIP	(1985 $) ANNUAL REVENUE
1990	987	360,091	$1,260,319
1991	1,079	393,724	$1,378,034
1992	1,171	427,357	$1,495,749
1993	1,263	460,990	$1,613,464
1994	1,355	494,623	$1,731,179
1995	1,447	528,256	$1,848,895
1996	1,539	561,888	$1,966,610
1997	1,632	595,521	$2,084,325
1998	1,724	629,154	$2,202,040
1999	1,816	662,787	$2,319,755
2000	1,908	696,420	$2,437,470
2001	2,000	730,053	$2,555,185
2002	2,092	763,686	$2,672,900
2003	2,184	797,319	$2,790,615
2004	2,277	830,952	$2,908,330
2005	2,369	864,584	$3,026,045
2006	2,461	898,217	$3,143,761
2007	2,553	931,850	$3,261,476
2008	2,645	965,483	$3,379,191
2009	2,737	999,116	$3,496,906
2010	2,829	1,032,749	$3,614,621

TABLE 2-6
ACCESS ROAD ALIGNMENT

ORIGINS OF COMMUTERS FROM DULLES CORRIDOR
TO DC AND NORTHERN VIRGINIA

STATION	PCT. OF BOARDING PASSENGERS
1 DULLES	0.0%
2 ROUTE 28	8.9%
3 HERNDON	19.5%
4 RESTON	51.2%
5 HUNTER	11.6%
6 TYSONS	8.7%
	100.0%

TABLE 2-7
ACCESS ROAD ALIGNMENT

ORIGINS AND DESTINATIONS OF LRT COMMUTERS
TRAVELLING ENTIRELY WITHIN DULLES CORRIDOR

STATION	PCT. OF BOARDING PASSENGERS	PCT. OF ALIGHTING PASSENGERS
1 DULLES	0.0%	3.7%
2 ROUTE 28	12.0%	3.1%
3 HERNDON	21.0%	14.2%
4 RESTON	34.0%	19.3%
5 HUNTER	10.7%	2.1%
6 TYSONS	6.2%	51.6%
7 W. FALLS	16.2%	6.1%
	100.0%	100.0%

TABLE 2-8
ACCESS ROAD ALIGNMENT

DESTINATIONS OF LRT COMMUTERS
TRAVELLING FROM DC AND N. VA TO THE DULLES CORRIDOR

STATION	PCT OF ALIGHTING PASSENGERS
1 DULLES	1.4%
2 ROUTE 28	2.4%
3 HERNDON	8.3%
4 RESTON	34.4%
5 HUNTER	3.3%
6 TYSONS	50.2%
7 W. FALLS	0.0%
	100.0%

TABLE 2-9

PERCENTAGE OF AIRPORT PASSENGERS USING
RAIL FOR AIRPORT ACCESS

DULLES (LOW ESTIMATE)	3.7%
Philadelphia	4.5%
DULLES (EXPECTED LEVEL)	4.6%
New York JFK (JFK Express)	5.0%
DULLES (HIGH ESTIMATE)	5.5%
Boston	6.0%
Cleveland	6.0%
Chicago O'Hare	6.5%
Washington National	9.4%

TABLE 2-10

DULLES CORRIDOR STUDY
RIDERSHIP AND REVENUE BY MARKET SEGMENT

MARKET SEGMENT	DAILY RIDERHIP YEAR 2000	PERCENTAGE OF DAILY RIDERSHIP	PERCENTAGE OF ANNUAL REVENUE
Airport Passengers	1,908	13.5%	33.4%
No. Virginia Commuters	1,246	8.8%	6.8%
Washington Commuters	5,576	39.5%	30.4%
Commuters Within Corridor	2,436	17.2%	13.3%
Commuters to Corridor	1,880	13.3%	10.2%
Off-Peak Within Corridor	610	4.3%	3.3%
Off-Peak to Corridor	470	3.3%	2.6%
	14,126	100%	100%

Operating Revenues

Initial fare assumptions as included in the proposed Operating Plan definition were modified based on the results of the initial forecasts, and on the potential for a revenue maximizing fare structure. The refined fare assumptions were used in developing the final set of forecasts. Operating revenue, like ridership, was estimated on an origin-destination pair basis in order to determine which stations and line segments are most productive. The following table reflects the mid range revenue projection for the proposed project.

TABLE 2-11

FORECAST OF ANNUAL OPERATING REVENUE
(constant 1985 $)

YEAR	TRAVEL TO DULLES ANNUAL REVENUE	CORRIDOR TRAVEL ANNUAL REVENUE
1990	$1,260,319	$5,146,280
1991	1,378,034	5,361,044
1992	1,495,749	5,575,809
1993	1,613,464	5,790,574
1994	1,731,179	6,005,338
1995	1,848,895	6,220,103
1996	1,966,610	6,434,868
1997	2,084,325	6,649,632
1998	2,202,040	6,864,397
1999	2,319,755	7,079,162
2000	2,437,470	7,293,926
2001	2,555,185	7,471,464
2002	2,672,900	7,649,002
2003	2,790,615	7,826,540
2004	2,908,330	8,004,078
2005	3,026,045	8,181,616
2006	3,143,761	8,359,154
2007	3,261,476	8,536,693
2008	3,379,191	8,714,231
2009	3,496,906	8,891,769
2010	3,614,621	9,069,307

TYSON'S CORNER ALIGNMENT VARIATION

The Task Force directed the consultant team to examine the costs and benefits of routing the LRT through the Tyson's Corner activity center. An alignment following Route 123 and Route 7 was considered. Incremental capital costs were estimated to be approximately $70 million. The incremental ridership was projected to be 1500 per day. Tyson's Corner represents an excellent opportunity for joint development, perhaps at such a level as to cover the costs of construction financing. Future studies should examine the Tyson's diversion in much greater detail.

CHAPTER 3: PLAN OF FINANCING

FINANCING CONCEPT

The objective of this Chapter is to determine if a financial structure utilizing private sector participation could be designed as a substitute for a publically financed system. The goal was to determine whether the techniques of privatization developed for other public services such as waste water treatment facilities were applicable to transit. Secondly, and as addressed in Chapter 4, this study examined mechanisms which will ensure that beneficiaries of the transit services, both users and non-users, pay for an equitable share of the proposed improvements.

The privatization of public services is not primarily a financing technique. It is an alternative method of service delivery. The principal reason for undertaking the private delivery of an otherwise public service is to reduce the unit cost of providing that service to its user. In the case of transit, where, as a matter of policy, the user does not bear the full cost of service, the objective is to reduce the level of system expense to the public sponsor. This reduction to the public sector can come through cost reductions and/or replacement of public sector support by payments from non-user beneficiaries. Privatization is an effective tool of cost reduction. It is not, however, a substitute for the ability to charge direct system users the cost of service. The purpose of private service delivery in transit is to lower the construction cost of new systems and to operate in a more efficient manner. The feasibility question facing this study was whether the savings from private operation would be sufficient to warrant the use of the private sector approach over more traditional approach. It was not to show how a subsidized public service could be turned into a profit making private enterprise.

Private sector initiatives in transit entail the creation of co-venture partnerships. As in any partnership there is a sharing of benefits. For the public sector, the incentive is a lower cost for a specified level of service. For the private sector, there is the promise of a reasonable rate of return on investment. For both parties there must be an acceptable allocation of risk.

The design objective in any privatization transaction is to strike a balance in the sharing of the benefits. For this study, the goal was to design a financing structure which minimized, to the greatest feasible extent, the contribution required from the public sponsor. The constraint was the minimum equity return required by the private owner. A companion objective was to allocate risk in a fashion such that the private owner assumed the risks traditionally borne by the private sector; namely, cost overruns and escalating operating deficits. The design criteria specified no Federal assistance. Financing was to rest solely on the basis of the private economics of the transaction.

Private sector involvement in the financing and operation of public services can lead to lower costs. The primary means for achieving better economics are (1) utilization of the tax benefits associated with the private ownership of capital assets, (2) lower construction costs, and (3) operating cost savings coming from greater productivity and management efficiency in the operation of the system.

Cost savings are also achieved by substituting market competition for federal regulation. The RFP procurement process in Appendix A is designed to create a competitive environment within which to negotiate the co-venture partnership agreement. One of the primary benefits of privatization is the effective deregulation of the service.

The concept underlying the financial strategies presented in this report may be simply stated. It is to fully utilize the tax advantages and incentives for efficient operation which accrue from private ownership to offset the lack of available capital assistance. The structuring goal is to reduce, if not eliminate, the public sector cost of offering transit service to the maximum extent feasible through the use of the cost reduction efficiencies associated with the private ownership and operation of the transit facilities.

FINANCING STRUCTURE

The financial framework described in this section is designed to:

(1) establish private ownership of the system;

(2) provide for the capital financing of the facilities;

(3) reflect the contract structure which provides for the allocation of financial and operating risk between participants;

(4) determine the flow of funds among the parties to the transaction; and

(5) result in the lowest possible public sector contribution.

Ownership

This report anticipates the use of a competitive process to select a private developer to undertake the design, financing, construction and operation of the mass transit facility. This report assumes the creation of a Transportation District, as provided by Section 15.1 of the Code of Virginia, comprised of the local government jurisdictions in the Dulles Corridor. It should be noted that this assumption was made for illustrative purposes. The ultimate decision would have to be made by the local political jurisdictions. The Transportation District, acting under Service Agreements with its member jurisdictions, would issue a Request for Proposals to solicit private development proposals for mass transit service. The RFP would require that developers propose privately designed and financed systems that would remain in private operation. The terms of agreement between the Transportation District and the Private Owner would be reflected in a Full Service Contract. Under the terms of the Service Contract, upon the receipt of specific transportation services, the Transportation District would pay a Service Fee to the private owner. Payment of the fee would be conditioned upon the delivery of transit service so as to not constitute a debt obligation of the Transportation District.

The Service Contract will grant to the winning proposer the exclusive right to build and operate a mass transportation facility in the Dulles Corridor. The RFP and response will set forth the specific terms and requirements for the service. In general, wide latitude will be given to bidders to propose the most cost effective system. Part of the flexibility inherent in the RFP is the form of private sector ownership which may be used. In general, the RFP calls for (i) 100% vendor ownership, (ii) limited partnerships, or (iii) use of a leveraged lease. For this report, however, 100% vendor ownership is reflected for it is best suited for the allocation of financial risk described in the following section. It is important to note that the ultimate decision and selection of the specific financing structure is the right of the local communities and would be determined when and if the project is implemented.

Private ownership is the underpinning for the benefits associated with the financial model described in the Report. Private ownership is what determines the availability of Federal Tax benefits and generates the incentive for more efficient management and operation of the system. The consequence of private ownership, however, is the loosening of public control. To establish tax ownership, the private owner/operator must (i) have physical possession of the system, (ii) control its operation, (iii) benefit from the service, and (iv) bear the risk of non-performance. This financial model represents a trade-off between cost and control. In exchange for the delivery of public transit service at a lower aggregate cost to the public sector, control is granted to the private operator subject only to the performance standards specified in the Service Contrct which condition receipt of the Service Fee.

Capital Financing

Financing for the System is anticipated to come from three sources:

(1) proceeds of tax-exempt Industrial Development Bonds issued by the Transportation District secured by a net revenue pledge of the system, guaranteed by the owner/operator, and insured under the terms of a new issue municipal bond insurance policy;

(2) trade terms extended by an international export credit agency in conjunction with the sale of transit vehicles, taxable and subordinate; and

(3) equity contributed by the owner of the system.

The use of tax-exempt Industrial Development Bonds (IDB's) is proposed in order to access the lowest cost source of permanent financing currently available for this project. The tax-exempt bonds will be the senior, secured debt of the project. The cash flow presented in Appendix B demonstrates debt service coverage of no less than 1.40 times the net system revenues and 1.20 coverage from the service fee alone. Coverage demonstrates to investors that the issuing entity has more than sufficient funds to meet the principal and interest payments on bonds and to cover ongoing operating costs.

The credit quality of the IDB's - and indeed the ability to secure financing at all - will depend upon the source and quality of the revenues pledged or available to the Transportation District for payment of the Service Fee. The primary source of security for the IDB's will be the revenue collected by the private owner under the Service Contract. The credit securing the Service Fee in turn determines the willingness of the private owner to guanantee debt service on the bonds and influences the availability of municipal bond insurance. The alternative means of providing the Service Contract revenues are presented in Chapter Four and Appendices

C, D, and E. It is important to point out, however, that the selection of non-user beneficiary revenues depends as much on the needs for high credit quality as it does on local political acceptability.

The use of senior, secured tax-exempt debt is kept to a minimum in this financing structure to reduce the aggregate level of debt service. The use of subordinated trade financing and a required equity contribution both serve to lower debt service expense.

Trade financing is utilized to lower the cost of vehicle acquisition. Foreign supplier credits effectively substitute for tax-exempt financing because the rates are heavily subsidized to foster the export of capital goods. This form of financing is especially valuable for transit vehicles because they are otherwise non-qualifying assets under the Internal Revenue Code and are consequently ineligible for tax-exempt financing. Supplier credit also improves the economics of this structure for we believe it will be available on a subordinate basis with 1 times effective coverage net of the payment on the senior bonds.

The equity contribution in this model is set at 25 percent of the present value of the construction fund draws. The equity contribution is paid in at the closing of the senior debt to eliminate any funding risk during construction. The present value calculation accounts for earnings during construction and neutralizes the timing of the contribution.

With the structure of the Service Contract proposed in the RFP, even a modest equity contribution would serve to establish tax ownership of the project. The size of the equity contribution, therefore, was determined in relation to utilization of the tax benefits as a source of return on equity, consistent with the IRS rules concerning non-economic tax shelters. In other words, the recommended equity contribution is determined by the level of available tax benefits and by what we believe to be an acceptable cash return on the cost contributed.

The financing structure reflects a clear priority order of capital and a conscious allocation of risk. The IDB's are the senior debt obligations and, while secured by a net revenue pledge, are payable primarily from the Service Fee. The vendor financing is subordinate to the public bond issue, but senior to the cash return to the equity investor. Debt service payments on the trade financing are dependent upon operating revenues of the system and are therefore more risky. The risk is offset by the purchase of the vehicles themselves, insofar as favorable trade terms are intended to induce the selection of particular brands of equipment. The equity return takes two forms (i) tax benefits and (ii) net cash flow. With the initial investment in the system assets the principal tax benefits of the Investment Tax Credit, accelerated depreciation, and the deductibility of interest expense are determined. This structure, however, depends upon the continuing ability of the equity investor to utilize the tax losses generated by this project in the early years in order to chieve the full economic return anticipated. This means that the owner must have sufficient profits from other business activities to offset the tax credits and deductions generated by this project. In addition, the cash portion of the equity return comes solely from the farebox. Incremental changes in the realized level of patronage have a dramatic effect on the total return to the project owner. The service contract structure places the full risk of patronage on the owner/operator of the system. Increases in ridership from service improvements accrue directly to the system owner. Likewise, however, the risk of non-performance is borne exclusively by the private owner/operator of the facility.

Contract Structure

The contracts which establish and govern the relationship between the Transportation District and the Private owner/operator fall into three general catagories:

(1) the service contracts which provide for the type, level and frequency of transit service;

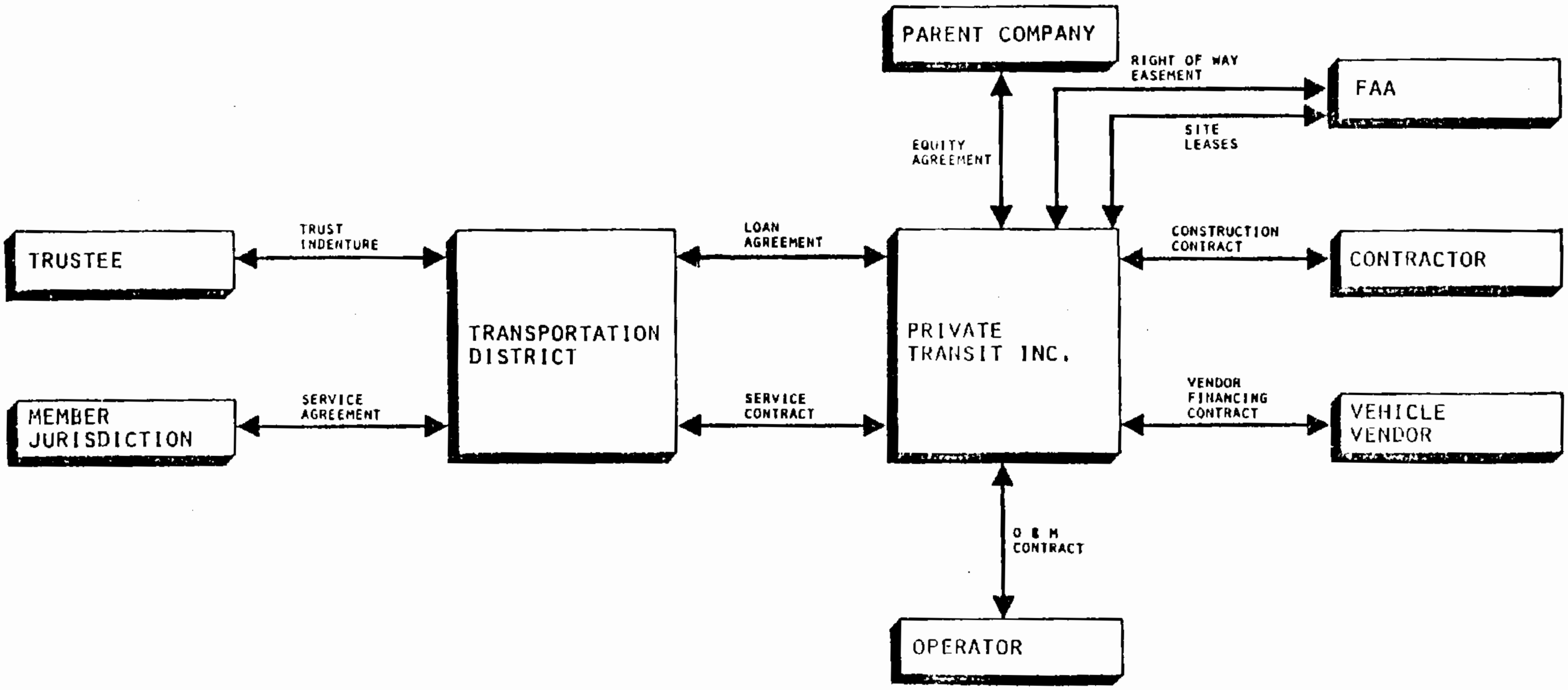
(2) the procurement contracts which serve as the basis for the design and construction of the facilities; and

(3) the financing documents which establish the priority of the pledged revenues, determine the flow of funds and govern the repayment of the debt obligations and control the return to the equity investor.

Service Contracts

There are three primary service contracts in this financing structure. The first agreement is between the Transportation District and its member jurisdictions. This agreement, subject to the constraints of Section 15.1 of the Code of Virginia, sets forth the powers and responsibility of the Transportation District. The purpose of the agreement is to clearly delineate the role and objectives of each party. The requirements concerning transit service and local financial participation are specified in this document. It is anticipated in this report that the local Service Agreement is the primary means through which the local jurisdictions enumerate their concerns relative to the drafting of the RFP. The Service Agreements will identify the service objectives and local planning and land use constraints which the private bidders must comply with. If there were to be local financing participation in the project its terms would also be set forth herein. This feasibility report, however, assumes no local financing assistance. The revenues to support the payment of the service fee are expected to come from a new source to be administered by the Transportation District, without secondary credit enhancement provided by the member jurisdictions.

DULLES CORRIDOR RAPID TRANSIT DEVELOPMENT
CONTRACTS AND AGREEMENTS



The second Service Contract is the one between the Transportation District and the private owner. This contract is the primary document governing the relationship between the public and private partners. The Service Contract is a partnership agreement and will reflect the terms and conditions negotiated in the competitive RFP procurement process. The most significant features of the contract are (1) the grant of power to build and operate the system, (2) the service parameters, and (3) the obligation to pay the service fee upon delivery of the service.

The third Contract would be an operations and maintenance agreement between the private owner and a contract operator, if actual running of the facility were to be sub-contracted.

Construction Contracts

Construction of the physical transit facilities will require at least three primary legal agreements:

(1) the grant of easement for the right-of-way from the F.A.A. to the private owner;

(2) the construction contract between the project developer and the builder; and

(3) the acquisition and purchase agreement for the transit vehicles.

The important consideration with respect to the construction contracts is that responsibility rests solely with the project owner. In none of the construction contracts is the Transportation District a party. One of the primary benefits of privatization is the deregulation of construction. The private owner is free to source equipment in the most cost effective manner and to build on a more rapid basis to save money, free of the financing concerns imposed by the artificial funding parameters imposed by the annual appropriations process used by the Federal Government and the attendant Federal regulations.

The private management of this construction program can save a considerable amount of money. With 100% financing in place before construction begins, scheduling can be much more efficient, and the aggregate time to build can be reduced.

An additional factor concerning the construction contract is that with a cooperative management structure and a team approach a private developer can reduce the cost of building the system. In public construction projects the price reflects the considerable uncertainty facing the builder when dealing with the various public procurement restraints and uncertain levels of funding.

A further benefit in this contract approach is the transfer of construction risk from the public to the private sector. The management of the project rests with the owner. The risk of cost overruns and completion delays rests with the builder. The use of fixed-price, guaranteed delivery construction contracts substantially protects the Transportation District from construction risk.

Financing Documents

The financing documents relate specifically to the three sources of capital used to fund construction.

Tax-Exempt Debt A trust indenture between the Transportation District and a trustee - acting on behalf of the bondholders - will set the terms for the issuance of the tax-exempt debt. The granting clause of the indenture will provide the pledge of revenues to secure the indebtedness. The proceeds of the bond issue will be loaned to the Private Owner of the transit system under the terms of the Loan Agreement. To enhance the security of the bonds the Loan Agreement may provide for a net billing arrangement whereunder the Service Fee is used to first pay debt service on the bonds with the residual paid directly to the owner/operator. The system owner would continue to be liable for loan payments from operating revenues if the Transportation District were unable to meet debt service requirements from the Service Fee revenues. The private owner/operator assumes the credit risk of the Transportation District under this structure. A direct corporate guarantee of the IDB's is preferable for credit reasons. This, however, is a sensitive structuring point and would be worked out in the RFP process. There is a trade-off between the credit quality of the non-user beneficiary revenues collected by the Transportation District and the need for additional credit enhancements including a corporate guarantee by the developer and municipal bond insurance.

Trade Financing The purchase of the transit vehicles presents an opportunity to reduce the aggregate level of public bonds which must be sold on a senior lien basis. Most recent purchases of transit rail vehicles have been from foreign manufacturers who may have access to attractive financing sources. The availability of highly competitive export financing programs makes it possible to acquire transit vehicles and pay for them over time. The terms are equivalent to tax-exempt levels despite applicability to taxable equipment. For the private financing model an additional structured trade financing has been fashioned to allow tax-exempt debt to be wrapped around it to produce combined level debt service over the life of the tax-exempt issue. This structure, effectively used in other projects with taxable components, allows for a reduction in aggregate debt service in the early project years. It functions to substantially reduce the service fee and allows projected increases in operating revenues to cover the marginally higher debt service in the out years. An American manufacturer could also offer attractive financing terms. However, the foreign example was chosen for illustration as it is the most common.

Equity The financial model presented in this report assumes a substantial corporate entity, with a strong balance sheet and other business income, as the winning respondent to the RFP. This structure implies the creation of a special purpose subsidiary to act as the owner/operator of the transit facilities. This, in turn, suggests the needs for an equity participation agreement governing the timing and commitment of the equity contribution and provision for consolidating the subsidiary tax losses and the project's net cash flow.

The contract relationships outlined in this section are graphically highlighted the preceeding chart.

Flow-of-Funds

The flow-of-funds in this financing structure is proscribed by the terms of the contracts identified above. For clarity of understanding, the cash flow relationships are presented in the following chart.

The capital flows are the Loan Proceeds and the Equity contribution. These monies are channelled through the private owner for payment to the builder.

The revenues consist of passenger fares, non-user beneficiary charges, and the Service Fee. Expenses consist of debt service, lease rental payments, vehicle financing charges and operation and maintenance.

Service Fee

The objective of this financing structure is to lower the cost to the public sector of providing transit service in the face of no federal participation. The features which contribute to the lower cost include:

(1) lower capital construction costs;

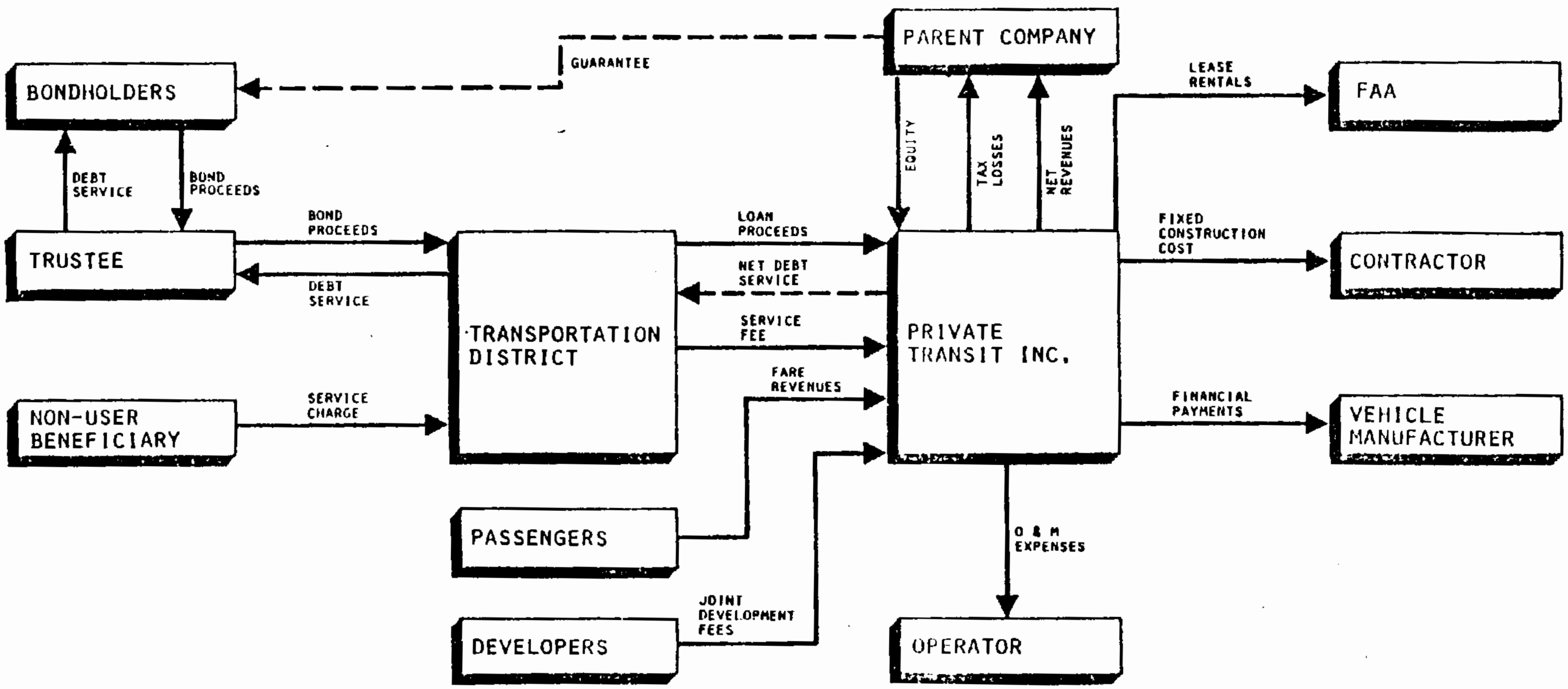
(2) more efficient management and operations;

(3) large equity contribution to reduce debt service;

(4) full utilization of federal tax benefits to provide return to equity investors;

DULLES CORRIDOR RAPID TRANSIT DEVELOPMENT

FLOW OF FUNDS



(5) use of subordinated trade financing;

(6) wrap-around debt service structure to level and minimize debt service; and

(7) allocation of risks to protect public partner from unanticipated cost increases.

The benefits from private participation stem from two general areas: (1) cost efficiencies which are achieved in both the construction and operation of the system as a result of deregulating the provision of service, and (2) debt service savings which result from substituting tax benefits for cash as the form of return to the equity investor.

ALLOCATION OF RISK

One of the unique benefits of private involvement in this project is the ability to fundamentally rearrange the allocation of financial and operating risk. In a Federally financed transit system, substantial cost and completion risk is assumed by the Federal government and to some extent, these risks are shared by local governments. Under UMTA's Full Funding Contract which is signed by both UMTA and the grantee and establishes the maximum Federal participation in the proposed project, much of the risk is being more clearly placed upon the local public project sponsor. The need to show stable and reliable operating revenues and a fully financed local capital share represents a new standard of fiscal responsibility for local transit authorities. The participation of a private developer allows much of the construction and operating risk to be shifted from the public sector - which has had mixed success at managing it - to the equity investor. Cost overruns, start-up delays, rapidly escalating operating cost and unrealized patronage forecasts have plagued publicly sponsored transit projects. Although transit improvements are desired, the risks and the often repeated inability to accurately project total system costs has led to an increased reluctance on the part of local public jurisdictions to undertake the financial risk and burden of developing a mass transit system. Privatization is tailor made to address these problems. The Service Contract structure allows the Public Sponsor to determine with absolute specificity its level and form of contribution and to insulate itself from further financial uncertainties. In return, the private investor earns a fair return on equity but absorbs the operating risk. Indeed, operating risk is what generates the incentive for efficient management, for performance improvements directly enhance the owner's rate of return.

Privatization addresses three classes of risks: (i) construction, (ii) technical, and (iii) financial. A comprehensive privatization structure covers each of these risk classifications.

Construction Risk

In its simpliest form construction risk relates to the timely completion of the physical plant at its budgeted cost. The risks include delay for any reason - change in federal regulation, lack of appropriations, labor stoppages or poor workmanship - cost overruns, and contractor default. The private transaction described in this report fully mitigates these risks from the point-of-view of the public sector sponsor. The equity investor will enter into a fixed-cost, guaranteed delivery construction contract with a financially capable builder. In exchange for the construction business, the primary construction risks are borne by the builder. To ensure delivery the contractor will be required to post a performance bond guaranteeing timely delivery. The contract will include provisions for the builder to pay all debt service costs associated with delivery which runs beyond the capitalized interest period. A criteria of the RFP is the financial capacity of the builder to stand behind the performance and cost guarantees embodied in the construction agreement.

Technological Risk

Technical risk is the chance that once the system is constructed according to specification that it doesn't work. The private development team will include the design engineers, the builder, and the owner/operator. The Transportation District is indifferent to the precise apportionment of risk among the private partners, but is only required to make payment of the service fee if service is delivered. Therefore, performance risk stops before it reaches the public sponsor. As a practical matter the builder will have to meet comprehensive acceptance testing standards and the equipment manufacturers will have to provide warranty coverage. The key distinction in this financing structure is that the public sector is insulated from the management and administration of performance acceptance and is only liable for payment when full commercial operation is reached.

Financial Risk

Public development of transit requires the local sponsor to bear significant financial risk. It is frequently the case that construction begins before all of the financing commitments are in place, or is subject to subsequent year's appropriation risk. Operating budgets bear the full risk of projected patronage levels being achieved at acceptable levels of operating cost. Public operators also bear the full brunt of inflationary cost increases while constrained on political grounds from adjusting fares. To the contrary, the private model protects the public partner from economic uncertainties. With privatization, the financing commitments for the full project cost will be in place prior to construction. Patronage levels provide the return to the equity investor. Realization of forecasted ridership is the risk the owner assumes. Likewise the deregulated ownership structure is free to set fares to maximize system revenues. The private owner is not constrained by political concerns over the absolute level of fares or the policy objective of maximizing ridership as opposed to revenue. Finally, a well crafted privatization transaction will provide for operating cost protection.

In general, the risk parameters and the allocation of financial responsibility with a privately financed system argue for its use irrespective of its cost advantages. The risk profile of this structure is worth something to the local political jurisdiction wishing to provide transit service. Privatization provides clear operational advantages separate and apart from its utility as a financing technique.

ADVANTAGES OF PRIVATE DEVELOPMENT

Private sector development of the Dulles Corridor Transit Project would enjoy significant cost advantages over traditional public ownership. There is a complex set of reasons for the cost differential, but they can be summarized as follows:

Construction

- Private developers can build more quickly knowing financing is in place and that subsequent design changes will not be required.
- Reduced time for design and construction reduces capitalized interest and lowers the overall need for capital financing.
- Private development is not constrained by artificial cost structures which are a function of complying with regulations that accompany federal capital grants.

- o Procurement of equipment and vehicles can be secured in the most economic fashion and on the most appropriate timetable for there is no need to match expenditures with annual appropriations.

- o Construction management can be turned over to the builder. The administration and contingency costs on public contracts are very high in response to the generally adversarial relationship between the public sponsor and the contractor.

According to the Associated Builders and Contractors, capital construction labor costs can be expected to be one third lower if open-shop labor is allowed as compared to the wages under Davis-Bacon requirements. This is supported by a survey of open-shop wages and benefits compiled by Virginia Polytechnic Institute and State University published July 3, 1984. Because labor is approximately one-half of the cost of most construction projects the minimum cost savings on labor alone would be 15-16%. The study assumed 15%. When compared to Federal funded projects, a project developed by a single joint venture design-construct team which will result in major cost savings. The smooth flow of continuous, sequential actions of the private venture after their initial selection would save considerable time and money otherwise spent soliciting and evaluating bids, complying with both local and Federal reviews, and negotiating and awarding contracts. The cost of project administration and the accompanying costs escalations has been estimated to be 15%.

ALLOCATION OF PROJECT RISK

Risk	Owner: Public	Owner: Private	Transfer Mechanism
Construction			
o Completion	X	X	Performance Bond
o Timely Delivery	X	X	Guaranteed Service Date w/Liquidated Damages
o Cost Overruns	X	X	Fixed Price Contract
o Force Majeure	X	X	Insurance
Technology			
o Performance	X	X	Acceptance Standard, Guarantee & Surety
o Reliability	X	X	Warranty
o Environmental/ Compliance	X	Negotiable	
Financial			
o Financing Commitments	X	X	Equity Contribution
o Patronage	X	X	Private Ownership
o O & M Expenses	X	X	Guaranteed Service Contract
o Tax Status	X	Negotiable	Tax Indemnification
o Force Majeure	X	X	Insurance
o Legislation	X	Negotiable	
o Inflation	X	Negotiable	Sharing of Risk

- Private development allows a more predictible cost structure. Private developers are more experienced than public agencies in managing and laying off risk. The builder will provide a fixed-cost, turn-key construction contract incorporating a guaranteed delivery date and liquidated damages for non-performance.

- System costs can also be lower because the project will be designed to meet the economic and functional transit needs of the corridor.

- The project will be designed to the fiscal reality of potential ridership and the creditworthiness of the pledged revenues supporting the payment of the service fee. The project will by its very nature have a well designed plan of capital financing and exhibit a stable and reliable operating revenue base.

- Private development also eliminates cost overruns which in itself is a significant cost reduction for most recently developed public systems.

- The consulting engineer for this report has determined that the design changes, the lower construction bids, the more efficient construction management and the use of a pure private sector cost structure has allowed the cost estimate for the Dulles light rail option to be more than 30 percent below what the same facility would cost if development were under public ownership. For purpose of comparison, and consistent with other private development projects we have been involved with, we have conservatively estimated that the public sector cost estimates would be higher by 20 percent of the non-vehicle construction bids in the financing alternative presented in Appendix B.

Construction

- Private development allows for the substitution of investor equity for tax-exempt bond proceeds. While in corporate finance equity will be a more expensive source of capital than debt, in this project the reverse is true. The reason is that the tax benefits are an unutilized asset in the public structure. Under private development, the return from the use of the Investment Tax Credit, Accelerated Depreciation, the Deductibility of Interest, and the amortization of issuance costs, substitute in part for a cash return in the early years of the Project. This level is consistent with Congressional guidance and the UMTA Major Capital Investment Policy.

The full financial models and the respective cash flows are presented in Appendix B.

- o Private financing and use of the Transportation District to provide the Service Fee, insulates the member jurisdictions from financial risk. The level of contribution is contractually determined. Local debt capacity is also preserved for other public purposes.

- o Private development protects the existing debt ratings of the local government jurisdictions and maintains future financing flexibility.

Operations

- o Private ownership relieves the public sector from management responsibilities for the service.

- o Operating costs are significantly less under private ownership as a result of a lower cost structure and more efficient management. O & M expense for this project would be at least 50 percent higher under public operation.

- o Contractural enforceable cost guarantees protect the public sector against subsequent increases in operating expense.

- o On-going Federal involvement is minimized.

ALTERNATIVE FINANCING STRATEGIES

The primary purpose of this study was to design a financing structure which would allow for the private development and financing of a light rail line in the Dulles Corridor. That objective has been achieved and forms the principal content of this Section. An equally important objective is the evaluation of the proposed structure and its comparison with current practices of financing transit. To enable this comparison, two financing models are presented:

(1) Full private development using the techniques described in this chapter.

(2) Local public development with no federal assistance.

The key structuring points of each alternative are highlighted below:

Private Development

- Use of transportation district
- Full service contract
- 25 percent equity contribution
- Full utilization of tax benefits
- Private sector capital costs as estimated
- Private sector operating expense as estimated
- Mid-point patronage forecast
- Senior lien tax-exempt IDB's
- Subordinated trade financing
- Levelized debt service
- 30 percent pre-tax return on equity
- Residual value equivalent to equity
- Service Fee levelized to achieve low initial contribution

Public Development

- Transportation District or local jurisdiction builds system.
- Transportation District issues tax-exempt bonds for the entire tax-exempt eligible cost of the project.
- Trade finance on identical terms as private alternative.
- Sale of tax benefits associated with the vehicles.
- Tax-exempt debt issued at same interest rate and terms as private IDB's above.
- Pledged revenues at 25 percent true coverage level.
- Public sector capital costs as estimated - non-vehicle construction costs 20 percent higher than under private.

- Public sector operating costs as estimated - 50 percent higher than private development.

- Mid-point patronage forecast provided by Charles River Associates.

- Non-project pledged revenues are allowed to drop as operating revenues begin to provide coverage.

The financing alternatives are presented in detail in Appendix B. The following Sources and Uses table reflects a summary of the financing alternatives.

SOURCES AND USES OF FUNDS

	FINANCING ALTERNATIVES	
	Private	Public Sector Public Costs
SOURCES		
Grant	$-0-	$-0-
Equity Contribution	38,957,000	3,902,000
Industrial Development Bonds	156,945,000	253,615,000
Export Credit	36,395,000	36,395,000
Earnings on Construction and Reserve Funds	25,846,000	34,298,000
Private/Public Sector Cost Sharing	---	---
TOTAL	$258,143,000	$328,210,000
USES		
Construction	$144,394,000	$173,273,000
Vehicles (Including Cost of Issuance and Capitalized Interest)	36,395,000	36,395,000
SUBTOTAL	180,789,000	209,668,000
Capitalized Interest	46,740,000	75,529,000
Cost of Issuance	9,977,000	15,554,000
Debt Service Reserve	20,637,000	27,459,000
TOTAL	$258,143,000	$328,210,000

Comparison of Financial Alternative

Private development would require an annual service fee of $18,500,000 to generate sufficient net revenues to provide for an economic rate of return on investment in this project. The service fee is set at that level for the life of the project which is assumed to be 30 years. The service fee is structured in such a fashion so that it is set at as low a level initially as is prudent with respect to IRS guidelines. The return on equity in the early years is provided almost entirely by tax benefits associated with the ownership of the assets. As the ACRS tax benefits are utilized, increasing project revenues generated by the farebox substitute to provide a true cash on cash return to the project owner. The service fee structure in the aggregate provides a fair rate of return to the equity investor, and provides a functional credit base upon which to issue the project debt.

This project functions in such a fashion that operating expenses rise in conjunction with inflation but are otherwise constrained by aggressive management. The operation and maintenance cost projections reflect no real increase. On the other hand, the patronage forecasts and operating revenue projections demonstrate a steady real growth in ridership over time. This real growth in passengers translates into increased operating earnings in the out years. This operating revenue provides the basis of the cash return to the private owner and is one of the fundamental operating risks assumed by the equity investor in this structure.

In the public case, the increasing operating earnings are used to offset the needed non-project pledged revenues. This is done to show the true cash effects of the structures given the operating forecasts provided by the consulting engineers. In reality, the public cases may be unfinancable as described. The reason is that as non-project revenues are replaced by projected fare derived operating earnings, the credit securing the debt fundamentally changes character. Recent experience clearly indicates that fare based net revenue pledges are not adequate security to sell tax-exempt transit revenue bonds. An alternative structure which would keep the pledged revenues at the projected level would be a fixed contribution akin to the service fee plus an agreement for net revenue sharing to distribute excess project earnings back to the member jurisdictions. This of course assumes that the operating earnings projected under private development are equally achievable with public ownership, a projection subject to lively dispute.

When compared to the locally financed public alternative, private development is unquestionably the preferred financial alternative. In terms of present value cost, the financing alternatives are even more starkly contrasted. Excluding coverage funds raised but not expended, the net present value of expense payments for the alternative financing options are:

- Private Sector Development $119,374,000

- Public Sector Development $181,278,000

The present value of the net required payments under the alternative financing options leads to an important conclusion. Private sector development is significantly less expensive than local development. Private ownership of the Dulles system would lead to an aggregate present value savings of $62 million, or 34.3 percent of the public sector cost. Therefore, private ownership is a more economic investment in transit and payment of the service fee a more efficient use of public resources. Put another way, public development is merely a function of cost allocation between the federal and local partners, whereas private development is a process of cost reduction.

In addition, given the risk of farebox based revenue streams, the public alternative may represent infeasible financing option, whereas, the private sector alternative - through a different allocation of risk - is a practical and feasible option. Further, with the current level of Federal assistance, privatization may be the only form of cost reduction available to local governments interested in developing new transit facilities. It may also be the only form of financing available to insure implementation.

CHAPTER FOUR: NON-USER BENEFIT ASSESSMENT

A comprehensive financial plan for the Dulles Corridor Rapid Transit System must include a proposal for raising the revenue to support payment of the Service Fee by the Transportation District to the Private Owner/Operator. Structuring and selection of the revenue sources to support the Service Fee are very important for they will form the basis of the credit for the tax-exempt Industrial Revenue Bonds.

Consistent with the private sector approach to financing this project, the Service Fee should be provided by the non-user beneficiaries of the system. Chart 4-1 identifies the potential beneficiaries of the transit service, the benefit they would receive, and the proposed transfer mechanism to capture the increased value for use in the project.

This chapter was designed to examine the mechanisms which could be used to capture non-user benefits and to develop a conceptual estimate of the resulting revenues. Selection of the specific combination of revenue sources is a critical - but appropriately local - political decision and will require additional effort to more precisely forecast revenues for purposes of establishing credit.

As a matter of policy the projected real estate development benefits discussed in Appendix C should be considered. As a matter of financial structuring, however, the real estate generated revenues are of a form and structure which make it difficult to secure a bond issue. First, the realization of the revenue stream is contingent upon substantial new development and the risks associated therewith. Second the revenue flow builds slowly over time, and is consequently mismatched with respect to the cash needs of the project in the early years.

An alternative structure would levy a transportation related tax to be collected by or paid to the Transportation District. The real estate assessment or other non-user benefit assessments would be levied in addition, but structured so as to replace the transit tax pledge as received for use in other transportation related projects.

The most compelling transportation revenue sources are:

(1) a head tax or other user fee on passengers enplanning at Dulles would require congressional action;

(2) dedication of a toll increase on the Access Road Tollway; or

(3) an increase in the regional gasoline tax currently collected by the Northern Virginia Transportation District.

Each of those sources would provide a good revenue stream which could be established with sufficient certainty to provide the credit basis for the Service Fee to support the issuance of the IDB's. Each source could be structured to provide sufficient revenue or could be used in combination.

Selection and implementation of the revenue source to support the Service Fee is a local decision. This report does not presume to impose a particular solution. It is clear, however, that it is feasible to raise the revenues if the local political jurisdictions determine that transit service in the Dulles Corridor is a regional service priority.

Subsequent to preliminary selection of the preferred revenue source, certain legal and economic functions must be performed. First, each new revenue source will require legal authorization. A head tax will require Congressional action to authorize its collection. The Trust Indenture securing the existing Toll Road Revenue Bonds is closed and would require refunding to make available that revenue stream for the issuance of additional bonds. Likewise, the gasoline tax would require legislative authorization. Second, each revenue source must be subjected to a feasibility analysis to document the level and sufficiency of the revenues.

The financial feasibility of this project rests on its comparison with the costs the local jurisdictions would incur under the publically financed alternative. On that basis, the project economics compare quite favorably. The choice of whether transit is a priority over other needed services is a local political choice. In either alternative, local revenues would be required to support the system - through the Service Fee or directly in the form of debt service. Privatization of transit is feasible, even desirable, depending on the risk allocation determined through the RFP process. The need to generate incremental non-user beneficiary revenues exists under either financing alternative.

CHART 4-1

Non-User Beneficiary	Benefit	Form of Project Contribution or Revenue Base
INSTITUTIONS		
1. F.A.A.	o Enhance Access to Airport o Generate Load Growth o Economic Return on Assets	o Right-of-Way o Station Properties o Sale or Lease of Additional Property o Credit Support o Share Capital Costs
2. UMTA	o Demonstration of Non-Traditional Financing	o Partial study funding o Increment in formula funds resulting from operation of project
3. Airlines	o Method of Load Management and Growth - National v. Dulles	o Higher Residuals o Direct Compensation
4. State of Virginia	o Additional Transit Infrastructure	o Allocation of IDB Cap o Credit Support o Grant o Share Capital Costs
5. Toll Road Authority	o Reduce Traffic Congestion on Toll Road	o Dedication of Toll Increase to Project
6. Fairfax & Loudoun Counties	o Additional Transit Infrastructure o Reduce Congestion and Enhance Access o Reduce Commute Times o Spur Economic Growth	o Serve as Public Partner o Levy & Collect Non-user Taxes or Fees o Provide Service Fee to Sponsor o Give Secondary Revenue Pledge as Credit Enhancement

CHART 4-1
(Continued)

Non-User Beneficiary	Benefit	Form of Project Contribution or Revenue Base
REAL PROPERTY OWNERS		
1. Contiguous Parcels or Defined Area	o Enhance Access to Property o Greater Traffic Flow	o Special Benefit Assessment
2. Incremental Development in Defined Area	o As above and for Counties o Growth Generates Additional Tax Base	o Dedication of Incremental Property Taxes o Impact Fee
3. Specific Site Developments in Conjunction with Project	o Direct Link to System	o Joint Development/Profit Sharing
4. Donated or Leased Real Property	o Enhance value of adjacent property retained	o Mortgage collaterial value
INDIVIDUALS		
1. Local Residents	o Additional Transit Option o Reduction in Commute Times	o Payment of General Tax Levy: - Sales - Gas
2. Tollway Patrons	o Reduced Congestion on Toll Road	o Higher toll dedicated to transit
3. Airline Passengers	o Faster Access to Airport o Cheaper Alternative	o Ticket Surcharge

CHART 4-1
(Continued)

Non-User Beneficiary	Benefit	Form of Project Contribution or Revenue Base
PRIVATE SECTOR		
1. Owner/Operator	o Management Contract o Fair Return o Share of Tax Benefits o Development Rights	o Equity o Pledge of Corporate Credit o Construction & Performance Guarantees
2. Third Party Lessor	o Fair/Fixed Return o Share of Tax Benefits	o Equity
3. Partnership	o Fair Return o Share of Tax Benefits	o Equity
4. Technology Manufacturers	o "Showcase" Demonstration Project	o Low Construction Price o Deferred Profit
5. Equipment Vendors	o Sale of Equipment	o Favorable Financing

APPENDIX A

APPENDIX A:
PROCUREMENT PROCESS

APPENDIX A:
PROCUREMENT PROCESS

The following procurement process has been developed as an example to illustrate a means of soliciting private sector participation in developing rail service in the Dulles Corridor. It does not necessarily represent a recommendation, but was intended to be a framework which identified the necessary procurement steps. There are numerous financing variations that could be utilized. Increased private sector contributions, cost sharing, risk sharing between the private and public sectors, changes in tax laws, increased use of leverage leases, etc. could materially effect the financing plan and may substantially alter the service fee and other costs.

The financing plan that follows assumes many actions which will require approval, legislative modifications and policy changes from various groups including Fairfax and Loudoun Counties, the U.S. Congress, the State of Virginia, the Northern Virginia Transportation District, the Federal Aviation Administration and others.

The ultimate decision regarding whether or not to implement the transit improvements, select specific technology, solicit private sector participation or form any institutional authority (Transportation District) lies with the local political jurisdictions.

LETTER OF INSTRUCTION

TO: Potential Respondents to the Dulles Access Transit Development Project Request for Proposals

This Request for Qualifications is being issued to solicit indications of interest from all qualified developers interested in bidding for the opportunity to design, finance, construct and operate a mass transportation facility in the Dulles Airport Corridor.

The RFQ is designed to allow potential bidders to demonstrate their capability of complying with the Terms of Development outlined in the RFP, without investing the considerable time and money required for a comprehensive response.

Based upon the evaluation of the information presented in the RFQs, the Transportation District will invite the best qualified respondents to prepare full proposals. Consequently, the RFP is attached for your review. Respondents to the RFQ must be aware of the level of information which will be required at the RFP stage, and be prepared to proceed with competitive negotiations if selected to develop a full proposal.

REQUEST FOR QUALIFICATIONS

INTRODUCTION

Invitation to Submit Qualifications

The Dulles Access Transportation District (hereinafter referred to as the District), a transportation district formed under the State of Virginia's Transportation Act of 1964, invites interested parties to submit their qualifications to design, finance, construct, operate and own a mass transportation system connecting Dulles International Airport and the Washington Metro System in West Falls Church, Virginia. Formal proposals will be solicited from parties deemed to be most qualified on the basis of their response to this Request for Qualifications to provide for the private ownership and operation of a transit system consistent with the detailed service parameters outlined in the Request for Proposals. A summary of these parameters is included in this RFQ for informational purposes. The District will select the two best qualified applicants and enter into competitive negotiations with these parties based upon their responses to the Request for Proposals. The final proposals will be evaluated according to the parameters set forth in the Request for Proposals and a developer will be selected to enter into contract negotiations with the District.

The Issuer of the Request for Qualifications

The Dulles Access Transportation District [was] formed pursuant to the State of Virginia's Transportation Act of 1964. The District is comprised of [one or more cities and/or counties impacted by the proposed mass transit system] and was created by ordinances adopted by the governing body of [each component government]. The District is empowered to, among other things; (1) prepare and revise a transportation plan for the District; (2) construct and acquire, by purchase or lease, the transportation facilities specified in the transportation plan; (3) enter into agreements or leases with private companies for the operation of its facilities; and (4) enter into contracts or agreements with component governments, or with adjoining cities or counties that are outside the District but within the transportation plan, to provide transit facilities or services. Moreover, the District is empowered to use these contracts, agreements and leases to finance the construction and operation of the transit facilities.

The District is a corporate body under Virginia law and is managed and controlled by its Commission, which is comprised of members appointed by the component governments. The

District has the power to issue tax-exempt bonds for any of its purposes and pay the principal and interest from any of its revenues without the consent of any other agency or government body, and without referendum. The District was formed for the specific purpose of developing mass transit service in the Dulles Airport Corridor.

The District solely represents the interests of its component governments in developing local transit service. The U.S. Department of Transportation is not a member of the District and will not be a party to this solicitation.

Project Objectives

It is the objective of the RFQ to identify well qualified private developers to enter into competitive negotiations to build and operate a mass transit system in the Dulles Airport Corridor. Respondents will be evaluated on their demonstrable capability to design, finance, construct, own and operate a mass transit system. Respondents should note that they will be required to provide private financing for the Project to the greatest extent feasible. Therefore, preference will be given to respondents that clearly indicate their capability to provide the financial resources to secure the private financing necessary for the Project.

It is the intent of the District to grant to the winning respondent the right to build and operate the transit system. The District will also agree--subject to certain conditions in the operating agreement--to pay a fee in exchange for the operator providing specific transit services. In exchange for payment of the service fee, the District expects the private operator to assume the operating risks of the system.

The Role of the Federal Government

The purpose of the Project is to finance and construct a mass transit system without the assistance of the Federal Government. The U.S. Department of Transportation, acting by or through the Urban Mass Transportation Administration will not: (i) be a party to this solicitation of qualifications, (ii) review or evaluate responses to the RFP, or (iii) provide direct capital or operating assistance to aid in the construction or operation of the Project.

The Request for Proposals will prize, above all, innnovative financing schemes which utilize the capacity of the private sector to build and operate major capital investments more economically than the public sector. Respondents to this RFQ should anticipate this requirement and structure their qualifications accordingly.

"Showcase" Demonstration

The District believes that this Project presents private vendors with a unique opportunity to build a "showcase" transit system in the United States. The nation's capital is an excellent location to demonstrate the technical properties of transportation systems.

The Project is structured to encourage joint development of real estate adjacent to the alignment of the system. The District believes this Project offers unique development potential to design and construct real estate development which can fully utilize the transportation advantages the system will provide.

In addition, the financial and legal structure contemplated by the Request for Proposals represents a bold departure from traditional methods of financing mass transit. To the extent a private developer can demonstrate economic benefit from privatization of transit, there should be significant additional market opportunities.

PROJECT BACKGROUND

A. Project History

The Dulles Airport Access Road (DAAR) was constructed over twenty years ago by the Federal Aviation Administration (FAA) to provide the rapid ground access necessary to the success of the airport. This four lane divided highway was planned as an exclusive use facility connecting Dulles Airport to I-495 and Virginia Route 123 and was not constructed to serve the communities along the route. The FAA recognized the potential need for future usage by non-airport related traffic and acquired sufficient right-of-way to construct adjacent service roads to accommodate local traffic. It also designed the DAAR with a median strip sufficient to permit construction of a future rapid rail transit system to serve the airport users.

Over the years, air traffic into Washington D.C. airports has created a need to provide more efficient ground access to Dulles airport in order to more fully utilize this facility and relieve some of the pressure on National airport. In addition, the communities surrounding the DAAR have experienced significant growth and development and the need for local transportation along the DAAR has increased dramatically. To meet part of this need, the DAAR was extended to connect to Interstate Route 66 adjacent to the West Falls Church Metro Station, and the originally planned service roads, now known as the Dulles Toll Road, were put into operation.

Current public transportation service to Dulles Airport is provided by the Washington Flyer Bus Service, or by private taxi cab. Public transportation service within the corridor consists of Metrobus service and bus service provided by Fairfax County and the individual municipalities along the DAAR. This bus service is heavily subsidized. The bulk of commuter and intra-county travel is made by private automobile.

In response to the demonstrable need for more efficient public transportation to Dulles airport and for local transportation along the DAAR, Congress directed the Secretary of Transportation to study the feasibility of constructing a rail rapid transit line between the West Falls Church, Virginia, station of the Washington, D.C. metrorail system and Dulles airport. Pursuant to this mandate, the Urban Mass Transit Administration (UMTA) funded a study to test the feasibility of private sector developers undertaking the construction and operation of this transit system.

The results of the UMTA funded study are available for inspection from the District, and serve as the basis for the RFP. It is important to point out that the study was guided by the Federal policy of encouraging private sector initiatives in mass transit, and sought to identify means of developing transit services without direct Federal involvement. The study also recognized the proper role of local government agencies in determining the required level of transit service. This local responsibility extends to determining the extent of development and providing any required financial assistance for the project.

Consistent with this approach, the Dulles Access Transportation District is issuing this RFQ without the participation of the Urban Mass Transportation Administration. It is the intention of the District to seek proposals to finance, build and operate the system solely as a co-venture partnership between the private owner/operator and the District.

B. Role of Project Sponsors and Cooperating Agencies

Dulles Airport Transportation District

The District will have overall responsibility to oversee the development and operation of the Project. It will administer the RFQ process, evaluate the qualifications of respondents, interview the qualified developers, enter into competitive negotiations with the two finalists, select the Developer, and enter into the construction and operating agreements. It will also monitor the performance of the Developer in the construction, operation and maintenance of the rail system. The District will make provisions for the right-of-way to the extent that the easement granted by the FAA (discussed below) is insufficient for the proposed rail system.

The District will also provide an irrevocable commitment to purchase transportation service from the Developer in the form of a take-and-pay contract. Payment of the Service Fee will be made from certain identified non-project revenues. The District will serve as the issuer of any required tax-exempt Industrial Development Bonds.

Component Governments

The component governments may consider, but need not agree to, any needed land use or zoning variances and will offer assistance in acquiring all necessary local permits and licenses. Certain of the component governments have stated that they do not wish to vary existing land uses or zoning beyond that provided for in their existing Master Development Plans. They will consider pledging credit sources where necessary to support the financing of the system and will administer the assessment of property and collection of taxes paid by owners of the improvements covered by any special assessment districts or tax increment districts formed to provide dedicated non-project revenues for the construction and operation of the Project. The component governments will undertake any modifications in the transportation infrastructure necessary to provide an acceptable interface with the rail system. They will also assist in providing needed infrastructure for sanitation and water for undeveloped land leased by the Developer from the FAA within their jurisdiction.

State of Virginia

The State has provided the authorizing legislation establishing the District and its powers. It will make available allocations for the necessary IDBs and provide necessary waivers from any impeding taxation of the rail system or its procurement. In addition, it is anticipated that the Virginia Department of Highways & Roads will provide any necessary changes in the transportation infrastrcture surrounding the rail system under its control to assure a proper interface with the system.

Federal Aviation Administration

The FAA will grant an easement on the median of the DAAR to provide the right-of-way for the rail system. The Secretary of Transportation has proposed legislation to transfer control of both Dulles and National airports to a new regional airport authority. This legislation is pending before the Congress and, if approved, the new airport authority would control the easements and property associated with Dulles Airport.

Urban Mass Transit Administration

UMTA will take an oversight role in the process as an interested but uninvolved party and will have no active role in the development, financing or operation of this rail system.

Regulatory Agencies

Other federal and state regulatory agencies with jurisdiction over parts of this development are expected to provide their input and cooperate in expediting necessary approvals and waiving unnecessary or conflicting regulations.

C. The Service Area

The Service Area is described in some detail in the RFP under Project Area Demographics. Respondents are cautioned not to rely on this information as it is provided for illustrative purposes only.

D. Patronage

Patronage forecasts as provided for the feasibility study are described in detail in the RFP under Project Area Demographics. Respondents are cautioned not to rely on this information as it is provided for illustrative purposes only.

III. PARAMETERS OF DEVELOPMENT

A. Permissible Transit Technology

The materials, equipment, components and systems to be employed on this transit system will in every case have been proven safe and reliable on other operating transit systems. Respondents will indicate, by reference to prior use, the basis for each such judgement. In similar manner, each design/construction/installation practice or technique will have been proved previously as well.

The Light Rail Transit (LRT) is the guideway option deemed most appropriate for the physical situation and the surroundings. The techniques and technologies proven in many LRT systems will be strongly considered for this Project to capitalize on the proven manufacturing and servicing capabilities and to take avantage of the generous supply of skilled personnel.

B. Operating Performance Standards

The central business district of Washington D.C. is approximately 26 miles from Dulles Airport. The District believes that rail transit between the two points should be frequent and swift. Preference will be given to those developers who propose systems that complete the trip in an hour or less, including station dwell time and a system transfer at West Falls Church and who propose frequent trips to prevent a buildup of waiting travelers. The feasibility study (which is available from the District) indicated that the trip will be achievable in an hour or less if the guideway and vehicle selected support a maximum speed of up to 70 mph. Moreover, preference will be given to Developers that tailor their service to be compatible with Metrorail peak periods.

C. Joint Real Estate Development

The financial feasibility study for the proposed System envisions an integrated development plan involving the construction and operation of the light rail system and simultaneous development of land along the rail line and contiguous to Dulles Airport. Through the cooperation of the Federal Aviation Administration, this land and the land for the right of way for the rail system, is being made available for development to the selected

Developer according to terms to be negotiated as part of the competitive negotiation phase of the selection process.

This undeveloped FAA land, and land privately owned along the Corridor, will directly benefit from the development of rail system in the Corridor and the District intends to institute methods of capturing part of this increased value to help defray the cost of constructing and operating the rail system. The feasibility study identified a number of potential non-user beneficiaries of the rail system and made preliminary estimates of the potential revenues that could be generated from these various sources. The District intends to implement means of capturing a sufficiently large and secure portion of these revenues to generate the Service Fee to be paid to the Developer. The component governments do not intend to make payments to the District from their existing tax revenues to support the construction and operation of the rail system. It is the District's intent to derive the revenues necessary to support the system from revenues captured from non-user beneficiaries.

D. Legal and Regulatory Constraints

Respondents will be required to comply with all applicable federal, state and local laws and regulations that impact upon their development plans for the Project. <u>Respondents are cautioned not to rely on this information, as it is provided for illustrative purposes only</u>.

IV. SUMMARY OF PROJECT DEVELOPMENT STRUCTURE

A. Ownership Alternatives

It is the intention of the District to enter into a joint public/private co-venture with a development corporation to build and operate a transit system in the Dulles Corridor. In return for the payment of a service fee, the District will expect the Developer to own and operate the system under a Full Service Contract.

Respondents will be free to propose an ownership structure of their choosing (including a 100% vendor owned facility, a tax-advantaged leveraged lease, or a limited partnership) provided that the structure meets the following standards: (1) it must involve a minimum at risk equity contribution at least sufficient to qualify for federal tax ownership of the facility, and (2) the Developer will be required to have sufficient assets or other forms of support to assure the efficacy of the cost, construction and performance guarantees required by the RFP.

The intial preference of the District is to have the selected Developer be a corporate entity that will build and own the transit system through to the end of the Operating Agreement.

B. Allocation of Risks

One of the principal advantages of private ownership identified in the Dulles Feasibility Report is the ability to control cost overruns and schedule delays that have plagued the construction of publicly sponsored transit developments. For this reason private ownership is being considred for this project. Consequently, Developers must be aware that the District will be seeking proposals wherein the private owner/operator can guarantee a fixed price development, timely completion, and assumption of technical feasibility.

It is the intention of the District to transfer to the Developer as much operating risk as is practically feasible. The District believes the owner/operator will be in a better position to manage risk, and will have a more clearly defined economic interest in controlling risk, than would a public manager of the Project.

C. Requirements of the Construction Contract

Qualified Developers will be asked to bid a fixed price turnkey construction price to construct the transit system as proposed. At a minimum, the contract will provide for a fixed completion schedule and strict performance standards for acceptance. The Developer will be required to provide unconditional and unlimited performance guarantees backed by surety bonds from a recognized financial intermediary with respect to completion of the system through satisfactory testing.

D. Minimum Standards for Operating Agreement

The District will require that the selected Developer take full responsibility for the operation and maintenance of the system, including but not limited to suppliers, concessionaires, labor contracts, equipment repairs and regular upkeep of the rail bed and stations, materials and power. The District will require that the operations of the system meet certain defined performance standards as measured from time-to-time by the District.

E. Acceptable Financing Alternatives

The District has an initial preference for a corporate owner providing financing with equity of at least 25% of total costs and debt financing provided through the issuance of tax exempt Industrial Development Bonds backed by the Developer with the full guarantee (or its functional equivalent provided by an acceptable financial intermediary) of its owner/parents.

The District will consider project financing alternatives based upon either a tax advantaged lease or a limited partnership wherein the tax benefits are sold or transferred to third party investors.

F. Payment of Service Fee

The initial projections by the District on the financial feasibility of the System indicate that fare revenues will not be sufficient to pay for operations and maintenance in the early years. The feasibility study proposes that additional revenues be identified to pay for the balance of operations and maintenance not covered by fare revenues, and to pay capital costs. This fee, designated as the Service Fee, will be comprised of revenues from various sources and will be collected and paid by the District to the Developer on a semi-annual basis, subject to the Developer's performance under the Operating Agreement. The Service Fee will at all times be based upon the level of service provided to the District pursuant to the Operating Agreement.

V. QUALIFICATIONS FORMAT & CONTENTS

Qualifications must be submitted in the format outlined in this section. Each part of the response must be completed in full. The District reserves the right to eliminate from further consideration any qualifications deemed to be substantially or materially unresponsive to the request for information contained herein. Clarity and directness in the responses will be valued.

Qualifications must be structured to include the following sections:

A. Summary of Qualifications

This section of the response should contain a brief summary of the Respondent's qualifications and experience in the development and operation of transit systems. The section should highlight those aspects of the respondent's qualifications (such as verifiable access to capital and the financial strength to offer enforceable cost and performance guarantees) that the Respondant believes to be particularly advantageous to the District. Previous experience with the efficient construction and operation of transit systems should be described in detail.

B. Background and Qualifications of Respondents

Section B of the response should contain the following information about the respondent and any sub-contractors or joint venture partners with which the Respondent intends to work.

1. Description of the Company or Corporation making the proposal. This sub-section must include:

   (a) the identity and relevant experience of the principal developer and each sub-contractor or partner;

   (b) a description of the respective responsibilities of each member of the team;

   (c) the identity of the lead personnel from each firm comprising the development team;

   (d) resumes for the management personnel listed above; and

(e) the name, address and phone number of the principal contact person regarding this RFQ.

2. Audited financial statements for the most recent three fiscal years for the Respondent and each sub-contractor. Alternatively, please provide references from nationally recognized financial institutions that can verify the financial capability of the applicant to undertake such a project.

3. Prior relevant work experience. This section should highlight prior transit experience both as construction contractor and owner/operator.

4. Prior experience as construction contractor and/or operator in providing timely performance with strong completion and operating guarantees of major public works projects.

5. History of service contract relationships. This section should cover prior cases where the developer owned and operated services under a contract with a public agency. The nature of the service and the terms of the operating agreement should be discussed in detail.

6. Financial resources available for the Project. This section must identify the corporate financial resources the respondent has available to support development of this Project. Support may take the form of either direct contributions or assets available to pledge towards performance guarantees. References should be provided from nationally recognized financial institutions who can verify the information provided. References will be checked.

7. References. Each Respondent must provide references of other clients for whom they have worked in similar capacities as proposed herein.

C. **Section C of response should outline the respondent's ideas on development of the Project, including:**

a. The technology to be proposed and general technical specifications, including costs.

b. Proposed terms of the construction and operating contracts and the nature of the guarantees that will be offered.

c. The financing plan, including the availability of financing to carry out the planned development.

d. Initial plans for joint development on undeveloped land adjoining Dulles Airport.

The responses to this section should not be comprehensive in detail. Rather, they should be designed to provide an overview of the respondent's plans for development of the Project.

VI. RFQ PROCEDURES

A. Pre-Qualifications Conference

The District will conduct a Pre-Proposal Conference on __date__, 1985 at __time__ A.M. at __location__.

Proposals will be accepted only from developers who were represented at the Pre-Qualifications Conference.

The purpose of this Conference is to describe the proposed procurement process, to provide additional information and background material, and answer any questions concerning the RFP process.

B. Submission of Qualifications

Interested developers must submit proposals in conformance with the Format and Context prescribed in Secton V.

Respondents must submit ten (10) copies of their qualifications. Proposals must be received by the District prior to five o'clock p.m. on (date). Proposals should be delivered to the District at the following address:

(Address)

The District reserves the right to disqualify qualifications received after this time.

C. Good Faith Deposit

All qualifications must be accompanied by a Good Faith Deposit of $100,000.00. Respondents not selected as the Developer will have their deposits refunded upon execution of the development agreement with the winning bidder.

For the selected Developer, an additional development fee of $150,000 will be required upon execution of the development agreement. At this point, the fees are not refundable.

D. Governing Procedures

1. Costs of Preparation

The costs of preparing and submitting qualifications and any risks associated therewith shall be bourne solely by the respondents. No compensation will be provided to proposing firms for work performed or costs incurred in association with the preparation of qualifications under this RFQ.

2. Proprietary Information

If a respondent's statement of qualifications includes any proprietary data or information that the respondent does not want disclosed to the public, such data or information must be specifically identified as such on every page on which it is found. Data or information so identified will be used by the District solely for the purposes of evaluating qualifications consistent with the provisions of any applicable Freedom of Information Laws. However the District assumes no responsibilities for any loss or damage which may result from a breach of confidentiality during the review of the proposals.

3. Modification or Withdrawal of Qualifications

Any qualifications may be modified or withdrawn by written request of the respondent prior to the closing date for qualifications. After the closing date, modifications will not be allowed, and withdrawal will forfeit the Good Faith Deposit.

4. Right to Reject

The District retains the right to reject any and all qualifications, and to waive any irregularities or formalities that are in the best interest of the District.

5. Questions

Prior to the closing date for proposals, potential respondents may submit written questions to the District. Prompt answers will be provided. The District reserves the right, however, to determine in its sole discretion what information is significant and to thereafter circulate the responses to all potential respondents.

6. Indemnity

The District will require indemnification from claims arising out of the District's failure to select any given respondent or from not making a selection at all. The indemnity must recognize the Authority's right to reject any or all proposals for whatever reasons.

7. Studies and Data

Copies of all studies and reports which have examined the technical and financial feasibility of transit service in the Dulles Corridor will be made available by the District to potential respondents. The District, however, will make no representation as to the accuracy of the data and conclusions presented therein.

8. Site Visits

The District will arrange whatever site visits potential respondents may reasonably request prior to the submission deadline.

9. Changes in Firms or Key Personnel

The respondents must notify the District of any changes in the Firms or key personnel included in their qualifications that occur after submission. The District retains the right to disqualify any respondent who changes participants or key personnel subsequent to submission at any time if, in the opinion of the District, such change materially impacts the overall qualifications of the respondent to perform.

VII. THE SELECTION PROCESS

A. Evaluation of Qualifications

All qualifications will be evaluated by a committee comprised of representatives of the District and its component governments, assisted by legal counsel and the financial advisor to the District and a consulting engineer retained to verify references and the technical capability of the respondents.

Qualifications will be evaluated on the basis of the following criteria:

1. Experience and Qualifications of the Respondent in Transit

   Preference will be given to respondents demonstrating strong technical and management experience in building and operating transit systems. Qualifications of firms and key personnel will be given significance in this category.

2. Experience and Qualifications of the Respondent in similar Major Public Works Projects

   Preference will be given to respondents demonstrating strong technical and management experience and management experience in building and operating similar public works projects. The relevant projects may be either publicly or privately owned. Preference will be given to respondents citing major projects that are similar to the proposed mass transit system. Clear indications of the ability to construct and operate similar projects in a timely and cost effective manner will be helpful.

3. Demonstrated Capacity to Provide the Cost and Performance Guarantees

   Preference will be given to respondents that clearly indicate verifiable financial capacity to provide the necessary guarantees on construction and operating costs. The financial resources of the respondents will be judged on the basis of the financial information requested, as well as references from well recognized financial institutions indicating satisfactory experience with the respondent in providing performance bonds or similar guarantees of performance on major construction and operating contracts.

B. Schedule

Following the evaluation of the respondent's qualifications by the District, the respondents deemed best qualified will be invited to make oral presentations to the Vendor Selection Committee of the District's Commission to more fully explore their qualifications. Upon completion of the interview process, the District will designate two Respondents as finalists to enter into competitive negotiations. These two respondents will then receive the formal Request for Proposals as the basis for the competitive negotiations. On the basis of the responses to the RFP, the District will select the Developer and enter into contract negotiations. Should the District and the selected Developer fail to reach agreement on the trms of the development contract within 120 days from the date of notice of selection, the District retains the right to terminate negotiations and commence contract negotiations with the second ranked Respondent.

<u>Selection Schedule</u>

(Date) <u>Request for Qualifications Issued</u>

(Date) <u>Respondents Question Period Closes</u>

Questions of substance will be answered in writing if submitted to:

(name & address)

Copies of all responses will be provided to all qualified proposers.

(Date) <u>Qualifications Close 5:00 P.M. EDST</u>

Qualifications must be time stamped by the Authority no later than 5:00 P.M. Eastern Daylight Savings Time in the office of the District Executive Director.

(Date) <u>Qualifiers for Oral Interviews Selected</u>

The evaluation committee will invite selected Respondents to oral interviews.

(Date) <u>Selection of Finalists</u>

(Date) Issuance of RFP and commencement of Competitive Negotiations with selected developers

(Date)	Recommendation of Vendors
	The Vendor Selection Committee will recommend the best proposal to the full District Board of Commissioners.
(Date)	Selection
	Board designates selected respondent.
	Authorizes commencement of contract negotiations.

REQUEST FOR PROPOSALS

REQUEST FOR PROPOSALS

DEVELOPMENT OF DULLES ACCESS TRANSIT PROJECT

Table of Contents

VI. Information Available Upon Request

A. Feasibility Report prepared by James J. Lowrey & Co.
B. Preliminary Design of LRT prepared by Parsons, Brinkerhoff, Quade and Douglas
C. Patronage Forecasts prepared by Charles River Associates
D. Parcels Available for Joint Development and Associated Lease Rental Payments
E. Legal Memorandum prepared by Baskins & Steingut

STATUS OF INFORMATION

The data presented in this Request for Proposals is believed to be accurate as of the date of its issuance. All representations reflect conditions as they existed at that time.

The Dulles Access Transportion District, however, makes no warranty of any kind as to the accuracy of the data and information presented herein, nor changes that may occur due to circumstances that arise up until the final contracts are signed.

Respondents to this RFP are advised that they may not rely solely on forecasts, projections or representations presented herein when submitting the business and financial proposals required by this RFP.

I. PROJECT AREA DEMOGRAPHICS

A. The Service Area

Base year and forecast population and employment for the Dulles Rail Corridor were compiled and aggregated for each of the seven transportation zones developed for this study. These zones correspond to the proposed station locations. Data from both Fairfax County (based on U. S. census data) and from WashCOG (Round III Cooperative Forecasts) were collected. The development of population and employment forecasts is a cooperative process between WashCOG and its member jurisdictions, which include Fairfax and Loudoun Counties. The most recent round of forecasts available were the WashCOG Round III forecasts, prepared with input from Fairfax and Loudoun Counties. Because these forecasts include adjustments for the most recent trends in population and employment growth, they were used in the patronage forecasting process.

Each of the seven transportation zones was defined as an aggregation of several 1980 Census Tracts. Since the COG/TPB small zones used in the "Cooperative Forecasts" are similar but not exactly the same as Census Tracts, we aggregated the COG/TPB zones which corresponded most closely to our seven zones. In some cases, the COG/TPB zones encompassed several Census Tracts. This made it necessary in these cases to proportion out the COG/TPB zone population and employment to the seven transportation zones developed for the study.

Population estimates for 1984 and 2000 were compiled for the component Census Tracts of each transportation zone from the 1984 Standards Reports of the Fairfax County Office of Research and Statistics. Data for individual Census Tracts in Loudoun County were not available so that the estimates for the Dulles Airport and Route 28 zones include Census data only for their Fairfax County portion. Population and employment data for 1985, 2000, and 2005 were taken from the WashCOG Round III Cooperative Forecast and aggregated for each of the seven transportation zones.

In September 1985, the WashCOG Round III estimates were revised to account for the most recent changes in projected land use and development. Our estimates were therefore also revised. A comparison of the Fairfax County and revised WashCOG forecasts (though not an exact comparison because of the missing Loudoun County's census data) showed the two to have a few discrepancies. The WashCOG forecast were chosen because of their status as the official forecasts for the region. A summary of the Fairfax County and revised Round III WashCOG forecasts is shown in Table 1. Table 2 shows details of the revised Round III WashCOG population and employment forecasts for the individual COG/TPB zones making up each of the seven transportation zones.

Table 3 compares average household income for the seven transportation zones for the years 1979 and 1983. (The Dulles and Route 28 zone estimates of 1973 income include only the Fairfax County portion of each zone.) 1979 income was taken from the 1980 U. S. Census while the 1983 income was estimated by Fairfax County. The median household income in 1983 for all of Fairfax County was $42,595.

The revised Round III WashCOG forecasts, as well as development activity, land use projections and zoning restrictions in Fairfax County, were used to estimate the amount of development around the proposed LRT stations. Estimates of population and employment located within one half mile of each LRT station in the forecast year 2000 are shown in Table 4. For the Route 7 alignment, estimates were developed for three stations in addition to the station location at Route 7 which is the only Tyson's Corner station in the Dulles Access Road alignment. These other stations were located at Westpark, Chain Bridge Road, and the Beltway.

TABLE 1

SUMMARY OF POPULATION AND EMPLOYMENT FORECASTS

DULLES TRANSPORTATION ZONE	WashCOG REVISED ROUND III FORECASTS: POPULATION 1985	POPULATION 2000	POPULATION 2005	GROWTH 1985-2000	GROWTH 1985-2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005	GROWTH 1985-2000	GROWTH 1985-2005	FAIRFAX COUNTY FORECASTS: POPULATION 1984	POPULATION 2000	GROWTH 1984-2000
1 DULLES AIRPORT	1143	3106	4248	171.7%	271.7%	6154	8341	9769	35.5%	58.7%	*	*	
2 ROUTE 28	17664	18295	18303	3.6%	3.6%	6636	26762	33910	303.3%	411.0%	*	*	
3 HERNDON	16992	26914	29613	58.4%	74.3%	4105	10738	13521	161.6%	229.4%	20444	27894	36.4%
4 RESTON	53064	72959	74020	37.5%	39.5%	13753	29688	33219	115.9%	141.5%	55076	70795	28.5%
5 HUNTERS MILL RD	19341	21127	20815	9.2%	7.6%	3514	6979	7329	98.6%	108.6%	17341	15591	-10.1%
6 TYSONS CORNER	31707	33412	32939	5.4%	3.9%	49022	78131	79824	59.4%	62.8%	31499	35545	12.8%
7 FALLS CHURCH	35873	34253	33481	-4.5%	-6.7%	6908	6955	6956	0.7%	0.7%	36491	33473	-8.3%
CORRIDOR TOTAL	175784	210066	213419	19.5%	21.4%	90092	167594	184528	86.0%	104.8%	160851	183298	14.0%

* TOTAL ZONE POPULATION NOT AVAILABLE

SOURCES: 1984 STANDARD REPORTS, FAIRFAX COUNTY OFFICE OF RESEARCH AND STATISTICS.
WashCOG, ROUND III COOPERATIVE FORECASTS.

TABLE 2

WashCOG REVISED ROUND III POPULATION AND EMPLOYMENT FORECASTS
FOR DULLES AIRPORT AND ROUTE 28 ZONES

1. DULLES AIRPORT ZONE

COG/TPB ZONE	POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
FAIRFAX COUNTY						
575A	0	0	0	205	374	524
FAIRFAX TOTAL	0	0	0	205	374	524
LOUDON COUNTY						
670A	22	0	0	5553	6675	7250
680C	648	690	742	67	235	285
681D	207	228	282	184	393	550
681E	266	2188	3224	145	665	1160
LOUDON TOTAL	1143	3106	4248	5949	7967	9245
TOTAL	1143	3106	4248	6154	8341	9769

2. ROUTE 28 ZONE

COG/TPB ZONE	POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
FAIRFAX COUNTY						
575D	224	678	650	1006	5325	5950
577D	86	0	0	20	6220	9320
FAIRFAX TOTAL	310	678	650	1026	11545	15270
LOUDON COUNTY						
671A	34	10	0	356	1473	1950
671B	98	24	0	1395	3900	4650
671C	82	66	61	586	788	850
671D	1444	421	473	635	3450	4500
671E	8088	9648	9722	1388	1495	1550
671F	7608	7448	7397	1250	4112	5140
LOUDON TOTAL	17354	17616	17653	5610	15217	18640
TOTAL	17664	18295	18303	6636	26762	33910

TABLE 2 (CONTINUED)

WashCOG REVISED ROUND III POPULATION AND EMPLOYMENT FORECASTS
FOR HERNDON AND RESTON ZONES

3. HERNDON ZONE

COG/TPB ZONE		POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
577A		1801	3027	3159	288	288	288
577B		3688	4798	5200	634	634	634
577C		2595	2577	2585	112	1462	1712
577E		236	1904	2773	6	3206	5006
577H		3744	4205	4557	967	2587	3287
577K		2718	2575	2707	1484	1658	1658
578B		832	3358	3501	52	52	52
578C	0.67	1378	4469	5131	562	851	884
TOTAL		16992	26914	29613	4105	10738	13521

4. RESTON ZONE

COG/TPB ZONE		POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
569C	0.75	3860	3756	3608	227	227	227
574F		2685	3863	3903	61	61	61
574G		3094	3411	3294	179	179	179
575E		2252	8141	9143	87	97	97
576A		7745	8243	8160	3694	4569	4444
576B		9379	6849	6920	2935	3695	3665
576C		6590	6717	6452	134	134	134
576D		2235	2155	2072	15	15	15
576E		2851	10557	10560	186	1024	1149
577F		5034	7073	7060	468	468	468
577G		5799	6117	6012	4888	6620	6715
577J		0	0	0	341	11180	14580
578C	0.33	679	2168	2489	277	419	435
578D		167	3062	3483	211	941	990
578E		694	847	864	50	60	60
TOTAL		53064	72959	74020	13753	29688	33219

* PERCENTAGE OF COG/TPB ZONE EQUIVALENT TO CORRESPONDING CENSUS TRACT

TABLE 2 (CONTINUED)

WashCOG REVISED ROUND III POPULATION AND EMPLOYMENT FORECASTS
FOR HUNTERS MILL ROAD ZONE

5. HUNTERS MILL ROAD ZONE

COG/TPB ZONE		POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
567A		1976	2138	2049	28	428	428
567B	0.25	466	634	726	9	9	9
567C	0.25	1505	1516	1503	191	191	191
568A		2341	2940	2828	188	188	188
568B		.1130	1612	1546	58	58	58
568C		3305	3252	3176	105	105	105
568D	0.25	1007	1045	1005	35	35	35
568E		844	863	880	403	403	403
569B		2295	2342	3210	469	532	532
569C	0.25	1287	1252	1203	76	76	76
569D		2284	2723	2811	349	556	556
576F		902	810	778	1603	4398	4748
TOTAL		19341	21127	20184	3514	6979	7329

TABLE 2 (CONTINUED)

WashCOG REVISED ROUND III POPULATION AND EMPLOYMENT FORECASTS
FOR TYSONS CORNER ZONE

6. TYSONS CORNER ZONE

COG/TPB ZONE		POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
545A		4425	4420	4328	8957	9629	9629
546B		2267	2036	1966	234	234	234
546C		710	1027	1052	1572	3263	3263
546D		2562	3273	3141	25790	3087	3453
546E		1427	1544	1483	1640	1987	1987
557A		2514	2315	2226	1721	1721	1721
557C	0.75	824	913	899	22	22	22
557D		1701	2745	2740	676	676	676
557E		1182	1557	1595	117	117	117
558A		1286	1721	1651	3161	4239	4239
558B		0	0	0	11533	29430	30507
558C		211	0	0	11137	14081	14081
558D		1171	0	0	2058	6030	6280
559A		2454	2820	2954	684	684	684
559B		233	285	304	10	10	10
559C		722	174	174	66	66	66
559D		2822	3533	3572	122	122	122
567F		2175	1913	1841	2630	2630	2630
568D	0.75	3020	3136	3013	104	104	104
TOTAL		31707	33412	32939	49022	78131	79824

* PERCENTAGE OF COG/TPB ZONE EQUIVALENT TO CORRESPONDING CENSUS TRACT

TABLE 2 (CONTINUED)

WashCOG REVISED ROUND III POPULATION AND EMPLOYMENT FORECASTS
FOR WEST FALLS CHURCH ZONE

7. WEST FALLS CHURCH ZONE

COG/TPB ZONE	POPULATION 1985	POPULATION 2000	POPULATION 2005	EMPLOYMENT 1985	EMPLOYMENT 2000	EMPLOYMENT 2005
544A	1936	1715	1525	667	667	667
544B	778	971	1103	598	598	598
545B	5079	5207	5234	1218	1218	1218
545C	6392	5610	5394	690	706	706
545D	3559	3241	3137	313	313	313
545E	534	516	512	0	0	0
545F	1197	1722	1718	143	143	143
546F	5041	4435	4272	1244	1276	1276
546G	4326	3937	3822	339	339	339
546H	2885	2639	2537	309	309	309
546J	2082	1928	1881	119	119	119
546K	2064	2331	2345	1268	1267	1268
TOTAL	35873	34253	33481	6908	6955	6956

TABLE 3

1979 AND 1983 AVERAGE HOUSEHOLD INCOME

DULLES TRANSPORTATION ZONE	1979	1983
DULLES	$24,429 *	$34,495
ROUTE 28	$30,868 *	$45,693
HERNDON	$27,263	$33,476
RESTON	$34,060	$45,232
HUNTERS MILL ROAD	$46,037	$58,831
TYSONS CORNER	$39,587	$52,358
WEST FALLS CHURCH	$37,267	$47,290

* MEDIAN HOUSEHOLD INCOME, FOR FAIRFAX COUNTY CENSUS TRACTS ONLY

SOURCES: 1979 INCOME - 1980 CENSUS OF POPULATION AND HOUSING, U.S. DEPARTMENT OF COMMERCE, JULY 1983.
1983 INCOME - 1984 STANDARD REPORTS, FAIRFAX COUNTY OFFICE OF RESEARCH AND STATISTICS.

TABLE 4

ESTIMATED YEAR 2000 POPULATION AND EMPLOYMENT
WITHIN ONE HALF MILE OF PROPOSED LRT STATION LOCATIONS

STATION	POPULATION	EMPLOYMENT
ROUTE 28	0	4500
HERNDON	2100	4100
RESTON	3000	15200
HUNTERS MILL ROAD	2400	3200
TYSONS CORNER - ROUTE 7	1000	4800
WESTPARK	400	9700
CHAIN BRIDGE	0	16200
BELTWAY	3400	12600
WEST FALLS CHURCH	4300	1300

B. Patronage Forecasts

Forecasts of ridership and operating revenue for the proposed Dulles Corridor Light Rail Transit (LRT) line are included in this section. Forecasts were developed for the proposed LRT line for the year 2000. Ridership forecasts for the intermediate years 1990-1999 and 2001-2010 were extrapolated from the year 2000 forecasts based on population and employment forecasts supplied by WashCOG and Fairfax and Loudoun Counties. Forecasts of total Dulles Airport air passenger travel were based on the official forecasts of Dulles' Airport usage provided by the FAA Metropolitan Washington Airports Engineering Staff.

In the initial phase of the study, three estimates of LRT line ridership and revenue were developed for several travel market segments including Dulles Airport air passenger usage of the LRT line. The low estimate represented a "worst case" scenario, in which the new line would not attract significant ridership beyond those markets currently served by transit (e.g. Reston to D.C.). It was also assumed in the low estimate that limousine service would compete with the LRT line for Dulles Airport passengers. A high estimate was also developed, which involved relatively optimistic assumptions concerning the attractiveness of the LRT system to currently unserved markets (e.g. peak period travel between origins and destinations entirely within the corridor). Finally, a "medium" estimate was developed, which represents the most likely forecast for the proposed facility, given the assumptions made concerning future corridor population and employment, growth in Dulles air passenger travel and the operating characteristics of the system.

Development of transit ridership and revenue forecasts requires that many assumptions be made concerning both the operating characteristics of the proposed system and the environment in which it will operate. Three major assumptions which are critical to the realization of projected patronage and revenues are:

1. That the substantial population and employment increases forecast for the corridor (approximately 20% and 90% respectively) actually materialize and that a level of development near station locations equal to that assumed in the forecasts takes place.

2. That the large increases forecast by the FAA for Dulles air passenger travel (3.5 million passengers in 1984 to 15.2 million in 2000) actually materialize.

3. That a high-quality Light Rail system with frequent service, adequate parking and excellent feeder bus service is implemented.

Because much of the population and employment which will generate patronage for the LRT system is not in place today, a lower than projected growth in corridor employment and population by WashCOG and Loudoun Counties will significantly impact the ridership and operating revenue forecasts for the project. It should also be noted that a fixed rail facility requires relatively high densities around stations to attract patronage. This is especially true in this case, since a large percentage of LRT line users (those bound for D.C. and Arlington) must transfer to MetroRail at West Falls Church. Because riders are very sensitive to additional access and egress time, use of the LRT line will drop off significantly for population and employment located away from the line. Passengers located south of the line also have an attractive alternative in the MetroRail Orange Line extension to Vienna, which will be open in 1986.

The forecasts presented here reflect the projected growth of Dulles air passenger travel from 3.5 million passengers in 1984 to 15.2 million passengers in 2000.

Dulles Airport traffic is projected to account for approximately 15% of LRT line ridership, but due to the higher fare charged to airport passengers ($3.50 rather than $1.50), and the fact that airport ridership will stay at a relatively high level on weekends, it generates one-third of system revenues. Therefore, if the high levels of growth projected for Dulles do not occur, or occur at a later date than projected, system operating revenue will be significantly lower than forecast.

The operating assumptions used in this study have been made for the purpose of estimating ridership, revenue and capital/operating costs. Because no federal funds are to be used to cover either capital or operating costs, the final specification of system operating characteristics will be up to the bidders and the agency issuing the RFP. The LRT system assumed for patronage forecasting purposes provides frequent, high-speed service throughout the day and evening. If a system is constructed which does not meet the level of operation proposed, ridership will be lower.

Forecasts were developed using more than one method wherever possible as a check to increase the confidence in the forecasts. Site specific relationships between transit modal shares and socio-economic and transportation level-of-service variables were developed using 1980 U.S. Census journey-to-work data from the Northern Virginia area. Forecasts were developed using significant variables (transit commuting time, average income of residence zone, and cost of auto commuting) and were further adjusted for fare changes and additional transfers. Parallel forecasts were developed using our incremental method.* This method increments existing ridership based on four factors; (1) growth in population and employment; (2) changes in the highway system; (3) diversion of travellers to new or improved transit services; and (4) "induced" or new travel generated by the improved service. This technique was used to project travel market segments such as Reston to downtown Washington, where a significant level of ridership and service already exists. These travel market segments account for approximately 40-45% of total forecast ridership on the proposed LRT lines. In the two major existing transit markets, Reston to downtown Washington and Reston to Rosslyn/Pentagon/ Crystal City, the two forecast methods produced estimates within 10% of each other.

The final round of patronage and revenue forecasts are presented in this section. Before these estimates were developed, both the forecasting techniques used and the input assumptions were refined. These refinements primarily involved increased detail concerning station area development and station area access/egress characteristics. The fact that the final revised estimate presented here matches very closely with the "medium" estimate developed in the previous forecasting round provides further confidence in the demand estimate. Data sources, operating assumptions, and the patronage forecasts are presented in Tables 1 through 10. The estimated year 2000 daily ridership of 14,100 shown in Table 3 represents the middle of a high-low range of 11,000-17,000 for that year. A Tyson's Corner alignment along Route 7 with three additional stations (Westpark Drive, Chain Bridge Road and Beltway) was also evaluated. Daily ridership along this alignment was estimated at 15,700 for the year 200, representing the middle of a range of 12,500 to 18,500 (Table 3B). Summaries of ridership for the Tyson's Route 7 alignment are shown in all the tables marked 'B' (3B, 4B, etc.).

*Daniel Brand and Joy Benham, "Elasticity-Based Method for Forecasting Travel on Current Urban Transportation Alternatives," TRB Record 895, 1982.

Table 1 summaries the major data sources used in the development of patronage and operating revenue forecasts. The population and employment forecasts which are probably the most critical non transportation inputs to the patronage and revenue forecasting process, were updated as of September, 1985 and reflect the most recent thinking of WashCOG, Fairfax County and Loudoun County concerning development trends.

In Table 2, the operating assumptions for the forecasting process are listed. Because the actual system will be open to bid from developers, it may be very different from the one described here. The system specified for forecasting purposes here is of high quality in terms of speed and headway. In addition, an excellent feeder bus system and adequate parking facilities are assumed to be available. Tables 3 and 3b show daily ridership, annual ridership and annual revenue for the years 1990-2010. The Route 7 alignment deverts from the original Access Road alignment and runs through the Tyson's Corner area laong Route 7. It was assumed that this alignment would have stations at Route 7 and the Access Road, Route 7 and Westpark Drive, Route 7 and Chain Bridge Road, and Route 7 and I-495. Because of the improved access to major employment centers in Tyson's Corner, ridership is estimated to be 11% higher in year the 2000 than on the Access Road alignment. Capital costs, of course, will be considerably higher for the Route 7 alignment.

Tables 4 and 4b show the breakdown of year 2000 ridership and revenue by market segment. The proposed line will draw from a variety of different market segments for its ridership. It was necessary to take the diverse behavior of these different market segments into account in developing patronage estimates for the new service. The final set of market segments were selected based on availability of base-year ridership and input data, as well as the outcome of initial ridership forecasts. The segments for which forecasts are presented in Tables 4 and 4b are:

- Dulles airport passengers
- Commuters to major Northern Virginia employment centers (Rosslyn, Pentagon, Crystal City)
- Commuters to downtown Washington
- Commuters travelling entirely within the corridor
- Commuters travelling into the corridor from Washington and other parts of Northern Virginia

- Off-peak travel entirely within the corridor
- Off-peak travel into the corridor

While the Washington Commuter market supplies the largest share of passengers, airport ridership supplies the greatest share of revenue as a result of the $3.50 fare. Travel to destinations within the corridor will account for approximately 30% of all ridership on the line. The forecasts indicate that the system should be designed to provide an acceptable level of service to all potential markets. While Washington commuters provide the most ridership and airport passengers provide the most revenue, no single market segment is dominant.

Table 5 shows the mode of access distribution for each proposed station along the line. Due to the suburban nature of the corridor and the likelihood that development along the Access Road will be primarily commercial, there will be few residents within walking distance of the line. Feeder bus is forecast to receive approximately one-third of the ridership at those stations with feeder bus service. Auto access use ranges from 47% at West Falls Church (where a parking fee will be required in the WMATA garage) to 100% at Route 28, where no other options are available.

Tables 5 and 5b summarize ridership and revenue for the airport air traveller market segment. The Route 7 alignment has a slightly lower level of ridership due to a longer travel time for air passengers travelling to and from areas east of the corridor. Running time on the Route 7 alignment is 3.5 minutes longer than on the Access Road alignment.

Tables 6 through 9 present the distribution of boardings and alightings by station for the various market segments. It is expected that Reston will continue to have a stronger orientation toward Washington (Tables 7 and 7b) than other parts of the corridor. Approximately half the commuters bound for Washington and Northern Virginia board at the Reston station. Origins for travel within the corridor (Tables 8 and 8b) are more scattered, with one-third of the riders boarding at Reston, 21% at Herndon and 16% at West Falls Church. Over half the passengers travelling entirely within the Dulles Corridor on both alignments are bound for Tyson's. Travellers coming into the corridor from other parts of Northern Virginia and Washington (Tables 9 and 9b) are also travelling primarily to Tyson's. The large employment center projected at Reston Avenue is also a major destination for commuters travelling into the corridor.

Table 1:

Primary Data Sources Used in Developing Ridership Forecasts

Data	Sources
Current WMATA Ridership	o WMATA Bus Operations o 1984 MetroRail Survey o WMATA Office of Planning and Development
Current Dulles Limousine/ Airport Bus Ridership	o Federal Aviation Administration o Washington Flyer, Inc. o WashCOG, 1981-1982 Baltimore-Washington Regional Airport Survey
Work Trip Modal Splits	o 1980 U.S. Census Journey-to-Work Survey
Household Income	o 1980 U.S. Census of Population and Housing o Fairfax County Office of Research and Statistics
Population, Household and Employment Forecasts	o WashCOG Round III Forecasts o Revised Round III Forecasts prepared by Bellomo-McGee, Inc. in cooperation with: - Fairfax County Office of Comprehensive Planning - Fairfax County Office of Research and Statistics - Fairfax City Office of Planning - Falls Church Planning Department - Loudoun County Office of Planning and Zoning
Dulles Passenger Forecasts	o FAA Metropolitan Washington Airports Engineering Department

Table 2

Input Assumptions

Fare: $1.50 for all trips using the line between West Falls Church and Route 28 plus the WMATA zone fare for trips transferring at West Falls Church Station

$3.50 for all trips to and from Dulles

100% of potential fare revenue is collected

No fare discounts

Light Rail Service:

Time of day	Headway (Min.)	Cars/Train
6 a.m. - 9 a.m.	10	2
9 a.m. - 4 p.m.	12	2
4 p.m. - 7 p.m.	10	2
7 p.m. - 9 p.m.	12	2
9 p.m. - MID	15	2

Running Time (Inbound only shown)

Station	Running Time (Min.)	Mileage
West Falls Church		
Tyson's Corner	5	4
Hunter Mill Road	10	8
Reston	13.5	10.9
Herndon	16	13.5
Route 28	18.5	15
Dulles Terminal	21	16.5

Bus Feeders:

Station	Headway (Min.) Peak	Headway (Min.) Off-Peak
West Falls Church	Metrorail Transfer	
Tyson's Corner	20	24
Hunter Mill Road	10	24
Reston	10	24
Herndon	20	36
Route 28	--	--
Dulles Terminal	--	--

Table 2

Input Assumptions

(continued)

Bus System Modifications:

- WMATA express bus service from Reston and Herndon to Rosslyn, Pentagon/Crystal City and the District will cease operation.

- The portion of Line 5S (Herndon-Ballston) between Herndon and Tyson's Corner and the portion of Line 3 (USGS outbound express) between Tyson's Corner and Reston will cease operation.

- Feeder buses in Reston and Herndon will cover the same areas as served by the present express bus service, but with all day service.

- Arrivals at the Reston, Hunter Mill Road and Herndon LRT stations will be timed to facilitate direct transfers to the LRT system.

- Feeder buses in Tyson's Corner will serve all major destinations in the area, and this service will be timed to meet every other LRT trip.

Rail Transfer:

- A direct cross-platform transfer will be available between the LRT system and MetroRail at West Falls Church.

Parking:

The following number of parking spaces will be available for LRT line users:

- Tyson's Corner	300
- Hunter Mill Road	500
- Reston	800
- Herndon	600
- Route 28	800
Total	3,000

Table 2

Input Assumptions

(continued)

Annualization factors:

- o Annual ridership for non-airport passengers is 265 times daily ridership.
- o Annual ridership for airport passengers is 365 times daily ridership (airport forecasts are developed from annual passenger data).

TABLE 3
ACCESS ROAD ALIGNMENT

DULLES CORRIDOR STUDY
ANNUAL LRT RIDERSHIP AND REVENUE FORECASTS

YEAR	DAILY RIDERSHIP	ANNUAL RIDERSHIP	ANNUAL REVENUE
1990	10,763	2,950,731	$5,146,280
1991	11,099	3,049,064	$5,361,044
1992	11,435	3,147,397	$5,575,809
1993	11,771	3,245,729	$5,790,574
1994	12,108	3,344,062	$6,005,338
1995	12,444	3,442,394	$6,220,103
1996	12,780	3,540,727	$6,434,868
1997	13,117	3,639,060	$6,649,632
1998	13,453	3,737,392	$6,864,397
1999	13,789	3,835,725	$7,079,162
2000	14,126	3,934,058	$7,293,926
2001	14,368	4,007,572	$7,471,464
2002	14,611	4,081,087	$7,649,002
2003	14,853	4,154,602	$7,826,540
2004	15,096	4,228,117	$8,004,078
2005	15,339	4,301,632	$8,181,616
2006	15,581	4,375,147	$8,359,154
2007	15,824	4,448,661	$8,536,693
2008	16,067	4,522,176	$8,714,231
2009	16,309	4,595,691	$8,891,769
2010	16,552	4,669,206	$9,069,307

TABLE 3B
ROUTE 7 ALIGNMENT

DULLES CORRIDOR STUDY
ANNUAL LRT RIDERSHIP AND REVENUE FORECASTS

YEAR	DAILY RIDERSHIP	ANNUAL RIDERSHIP	ANNUAL REVENUE
1990	11,988	3,274,510	$5,624,021
1991	12,356	3,381,070	$5,850,386
1992	12,724	3,487,630	$6,076,752
1993	13,092	3,594,190	$6,303,117
1994	13,459	3,700,750	$6,529,483
1995	13,827	3,807,310	$6,755,848
1996	14,195	3,913,870	$6,982,214
1997	14,563	4,020,430	$7,208,579
1998	14,930	4,126,990	$7,434,945
1999	15,298	4,233,550	$7,661,310
2000	15,666	4,340,111	$7,887,676
2001	15,933	4,420,059	$8,074,124
2002	16,200	4,500,008	$8,260,573
2003	16,468	4,579,956	$8,447,021
2004	16,735	4,659,905	$8,633,469
2005	17,002	4,739,854	$8,819,918
2006	17,270	4,819,802	$9,006,366
2007	17,537	4,899,751	$9,192,815
2008	17,804	4,979,700	$9,379,263
2009	18,071	5,059,648	$9,565,711
2010	18,339	5,139,597	$9,752,160

TABLE 4
ACCESS CORRIDOR ALIGNMENT

DULLES CORRIDOR STUDY
RIDERSHIP AND REVENUE BY MARKET SEGMENT

MARKET SEGMENT	DAILY RIDERSHIP YEAR 2000	PERCENTAGE OF DAILY RIDERSHIP	PERCENTAGE OF ANNUAL REVENUE
AIRPORT PASSENGERS	1,908	13.5%	33.4%
NO. VIRIGINIA COMMUTERS	1,246	8.8%	6.8%
WASHINGTON COMMUTERS	5,576	39.5%	30.4%
COMMUTERS WITHIN CORRIDOR	2,436	17.2%	13.3%
COMMUTERS TO CORRIDOR	1,880	13.3%	10.2%
OFF-PEAK WITHIN CORRIDOR	610	4.3%	3.3%
OFF-PEAK TO CORRIDOR	470	3.3%	2.6%
	14,126	100.0%	100.0%

TABLE 4B
ROUTE 7 ALIGNMENT

DULLES CORRIDOR STUDY
RIDERSHIP AND REVENUE BY MARKET SEGMENT

MARKET SEGMENT	DAILY RIDERSHIP YEAR 2000	PERCENTAGE OF DAILY RIDERSHIP	PERCENTAGE OF ANNUAL REVENUE
AIRPORT PASSENGERS	1,887	12.0%	30.6%
NO. VIRIGINIA COMMUTERS	1,276	8.1%	6.4%
WASHINGTON COMMUTERS	5,708	36.4%	28.7%
COMMUTERS WITHIN CORRIDOR	2,534	16.2%	12.8%
COMMUTERS TO CORRIDOR	2,152	13.7%	10.8%
OFF-PEAK WITHIN CORRIDOR	1,140	7.3%	5.7%
OFF-PEAK TO CORRIDOR	968	6.2%	4.9%
	15,666	100.0%	100.0%

TABLE 5

ACCESS MODE TO LRT STATIONS

ACCESS MODE TO DULLES LRT STATIONS
ACCESS ROAD ALIGNMENT

STATION	WALK PCT	BUS PCT	AUTO PCT
1 DULLES	100.0%	0.0%	0.0%
2 ROUTE 28	0.0%	0.0%	100.0%
3 HERNDON	9.1%	29.9%	61.0%
4 RESTON	4.7%	32.8%	62.4%
5 HUNTER	12.9%	31.9%	55.2%
6 TYSONS	3.3%	32.8%	63.9%
7 W. FALLS	12.7%	40.6%	46.7%

ACCESS MODE TO DULLES LRT STATIONS
ROUTE 7 ALIGNMENT

STATION	WALK PCT	BUS PCT	AUTO PCT
1 DULLES	100.0%	0.0%	0.0%
2 ROUTE 28	0.0%	0.0%	100.0%
3 HERNDON	9.1%	30.0%	60.9%
4 RESTON	4.7%	32.8%	62.4%
5 HUNTER	12.8%	31.8%	55.4%
6 TYSONS	16.2%	28.4%	55.4%
7 W. FALLS	12.9%	40.5%	46.7%

TABLE 6
ACCESS ROAD ALIGNMENT

DULLES CORRIDOR STUDY
ANNUAL LRT AIRPORT RIDERSHIP AND REVENUE FORECASTS

YEAR	DAILY RIDERSHIP	ANNUAL RIDERSHIP	ANNUAL REVENUE
1990	987	360,091	$1,260,319
1991	1,079	393,724	$1,378,034
1992	1,171	427,357	$1,495,749
1993	1,263	460,990	$1,613,464
1994	1,355	494,623	$1,731,179
1995	1,447	528,256	$1,848,895
1996	1,539	561,888	$1,966,610
1997	1,632	595,521	$2,084,325
1998	1,724	629,154	$2,202,040
1999	1,816	662,787	$2,319,755
2000	1,908	696,420	$2,437,470
2001	2,000	730,053	$2,555,185
2002	2,092	763,686	$2,672,900
2003	2,184	797,319	$2,790,615
2004	2,277	830,952	$2,908,330
2005	2,369	864,584	$3,026,045
2006	2,461	898,217	$3,143,761
2007	2,553	931,850	$3,261,476
2008	2,645	965,483	$3,379,191
2009	2,737	999,116	$3,496,906
2010	2,829	1,032,749	$3,614,621

TABLE 6B

ROUTE 7 ALIGNMENT

DULLES CORRIDOR STUDY

ANNUAL LRT AIRPORT RIDERSHIP AND REVENUE FORECASTS

YEAR	DAILY RIDERSHIP	ANNUAL RIDERSHIP	ANNUAL REVENUE
1990	976	356,128	$1,246,448
1991	1,067	389,391	$1,362,867
1992	1,158	422,653	$1,479,287
1993	1,249	455,916	$1,595,706
1994	1,340	489,179	$1,712,126
1995	1,431	522,441	$1,828,545
1996	1,522	555,704	$1,944,965
1997	1,614	588,967	$2,061,384
1998	1,705	622,230	$2,177,804
1999	1,796	655,492	$2,294,223
2000	1,887	688,755	$2,410,643
2001	1,978	722,018	$2,527,062
2002	2,069	755,280	$2,643,481
2003	2,160	788,543	$2,759,901
2004	2,252	821,806	$2,876,320
2005	2,343	855,069	$2,992,740
2006	2,434	888,331	$3,109,159
2007	2,525	921,594	$3,225,579
2008	2,616	954,857	$3,341,998
2009	2,707	988,119	$3,458,418
2010	2,798	1,021,382	$3,574,837

TABLE 2-6
ACCESS ROAD ALIGNMENT

ORIGINS OF COMMUTERS FROM DULLES CORRIDOR TO DC AND NORTHERN VIRGINIA	
STATION	PCT. OF BOARDING PASSENGERS
1 DULLES	0.0%
2 ROUTE 28	8.9%
3 HERNDON	19.5%
4 RESTON	51.2%
5 HUNTER	11.6%
6 TYSONS	8.7%
	100.0%

TABLE 7B
ROUTE 7 ALIGNMENT

ORIGINS OF COMMUTERS FROM DULLES CORRIDOR
TO DC AND NORTHERN VIRGINIA

STATION	PCT. OF BOARDING PASSENGERS
1 DULLES	0.0%
2 ROUTE 28	8.7%
3 HERNDON	19.1%
4 RESTON	50.0%
5 HUNTER	11.4%
6 TYSONS	10.9%
	100.0%

TABLE 8
ACCESS ROAD ALIGNMENT

ORIGINS AND DESTINATIONS OF LRT COMMUTERS
TRAVELLING ENTIRELY WITHIN DULLES CORRIDOR

STATION	PCT. OF BOARDING PASSENGERS	PCT. OF ALIGHTING PASSENGERS
1 DULLES	0.0%	3.7%
2 ROUTE 28	12.0%	3.1%
3 HERNDON	21.0%	14.2%
4 RESTON	34.0%	19.3%
5 HUNTER	10.7%	2.1%
6 TYSONS	6.2%	51.6%
7 W. FALLS	16.2%	6.1%
	100.0%	100.0%

TABLE 8B
ROUTE 7 ALIGNMENT

ORIGINS AND DESTINATIONS OF LRT COMMUTERS
TRAVELLING ENTIRELY WITHIN DULLES CORRIDOR

STATION	PCT. OF BOARDING PASSENGERS	PCT. OF ALIGHTING PASSENGERS
1 DULLES	0.0%	3.6%
2 ROUTE 28	11.7%	3.0%
3 HERNDON	20.9%	13.5%
4 RESTON	34.1%	18.8%
5 HUNTER	10.6%	2.0%
6 TYSONS	6.2%	53.3%
7 W. FALLS	16.6%	5.8%
	100.0%	100.0%

TABLE 9
ACCESS ROAD ALTERNATIVE

DESTINATIONS OF LRT COMMUTERS
TRAVELLING FROM DC AND N. VA TO THE DULLES CORRIDOR

STATION	PCT OF ALIGHTING PASSENGERS
1 DULLES	1.4%
2 ROUTE 28	2.4%
3 HERNDON	8.3%
4 RESTON	34.4%
5 HUNTER	3.3%
6 TYSONS	50.2%
7 W. FALLS	0.0%
	100.0%

TABLE 9B
ROUTE 7 ALTERNATIVE

DESTINATIONS OF LRT COMMUTERS
TRAVELLING FROM DC AND N. VA TO THE DULLES CORRIDOR

STATION	PCT OF ALIGHTING PASSENGERS
1 DULLES	1.2%
2 ROUTE 28	2.1%
3 HERNDON	7.2%
4 RESTON	30.0%
5 HUNTER	2.9%
6 TYSONS	56.5%
7 W. FALLS	0.0%
	100.0%

TABLE 9B
ROUTE 7 ALTERNATIVE

DESTINATIONS OF LRT COMMUTERS
TRAVELLING FROM DC AND N. VA TO THE DULLES CORRIDOR

STATION	PCT OF ALIGHTING PASSENGERS
1 DULLES	1.2%
2 ROUTE 28	2.1%
3 HERNDON	7.2%
4 RESTON	30.0%
5 HUNTER	2.9%
6 TYSONS	56.5%
7 W. FALLS	0.0%
	100.0%

Existing Travel patterns in the Corridor

An understanding of existing travel patterns in the Dulles Corridor provides a context for understanding the forecasts presented in the previous section, as well as aids in the design of the proposed LRT system. The Dulles corridor is typical in many ways of fast-growing suburban areas. Residential development consists primarily of single-family homes and commercial and office development and is low-density in nature. The corridor is characterized by an affluent population and a rapidly growing employment base consisting primarily of service and high-technology firms. Transit service in the corridor is very limited, with the exception of peak-period service between Reston and Washington. Travel patterns throughout the corridor are overwhelmingly auto-oriented. There are several unique characteristics of the corridor, however, which have created an interest among private developers in fixed-rail transit:

- Projected rapid growth in the corridor of 86% in employment and 20% in population over the next 15 years

- The presence of a rapidly-growing planned community, Reston, which is strongly-oriented toward Washington

- The presence of Tyson's Corner, the largest suburban employment center in the Washington area, which is projected to have 80,000 employees in the year 2000

- The availability of a transit right-of-way in the middle of the Dulles Access Road

Travel patterns are therefore likely to change if the rapid growth projected for the corridor does materialize. However, the description of current travel patterns which follows is helpful in understanding the potential for transit service.

The most recent survey of travel movements in the Dulles Corridor is the 1980 U.S. Census journey-to-work survey. At that time, approximately 16,000 corridor residents were employed in Washington, 6,500 in the major employment centers of Northern Virginia (Rosslyn, Pentagon, Crystal City) and 27,000 in the corridor itself. Approximately 20% of the Washington commuters reported using transit in 1980, while 40% drove alone and 40% carpooled.

Reston has the highest level of transit service and ridership of any area in the corridor. (It accounted for 55% of non airport originating corridor transit ridership to Washington in 1980). WMATA currently serves Reston with 44 peak-hour buses to Washington and Northern

Virginia. Five different routes are run within Reston but all buses pass through the commuter parking lot at Wiehle Avenue before beginning their express trip on the Dulles Access Road and I-66 to Washington or Northern Virginia. In addition, there is limited bus service available within Reston itself.

WMATA bus ridership counts from 1985 indicate that bus ridership from Reston has declined in absolute terms by approximately 30% from the 1980 level reported in the Census. Part of the reason may be a shift in employment destinations from Washington to the faster-growing centers in the corridor such as Tyson's Corner, Reston and Route 28. A more likely reason, however, is that the construction of the Dulles Toll Road and the opening of the I-66 extension to three-person carpools has made carpooling a more attractive option to commuters.

Bus service is considerably less frequent from other parts of the corridor than from Reston. Herndon, for example, has three WMATA one-way express bus runs to Washington daily while the Sterling Park area of Loudoun County is served by three privately-operated bus runs to Washington. Local service within the corridor is very limited, with one route (5S) connecting Herndon, Reston, and Tyson's Corner via Route 7. Several routes terminate at Tyson's Corner. One is an express bus route to Washington while the others provide access to Tyson's Corner from different areas of Northern Virginia. Present WMATA bus service in the corridor is summarized in Table 1.

With the exception of peak-period work trips to Washington and the major employment centers of Northern Virginia, transit usage in the corridor is very limited. 1980 Census figures indicate that between 1% and 2% of all work trips entirely within the corridor are made by transit. Trips from outside the corridor into the major employment center of Tyson's Corner show a similar mode split of 1-2%. From certain areas with good bus service to Tyson's however, transit mode splits run as high as 7%. Transit ridership to corridor employment centers other than Tyson's Corner, is virtually non-existent. Table 2 summarizes 1980 U.S. Census journey-to-work modal splits from the Dulles Corridor and other areas of Northern Virginia to relevant destinations for this study.

TABLE 1

1985 WMATA BUS ROUTES SERVING DULLES RAIL CORRIDOR

		DAILY A.M. PEAK-PERIOD BUS RIDERSHIP THAT COULD BE POTENTIALLY DIVERTED TO THE PROPOSED LIGHT RAIL LINE		
		EASTBOUND	WESTBOUND	TOTAL
5Y	HERNDON EXPRESS Express service from Herndon and Reston to D.C.	76		76
5A-F	RESTON EXPRESS Express service from Reston commuter parking lot to Rosslyn, Pentagon, Crystal City and D.C.	1062		1062
	HERNDON-BALLSTON LINE Herndon and Reston to Tysons Corner and Ballstonvia Route 7	241	247	488
5Z	TYSONS CORNER EXPRESS Express service from Tysons Corner to D.C. via I-66	247		247
5W/5K	CHAIN BRIDGE ROAD LINE Tysons Corner to Rosslyn and D.C. via Chain Bridge Road	65	57	122
3Z/3A/3B	LEE HIGHWAY LINE Tysons Corner to Ballston and Rosslyn via Route 7 and Lee Highway	20	51	71
3X	LEE HIGHWAY LINE Rosslyn and Ballston to Tysons Corner and Reston (U.S.G.S.) via Lee Highway and Route 7		26	26
2C	WASHINGTON BOULEVARD LINE Tysons Corner to Ballston via Washington Boulevard	13	49	62
2X	TYSONS CORNER-OAKTON EXPRESS LINE Tysons Corner to Ballston and Pentagon via Nutley Street and I-66	89		89
TOTAL RIDERSHIP POTENTIALLY DIVERTABLE		1813	430	2243

SOURCES: WMATA BUS ROUTE SCHEDULES AND RIDE CHECK COUNTS, 1985.

TABLE 2

1980 U.S. JOURNEY-TO-WORK MODE SPLITS TO/FROM NORTHERN VIRGINIA SUBURBS

FROM	TO	PERCENT TRANSIT	PERCENT CARPOOL
Dulles Corridor	Reston	1.5%	12.7%
Dulles Corridor	Tysons Corner	2.3%	17.5%
Fairfax County Excluding Dulles Corridor	Tysons Corner	2.1%	14.2%
Arlington/Alexandria	Tysons Corner	7.4%	18.8%
Northern Virginia	Fairfax City	0.6%	14.1%
Northern Virginia	Annandale	1.6%	16.8%
Northern Virginia	7 Corners	3.9%	17.7%
Northern Virginia	Downtown Alexandria	7.9%	19.5%
Dulles Corridor	Crystal City	6.8%	32.2%
Fairfax County Excluding Dulles Corridor	Crystal City	8.1%	38.6%
Dulles Corridor	Rosslyn	10.9%	24.2%
Fairfax County Excluding Dulles Corridor	Rosslyn	18.0%	25.6%
Dulles Corridor	Pentagon	18.5%	40.2%
Fairfax County Excluding Dulles Corridor	Pentagon	21.8%	41.3%
Arlington/Alexandria	Pentagon	29.4%	17.8%
Dulles Corridor	Downtown D.C.	20.5%	39.4%
Central Fairfax Outside Beltway	Downtown D.C.	23.2%	47.3%
Central Fairfax Inside Beltway	Downtown D.C.	27.7%	40.3%
Southern Fairfax	Downtown D.C.	21.5%	42.3%
Arlington	Downtown D.C.	44.9%	23.5%
Alexandria	Downtown D.C.	34.5%	29.8%

SOURCE: 1980 U.S. CENSUS JOURNEY-TO-WORK SURVEY. WashCOG UTPP FILE 4a.

Dulles Airport Travel Trends and Forecasts

During the past two years, Dulles Airport has experienced a rapid increase in air passenger travel. Total passenger movements at the airport increased from 2.1 million in 1982 to 2.9 million in 1983 to 3.5 million in 1984. Total passenger travel is expected to be over 4 million in 1985. The Federal Aviation Administration, which runs both National and Dulles Airports, has attempted to promote greater use of Dulles ever since its opening in 1962. National Airport, however, still serves the overwhelming majority of Washington area air passenger. Despite curfew restrictions and restrictions on jumbo jets, National served 14.6 million passengers in 1984, just under its legal limit of 15 million. The proximity of Washington National to the center of the city, and its excellent and inexpensive access by taxi and transit, continue to attract most area air passengers.

The FAA Metropolitan Washington Airports engineering staff projects that 15.2 million passengers will use Dulles in the year 2000, a fourfold increase in fifteen years. There are a number of reasons why this growth at Dulles anticipated:

- The FAA is assuming in its planning work that the 15 million passenger cap at National will hold. Because National is currently just under this limit, all area air travel growth will have to occur at either Dulles or BWI. If the airport transfer legislation is passed, the cap would be eliminated and all airports could grow in terms of usage.

- A 1981-82 survey of the three area airports indicated that Dulles would experience a net gain of one million passengers if travellers could use their "preferred airport. Because of the limited number and selection of flights at Dulles, many passengers who live near Dulles are forced to use National.

- Population and employment have grown rapidly in the Dulles Corridor and this growth is projected to continue. Much of this growth consists of high-income residential development and high-technology employment. These activities are likely to generate a large number of air travellers. Much lower rates of growth are projected in areas near National.

- More airlines are using hub-and-spoke systems to improve operational efficiency. Dulles is apparently more attractive now as a hub than National since it attracted three airline hub operations during 1985; New York Air, Pan American and Presidential. Many passengers using the hub airlines will only change planes and thus do not require ground transportation.

The availability and selection of flights for Washington area passengers will be greatly improved, however.

Ground transportation to Dulles is primarily by automobile. Table 1 shows the breakdown of Dulles access modes from the 1981-1982 regional air passenger survey. Limousine service is provided by Washington Flyer, Inc. to Dulles from National and major hotesl through the region. Fares are $10 for most trips, but are slighlty higher for more remote points. The number of daily limousine trips has remained steady since the 1981-1982 survey at approximately 550 per day. Other than the Washington Flyer Service there is no scheduled public transportation serving Dulles.

II. PARAMETERS OF DEVELOPMENT

A. Permissible Transit Technology

The materials, equipment, components and systems to be employed on this transit system will in every case have been proven safe and reliable on other operating transit systems. Respondents will indicate, by reference to prior use, the basis for each such judgment. In similar manner, each design/construction/installation practice or technique will have been proved previously as well.

Specification of Technological Requirements

Throughout the design and construction of this transit system, respondents shall maintain smooth vertical and horizontal alignments with gradual transitions to instill confidence in patrons and provide a safe, comfortable ride. Guideway alignment should generally follow the DAAR centerline alignment and remain within the median at all times. Deviations from the median centerline alignment will be allowed to enhance the comfort of the ride.

The design alignment shall support a maximum train speed of 70 mph where the DAAR median and bridges will permit. Lower speeds are to be expected at constraints, such as overhead bridges, and shall be identified in the design. Designers shall provide indications of the dynamic envelope of vehicles at each such constraint.

System alignment may vary from the median centerline at each proposed station in order that stations will be on tangent sections of track with vertical slope no greater than ____. Stations shall have high-level platforms, as indicated on Figure __, to be compatible with Metrorail vehicles.

The system shall be sufficiently reliable that no patron is required to wait longer than 15 minutes for a vehicle to arrive headed toward the correct destination. This criterion shall be applied to the location of track crossovers and the provision and location of spare vehicles. Traction power, signals and communications systems shall provide sufficient redundancy to support continued, safe operation in the event that the primary systems are interrupted.

Typical system characteristics and station dimensioning are the design criteria standards to be observed throughout the project unless prior written approval for an exception is obtained in each case.

System track design, signaling and communication will provide the required safety to support operation of trains on five-minute headways without diminished speed. Signaling will be designed to protect stopped trains in stations and on the mainline tracks.

In no instance shall the DAAR median be either excavated or filled in such a way as to imperil the Access Road itself; and the FAA shall be the sole judge of that condition. Any designs for retained cut or fill shall be submitted for FAA approval before they can be issued as construction directives.

Stations and station parking areas shall be equipped with standby illumination, in addition to normal light fixtures, and telephones.

Identification of Acceptable Technologies

The Light Rail Transit (LRT) is the guideway option deemed appropriate for the physical situation and the surroundings. The techniques and technologies proven in many LRT systems should be considered for this application to capitalize on the proven manufacturing and servicing capabilities and to take advantage of the generous supply of skilled personnel.

The reliability required of this system suggests that simplicity should be guiding principle throughout. Unnecessary complexity and the sophistication of unproven concepts should be avoided.

All electronic devices shall be solid state and modular in nature, allowing for plug-in circuit boards for routine replacements.

All standards required by the Commonwealth of Virginia shall be compiled with. Where not otherwise specified, this system should be compatible with Metro vehicles.

Communications shall be line-of-sight radio for vehicles with battery powered back-up. Stations shall be connected by a dedicated telephone line.

DULLES INTERNATIONAL AIRPORT
MODE OF ACCESS - 1981/1982

AUTOMOBILE		
PARKED	23.0%	
DROPPED OF	41.3%	
RENTAL CAR	15.6%	
TOTAL AUTO	79.9%	
TAXI		11.8%
PUBLIC BUS		0.9%
AIRPORT BUS/LIMOUSINE		6.3%
HOTEL/MOTEL CAR		1.1%
		100.0%

SOURCE: WASHINGTON-BALTIMORE REGIONAL AIR PASSENGER SURVEY, METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS, WASHINGTON, D.C., SEPTEMBER,1982.

A simple graphic train control board shall provide continuous identification of occupied track circuits. A collocated power control shall indicate energized traction power circuits.

B. Operating Performance Standards

The central business district of Washington, D.C. is approximately 26 miles from Dulles Airport. The District believes that rail transit between the two points should be frequent and swift. Preferences will be given to those developers who propose systems that complete the trip in an hour or less, including station dwell time and a system transfer at West Falls Church and who propose frequent trips to prevent a buildup of waiting travelers. The feasibility study (which is available from the District) indicated that the trip will be achievable in an hour or less if the guideway and vehicle selected support a maximum speed of up to 70 mph. Moreover, preference will be given to Developers who structure their service plans to be compatible with Metrorail peak rush hour schedules.

C. Joint Real Estate Development

The District may implement mechanisms to capture a sufficiently large and secure portion of these revenues to generate the service fee to be paid to the Developer. The component governments do not intend to make payments to the District from their existing tax revenues to support the construction and operation of the rail system. It is the District's intent to derive the revenues necessary to support the system from revenues captured from non-user beneficiaries.

D. Legal and Regulatory Constraints

Respondents will be required to comply with all applicable federal, state and local laws and regulations that impact upon their development plans for the Project. Respondents may wish to review the memorandum prepared by Baskins & Steingut prepared as part of the feasibility study on the institutional constraints that should be addressed. <u>Respondents are cautioned not to rely on this information, as it is provided for illustrative purposes only</u>.

III. PROJECT DEVELOPMENT STRUCTURE

A. Ownership Alternatives

It is the intention of the District to enter into a joint public/private co-venture with a development corporation to build and operate a transit system in the Dulles Corridor. In return for the payment of a service fee, the District will expect the Developer to own and operate the system under a Full Service Contract.

The initial preference of the District is for the Developer to be a corporate entity that will build and own the System from the onset of construction through the end of the Operating Agreement. The District preference for such ownership structure is based upon its desire to have one easily identifiable contract party throughout the life of the Agreement for the purpose of accountability, consistency and continuity. Preference will be given to those respondents ownership proposed.

Respondents are free to propose an ownership structure of their choosing (including a 100% vendor owned facility, a tax-advantaged leveraged lease, or a limited partnership) provided that the structure meets the following standards: (1) it must involve a minimum at risk equity contribution at least sufficient to qualify for federal tax ownership of the facility, and (2) the Developer must have sufficient assets or other forms of support to assure the efficacy of the cost, construction and performance guarantees required by the RFP.

Respondents are required to specify in detail the ownership structure which is proposed. The proposal must identify the corporate or partnership entity with whom the District will contract and the relationship between this entity and its owners/parents.

B. Allocation of Risks

Respondents are asked to assume the full measure of risk properly associated with their ownership and operating responsibilities. Each proposal should demonstrate the respondent's willingness and capability to assume those risks outlined in the following sections relating to the construction and operating contracts.

It is the intention of the District to transfer to the Developer as much operating risk as is practically feasible. The District believes the Developer will be in a better position to manage risk, and will have a more clearly defined economic interest in controlling risk, than would a public manager of the Project.

One of the principal advantages of private ownership identified in the Dulles Feasibility Report is the ability to control cost overruns and schedule delays that have plagued publicly sponsored transit developments. For this reason private ownership is being considered for this project. Consequently, respondents must be aware that the District is seeking proposals wherein the private Developer can guarantee a fixed price development, timely completion, and assumption of technical feasibility.

Preference will be given to the proposals which clearly demonstrate the economic capacity to stand behind the cost and performance guarantees anticipated in this RFP. Evidence of commitment to provide construction bonds, efficacy insurance, standby letters of credit, or other performance obligations from nationally recognized financial intermediaries is sought and will weigh heavily in the evaluation of proposals under this RFP.

C. Requirements of the Construction Contract

Respondents are asked to bid a fixed price turnkey construction price to construct the System as proposed. At a minimum, the contract will provide for a fixed completion schedule and strict performance standards for acceptance. The Contractor will be required to provide unconditional and unlimited performance guarantees backed by surety bonds from a nationally recognized financial intermediary with respect to completion of the System through satisfactory acceptance testing.

Increases in construction costs are the responsibility of the Developer, except insofar as they relate to design modifications made at the request of the District after the final engineering design has been approved by all the appropriate authorities, including a final approval by the District. Design modifications imposed by federal or state authorities after approval of final engineering plans are to be assumed by the Developer as part of its assumption of the risk of adverse changes in federal or state law. Penalties for the failure to deliver the System and meeting acceptance standards on schedule will be imposed. These penalties will be calculated to offset the additional costs of financing and other costs reasonably incurred as a result of the Developer's breach.

D. Minimum Standards for Operating Agreement

The District will require that the selected Developer take full responsibility for the operation and maintenance of the system, including but not limited to suppliers, concessionaires, labor contracts, equipment repairs and regular upkeep of the rail bed and stations, materials and power. The District will require that the operations of the system meet certain defined performance standards as measured from time-to-time by the District. The District expects that the operating agreement should be for a term not less than 10 years. A material failure to meet these standards will result in a decrease in, or complete cessation of, payment of the service fee.

Respondents are asked to bid and guarantee a fixed price operations and maintenance contract to begin from acceptance to the termination of the Agreement, subject only to adjustments for inflation as measured by an appropriate index. The selected Developer will be required to provide a surety or another form of financial guarantee of one year's estimated operations and maintenance expense upon completion and acceptance. The surety will serve as a reserve fund to be drawn upon only in the event of Developer defaults under this Agreement.

The Operating Agreement anticipated by this RFP will expressly identify the responsibilities of the public and private partners, to include at least the following items:

<u>Responsibilities of District</u>

(i) obligation to receive transit service;

(ii) Commitment to pay service fee to Developer; and

(iii) District to monitor performance and compliance with service standards.

<u>Responsibilities of Developer</u>

(i) maintain facility;

(ii) provide service at minimum performance standard; and

(iii) provide payment for financial obligations.

E. Acceptable Financing Alternatives

The District has an initial preference for a corporate owner providing financing with equity of at least 25% of total costs and debt financing provided through the issuance of tax exempt Industrial Development Bonds backed by the Developer with the full guarantee (or its functional equivalent provided by an acceptable financial intermediary of its owner/parents.

The District will consider project financing alternatives based upon either a tax advantaged lease or a limited partnership wherein the tax benefits are sold or transferred to third party investors.

Preference will be given to respondents that propose to acquire and retain ownership of the System through the life of the Agreement. Preference will also be given to respondents that propose to inject equity at the beginning of the construction period, as opposed to purchasing the equity interest upon completion and acceptance.

While the District appreciates and understands innovative financing alternatives, respondents are encouraged to use the necessary graphics and descriptive material to facilitate a clear and concise presentation. In addition, preference will be shown to respondents that certify the availability of the sources of capital required and the terms and conditions necessary to the financing proposed. Respondents will also be required to discuss in detail the impact of the use of taxable debt on the proposed financing structure in the event that tax exempt Industrial Development Bonds are eliminated by pending federal tax legislation.

F. Payment of Service Fees

The initial projections by the District on the financial feasibility of the System indicate that fare revenues will not be sufficient to pay for operations and maintenance in the early years. The feasibility study proposes that additional revenues be identified to pay for the balance of operations and maintenance not covered by fare revenues, and to capital costs and provide a reasonable return to the equity investor(s). This fee, designated as the Service Fee, will be comprised of revenues from various sources as indicated in the above section in Joint Real Estate Development will be collected and paid by the District to the Developer on a semi-annual basis.

The financial feasibility study identified a number of non-use beneficiaries of the system and the District has or will adopt measures to capture the incremental value of these benefits in order to generate revenue for the operation of the System. These revenues may include but need not be limited to special tax districts comprised of property owners with holdings contiguous to the rail line. It should be noted that the component governments have clearly indicated that they will not contribute revenues from existing tax sources to the payment of the Service Fee. All revenues necessary for the District to pay the Service Fee will be generated from value capture methods directed at non-user beneficiaries. The District has independently assessed the amount collectibility and credit worthiness of these revenues and will covenant that these revenues are sufficient to pay anticipated Service Fees during the life of the Operating Agreement.

The District will guarantee the payment of a Service Fee sufficient to pay (after collection of direct project revenues) a part of operations and maintenance, and capital costs, contingent upon full and satisfactory performance by the Developer of its responsibilities to construct the System and operate it as prescribed by the Operating Agreement.

IV. PROPOSAL FORMAT & CONTENTS

Proposals must be submitted in the format outlined in this section. Each part of the proposal must be completed in full. The District reserves the right to eliminate from further consideration any proposal deemed to be substantially or materially unresponsive to the request for information contained herein. Clarity and directness in the responses will be valued.

Proposals must be structured to include the following sections:

A. Summary of Proposal

Section A of the proposal should contain a brief summary of the respondent's overall approach to the development of the transit system. This section should highlight those aspects of the proposal (such as strong and enforceable cost and performance guarantees) the respondent believes to be particularly advantageous to the District.

B. Background and Qualifications of Respondents

Section B of the Proposal should contain the following information about the Respondent and any sub-contractors or joint venture partners with which the Respondent intends to work. This information should be substantially the same as that provided in the RFQ. Differences or changes should be brought to the attention of the District immediately and in all cases before final submission.

1. Description of the Company or Corporation making the proposal. This sub-section must include:

   (a) the identity of the principal Developer and each sub-contractor or partner;

   (b) a description of the respective responsibilities of each member of the team;

   (c) the identity of the lead personnel from each firm comprising the development team;

   (d) resumes for the management personnel listed above; and

(e) the name, address and phone number of the principal contact person regarding this RFQ.

2. Audited financial statements for the most recent three fiscal years for the Respondent and each sub-contractor.

3. Prior relevant work experience. This section should highlight prior transit experience both as contractor and owner/operator.

4. Prior experience as construction contractor and/or operator in providing timely performance with strong completion and operating guarantees on major public works projects.

5. History of service contract relationships. This section should cover prior cases where the developer owned and operated services under a contract with a public agency. The nature of the service and the terms of the operating agreement should be discussed in detail.

6. Financial resources available for the project. This section must identify the corporate financial resources the respondent has available to support development of this Project. Support may take the form of either direct contributions or assets available to pledge towards performance guarantees.

7. References. Each Respondent must provide references of other clients for whom they have worked in similar capacities as proposed herein.

C. Technical Proposal

Section C of the Proposal should contain the technical specifications for the transit system the Respondent proposes to develop. Section C must contain the following minimum level of detail:

1. Preliminary design of the transit system to include working drawings specifically showing:

   (a) the primary technology of the selected mode;

   (b) the configuration of the track and any aerial structures;

   (c) the design of the vehicles and the required sources of power;

   (d) the conceptual plan for, and locations of, any mid point stations;

(e) the system alignment and required easements and/or right-of-ways;

(f) the design speed of the system;

(g) evidence of compliance with all technical specifications required by Section IIB of this RFP; and

(h) documentation of the proven "commercial feasibility" of the proposed technology and the location of the nearest similar facility in full commercial operation.

2. Detailed cost information concerning the proposed transit development including:

   (a) a breakdown of the respondents projected budget for construction of the facility showing costs for design, equipment, labor, overhead, insurance, interest during construction and contingency funds;

   (b) the cost and estimated useful lives of major items of equipment; and

3. Proposed terms of the construction contract to include at a minimum:

   (a) the nature of price protection the respondent is willing to grant the District, specifically to include whether the respondent will guarantee a maximum fixed price;

   (b) the construction time table and the level of performance guarantees the respondent will offer the agency for timely completion including whether the respondent will accept full financial responsibility for any financial obligation outstanding after the full utilization of any capitalized interest and prior to the acceptance of the facility for full commercial operation;

   (c) the level of performance guarantee the respondent will offer the District and the nature of the acceptance testing procedures the respondent intends to comply with;

   (d) the nature of any insurance, surety or construction bond, or pledge of corporate resources the respondent will make available to secure any performance or cost guarantees made under the terms of the construction contract anticipated by this Section; and

(e) a specific list of any technical or construction risks that the District will be asked to bear, including but not limited to:

(i) technology performance,
(ii) system reliability,
(iii) environmental and regulatory compliance,
(iv) acceptance of faulty workmanship,
(v) contractor default,
(vi) cost overruns,
(vii) force majeure,
(viii) project completion delay,
(ix) labor unrest, or
(x) inflation.

4. Proposed terms of the operating agreement including;

(a) the operating service plan identifying hours of service, headways, average trip lengths, number of trains, and system capacity;

(b) estimated patronage;

(c) proposed fare structure;

(d) guarantees of system performance;

(e) period of time respondent is willing to guarantee the level of operating expenses;

(f) proposed methodology of adjusting service fee to reflect higher operating costs;

(g) procedures for preventive maintenance to be performed by the respondent to ensure the integrity of the facility;

(h) method of accumulating a replacement and repair fund;

(i) suggested audit and control procedures for the oversight of the system by the District;

(j) identification of operating risks to be borne by the District; and

(k) evidence that operating agreement meets the conditions of the Federal Revenue Code such that the ownership of the facility by the respondent is not jeopardized.

D. Business and Financial Proposal

Section D should contain the basic financial terms under which the respondent proposes to build and operate the facility. This Section must contain the following elements:

1. Identification of all parties involved in any capacity with the financing of the facility and a description of the role of each party to the transaction.

2. A description of the contractual relationship of each party, including the term of each agreement and the financial obligation of the parties thereunder.

3. The respondent's strategy for minimizing the degree of risk assumed by the District (including any cost, construction, performance, or other warranties or guarantees to be provided for the District).

4. A detailed capital financing plan for the project including:

   (a) the ownership structure the respondent proposes to utilize to fully capture the available Federal and State tax benefits associated with the development of the facility;

   (b) a binding letter of commitment from each source of financing indicating (i) that the financing described in the proposal will be available at the rates and terms and within the timeframe indicated and (ii) stating that the financing entity has read this RFP and the respondent's proposal and is aware of the terms, requirements and conditions of each;

   (c) any contingencies that must be met in order to obtain such financing;

   (d) if any debt financing is involved, the percentage of total project cost to be financed with debt, the anticipated interest rate, and the term of the loan;

   (e) indication of the availability or intended use of any vendor financing or foreign supplier credits;

   (f) a commitment from the respondent as to the level and timing of anticipated equity contributions, and the proposed security if the equity will not be contributed during the construction period;

(g) the required internal rate of return the respondent will require on the equity contribution to the project;

(h) the aggregate principal amount of tax-exempt Industrial Development Bonds the District will be asked to issue on behalf of the respondent, and whether or not the respondent will pledge its corporate credit to the repayment of such obligations;

(i) any public guarantees required in association with payment of debt service on bonded indebtedness;

(j) the intention of the respondents to apply for any governmental grants and the nature and source thereof;

(k) the nature of any required reserve or contingency funds; and

5. A description of the respondent's tax position with respect to the project including;

   (a) any federal, state and/or local tax benefits the respondent expects to claim in connection with its investment,

   (b) the legal basis for taking such tax benefits (including the respondents strategy for complying with the service contract provisions of the Tax Reform Act of 1984).

   (c) the level of indemnification (if any) required by the respondent of the District from the effects of changes in the tax law subsequent to signing the Operating Agreement.

6. The level of service fees the District must commit to provide to the respondent in return for the provision of transit service identified in Section IIB. The frequency and manner of adjustment must also be specified. In addition, to the extent this appropriation must be guaranteed by parties other than the District, the nature of the secondary pledge must be identified.

7. Based on the responses to this Section, respondents must provide a detailed cash flow analysis (consistent with the methodology set forth in the

feasibility study) covering the construction period of the project plus 25 years of operations. Respondents may also provide additional financial analyses, based on other assumptions or parameters, but must clearly provide the reasoning for utilizing alternative assumptions. At a minimum a specific schedule of sources and uses of funds must be provided and a detailed flow of funds diagram must be prepared to highlight the contractual relationships between the parties to any financing.

E. Legal Aspects of the Proposal

Section E must identify the principal legal relationships among the parties to the proposed development, including:

(a) All legal agreements and documents anticipated by this RFP and the respondents proposal must be identified and their respective terms summarized;

(b) a description of each circumstance under which the respondent or any of the parties identified in the proposal could or would have the right to fail to perform as described in the proposal must be identified, and

(c) an outline must be provided stating the responsibilities and duties which the District will be asked to accept under the terms of the proposal.

F. Schedule for Project Completion

Proposals must include a full and complete project development schedule including construction timetable and a proposed date for full commercial operation. The schedule may anticipate a selection process as outlined in Section VII of this RFP.

G. Associated Joint Development

Section G should contain the respondent's proposal for joint development projects to be built in conjunction with the mass transit system. Section G of the proposal must contain the following information:

(1) Project Development - The respondent must provide preliminary design drawings to show the conceptual plan for all proposed joint development projects. The plan must indicate the identified parcels under his control which are to be utilized, and their intended use.

(2) Zoning/Land Use - The proposal must comply with existing zoning and land use statutes. The component jurisdictions do not intend to grant variances outside their respective Master Development Plans.

(3) Financing Plan - The proposal must demonstrate the financial capability of the respondent to finance the construction of the proposed development, and show evidence of permanent financing for the Project. Preference will be given for signed commitments for the financing of the Projects.

(4) Financial Guaranty - The proposal must demonstrate the financial capacity of the respondent to meet the expenses associated with the level under its control as part of the Operating Agreement.

VI. THE SELECTION PROCESS

A. Proposal Evaluation

The proposals will be evaluated by the Vendor Selection Committee which is comprised of representatives of the District and its component governments assisted by legal counsel, a financial advisor to the District, and a professional engineer.

Proposals will be evaluated on the basis of the following criteria:

1. Experience and Qualifications of the Respondent

   Preference will be given to respondents demonstrating strong technical and management ability and proven experience in similar undertakings. Demonstrated financial capacity to support cost and performance guarantees is essential.

2. Technical Proposal

   Preference will be given to the proposal employing commercially proven technology which best meets the design, performance and safety parameters outlined in this RFP. Preference will also be given to the proposal which transfers the greatest degree of construction and operating risk from the District to the private developer of the system.

3. Financial Proposal

   Preference will be given to proposals that responsibly maximize the net economic benefit to the District from permitting private development of the project. Factors which will be considered include: (i) the nature of the respondent's sources of financing, their magnitude, and degree of commitment, (ii) the extent to which the respondent provides cost and performance guarantees for construction of the system, (iii) the time period the respondent will be willing to guarantee operating expenses, and (iv) the level of service fee the District will be required to pay to the Respondent.

4. <u>Joint Development</u>

Preference will be given to the Respondent which proposes the best associated joint development scheme. Proposals will be evaluated on the basis of providing the highest economic use for the available parcels of land, their inter-relationship with the transit system, their impact on general development in the region.

5. <u>Ability to Implement Proposal</u>

Preference will be given to respondents demonstrating the technical and financial ability to promptly and efficiently carry out the tasks and responsibilities outlined in the proposal, including the procurement of financing, and compliance with the proposed schedule of implementation.

V. RFP PROCEDURES

1. Cost of Preparation

The costs of preparing and submitting proposals and risks associated therewith shall be bourne solely by the respondents. No compensation will be provided to proposing firms for work performed or costs incurred in association with the preparation of a proposal under this RFP.

2. Proprietary Information

If a proposal includes any proprietary data or information that the respondent does not want disclosed to the public, such data or information must be specifically identified as such on every page on which it is found. Data or information so identified will be used by the District solely for the purposes of evaluating proposals and conducting contract negotiations, consistent with the provisions of any applicable Freedom of Information Laws. However the District assumes no responsibilities for any loss or damage which may result from a breach of confidentiality during the review of the proposals.

3. Modification or Withdrawal of Proposal

Any proposal may be modified or withdrawn by written request of the respondents prior to the closing date for proposals. After the closing date modification will not be allowed, and withdrawal will forfeit the Good Faith Deposit.

4. Right to Reject

The Authority retains the right to reject either or both proposals, and to waive any irregularities or formalities that are in the best interest of the District.

5. Questions

Prior to the closing date for proposals, respondents may submit written questions to the District. Prompt answers will be provided. The District reserves the right, however, to determine in its sole discretion what information is significant and to thereafter provide the responses to the other finalist.

6. Indemnity

The District will require indemnification from claims arising out of the District's failure to select any given respondent or from not making a selection at all. The indemnity must recognize the District right to reject any or all proposals for whatever reasons.

7. Studies and Data

Copies of all studies and reports which have examined the technical and financial feasibility of transit service in the Dulles Corridor will be made available by the District to the respondents. The District, however, will make no representation as to the accuracy of the data and conclusions presented therein.

8. Site Visits

The District will arrange whatever site visits potential respondents may reasonably request prior to the submission deadline.

9. Statement of Respondents

The proposal must contain statements to the following effect, signed by an officer authorized to bind the respondent:

(i) the respondent has read and agrees to be bound by terms and conditions set forth in the RFP; and

(ii) the terms and conditions set forth in the proposal will remain open for acceptance for a period of not less than 120 days from the deadline for submission of proposals.

REQUEST FOR PROPOSAL EVALUATION CRITERIA

RFP EVALUATION CRITERIA

General Guidelines

The evaluation of the responses to the RFP should be based upon objective criteria relating specifically to each aspect of the Proposal. The nature of the competitive negotiation process contemplated will require the District staff to work closely with the members of the development team of each of the finalists. Therefore, subjective factors such as the compatibility of the personalities of the individuals involved will, of necessity, be a factor in the evaluations. This is not inappropriate since the ability of the District staff to work well with the Developer's team will materially affect the success of the Project. However, this factor should not outweigh the substantive elements of the business structure that is being proposed. Therefore, to prevent these factors from unduly influencing the evaluation of other substantive elements of the proposal, these factors are included in a separate category and weighted accordingly.

The evaluation criteria is divided into seven categories, matching the sections of required information included in each proposal. Weights are assigned to each category, reflecting the relative importance attached to that part of the business deal. The maximum number of points possible is 100. This is meant to reflect a business deal that meets every stated objective of the District in developing the Project and is, in conception, more of a yardstick by which to measure each proposal, as opposed to a reasonable expectation of actual terms and conditions of a business transaction.

The RFP specifies that the District reserves the right to reject both proposals. In the event that both proposals score below 50 points, the District should consider whether, as a matter of policy, to go forward with the Project. The evaluation criteria are structured so that satisfaction of the elements deemed critical to the success of the Project as contemplated in the feasibility study are sufficient to give a ranking of over 50. These elements, relating to technical competence and strong financial backing for the construction and operating guarantees, are basic to the business transaction contemplated by the RFP.

A. Summary of Proposal — Maximum Points — 5

This section of the RFP outlines the respondent's overall approach to development of the transit sytem. The proposal should be well written, clear and precise as to the terms of the business structure proposed and the role of the various parties. It should also be responsive to the questions and preferences indicated in the RFP and be thorough in its preparation and presentation of the issues.

B. Background and Qualifications of Respondents — Maximum Points — 15

The evaluation criteria is divided into two parts; the first provides for an objective evaluation of the qualifications and experience of the individuals and firms on the respondents' development team and; second, a subjective appraisal of the ability of this team to work together amongst themselves and with the District staff in successfully completing the Project.

In objectively assessing the background and qualifications of the individuals and firms involved in the respondent's development team, the team with the most direct experience in construcing and operating a transit system utilizing similar technology and ownership structure would rank highest. Previous experience in constructing and operating similar major public works projects, whether publicly or privately owned, with significant and enforceable construction and operating guarantees would also score well. Significant guidance should be obtained from the consulting engineer and the financial advisor to the District on these points. In addition, all references should be interviewed. Maximum points in this sub-category — 10.

The subjective evaluation of background and qualifications of should be drawn from the staff's experience in working with the respondent's development team during the competitive negotiation process. The evaluation should take into account how the respective members work amongst themselves as well as how they work with the District's staff. Maximum points in this sub-category — 5.

C. Technical Proposal — Maximum Points — 25

Section C of the RFP contains the technical specifications of the transit system the respondent proposes to construct and operate. Willingness to accept the major risks identified in this section results in a minimum of 20 points.

1. Preliminary design of the transit system, including working drawings:

   The feasibility study indicated the preferred technology and suggested track configurations, vehicle design, power sources, the location of stations, system alignment and design speed. Evidence of compliance with the technical specifications required by the RFP and documentation of commercial feasibility is of the greatest importance. Extra points should be awarded for proposals that are deemed by the consulting engineer to be technically superior to the system proposed in the feasibility study that is consistent with the financial feasibility of the Project.

2. <u>Detailed cost information concerning the proposed transit development</u>:

   The feasibility study estimated the full cost of the transit system. Developers proposing verifiable means of reducing costs through proffers of stations from private land owners, equipment vendors and suppliers, and other parties should score well in this category. Any material changes in station location should be accompanied by revised patronage forecasts to assure that overall ridership is not adversely impacted in a material way.

3. <u>Proposed terms of the construction contract</u>:

   The RFP indicates a clear preference for a fixed priced construction contract for the design and construction of the transit system. The intent of this requirement is to allocate risks to the party best able to control the risk at issue. In this regard, the Developer willing to accept the greatest level of technical and construction risk should score the highest. At a minimum, the Developer should bear the following risks:

   - technology performance
   - system reliability
   - environmental and regulatory compliance
   - acceptance of faulty workmanship
   - sub contractor default
   - cost overruns
   - project completion delay
   - inflation
   - labor unrest, except as its relates to District staff

   Failure to take on each of these risks, backed by a verifiable and enforceable guarantee, <u>should result in no points awarded for this category</u>. Willingness to accept these risks results in a minimum of 10 points awarded.

4. Proposed terms of the operating agreement

The most important component of the operating agreement to the District will be the willingness of the Developer to accept operating risk for a significant portion of the life of the Operating Agreement. Developers who are willing to guarantee a minimum of 10 years of operating expenses consistent with acceptable operation parameters will score a minimum of 10 points for this category.

D. Business and Financial Proposal - Maximum points allowed — 25

This section outlines the basic financial terms under which the respondent proposes to build and operate the Project. This section will be extensive and it is suggested that certain highlights be noted:

- Single-source financial responsibility. Technical and financial obligations not shared among multiple parties or joint venture participants -- compliance gives 5 points.

- Corporate equity contribution of 25% of construction costs.

- Construction and operating performance guarantees that are verifiable and backed by nationally known financial institutions or identified assets of sufficient magnitude.

- Commitments from well-known financial institutions for necessary financing and the terms and conditions under which this financing will be available.

Compliance with these criteria is rewarded with a minimum of 20 points. Failure to provide any one of these four elements results in a maximum allowed for this category of 15 points except that failure to provide strong verifiable construction and operating performance guarantees results in no points. Failure to provide two of these elements results in a maximum allowable for this category of 10 points.

E. Legal Aspects of the Proposal — Maximum points allowed — 10

This section should demonstrate that the respondent understands and will comply with the legal and regulatory requirements attendant to the Development of the Project and has adequately identified the nature of the contractual relationships between the parties.

F. Schedule for Project Completion — Maximum points allowed — 5

This section should be realistic and provide firm dates for completion of construction of the Project, a reasonable acceptance period, and a final date of operation.

G. Associated Joint Development — Maximum points allowed — 15

This section should provide detailed information on the respondent's plans for joint development projects to be built in conjunction with the mass transit system. These plans should contain the following elements:

- Adequate and verifiable financial resources to undertake and complete the development plan from identified assets and/or commitments from nationally recognized financial institutions.

- Evidence of compliance with local land use and zoning ordinances.

- Clear identification of the costs of the infrastructure improvement and verifiable financing commitments for these improvements from lcoal government sources or well-known financial institutions.

- Demonstrated experience and qualifications to undertake and complete the planned development.

Failure to provide any one of these elements results in no points awarded for this category.

APPENDIX B

APPENDIX B:
FINANCING ASSUMPTIONS

BASE CASE

PRINCIPAL ASSUMPTIONS
Base Case

- Full cost for construction of the complete transit system as estimated
- Equity contribution set at 25% of the present value of the full construction costs
- Operating revenues based upon mid range patronage forecasts as provided by Charles River Associates with annual inflation adjustments of 6%
- Operating expenses estimated by Parsons, Brinckerhoff with annual inflation adjustments of 6%
- Depreciation and amoritization schedules based upon full utilization of existing tax law as determined by Baskin & Steingut
- Debt financing provided through tax-exempt bond issue structured as an Industrial Development Bond with 30 year maturity with debt service blended with debt service on trade finance to produce overall level debt service
- Financing for vehicles from export credit agency at competitive taxable rates for 15 years with 3 years fully funded capitalized interest
- Service fee set at level payments throughout the life of the operating contract
- Tax laws in effect as of the date of the report

Dulles Airport Access Project
Expected Case

Cash Flow Statement		1990	1991	1992	1993	1994	1995
Sources:							
Fare Revenue		$7,029,543	$7,715,943	$8,454,608	$9,253,549	$10,115,524	$11,055,635
Payment in Lieu of Taxes		$0	$0	$0	$0	$0	$0
Service Fee		$9,250,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000
		============	============	============	============	============	============
		$16,279,543	$26,215,943	$26,954,608	$27,753,549	$28,615,524	$29,555,635
Uses:							
O & M Expenses		$6,557,305	$6,950,744	$7,367,788	$7,809,856	$8,278,447	$8,775,154
Net Interest Expense		$7,603,300	$17,185,300	$17,006,550	$16,809,800	$16,593,550	$16,355,800
Principal Repayment		$0	$1,700,000	$1,875,000	$2,060,000	$2,265,000	$2,490,000
Capital Expenditures		$0	$0	$0	$0	$0	$0
		============	============	============	============	============	============
		$14,160,605	$25,836,044	$26,249,338	$26,679,656	$27,136,997	$27,620,954
Net Cash Flow		$2,118,938	$379,899	$705,270	$1,073,894	$1,478,527	$1,934,682
Present Value of Service Fee							
Interest Rate:	9	$6,797,163	$12,720,828	$11,656,169	$10,673,903	$9,774,413	$8,950,723
	10	$6,573,802	$12,223,397	$11,086,981	$10,056,219	$9,121,287	$8,273,276
	11	$6,350,790	$11,740,360	$10,548,155	$9,477,015	$8,514,647	$7,650,005

Income Statement	1990	1991	1992	1993	1994	1995
Revenues:						
Fare Revenue	$7,029,543	$7,715,943	$8,454,608	$9,253,549	$10,115,524	$11,055,635
Payment in Lieu of Taxes	$0	$0	$0	$0	$0	$0
Service Fee	$9,250,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000
	============	============	============	============	============	============
	$16,279,543	$26,215,943	$26,954,608	$27,753,549	$28,615,524	$29,555,635
Expenses:						
O & M	$6,557,305	$6,950,744	$7,367,788	$7,809,856	$8,278,447	$8,775,154
Depreciation	$20,794,168	$20,794,168	$20,794,168	$20,794,168	$20,794,168	$4,377,154
Amortization						
Capitalized Interest	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818
Issue Costs	$287,846	$287,846	$287,846	$287,846	$287,846	$287,846
	============	============	============	============	============	============
	$33,397,137	$33,790,575	$34,207,620	$34,649,607	$35,118,279	$19,197,972
Net Operating Income	$-17,117,594	$-7,574,632	$-7,253,012	$-6,896,138	$-6,502,755	$10,357,663
Net Interest Expense	$7,603,300	$17,185,300	$17,006,550	$16,809,800	$16,593,550	$16,355,800
Earnings Before Taxes	$-24,720,894	$-24,759,932	$-24,259,562	$-23,705,938	$-23,096,305	$-5,998,137

Net Benefit to Investor	1990	1991	1992	1993	1994	1995
Tax Benefit (Cost) @ 46%	$11,371,611	$11,389,569	$11,159,398	$10,904,731	$10,624,300	$2,759,143
Net Cash Flow	$2,118,938	$379,899	$705,270	$1,073,894	$1,478,527	$1,934,682
Investment Tax Credit	$3,605,169					
	============	============	============	============	============	============
Net Benefit Received	$17,095,718	$11,769,468	$11,864,668	$11,978,625	$12,102,827	$4,693,825

Dulles Airport Access Project

Expected Case

	1996	1997	1998	1999	2000	2001	2002
Cash Flow Statement							
Sources:							
Fare Revenue	$12,065,032	$13,159,548	$14,343,047	$15,619,388	$17,791,828	$19,339,093	$21,019,113
Payment in Lieu of Taxes	$0	$0	$0	$0	$0	$0	$0
Service Fee	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000
	============	============	============	============	============	============	============
	$30,565,032	$31,659,548	$32,843,047	$34,119,388	$36,291,828	$37,839,093	$39,519,113
Uses:							
O & M Expenses	$9,301,663	$9,859,763	$10,451,348	$11,078,429	$11,743,135	$12,447,723	$13,194,587
Net Interest Expense	$16,094,300	$15,806,550	$15,490,050	$15,141,800	$14,758,550	$14,337,050	$13,873,550
Principal Repayment	$2,740,000	$3,015,000	$3,315,000	$3,650,000	$4,015,000	$4,415,000	$4,855,000
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0
	============	============	============	============	============	============	============
	$28,135,963	$28,681,313	$29,256,398	$29,870,229	$30,516,685	$31,199,773	$31,923,137
Net Cash Flow	$2,429,069	$2,978,236	$3,586,649	$4,249,159	$5,775,143	$6,639,319	$7,595,976
Present Value of Service Fee							
Interest Rate:	$8,196,445	$7,505,730	$6,873,222	$6,294,015	$5,763,618	$5,277,918	$4,833,147
	$7,504,105	$6,806,445	$6,173,646	$5,599,679	$5,079,074	$4,606,870	$4,178,567
	$6,873,166	$6,175,212	$5,548,135	$4,984,735	$4,470,547	$4,023,761	$3,615,158

	1996	1997	1998	1999	2000	2001	2002
Income Statement							
Revenues:							
Fare Revenue	$12,065,032	$13,159,548	$14,343,047	$15,619,388	$17,791,828	$19,339,093	$21,019,113
Payment in Lieu of Taxes	$0	$0	$0	$0	$0	$0	$0
Service Fee	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000
	============	============	============	============	============	============	============
	$30,565,032	$31,659,548	$32,843,047	$34,119,388	$36,291,828	$37,839,093	$39,519,113
Expenses:							
O & M	$9,301,663	$9,859,763	$10,451,348	$11,078,429	$11,743,135	$12,447,723	$13,194,587
Depreciation	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154
Amortization							
Capitalized Interest	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818
Issue Costs	$287,846	$287,846	$287,846	$287,846	$287,846	$287,846	$287,846
	============	============	============	============	============	============	============
	$19,724,481	$20,282,581	$20,874,167	$21,501,248	$22,165,954	$22,870,542	$23,617,405
Net Operating Income	$10,840,550	$11,376,967	$11,968,880	$12,618,140	$14,125,875	$14,968,551	$15,901,708
Net Interest Expense	$16,094,300	$15,806,550	$15,490,050	$15,141,800	$14,758,550	$14,337,050	$13,873,550
Earnings Before Taxes	$-5,253,750	$-4,429,583	$-3,521,170	$-2,523,660	$-632,675	$631,501	$2,028,158

	1996	1997	1998	1999	2000	2001	2002
Net Benefit to Investor							
Tax Benefit (Cost) @ 46%	$2,416,725	$2,037,608	$1,619,738	$1,160,883	$291,031	$-290,490	$-932,953
Net Cash Flow	$2,429,069	$2,978,236	$3,586,649	$4,249,159	$5,775,143	$6,639,319	$7,595,976
Investment Tax Credit							
	============	============	============	============	============	============	============
Net Benefit Received	$4,845,794	$5,015,844	$5,206,387	$5,410,042	$6,066,174	$6,348,829	$6,663,024

Dulles Airport Access Project
Expected Case

	2003	2004	2005	2006	2007	2008	2009
Cash Flow Statement							
Sources:							
Fare Revenue	$22,821,634	$24,775,811	$26,871,196	$29,138,666	$31,576,345	$34,199,497	$37,024,153
Payment in Lieu of Taxes	$0	$0	$0	$0	$0	$0	$0
Service Fee	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000
	============	============	============	============	============	============	============
	$41,321,634	$43,275,811	$45,371,196	$47,638,666	$50,076,345	$52,699,497	$55,524,153
Uses:							
O & M Expenses	$13,986,262	$14,825,438	$15,714,964	$16,657,862	$17,657,333	$18,716,773	$19,839,780
Net Interest Expense	$13,383,800	$12,865,050	$12,294,550	$11,667,050	$10,976,800	$10,177,550	$9,382,300
Principal Repayment	$4,940,000	$5,435,000	$5,975,000	$6,575,000	$7,230,000	$7,955,000	$8,750,000
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0
	============	============	============	============	============	============	============
	$32,310,062	$33,125,488	$33,984,514	$34,899,912	$35,864,133	$36,849,323	$37,972,080
Net Cash Flow	$9,011,572	$10,150,323	$11,386,683	$12,738,755	$14,212,212	$15,850,174	$17,552,073
Present Value of Service Fee							
Interest Rate:	$4,425,858	$4,052,891	$3,711,353	$3,398,597	$3,112,197	$2,849,932	$2,609,768
	$3,790,083	$3,437,717	$3,118,111	$2,828,218	$2,565,277	$2,326,702	$2,110,460
	$3,248,048	$2,910,216	$2,621,878	$2,355,633	$2,116,424	$1,901,506	$1,708,413

	2003	2004	2005	2006	2007	2008	2009
Income Statement							
Revenues:							
Fare Revenue	$22,821,634	$24,775,811	$26,871,196	$29,138,666	$31,576,345	$34,199,497	$37,024,153
Payment in Lieu of Taxes	$0	$0	$0	$0	$0	$0	$0
Service Fee	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18,500,000	$18.500,000
	============	============	============	============	============	============	============
	$41,321,634	$43,275,811	$45,371,196	$47,638,666	$50,076,345	$52,699,497	$55,524,153
Expenses:							
O & M	$13,986,262	$14,825,438	$15,714,964	$16,657,862	$17,657,333	$18,716,773	$19,839,780
Depreciation	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$0	$0
Amortization							
Capitalized Interest	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818	$5,757,818
Issue Costs	$287,846	$287,846	$287,846	$287,846	$287,846	$287,846	$287,846
	============	============	============	============	============	============	============
	$24,409,080	$25,248,256	$26,137,782	$27,080,680	$28,080,152	$24,762,437	$25,885,444
Net Operating Income	$16.912,554	$18,027,555	$19,233,414	$20,557,986	$21,996,193	$27,937,060	$29,638,709
Net Interest Expense	$13,383,800	$12,865,050	$12,294,550	$11,667,050	$10,976,800	$10,177,550	$9,382,300
Earnings Before Taxes	$3,528,754	$5,162,505	$6,938,864	$8,890,936	$11,019,393	$17,759,510	$20,256,409

	2003	2004	2005	2006	2007	2008	2009
Net Benefit to Investor							
Tax Benefit (Cost) @ 46%	$-1,623,227	$-2,374,752	$-3,191,878	$-4,089,831	$-5,068,921	$-8,169,375	$-9,317,948
Net Cash Flow	$9,011,572	$10,150,323	$11,386,683	$12,738,755	$14,212,212	$15,850,174	$17,552,073
Investment Tax Credit							
	============	============	============	============	============	============	============
Net Benefit Received	$7,388,346	$7,775,571	$8,194,805	$8,648,924	$9,143,291	$7,680,799	$8,234,125

	2010	
Cash Flow Statement		
Sources:		
Fare Revenue	$40,067,108	
Payment in Lieu of Taxes	$0	
Service Fee	$18,500,000	
	============	
	$58,567,108	
Uses:		
O & M Expenses	$21,030,167	
Net Interest Expense	$8,463,550	
Principal Repayment	$9,625,000	
Capital Expenditures	$0	
	============	
	$39,118,717	
Net Cash Flow	$19,448,391	
Present Value of		
Service Fee		Total
Interest Rate:	$2,389,843	$131,875,736
	$1,914,249	$119,374,244
	$1,534,928	$108,392,735

	2010
Income Statement	
Revenues:	
Fare Revenue	$40,067,108
Payment in Lieu of Taxes	$0
Service Fee	$18,500,000
	============
	$58,567,108
Expenses:	
O & M	$21,030,167
Depreciation	$0
Amortization	
Capitalized Interest	$5,757,818
Issue Costs	$287,846
	============
	$27,075,831
Net Operating Income	$31,491,277
Net Interest Expense	$8,463,550
Earnings Before Taxes	$23,027,727

	2010
Net Benefit to Investor	
Tax Benefit (Cost) @ 46%	$-10,592,754
Net Cash Flow	$19,448,391
Investment Tax Credit	
	============
Net Benefit Received	$8,855,637

Fare Revenue		1990	1991	1992	1993	1994	1995
Annual Revenue (1985 $)		5,253,769	5,437,592	5,621,415	5,805,238	5,989,061	6,172,884
Inflation Factor		1.338	1.419	1.504	1.594	1.689	1.791
Fare Revenue (Current $)		$7,029,543	$7,715,943	$8,454,606	$9,253,549	$10,115,524	$11,055,635

O & M Expenses	1985	1990	1991	1992	1993	1994	1995
Cost Base	$4,900,000						
Inflation Factor	6.00 %						
O & M Expenses		$6,557,305	$6,950,744	$7,367,788	$7,809,856	$8,278,447	$8,775,154

Equipment Finance		1990	1991	1992	1993	1994	1995
Net Interest Expense		$1,819,750	$3,554,500	$3,375,750	$3,179,000	$2,962,750	$2,725,000
Principal Repayment		$0	$1,700,000	$1,875,000	$2,060,000	$2,265,000	$2,490,000
Net Debt Service		$1,819,750	$5,254,500	$5,250,750	$5,239,000	$5,227,750	$5,215,000

Industrial Dev. Bonds		1990	1991	1992	1993	1994	1995
Net Interest Expense		$5,783,550	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800
Principal Repayment		$0	$0	$0	$0	$0	$0
Net Debt Service		$5,783,550	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800
Coverage Ratio		1.68	1.41	1.44	1.46	1.49	1.52

Equity Account	1987	1990	1991	1992	1993	1994	1995
Paid in Capital	$38,957,085						
Net Benefit Received		$17,095,718	$11,769,468	$11,864,668	$11,978,625	$12,102,827	$4,693,825
Internal Rate of Return (after tax)		9.53 %	12.42 %	14.24 %	15.48 %	16.36 %	16.17 %

Depreciation		1990	1991	1992	1993	1994	1995
5 Year Assets							
Depreciable Base	$82,085,067						
Depreciation Schedule		20.00 %	20.00 %	20.00 %	20.00 %	20.00 %	
Depreciation Amount		$16,417,013	$16,417,013	$16,417,013	$16,417,013	$16,417,013	$0
Investment Tax Credit		$3,605,169					
18 Year Assets							
Depreciable Base	$78,788,780						
Depreciation Schedule		5.556 %	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %
Depreciation Amount		$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154

Dulles Airport Access Project
Expected Case

Fare Revenue	1996	1997	1998	1999	2000	2001	2002
Annual Revenue (1985 $)	6,356,708	6,540,531	6,724,354	6,908,177	7,422,540	7,613,916	7,805,092
Inflation Factor	1.898	2.012	2.133	2.261	2.397	2.540	2.693
Fare Revenue (Current $)	$12,065,032	$13,159,548	$14,343,047	$15,619,388	$17,791,828	$19,339,093	$21,019,113

O & M Expenses	1996	1997	1998	1999	2000	2001	2002
Cost Base							
Inflation Factor							
O & M Expenses	$9,301,663	$9,859,763	$10,451,348	$11,078,429	$11,743,135	$12,447,723	$13.194,587

Equipment Finance	1996	1997	1998	1999	2000	2001	2002
Net Interest Expense	$2,463,500	$2,175,750	$1,859,250	$1,511,000	$1,127,750	$706,250	$242,750
Principal Repayment	$2,740,000	$3,015,000	$3,315,000	$3,650,000	$4,015,000	$4,415,000	$4,855,000
Net Debt Service	$5,203,500	$5,190,750	$5,174,250	$5,161,000	$5,142,750	$5,121,250	$5,097,750

Industrial Dev. Bonds	1996	1997	1998	1999	2000	2001	2002
Net Interest Expense	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800
Principal Repayment	$0	$0	$0	$0	$0	$0	$0
Net Debt Service	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800	$13,630,800
Coverage Ratio	1.56	1.60	1.64	1.69	1.80	1.86	1.93

Equity Account	1996	1997	1998	1999	2000	2001	2002
Paid in Capital							
Net Benefit Received	$4,845,794	$5,015,844	$5,206,387	$5,410,042	$6,066,174	$6,348,829	$6,663,024
Internal Rate of Return (after tax)	16.02 %	15.92 %	15.85 %	15.81 %	15.80 %	15.81 %	15.83 %

Depreciation	1996	1997	1998	1999	2000	2001	2002
5 Year Assets							
Depreciable Base							
Depreciation Schedule							
Depreciation Amount	$0	$0	$0	$0	$0	$0	$0
Investment Tax Credit							
18 Year Assets							
Depreciable Base							
Depreciation Schedule	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %
Depreciation Amount	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154

Dulles Airport Access Project
Expected Case

Fare Revenue	2003	2004	2005	2006	2007	2008	2009
Annual Revenue (1985 $)	7,996,368	8,187,644	8,370,920	8,570,196	8,761,472	8,952,748	9,144,024
Inflation Factor	2.854	3.026	3.207	3.400	3.604	3.820	4.049
Fare Revenue (Current $)	$22,821,634	$24,775,811	$26,871,196	$29,138,666	$31,576,345	$34,199,497	$37,024,153

O & M Expenses	2003	2004	2005	2006	2007	2008	2009
Cost Base							
Inflation Factor							
O & M Expenses	$13,986,262	$14,825,438	$15,714,964	$16,657,862	$17,657,333	$18,716,773	$19,839,780

Equipment Finance	2003	2004	2005	2006	2007	2008	2009
Net Interest Expense							
Principal Repayment							
Net Debt Service							

Industrial Dev. Bonds	2003	2004	2005	2006	2007	2008	2009
Net Interest Expense	$13,383,800	$12,865,050	$12,294,550	$11,667,050	$10,976,800	$10,177,550	$9,382,300
Principal Repayment	$4,940,000	$5,435,000	$5,975,000	$6,575,000	$7,230,000	$7,955,000	$8,750,000
Net Debt Service	$18,323,800	$18,300,050	$18,269,550	$18,242,050	$18,206,800	$18,132,550	$18,132,300
Coverage Ratio	1.49	1.55	1.62	1.70	1.78	1.87	1.97

Equity Account	2003	2004	2005	2006	2007	2008	2009
Paid in Capital							
Net Benefit Received	$7,388,346	$7,775,571	$8,194,805	$8,648,924	$9,143,291	$7,680,799	$8,234,125
Internal Rate of Return (after tax)	15.87 %	15.91 %	15.95 %	16.00 %	16.05 %	16.06 %	16.09 %

Depreciation	2003	2004	2005	2006	2007	2008	2009
5 Year Assets							
Depreciable Base							
Depreciation Schedule							
Depreciation Amount	$0	$0	$0	$0	$0	$0	$0
Investment Tax Credit							
18 Year Assets							
Depreciable Base							
Depreciation Schedule	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %		
Depreciation Amount	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$4,377,154	$0	$0

Fare Revenue	2010
Annual Revenue (1985 $)	9,335,300
Inflation Factor	4.292
Fare Revenue (Current $)	$40,067,108

O & M Expenses	2010
Cost Base	
Inflation Factor	
O & M Expenses	$21,030,167

Equipment Finance	2010
Net Interest Expense	
Principal Repayment	
Net Debt Service	

Industrial Dev. Bonds	2010
Net Interest Expense	$8,463,550
Principal Repayment	$9,625,000
Net Debt Service	$18,088,550
Coverage Ratio	2.08

Equity Account	2010
Paid in Capital	
Net Benefit Received	$8,855,637
Internal Rate of Return (after tax)	16.11 %

Depreciation	2010
5 Year Assets	
Depreciable Base	
Depreciation Schedule	
Depreciation Amount	$0
Investment Tax Credit	
18 Year Assets	
Depreciable Base	
Depreciation Schedule	
Depreciation Amount	$0

DULLES AIRPORT ACCESS PROJECT
25% EQUITY BASED ON PV CONSTRUCTION
30 YEAR DEBT - LEVEL WITH TRADE

S O U R C E S   A N D   U S E S   O F   F U N D S

DELIVERY DATE: 1/ 1/87

SOURCES

PAR AMOUNT OF BONDS....................	$156,945,000.00	
+PREMIUM /-DISCOUNT....................	$0.00	
BOND PROCEEDS..		156,945,000.00
EQUITY INVESTMENT......................................		38,957,085.00
		$195,902,085.00

USES OF FUNDS

UNDERWRITERS DISCOUNT (% or $)..........(	2.500000%)...	3,923,625.00
COST OF ISSUANCE......................(	1.000000%)...	1,569,450.00
BOND INS.(% OF TOTAL D/S-ACCR.-CAP.INT.)(	0.900000%)...	4,483,746.35
CAPITALIZED INTEREST....................................		46,739,461.00
DEBT SERVICE RESERVE....................................		20,637,000.00
NET CONSTRUCTION FUND AMOUNT............................		118,548,053.87
CONTINGENCY...		748.78
		$195,902,085.00

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DULLES AIRPORT ACCESS PROJECT
25% EQUITY BASED ON PV CONSTRUCTION
30 YEAR DEBT - LEVEL WITH TRADE

CONSTRUCTION FUND

DELIVERY DATE: 1/ 1/87

DRAW DATE	CONSTRUCTION FUND BALANCE	CONSTRUCTION DRAW NEEDED	NET CONSTR. FUND DRAW	INV. RATE OF DRAW	CONSTR. FUND EARNINGS	DEBT SERVICE RESERVE (10.000000 %)	CAPITALIZED INT. EARNINGS (9.000000 %)	REMAINING CONSTR. FUNDS
1/ 1/87	118,548,053.87	807,000.00	807,000.00	8.000000				117,741,053.87
2/ 1/87	117,741,053.87	990,000.00	205,059.64	8.000000	784,940.36			117,535,994.23
3/ 1/87	117,535,994.23	2,233,000.00	1,449,426.71	8.000000	783,573.29			116,086,567.52
4/ 1/87	116,086,567.52	3,393,000.00	2,619,089.55	8.000000	773,910.45			113,467,477.97
5/ 1/87	113,467,477.97	3,551,000.00	2,794,550.15	8.000000	756,449.85			110,672,927.83
6/ 1/87	110,672,927.83	6,148,000.00	5,410,180.48	8.000000	737,819.52			105,262,747.35
7/ 1/87	105,262,747.35	8,604,000.00	4,727,289.60	8.000000	701,751.65	1,031,850.00	2,143,108.75	100,535,457.75
8/ 1/87	100,535,457.75	6,265,000.00	5,594,763.61	8.000000	670,236.39			94,940,694.13
9/ 1/87	94,940,694.13	3,937,000.00	3,304,062.04	8.000000	632,937.96			91,636,632.09
10/ 1/87	91,636,632.09	4,093,000.00	3,482,089.12	8.000000	610,910.88			88,154,542.97
11/ 1/87	88,154,542.97	4,820,000.00	4,232,303.05	8.000000	587,696.95			83,922,239.93
12/ 1/87	83,922,239.93	4,553,000.00	3,993,518.40	8.000000	559,481.60			79,928,721.53
1/ 1/88	79,928,721.53	4,419,000.00	1,070,997.06	8.000000	532,858.14	1,031,850.00	1,783,294.80	78,857,724.47
2/ 1/88	78,857,724.47	4,592,000.00	4,066,281.84	8.000000	525,718.16			74,791,442.63
3/ 1/88	74,791,442.63	5,016,000.00	4,517,390.38	8.000000	498,609.62			70,274,052.25
4/ 1/88	70,274,052.25	4,882,000.00	4,413,506.32	8.000000	468,493.68			65,860,545.93
5/ 1/88	65,860,545.93	4,947,000.00	4,507,929.69	8.000000	439,070.31			61,352,616.24
6/ 1/88	61,352,616.24	4,836,000.00	4,426,982.56	8.000000	409,017.44			56,925,633.68
7/ 1/88	56,925,633.68	5,066,000.00	2,231,164.93	8.000000	379,504.22	1,031,850.00	1,423,480.85	54,694,468.75
8/ 1/88	54,694,468.75	5,114,000.00	4,749,370.21	8.000000	364,629.79			49,945,098.55
9/ 1/88	49,945,098.55	4,982,000.00	4,649,032.68	8.000000	332,967.32			45,296,065.87
10/ 1/88	45,296,065.87	5,279,000.00	4,977,026.23	8.000000	301,973.77			40,319,039.64
11/ 1/88	40,319,039.64	5,138,000.00	4,869,206.40	8.000000	268,793.60			35,449,833.24
12/ 1/88	35,449,833.24	4,847,000.00	4,610,667.78	8.000000	236,332.22			30,839,165.46
1/ 1/89	30,839,165.46	4,317,000.00	2,015,888.67	8.000000	205,594.44	1,031,850.00	1,063,666.90	28,823,276.79
2/ 1/89	28,823,276.79	3,921,000.00	3,728,844.82	8.000000	192,155.18			25,094,431.97
3/ 1/89	25,094,431.97	4,324,000.00	4,156,703.79	8.000000	167,296.21			20,937,728.19
4/ 1/89	20,937,728.19	3,066,000.00	2,926,415.15	8.000000	139,584.85			18,011,313.04
5/ 1/89	18,011,313.04	3,185,000.00	3,064,924.58	8.000000	120,075.42			14,946,388.46
6/ 1/89	14,946,388.46	3,101,000.00	3,001,357.41	8.000000	99,642.59			11,945,031.05
7/ 1/89	11,945,031.05	3,039,000.00	1,223,663.51	8.000000	79,633.54	1,031,850.00	703,852.94	10,721,367.54
8/ 1/89	10,721,367.54	2,450,000.00	2,378,524.22	8.000000	71,475.78			8,342,843.32
9/ 1/89	8,342,843.32	2,348,000.00	2,292,381.04	8.000000	55,618.96			6,050,462.28
10/ 1/89	6,050,462.28	2,101,000.00	2,060,663.58	8.000000	40,336.42			3,989,798.69
11/ 1/89	3,989,798.69	1,976,000.00	1,949,401.34	8.000000	26,598.66			2,040,397.35
12/ 1/89	2,040,397.35	2,054,000.00	2,040,397.35	8.000000	13,602.65			-0.00
		144,394,000.00	118,548,053.87		13,569,291.88	5,159,250.00	7,117,404.24	

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DULLES AIRPORT ACCESS PROJECT
25% EQUITY BASED ON PV CONSTRUCTION
30 YEAR DEBT - LEVEL WITH TRADE

NET DEBT SERVICE REQUIREMENTS

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	PRINCIPAL	COUPON	INTEREST	TOTAL DEBT SERVICE	CONSTR. FUND EARNINGS	DEBT SVC. RES. + CAP. INT.	NET DEBT SERVICE	SURPLUS FUNDS REMAINING
7/ 1/87			7,847,250.00	7,847,250.00		46,739,461.00		38,892,211.00
1/ 1/88			7,847,250.00	7,847,250.00				31,044,961.00
7/ 1/88			7,847,250.00	7,847,250.00				23,197,711.00
1/ 1/89			7,847,250.00	7,847,250.00				15,350,461.00
7/ 1/89			7,847,250.00	7,847,250.00				7,503,211.00
1/ 1/90			7,847,250.00	7,847,250.00		1,375,889.00		1,031,850.00
7/ 1/90			7,847,250.00	7,847,250.00		1,031,850.00	5,783,550.00	
1/ 1/91		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/91			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/92		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/92			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/93		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/93			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/94		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/94			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/95		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/95			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/96		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/96			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/97		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/97			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/98		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/98			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/99		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/99			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/ 0		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/ 0			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/ 1		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/ 1			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/ 2		10.000000	7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
7/ 1/ 2			7,847,250.00	7,847,250.00		1,031,850.00	6,815,400.00	
1/ 1/ 3	4,940,000.00	10.000000	7,847,250.00	12,787,250.00		1,031,850.00	11,755,400.00	
7/ 1/ 3			7,600,250.00	7,600,250.00		1,031,850.00	6,568,400.00	
1/ 1/ 4	5,435,000.00	10.000000	7,600,250.00	13,035,250.00		1,031,850.00	12,003,400.00	
7/ 1/ 4			7,328,500.00	7,328,500.00		1,031,850.00	6,296,650.00	
1/ 1/ 5	5,975,000.00	10.000000	7,328,500.00	13,303,500.00		1,031,850.00	12,271,650.00	
7/ 1/ 5			7,029,750.00	7,029,750.00		1,031,850.00	5,997,900.00	
1/ 1/ 6	6,575,000.00	10.000000	7,029,750.00	13,604,750.00		1,031,850.00	12,572,900.00	
7/ 1/ 6			6,701,000.00	6,701,000.00		1,031,850.00	5,669,150.00	
1/ 1/ 7	7,230,000.00	10.000000	6,701,000.00	13,931,000.00		1,031,850.00	12,899,150.00	
7/ 1/ 7			6,339,500.00	6,339,500.00		1,031,850.00	5,307,650.00	
1/ 1/ 8	7,955,000.00	10.000000	6,339,500.00	14,294,500.00		1,031,850.00	13,262,650.00	

DULLES AIRPORT ACCESS PROJECT
25% EQUITY BASED ON PV CONSTRUCTION
30 YEAR DEBT - LEVEL WITH TRADE

NET DEBT SERVICE REQUIREMENTS

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	PRINCIPAL	COUPON	INTEREST	TOTAL DEBT SERVICE	CONSTR. FUND EARNINGS	DEBT SVC. RES. + CAP. INT.	NET DEBT SERVICE	SURPLUS FUND REMAINING
7/ 1/ 8			5,941,750.00	5,941,750.00		1,031,850.00	4,909,900.00	
1/ 1/ 9	8,750,000.00	10.000000	5,941,750.00	14,691,750.00		1,031,850.00	13,659,900.00	
7/ 1/ 9			5,504,250.00	5,504,250.00		1,031,850.00	4,472,400.00	
1/ 1/10	9,625,000.00	10.000000	5,504,250.00	15,129,250.00		1,031,850.00	14,097,400.00	
7/ 1/10			5,023,000.00	5,023,000.00		1,031,850.00	3,991,150.00	
1/ 1/11	10,590,000.00	10.000000	5,023,000.00	15,613,000.00		1,031,850.00	14,581,150.00	
7/ 1/11			4,493,500.00	4,493,500.00		1,031,850.00	3,461,650.00	
1/ 1/12	11,645,000.00	10.000000	4,493,500.00	16,138,500.00		1,031,850.00	15,106,650.00	
7/ 1/12			3,911,250.00	3,911,250.00		1,031,850.00	2,879,400.00	
1/ 1/13	12,810,000.00	10.000000	3,911,250.00	16,721,250.00		1,031,850.00	15,689,400.00	
7/ 1/13			3,270,750.00	3,270,750.00		1,031,850.00	2,238,900.00	
1/ 1/14	14,095,000.00	10.000000	3,270,750.00	17,365,750.00		1,031,850.00	16,333,900.00	
7/ 1/14			2,566,000.00	2,566,000.00		1,031,850.00	1,534,150.00	
1/ 1/15	15,505,000.00	10.000000	2,566,000.00	18,071,000.00		1,031,850.00	17,039,150.00	
7/ 1/15			1,790,750.00	1,790,750.00		1,031,850.00	758,900.00	
1/ 1/16	17,055,000.00	10.000000	1,790,750.00	18,845,750.00		1,031,850.00	17,813,900.00	
7/ 1/16			938,000.00	938,000.00		1,031,850.00		93,850.00
1/ 1/17	18,760,000.00	10.000000	938,000.00	19,698,000.00		21,668,850.00		2,064,700.00
	156,945,000.00		387,988,500.00	544,933,500.00		124,472,250.00	422,525,950.00	

RUNDATE: 09-30-1985 RUNTIME: 11:42:43

[illegible]

25% EQUITY BASED ON PV CONSTRUCTION

30 YEAR DEBT - LEVEL WITH TRADE

DEBT SERVICE SCHEDULE

DELIVERY DATE: 1/ 1/87

DATE	PRINCIPAL	COUPON	INTEREST	PERIOD TOTAL	FISCAL TOTAL
1/ 1/88			15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/89			15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/90			15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/91		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/92		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/93		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/94		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/95		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/96		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/97		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/98		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/99		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/ 0		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/ 1		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/ 2		10.000000	15,694,500.00	15,694,500.00	15,694,500.00
1/ 1/ 3	4,940,000.00	10.000000	15,694,500.00	20,634,500.00	20,634,500.00
1/ 1/ 4	5,435,000.00	10.000000	15,200,500.00	20,635,500.00	20,635,500.00
1/ 1/ 5	5,975,000.00	10.000000	14,657,000.00	20,632,000.00	20,632,000.00
1/ 1/ 6	6,575,000.00	10.000000	14,059,500.00	20,634,500.00	20,634,500.00
1/ 1/ 7	7,230,000.00	10.000000	13,402,000.00	20,632,000.00	20,632,000.00
1/ 1/ 8	7,955,000.00	10.000000	12,679,000.00	20,634,000.00	20,634,000.00
1/ 1/ 9	8,750,000.00	10.000000	11,883,500.00	20,633,500.00	20,633,500.00
1/ 1/10	9,625,000.00	10.000000	11,008,500.00	20,633,500.00	20,633,500.00
1/ 1/11	10,590,000.00	10.000000	10,046,000.00	20,636,000.00	20,636,000.00
1/ 1/12	11,645,000.00	10.000000	8,987,000.00	20,632,000.00	20,632,000.00
1/ 1/13	12,810,000.00	10.000000	7,822,500.00	20,632,500.00	20,632,500.00
1/ 1/14	14,095,000.00	10.000000	6,541,500.00	20,636,500.00	20,636,500.00
1/ 1/15	15,505,000.00	10.000000	5,132,000.00	20,637,000.00	20,637,000.00
1/ 1/16	17,055,000.00	10.000000	3,581,500.00	20,636,500.00	20,636,500.00
1/ 1/17	18,760,000.00	10.000000	1,876,000.00	20,636,000.00	20,636,000.00
	156,945,000.00		387,988,500.00	544,933,500.00	
ACCRUED					
	156,945,000.00		387,988,500.00	544,933,500.00	

DATED 1/ 1/87 WITH DELIVERY OF 1/ 1/87

BOND YEARS 3,879,885.000

AVERAGE COUPON 10.000

AVERAGE LIFE 24.721

N I C % 10.000000 % USING 100.0000000

BOND INSURANCE: ... 0.900000 % OF

(TOTAL DEBT SERVICE - ACCRUED - CAP. INT.) = 4,483,746.35

RUNDATE: 09-30-1985 RUNTIME: 11:42:10

DULLES AIRPORT ACCESS PROJECT
25% EQUITY BASED ON PV CONSTRUCTION
30 YEAR DEBT - LEVEL WITH TRADE

CAPITALIZED INTEREST FUND

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	BEGINNING BALANCE	ACCRUED INTEREST	CONSTR. FUND EARNINGS	DEBT SERVICE RESERVE (10.000000 %)	CAPITALIZED INT. EARNINGS (9.000000 %)	TOTAL FUNDS AVAILABLE	BOND INTEREST CAPITALIZED (100.000000 %)	ENDING BALANCE
7/ 1/87	46,739,461.00					46,739,461.00	7,847,250.00	38,892,211.00
1/ 1/88	38,892,211.00					38,892,211.00	7,847,250.00	31,044,961.00
7/ 1/88	31,044,961.00					31,044,961.00	7,847,250.00	23,197,711.00
1/ 1/89	23,197,711.00					23,197,711.00	7,847,250.00	15,350,461.00
7/ 1/89	15,350,461.00					15,350,461.00	7,847,250.00	7,503,211.00
1/ 1/90	7,503,211.00				344,039.00	7,847,250.00	7,847,250.00	
					344,039.00		47,083,500.00	

RUNDATE: 09-30-1985 RUNTIME: 11:43:13

S C R E E N - A

G E N E R A L   B O N D   I N F O R M A T I O N

PAR AMOUNT		(156,945,000)
DATED DATE	*	(1/ 1/87)
DELIVERY DATE	*	(1/ 1/87)
1ST COUPON DATE	*	(7/ 1/87)
1ST MATURITY DATE	*	(1/ 1/91)
LAST MATURITY DATE	*	(1/ 1/17)
FISCAL DATE FOR BOND SOLUTIONS AND REPORTS		(1/ 1/91)
BOND INTEREST FREQUENCY <ANN,SEM,QUA,MON>		(SEMI-ANNUAL)
BOND PRINCIPAL FREQUENCY <ANN,SEM,QUA,MON>		(ANNUAL)
YEAR <360 OR 365>		(360)
BOND DENOMINATION		(5,000)
FILENAME FOR SAVINGS THIS ISSUE		(DART)
KEYNAME OF THIS ISSUE		(LEVEQ)

R E P O R T   T I T L E S

(DULLES AIRPORT ACCESS PROJECT)
(25% EQUITY BASED ON PV CONSTRUCTION)
(30 YEAR DEBT - LEVEL WITH TRADE)

S C R E E N - B

NO.	DATE	AMOUNT	COUPON	YIELD	PRICE
1)	1/ 1/91	0.00	10.000000	0.000000	100.000000
2)	1/ 1/92	0.00	10.000000	0.000000	100.000000
3)	1/ 1/93	0.00	10.000000	0.000000	100.000000
4)	1/ 1/94	0.00	10.000000	0.000000	100.000000
5)	1/ 1/95	0.00	10.000000	0.000000	100.000000
6)	1/ 1/96	0.00	10.000000	0.000000	100.000000
7)	1/ 1/97	0.00	10.000000	0.000000	100.000000
8)	1/ 1/98	0.00	10.000000	0.000000	100.000000
9)	1/ 1/99	0.00	10.000000	0.000000	100.000000
10)	1/ 1/ 0	0.00	10.000000	0.000000	100.000000
11)	1/ 1/ 1	0.00	10.000000	0.000000	100.000000
12)	1/ 1/ 2	0.00	10.000000	0.000000	100.000000
13)	1/ 1/ 3	4,940,000.00	10.000000	0.000000	100.000000
14)	1/ 1/ 4	5,435,000.00	10.000000	0.000000	100.000000
15)	1/ 1/ 5	5,975,000.00	10.000000	0.000000	100.000000
16)	1/ 1/ 6	6,575,000.00	10.000000	0.000000	100.000000
17)	1/ 1/ 7	7,230,000.00	10.000000	0.000000	100.000000
18)	1/ 1/ 8	7,955,000.00	10.000000	0.000000	100.000000
19)	1/ 1/ 9	8,750,000.00	10.000000	0.000000	100.000000
20)	1/ 1/10	9,625,000.00	10.000000	0.000000	100.000000
21)	1/ 1/11	10,590,000.00	10.000000	0.000000	100.000000
22)	1/ 1/12	11,645,000.00	10.000000	0.000000	100.000000
23)	1/ 1/13	12,810,000.00	10.000000	0.000000	100.000000
24)	1/ 1/14	14,095,000.00	10.000000	0.000000	100.000000
25)	1/ 1/15	15,505,000.00	10.000000	0.000000	100.000000
26)	1/ 1/16	17,055,000.00	10.000000	0.000000	100.000000
27)	1/ 1/17	18,760,000.00	10.000000	0.000000	100.000000

S C R E E N - C

NO.	DATE	MAXIMUM D/S
1)	1/ 1/91	100,000,000
2)	1/ 1/92	100,000,000
3)	1/ 1/93	100,000,000
4)	1/ 1/94	100,000,000
5)	1/ 1/95	100,000,000
6)	1/ 1/96	100,000,000
7)	1/ 1/97	100,000,000
8)	1/ 1/98	100,000,000
9)	1/ 1/99	100,000,000
10)	1/ 1/ 0	100,000,000
11)	1/ 1/ 1	100,000,000
12)	1/ 1/ 2	100,000,000
13)	1/ 1/ 3	100,000,000
14)	1/ 1/ 4	100,000,000
15)	1/ 1/ 5	100,000,000
16)	1/ 1/ 6	100,000,000
17)	1/ 1/ 7	100,000,000
18)	1/ 1/ 8	100,000,000
19)	1/ 1/ 9	100,000,000
20)	1/ 1/10	100,000,000
21)	1/ 1/11	100,000,000
22)	1/ 1/12	100,000,000
23)	1/ 1/13	100,000,000
24)	1/ 1/14	100,000,000
25)	1/ 1/15	100,000,000
26)	1/ 1/16	100,000,000
27)	1/ 1/17	100,000,000

S C R E E N - D

GENERAL CONSTRUCTION FUND INFORMATION

TOTAL CONSTRUCTION FUND AMOUNT ———— (144,394,000)

1ST DRAW DATE ———— * (1/ 1/87)

2ND DRAW DATE ———— * (2/ 1/87)

TOTAL NUMBER OF DRAWS ———— * (36)

CONSTRUCTION DRAWS <ANN,SEM,QUA,MON,IRR> — * (MONTHLY)

FLOW OF INTEREST EARNINGS
A - To The Construction Fund
B - To Pay Bond Debt Service ———— * (A)

S C R E E N - E

NO.	DATE	DRAW AMOUNT	INV. RATE	EARNINGS	NET FUNDING
1)	1/ 1/87	807,000.00	8.000000	0.00	807,000.00
2)	2/ 1/87	990,000.00	8.000000	784,940.36	205,059.64
3)	3/ 1/87	2,233,000.00	8.000000	783,573.29	1,449,426.71
4)	4/ 1/87	3,393,000.00	8.000000	773,910.45	2,619,089.55
5)	5/ 1/87	3,551,000.00	8.000000	756,449.85	2,794,550.15
6)	6/ 1/87	6,148,000.00	8.000000	737,819.52	5,410,180.48
7)	7/ 1/87	8,604,000.00	8.000000	701,751.65	7,902,248.35
8)	8/ 1/87	6,265,000.00	8.000000	670,236.39	5,594,763.61
9)	9/ 1/87	3,937,000.00	8.000000	632,937.96	3,304,062.04
10)	10/ 1/87	4,093,000.00	8.000000	610,910.88	3,482,089.12
11)	11/ 1/87	4,820,000.00	8.000000	587,696.95	4,232,303.05
12)	12/ 1/87	4,553,000.00	8.000000	559,481.60	3,993,518.40
13)	1/ 1/88	4,419,000.00	8.000000	532,858.14	3,886,141.86
14)	2/ 1/88	4,592,000.00	8.000000	525,718.16	4,066,281.84
15)	3/ 1/88	5,016,000.00	8.000000	498,609.62	4,517,390.38
16)	4/ 1/88	4,882,000.00	8.000000	468,493.68	4,413,506.32
17)	5/ 1/88	4,947,000.00	8.000000	439,070.31	4,507,929.69
18)	6/ 1/88	4,836,000.00	8.000000	409,017.44	4,426,982.56
19)	7/ 1/88	5,066,000.00	8.000000	379,504.22	4,686,495.78
20)	8/ 1/88	5,114,000.00	8.000000	364,629.79	4,749,370.21
21)	9/ 1/88	4,982,000.00	8.000000	332,967.32	4,649,032.68
22)	10/ 1/88	5,279,000.00	8.000000	301,973.77	4,977,026.23
23)	11/ 1/88	5,138,000.00	8.000000	268,793.60	4,869,206.40
24)	12/ 1/88	4,847,000.00	8.000000	236,332.22	4,610,667.78
25)	1/ 1/89	4,317,000.00	8.000000	205,594.44	4,111,405.56
26)	2/ 1/89	3,921,000.00	8.000000	192,155.18	3,728,844.82
27)	3/ 1/89	4,324,000.00	8.000000	167,296.21	4,156,703.79
28)	4/ 1/89	3,066,000.00	8.000000	139,584.85	2,926,415.15
29)	5/ 1/89	3,185,000.00	8.000000	120,075.42	3,064,924.58
30)	6/ 1/89	3,101,000.00	8.000000	99,642.59	3,001,357.41
31)	7/ 1/89	3,039,000.00	8.000000	79,633.54	2,959,366.46
32)	8/ 1/89	2,450,000.00	8.000000	71,475.78	2,378,524.22
33)	9/ 1/89	2,348,000.00	8.000000	55,618.96	2,292,381.04
34)	10/ 1/89	2,101,000.00	8.000000	40,336.42	2,060,663.58
35)	11/ 1/89	1,976,000.00	8.000000	26,598.66	1,949,401.34
36)	12/ 1/89	2,054,000.00	8.000000	13,602.65	2,040,397.35

S C R E E N - F

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———————————— CAPITALIZED INTEREST FUND ————————————

MINIMUM CAPITALIZED INTEREST AMOUNT ———— (                0)

FINAL CAPITALIZED INTEREST CUTOFF DATE ——— (   12/31/89     )


REINVESTMENT RATE OF FUNDS (%) ——————— (         9.000000)

COMPOUNDINGS FOR ALL FUNDS  <1,2,4,12> —— * (            12)


% OF BONDS CAPITALIZED ———————————— (       100.000000)

       FLOW OF INTEREST EARNINGS
A - To The Construction Fund
B - To Pay Capitalized Interest Fund ———————————— * (A )
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S C R E E N - G

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——   D E B T   S E R V I C E   R E S E R V E   F U N D   ——

Debt Service Reserve Fund Amount ————————— (      20,637,000)
Interest Start Calculation Date ————————— (     1/ 1/87     )
1st Interest Payment Date ——————————— * (     7/ 1/87     )
Interest Frequency <ANN,SEM,QUA,MON> ———— (SEMI-ANNUAL      )
Interest Rate on Funds <%> ——————————— (       10.000000)
Maturity Date ———————————————————— * (     1/ 1/17     )
Year <360 or 365> ———————————————— (             360)

A) DSRF = Max Ann. Debt Service    E) DSRF = Fixed Dollar Amount
B) DSRF = Max Ann. Bond Interest   F) % of Total Bond Size (PAR)
C) DSRF = Max Semi Debt Service    G) DSRF = Average Annual  D/S
D) DSRF = Max Semi Bond Interest   H) Option A for CUR + PRI D/S
DSRF option (A-H) ——————————————————————————————— (A )

% factor to apply to DSRF options A-H ——— (      100.000000)

Interest Flows to: A) Construction Fund, B) Pay Bond D/S - (A )
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S C R E E N - H

——— O T H E R S O U R C E S O F F U N D S ———

(EQUITY INVESTMENT) — (	38,957,Ø85.ØØ)
( ) — (	Ø)
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S C R E E N - I

——— O T H E R U S E S O F F U N D S ———

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(UNDERWRITERS DISCOUNT (% or $)) — (	2.5ØØØØØ)
(COST OF ISSUANCE) — (	1.ØØØØØØ)
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(BOND INS.{% OF TOTAL D/S-ACCR.-CAP.INT.}) — (	Ø.9ØØØØØ)

Dulles Airport Access Project
25% Equity Scenario

Nominal $ Cash Flows:	Asset Type	1/87	2/87	3/87	4/87	5/87	6/87
Contractor Mobilization	0	$142.2	$129.3	$143.9	$140.0		
Systemwide Design	0	$47.1	$42.9	$47.7	$46.4	$48.2	$46.9
Clear & Grub - Design	3			$150.2	$146.0	$151.8	
Clear & Grub - Install	3						$2,139.1
Drainage Struct - Design	2			$75.1	$73.0	$75.9	
Drainage Struct - Procure	2						$773.2
Drainage Struct - Install	2						
Safety Barrier - Design	2			$874.5			
Safety Barrier - Procure	2				$2,072.3	$2,152.9	$2,096.4
Safety Barrier - Install	2						
Bridges - Design	3	$75.4	$68.6	$76.3	$74.3	$77.1	$75.1
Bridges - Procure	3						
Bridges - Install	3						
Yards & Shop - Design	3			$7.0	$6.8	$7.1	$6.9
Yards & Shop - Procure	3						
Yards & Shop - Install	3						
Earthwork - Design	3					$132.0	$129.3
Earthwork- Phase 1 Install	3						
Earthwork- Phase 2 Install	3						
Stations - Design	3					$37.9	$36.9
Stations - Procure	3						
Stations - Install	3						
Aerial Structure - Design	3		$257.1	$286.2	$278.4	$289.3	$281.7
Aerial Structure - Procure	3						
Aerial Structure - Install	3						
Pedestrian Tunnel - Design	3						
Pedestrian Tunnel- Procure	3						
Pedestrian Tunnel- Install	3						
Vehicles - Design	1		$310.2	$345.3	$336.0	$349.1	$339.9
Vehicles - Procure	1						
Traction Power - Design	3			$23.5	$22.8	$23.8	$23.1
Traction Power - Procure	3						
Traction Power - Install	3						
Trackwork - Design	2						
Trackwork - Procure	2						
Trackwork - Install	2						
Ped Bridges - Design	3						
Ped Bridges - Procure	3						
Ped Bridges - Install	3						
Signals - Design	1						
Signals - Procure	1						
Signals - Install	1						
Real Est for Parking	0						
Parking K & R - Design	3						
Parking K & R - Install	3						
Fare Card - Design	1						
Fare Card - Procure	1						
Fare Card - Install	1						
System Static & Dyn Tests	0						
Start-Up Training	0						
Maintenance of Equipment	1						
Maintenance of Ways	1						
Station Access Imp	3						
Agency Coordination	0	$72.0	$65.5	$72.9	$70.9	$73.6	$71.7
Contingency	4	$469.0	$427.0	$475.0	$462.4	$480.5	$467.8
Draw Schedule		$807	$1,301	$2,578	$3,729	$3,900	$6,488
Vehicles		$0	$310	$345	$336	$349	$340
Draw less Vehicles		$807	$990	$2,233	$3,393	$3,551	$6,148

Nominal $ Cash Flows:	7/87	8/87	9/89	10/87	11/87	12/87	1/88
Contractor Mobilization							
Systemwide Design							
Clear & Grub - Design							
Clear & Grub - Install	$2,222.2	$2,233.9					
Drainage Struct - Design							
Drainage Struct - Procure	$803.1						
Drainage Struct - Install		$205.6	$200.2	$208.2	$202.5	$210.5	$211.6
Safety Barrier - Design							
Safety Barrier - Procure							
Safety Barrier - Install	$740.6	$744.5	$725.0	$753.6	$733.1	$762.0	$765.9
Bridges - Design							
Bridges - Procure	$171.5	$172.4	$168.0	$174.5	$169.9	$176.5	$177.4
Bridges - Install	$197.3	$198.3	$193.1	$200.7	$195.3	$203.0	$204.0
Yards & Shop - Design	$7.2	$7.2					
Yards & Shop - Procure			$19.8	$20.6	$20.0	$20.9	$21.0
Yards & Shop - Install			$22.5	$23.4	$22.7	$23.7	$23.8
Earthwork - Design	$134.3						
Earthwork- Phase 1 Install		$446.8	$435.0	$452.2	$439.9		
Earthwork- Phase 2 Install							
Stations - Design	$38.4	$38.6	$37.6	$39.1			
Stations - Procure					$64.2	$66.8	$67.1
Stations - Install					$73.0	$75.9	$76.3
Aerial Structure - Design	$292.6						
Aerial Structure - Procure		$609.3	$593.2	$616.7	$599.9	$623.6	$626.8
Aerial Structure - Install		$696.6	$678.3	$705.1	$686.0	$713.0	$716.7
Pedestrian Tunnel - Design	$13.0	$13.1	$12.7	$13.2	$12.8	$13.4	
Pedestrian Tunnel- Procure							$52.9
Pedestrian Tunnel- Install							$59.6
Vehicles - Design							
Vehicles - Procure	$868.3	$872.8	$849.8	$883.5	$859.4	$893.4	$898.0
Traction Power - Design	$24.0	$24.2					
Traction Power - Procure	$56.2	$56.4	$55.0	$57.1	$55.6	$57.8	$58.1
Traction Power - Install							
Trackwork - Design	$244.2	$245.5	$239.0	$248.5	$241.7	$251.3	
Trackwork - Procure					$710.7	$738.7	$742.5
Trackwork - Install							
Ped Bridges - Design							$5.4
Ped Bridges - Procure							
Ped Bridges - Install							
Signals - Design	$9.6	$9.6	$9.4	$9.7	$9.6	$9.8	
Signals - Procure					$28.7	$29.8	$29.9
Signals - Install							
Real Est for Parking	$3,089.0						
Parking K & R - Design							
Parking K & R - Install							
Fare Card - Design							
Fare Card - Procure							
Fare Card - Install							
System Static & Dyn Tests							
Start-Up Training							
Maintenance of Equipment							
Maintenance of Ways							
Station Access Imp							
Agency Coordination	$74.5	$74.9	$72.9	$75.8	$73.7	$76.6	$77.0
Contingency	$486.0	$488.6	$475.7	$494.5	$481.0	$500.1	$502.7
Draw Schedule	$9,472	$7,138	$4,787	$4,977	$5,680	$5,447	$5,317
Vehicles	$868	$873	$850	$884	$859	$893	$898
Draw less Vehicles	$8,604	$6,265	$3,937	$4,093	$4,820	$4,553	$4,419

25% Equity Scenario

Nominal $ Cash Flows:	2/88	3/88	4/88	5/88	6/88	7/88	8/88
Contractor Mobilization							
Systemwide Design							
Clear & Grub - Design							
Clear & Grub - Install							
Drainage Struct - Design							
Drainage Struct - Procure							
Drainage Struct - Install	$199.1	$214.1	$207.4				
Safety Barrier - Design							
Safety Barrier - Procure							
Safety Barrier - Install	$720.8	$775.0	$754.5				
Bridges - Design							
Bridges - Procure	$167.0	$179.5	$174.8	$181.6	$176.9	$183.7	$184.8
Bridges - Install	$192.0	$206.5	$201.0	$208.9	$203.3	$211.3	$212.5
Yards & Shop - Design							
Yards & Shop - Procure	$19.7	$21.2	$20.6	$21.5	$20.9	$21.7	$21.8
Yards & Shop - Install	$22.4	$24.1	$23.4	$24.4	$23.7	$24.6	$24.8
Earthwork - Design							
Earthwork- Phase 1 Install							
Earthwork- Phase 2 Install	$433.9	$466.7	$454.3	$472.1	$459.6	$477.6	$480.4
Stations - Design							
Stations - Procure	$63.2	$67.9	$66.1	$68.7	$66.8	$69.5	$69.9
Stations - Install	$71.8	$77.2	$75.2	$77.2	$76.1	$79.1	$79.5
Aerial Structure - Design							
Aerial Structure - Procure	$589.8	$634.3	$617.4	$641.7	$624.6	$649.2	$652.9
Aerial Structure - Install	$674.5	$725.2	$706.0	$733.7	$714.2	$742.2	$746.5
Pedestrian Tunnel - Design							
Pedestrian Tunnel- Procure	$49.8	$53.5	$52.0	$54.1	$52.6	$54.8	$55.1
Pedestrian Tunnel- Install	$56.1	$60.3	$58.8	$61.0	$59.4	$61.7	$62.1
Vehicles - Design							
Vehicles - Procure	$845.0	$908.7	$884.5	$919.3	$894.0	$930.0	$935.3
Traction Power - Design							
Traction Power - Procure	$54.6	$58.8	$57.2	$59.5	$57.9	$60.1	$60.5
Traction Power - Install		$75.9	$73.9	$76.8	$74.7	$77.7	$78.2
Trackwork - Design							
Trackwork - Procure	$698.8	$751.3	$731.4	$760.1	$739.9	$769.0	$773.4
Trackwork - Install				$873.6	$850.4	$883.0	$888.8
Ped Bridges - Design	$5.1	$5.5	$5.4	$5.5	$5.5		
Ped Bridges - Procure						$29.3	$29.4
Ped Bridges - Install							
Signals - Design							
Signals - Procure	$28.2	$30.3	$29.5	$30.6	$29.8	$31.0	$31.2
Signals - Install						$35.4	$35.6
Real Est for Parking							
Parking K & R - Design						$20.5	$20.6
Parking K & R - Install							
Fare Card - Design		$2.5	$2.5	$2.5	$2.5	$2.6	$2.6
Fare Card - Procure							
Fare Card - Install							
System Static & Dyn Tests							
Start-Up Training							
Maintenance of Equipment							
Maintenance of Ways							
Station Access Imp							
Agency Coordination	$72.5	$78.0	$75.9	$78.9	$79.3	$77.2	$80.2
Contingency	$473.1	$508.6	$495.1	$514.6	$517.6	$503.7	$523.6
Draw Schedule	$5,437	$5,925	$5,767	$5,867	$5,731	$5,996	$6,050
Vehicles	$845	$909	$885	$919	$895	$930	$935
Draw less Vehicles	$4,592	$5,016	$4,882	$4,947	$4,836	$5,066	$5,114

25% Equity Scenario

Nominal $ Cash Flows:	9/88	10/88	11/88	12/88	1/89	2/89	3/89
Contractor Mobilization							
Systemwide Design							
Clear & Grub - Design							
Clear & Grub - Install							
Drainage Struct - Design							
Drainage Struct - Procure							
Drainage Struct - Install							
Safety Barrier - Design							
Safety Barrier - Procure							
Safety Barrier - Install							
Bridges - Design							
Bridges - Procure	$180.1	$187.0	$182.1	$189.2			
Bridges - Install	$207.0	$215.1	$209.3	$217.5			
Yards & Shop - Design							
Yards & Shop - Procure	$21.2	$22.1	$21.5	$22.4			
Yards & Shop - Install	$24.1	$25.1	$24.4	$25.4			
Earthwork - Design							
Earthwork- Phase 1 Install							
Earthwork- Phase 2 Install	$467.9	$486.2	$473.2				
Stations - Design							
Stations - Procure	$68.0	$70.8	$68.8	$71.6	$72.0	$65.3	$72.8
Stations - Install	$77.4	$80.5	$78.3	$81.4	$81.9	$74.4	$82.8
Aerial Structure - Design							
Aerial Structure - Procure	$635.9	$660.9	$643.1	$668.3	$672.6	$610.8	$680.0
Aerial Structure - Install	$727.2	$755.6	$735.4	$764.2	$769.0	$698.4	$777.5
Pedestrian Tunnel - Design							
Pedestrian Tunnel- Procure	$53.6	$55.8	$54.2	$56.4			
Pedestrian Tunnel- Install	$60.5	$62.8	$61.2	$63.6			
Vehicles - Design							
Vehicles - Procure	$911.1	$946.8	$921.4	$957.4	$963.5	$875.1	$974.2
Traction Power - Design							
Traction Power - Procure	$58.9	$61.2	$59.6	$61.9			
Traction Power - Install	$76.1	$79.1	$76.9	$80.0	$80.5	$73.1	$81.4
Trackwork - Design							
Trackwork - Procure	$753.4	$782.8	$761.9	$791.7			
Trackwork - Install	$865.9	$899.7	$875.7	$909.8	$915.6	$831.6	$925.8
Ped Bridges - Design							
Ped Bridges - Procure	$28.7	$29.8	$29.0	$30.1	$30.3	$27.6	$30.7
Ped Bridges - Install					$44.4	$40.3	$44.9
Signals - Design							
Signals - Procure	$30.4	$31.5	$30.7	$31.9			
Signals - Install	$34.7	$36.0	$35.1	$36.4	$36.7	$33.3	$37.1
Real Est for Parking							
Parking K & R - Design	$20.1	$20.9	$20.4	$21.1			
Parking K & R - Install					$670.7	$609.2	$678.1
Fare Card - Design	$2.6	$2.6	$2.6	$2.6	$2.7	$2.4	
Fare Card - Procure		$102.0	$99.3	$103.1	$103.8	$94.3	
Fare Card - Install							$67.1
System Static & Dyn Tests							
Start-Up Training							
Maintenance of Equipment							
Maintenance of Ways							
Station Access Imp					$214.8	$195.0	$217.1
Agency Coordination	$78.2	$81.2	$79.1	$82.1	$82.7	$75.1	$83.6
Contingency	$509.9	$530.0	$515.7	$535.9	$539.3	$489.8	$545.3
Draw Schedule	$5,893	$6,226	$6,059	$5,804	$5,280	$4,796	$5,298
Vehicles	$911	$947	$921	$957	$964	$875	$974
Draw less Vehicles	$4,982	$5,279	$5,138	$4,847	$4,317	$3,921	$4,324

25% Equity Scenario

Nominal $ Cash Flows:	4/89	5/89	6/89	7/89	8/89	9/89	10/89
Contractor Mobilization							
Systemwide Design							
Clear & Grub - Design							
Clear & Grub - Install							
Drainage Struct - Design							
Drainage Struct - Procure							
Drainage Struct - Install							
Safety Barrier - Design							
Safety Barrier - Procure							
Safety Barrier - Install							
Bridges - Design							
Bridges - Procure							
Bridges - Install							
Yards & Shop - Design							
Yards & Shop - Procure							
Yards & Shop - Install							
Earthwork - Design							
Earthwork- Phase 1 Install							
Earthwork- Phase 2 Install							
Stations - Design							
Stations - Procure	$70.9	$73.7	$71.7	$74.6	$75.0	$73.0	$75.9
Stations - Install	$80.6	$83.8	$81.6	$84.8	$85.3	$83.0	$86.3
Aerial Structure - Design							
Aerial Structure - Procure							
Aerial Structure - Install							
Pedestrian Tunnel - Design							
Pedestrian Tunnel- Procure							
Pedestrian Tunnel- Install							
Vehicles - Design							
Vehicles - Procure	$948.7	$985.7	$959.7	$997.9	$1,003.2	$976.7	$1,015.4
Traction Power - Design							
Traction Power - Procure							
Traction Power - Install	$79.2	$82.4	$80.1				
Trackwork - Design							
Trackwork - Procure							
Trackwork - Install	$901.6	$936.6	$912.1				
Ped Bridges - Design							
Ped Bridges - Procure	$29.8	$31.0	$30.2				
Ped Bridges - Install	$43.7	$45.4	$44.2	$45.9	$46.2	$45.0	
Signals - Design							
Signals - Procure							
Signals - Install	$36.1	$37.5	$36.6	$38.0	$38.2		
Real Est for Parking							
Parking K & R - Design							
Parking K & R - Install	$660.4	$686.1	$668.1	$694.6	$698.3	$679.9	$706.8
Fare Card - Design							
Fare Card - Procure							
Fare Card - Install	$65.3	$67.9	$66.1	$68.7	$69.1	$67.3	$69.9
System Static & Dyn Tests	$274.0	$284.7	$277.2	$288.2	$289.8	$282.1	
Start-Up Training				$275.7	$277.1	$269.8	$280.5
Maintenance of Equipment				$196.4			
Maintenance of Ways				$405.8			
Station Access Imp	$211.4	$219.7	$213.9	$222.4	$223.6	$217.7	$226.3
Agency Coordination	$81.4	$84.6	$82.4	$85.6	$86.1	$83.8	$87.1
Contingency	$531.0	$551.7	$537.2	$558.6	$561.5	$546.7	$568.4
Draw Schedule	$4,014	$4,171	$4,061	$4,037	$3,453	$3,325	$3,117
Vehicles	$949	$986	$960	$998	$1,003	$977	$1,015
Draw less Vehicles	$3,066	$3,185	$3,101	$3,039	$2,450	$2,348	$2,101

Nominal $ Cash Flows:	11/89	12/89	Sum	Assets	Assets	Assets
Contractor Mobilization			$555	$555		
Systemwide Design			$279	$279		
Clear & Grub - Design			$448			
Clear & Grub - Install			$6,595			
Drainage Struct - Design			$224			$224
Drainage Struct - Procure			$1,576			$1,576
Drainage Struct - Install			$1,859			$1,859
Safety Barrier - Design			$874			$874
Safety Barrier - Procure			$6,322			$6,322
Safety Barrier - Install			$7,475			$7,475
Bridges - Design			$447			
Bridges - Procure			$3,197			
Bridges - Install			$3,676			
Yards & Shop - Design			$42			
Yards & Shop - Procure			$337			
Yards & Shop - Install			$382			
Earthwork - Design			$396			
Earthwork- Phase 1 Install			$1,774			
Earthwork- Phase 2 Install			$4,672			
Stations - Design			$228			
Stations - Procure	$73.8	$76.8	$1,825			
Stations - Install	$84.0	$87.3	$2,075			
Aerial Structure - Design			$1,685			
Aerial Structure - Procure			$12,651			
Aerial Structure - Install			$14,465			
Pedestrian Tunnel - Design			$78			
Pedestrian Tunnel- Procure			$645			
Pedestrian Tunnel- Install			$727			
Vehicles - Design			$1,681		$1,681	
Vehicles - Procure	$987.8	$1,026.8	$27,894		$27,894	
Traction Power - Design			$141			
Traction Power - Procure			$1,046			
Traction Power - Install			$1,246			
Trackwork - Design			$1,470			$1,470
Trackwork - Procure			$10,506			$10,506
Trackwork - Install			$12,471			$12,471
Ped Bridges - Design			$32			
Ped Bridges - Procure			$356			
Ped Bridges - Install			$400			
Signals - Design			$58		$58	
Signals - Procure			$424		$424	
Signals - Install			$507		$507	
Real Est for Parking			$3,089	$3,089		
Parking K & R - Design			$124			
Parking K & R - Install	$687.6	$714.7	$8,154			
Fare Card - Design			$31		$31	
Fare Card - Procure			$502		$502	
Fare Card - Install			$541		$541	
System Static & Dyn Tests			$1,696	$1,696		
Start-Up Training	$272.9	$283.7	$1,660	$1,660		
Maintenance of Equipment			$196		$196	
Maintenance of Ways			$406		$406	
Station Access Imp	$220.1	$228.9	$2,611			
Agency Coordination	$84.8	$88.1	$2,820	$2,820		
Contingency	$552.9	$574.8	$18,396	$1,194	$3,812	$5,058
Draw Schedule	$2,964	$3,081	$173,970	$11,294	$36,052	$47,836
Vehicles	$988	$1,027				
Draw less Vehicles	$1,976	$2,054				

Nominal $ Cash Flows:	Type 3 Assets
Contractor Mobilization	
Systemwide Design	
Clear & Grub - Design	$448
Clear & Grub - Install	$6,595
Drainage Struct - Design	
Drainage Struct - Procure	
Drainage Struct - Install	
Safety Barrier - Design	
Safety Barrier - Procure	
Safety Barrier - Install	
Bridges - Design	$447
Bridges - Procure	$3,197
Bridges - Install	$3,676
Yards & Shop - Design	$42
Yards & Shop - Procure	$337
Yards & Shop - Install	$382
Earthwork - Design	$396
Earthwork- Phase 1 Install	$1,774
Earthwork- Phase 2 Install	$4,672
Stations - Design	$228
Stations - Procure	$1,325
Stations - Install	$2,075
Aerial Structure - Design	$1,605
Aerial Structure - Procure	$12,651
Aerial Structure - Install	$14,465
Pedestrian Tunnel - Design	$78
Pedestrian Tunnel- Procure	$645
Pedestrian Tunnel- Install	$727
Vehicles - Design	
Vehicles - Procure	
Traction Power - Design	$141
Traction Power - Procure	$1,046
Traction Power - Install	$1,246
Trackwork - Design	
Trackwork - Procure	
Trackwork - Install	
Ped Bridges - Design	$32
Ped Bridges - Procure	$356
Ped Bridges - Install	$400
Signals - Design	
Signals - Procure	
Signals - Install	
Real Est for Parking	
Parking K & R - Design	$124
Parking K & R - Install	$8,154
Fare Card - Design	
Fare Card - Procure	
Fare Card - Install	
System Static & Dyn Tests	
Start-Up Training	
Maintenance of Equipment	
Maintenance of Ways	
Station Access Imp	$2,611
Agency Coordination	
Contingency	$8,331
Draw Schedule	$70,789
Vehicles	
Draw less Vehicles	

DULLES AIRPORT ACCESS PROJECT
ALL DEBT SCENARIO
PV CONSTRUCTION

PV DATE: 1/ 1/1987 WITH 2 COMPOUNDINGS / 360 DAY YEAR

PV RESULTS: PV TOTAL = 155,828,338.31 PV RATE = 8.0000000000
CASH - FLOW SUBTOTAL = 173,973,900.00

DATE	AMOUNT	RATE	PV FACTOR	PV AMOUNT
1/ 1/1987	806,600.00	8.0000000	1.00000000	806,600.00
2/ 1/1987	1,300,600.00	8.0000000	0.99348453	1,292,125.98
3/ 1/1987	2,577,900.00	8.0000000	0.98701152	2,544,416.99
4/ 1/1987	3,729,600.00	8.0000000	0.98058068	3,657,173.69
5/ 1/1987	3,899,900.00	8.0000000	0.97419173	3,799,250.35
6/ 1/1987	6,488,100.00	8.0000000	0.96784442	6,279,471.38
7/ 1/1987	9,471,900.00	8.0000000	0.96153846	9,107,596.15
8/ 1/1987	7,138,400.00	8.0000000	0.95527359	6,819,124.99
9/ 1/1987	4,787,000.00	8.0000000	0.94904954	4,543,100.13
10/ 1/1987	4,976,700.00	8.0000000	0.94286603	4,692,361.39
11/ 1/1987	5,679,600.00	8.0000000	0.93672282	5,320,210.94
12/ 1/1987	5,446,900.00	8.0000000	0.93061963	5,068,992.09
1/ 1/1988	5,316,800.00	8.0000000	0.92455621	4,915,680.47
2/ 1/1988	5,437,400.00	8.0000000	0.91853230	4,994,427.51
3/ 1/1988	5,925,100.00	8.0000000	0.91254763	5,406,935.96
4/ 1/1988	5,767,700.00	8.0000000	0.90660196	5,229,008.10
5/ 1/1988	5,867,600.00	8.0000000	0.90069502	5,284,918.10
6/ 1/1988	5,711,300.00	8.0000000	0.89482657	5,110,623.00
7/ 1/1988	6,015,300.00	8.0000000	0.88899636	5,347,579.80
8/ 1/1988	6,049,800.00	8.0000000	0.88320413	5,343,208.36
9/ 1/1988	5,892,800.00	8.0000000	0.87744964	5,170,635.26
10/ 1/1988	6,225,800.00	8.0000000	0.87173265	5,427,233.13
11/ 1/1988	6,058,900.00	8.0000000	0.86605290	5,247,327.94
12/ 1/1988	5,804,200.00	8.0000000	0.86041017	4,993,992.68
1/ 1/1989	5,280,500.00	8.0000000	0.85480419	4,513,793.53
2/ 1/1989	4,795,900.00	8.0000000	0.84923474	4,072,844.90
3/ 1/1989	5,298,500.00	8.0000000	0.84370158	4,470,352.83
4/ 1/1989	4,014,400.00	8.0000000	0.83820447	3,364,888.03
5/ 1/1989	4,170,700.00	8.0000000	0.83274318	3,473,121.97
6/ 1/1989	4,061,200.00	8.0000000	0.82731747	3,359,901.70
7/ 1/1989	4,037,100.00	8.0000000	0.82192711	3,318,201.92
8/ 1/1989	3,453,300.00	8.0000000	0.81657187	2,819,867.63
9/ 1/1989	3,325,100.00	8.0000000	0.81125152	2,697,492.43
10/ 1/1989	3,116,500.00	8.0000000	0.80596584	2,511,792.53
11/ 1/1989	2,963,900.00	8.0000000	0.80071459	2,373,237.98
12/ 1/1989	3,080,900.00	8.0000000	0.79549756	2,450,848.45
SUBTOTAL	173,973,900.00			155,828,338.31

RUNDATE: 09-06-1985 RUNTIME: 13:37:26

DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO
MODIFIED CONSTRUCTION DRAW SCHEDULE

	ORIGINAL	ESCALATED		MODIFIED	
DRAW DATE	DRAW	20%	VEHICLES	TOTAL	
1/1/87	807	968.4		968.4	484.2
2/1/87	990	1188.0	310.2	1498.2	594.0
3/1/87	2233	2679.6	345.3	3024.9	1339.8
4/1/87	3393	4071.6	336.0	4407.6	2035.8
5/1/87	3551	4261.2	349.1	4610.3	2130.6
6/1/87	6148	7377.6	339.9	7717.5	3688.8
7/1/87	8604	10324.8	868.3	11193.1	5162.4
8/1/87	6265	7518.0	872.8	8390.8	3759.0
9/1/87	3937	4724.4	849.8	5574.2	2362.2
10/1/87	4093	4911.6	883.5	5795.1	2455.8
11/1/87	4820	5784.0	859.4	6643.4	2892.0
12/1/87	4553	5463.6	893.4	6357.0	2731.8
1/1/88	4419	5302.8	898.0	6200.8	2651.4
2/1/88	4592	5510.4	845.0	6355.4	2755.2
3/1/88	5016	6019.2	908.7	6927.9	3009.6
4/1/88	4882	5858.4	884.5	6742.9	2929.2
5/1/88	4947	5936.4	919.3	6855.7	2968.2
6/1/88	4836	5803.2	894.8	6698.0	2901.6
7/1/88	5066	6079.2	930.0	7009.2	3039.6
8/1/88	5114	6136.8	935.3	7072.1	3068.4
9/1/88	4982	5978.4	911.1	6889.5	2989.2
10/1/88	5279	6334.8	946.8	7281.6	3167.4
11/1/88	5138	6165.6	921.4	7087.0	3082.8
12/1/88	4847	5816.4	957.4	6773.8	2908.2
1/1/89	4317	5180.4	963.5	6143.9	2590.2
2/1/89	3921	4705.2	875.1	5580.3	2352.6
3/1/89	4324	5188.8	974.2	6163.0	2594.4
4/1/89	3066	3679.2	948.7	4627.9	1839.6
5/1/89	3185	3822.0	985.7	4807.7	1911.0
6/1/89	3101	3721.2	959.7	4680.9	1860.6
7/1/89	3039	3646.8	997.9	4644.7	1823.4
8/1/89	2450	2940.0	1003.2	3943.2	1470.0
9/1/89	2348	2817.6	976.7	3794.3	1408.8
10/1/89	2101	2521.2	1015.4	3536.6	1260.6
11/1/89	1976	2371.2	987.8	3359.0	1185.6
12/1/89	2054	2464.8	1026.8	3491.6	1232.4
TOTALS	144394.0	173272.8	29574.7	202847.5	86636.4

PRINCIPAL ASSUMPTIONS
Public Development

- Full public sector development cost for construction of complete transit system as estimated by Parsons, Brinckerhoff at 20% over private sector development costs

- Operating revenues based upon mid range patronage forecasts as provided by Charles River Associates with annual inflation adjustments of 6%

- Operating expenses estimated by Parsons, Brinckerhoff for public sector operating costs at 50% above private sector operating costs with annual inflation adjustments of 6%

- Debt financing provided by tax-exempt transit system revenue bonds with a 30 year maturity and requiring 1.25x true coverage

- Equity contribution of 15% of cost of the vehicles assumed to occur through a tax benefit transfer at or about the date of operation with proceeds used to decrease the level of tax exempt debt

- Vehicle financing provided at taxable rates by an export credit agency for 12 years with 3 years of fully funded capitalized interest with 1.00x true coverage

Dulles Airport Project
Public Case - Full Capital Cost

		1990	1991	1992	1993	1994	1995
Cash Flow Statement							
Sources:							
Fare Revenue		$7,029,543	$7,715,943	$8,454,608	$9,250,549	$10,115,524	$11,055,635
Non Project Revenues		$17,044,790	$38,722,047	$38,592,699	$38,430,109	$38,239,771	$38,016,345
		============	============	============	============	============	============
		$24,074,333	$46,437,990	$47,047,307	$47,683,658	$48,355,295	$49,071,981
Uses:							
O & M Expenses		$9,835,958	$10,426,115	$11,051,682	$11,714,783	$12,417,670	$13,162,731
Lease Expense (Vehicles)		$1,819,750	$5,254,500	$5,250,750	$5,239,000	$5,227,750	$5,215,000
Net Interest Expense		$0	$22,510,900	$22,290,900	$22,048,900	$21,782,900	$21,499,400
Principal Repayment		$0	$2,095,000	$2,305,000	$2,535,000	$2,785,000	$3,065,000
Capital Expenditures		$0	$0	$0	$0	$0	$0
		============	============	============	============	============	============
		$11,655,708	$40,286,515	$40,898,332	$41,537,683	$42,213,320	$42,933,131
Net Cash Flow		$12,418,625	$6,151,475	$6,148,975	$6,145,975	$6,141,975	$6,138,850
Net Coverage		1.25	1.25	1.25	1.25	1.25	1.25
Present Value of Non-Project Revenues							
Interest Rate:	9	$12,524,997	$26,642,503	$24,315,840	$22,172,934	$20,203,055	$18,398,177
	10	$12,113,414	$25,584,591	$23,128,461	$20,889,815	$18,850,833	$17,001,066
	11	$11,717,216	$24,573,556	$22,004,420	$19,686,634	$17,599,901	$15,730,284
Present Value of Non-Project Revenues less Net Cash Flow							
Interest Rate:	9	$3,399,438	$22,410,012	$20,441,597	$18,626,904	$16,958,763	$15,423,061
	10	$3,287,729	$21,520,163	$19,443,403	$17,548,990	$15,825,579	$14,255,747
	11	$3,180,196	$20,669,743	$18,498,456	$16,538,229	$14,773,049	$13,181,785

Dulles Airport Project
Public Case - Full Capital Cost

	1996	1997	1998	1999	2000	2001	2002
Cash Flow Statement							
Sources:							
Fare Revenue	$12,065,032	$13,159,548	$14,343,047	$15,619,388	$17,791,828	$19,339,093	$21,019,113
Non Project Revenues	$37,764,275	$37,476,658	$37,139,663	$36,767,568	$35,547,062	$34,999,555	$34,384,767
	============	============	============	============	============	============	============
	$49,829,307	$50,636,207	$51,482,710	$52,386,957	$53,338,890	$54,338,647	$55,403,880
Uses:							
O & M Expenses	$13,952,494	$14,789,644	$15,677,023	$16,617,644	$17,614,703	$18,671,585	$19,791,880
Lease Expense (Vehicles)	$5,203,500	$5,190,750	$5,174,250	$5,161,000	$5,142,750	$5,121,250	$5,097,750
Net Interest Expense	$21,168,650	$20,814,650	$20,425,150	$19,996,650	$19,525,150	$19,006,650	$18,436,400
Principal Repayment	$3,370,000	$3,710,000	$4,080,000	$4,490,000	$4,940,000	$5,430,000	$5,975,000
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0
	============	============	============	============	============	============	============
	$43,694,644	$44,505,044	$45,356,423	$46,265,294	$47,222,603	$48,229,485	$49,301,030
Net Cash Flow	$6,134,663	$6,131,163	$6,126,288	$6,121,663	$6,116,288	$6,109,163	$6,102,850
Net Coverage	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Present Value of Non-Project Revenues							
Interest Rate:	$16,731,503	$15,204,848	$13,798,332	$12,508,953	$11,074,578	$9,985,123	$8,985,062
	$15,318,221	$13,788,259	$12,393,899	$11,129,004	$9,759,251	$8,715,598	$7,766,434
	$14,030,277	$12,509,531	$11,138,154	$9,906,842	$8,605,362	$7,612,425	$6,719,263
Present Value of Non-Project Revenues less Net Cash Flow							
Interest Rate:	$14,013,534	$12,717,342	$11,522,260	$10,426,259	$9,169,067	$8,242,222	$7,388,685
	$12,829,835	$11,532,507	$10,349,492	$9,276,066	$8,080,058	$7,194,285	$6,387,993
	$11,751,112	$10,462,978	$9,300,886	$8,257,390	$7,124,709	$6,283,678	$5,526,681

Dulles Airport Project
Public Case - Full Capital Cost

	2003	2004	2005	2006	2007	2008	2009
Cash Flow Statement							
Sources:							
Fare Revenue	$22,821,634	$24,775,811	$26,871,196	$29,138,666	$31,576,345	$34,199,497	$37,024,153
Non Project Revenues	$28,631,696	$27,898,783	$27,094,874	$26,191,439	$25,198,280	$24,101,163	$22,896,641
	$51,453,330	$52,674,594	$53,966,071	$55,330,105	$56,774,625	$58,300,660	$59,920,795
Uses:							
O & M Expenses	$20,979,393	$22,238,156	$23,572,446	$24,986,792	$26,486,000	$28,075,160	$29,759,670
Lease Expense (Vehicles)	$0	$0	$0	$0	$0	$0	$0
Net Interest Expense	$17,809,150	$17,119,150	$16,359,900	$15,524,650	$14,605,900	$13,595,400	$12,483,900
Principal Repayment	$6,570,000	$7,230,000	$7,955,000	$8,750,000	$9,625,000	$10,585,000	$11,645,000
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0
	$45,358,543	$46,587,306	$47,867,346	$49,261,442	$50,716,900	$52,255,560	$53,888,570
Net Cash Flow	$6,094,788	$6,087,288	$6,078,725	$6,068,663	$6,057,725	$6,045,100	$6,032,225
Net Coverage	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Present Value of Non-Project Revenues							
Interest Rate:	$6,849,720	$6,111,931	$5,435,603	$4,811,576	$4,239,028	$3,712,794	$3,229,996
	$5,865,757	$5,184,223	$4,566,747	$4,004,060	$3,494,005	$3,031,252	$2,612,024
	$5,026,871	$4,400,794	$3,839,971	$3,334,996	$2,882,716	$2,477,217	$2,114,428
Present Value of Non-Project Revenues less Net Cash Flow							
Interest Rate:	$5,391,630	$4,778,357	$4,216,127	$3,696,714	$3,219,956	$2,781,544	$2,379,039
	$4,617,122	$4,053,068	$3,542,199	$3,076,303	$2,654,099	$2,270,947	$1,923,874
	$3,956,808	$3,440,576	$2,978,475	$2,562,264	$2,189,704	$1,855,077	$1,557,372

	2010	
Cash Flow Statement		
Sources:		
Fare Revenue	$40,067,108	
Non Project Revenues	$21,567,080	
	============	
	$61,634,187	
Uses:		
O & M Expenses	$31,545,250	
Lease Expense (Vehicles)	$0	
Net Interest Expense	$11,261,150	
Principal Repayment	$12,810,000	
Capital Expenditures	$0	
	============	
	$55,616,400	
Net Cash Flow	$6,017,788	
Net Coverage	1.25	
Present Value of		Totals
Non-Project Revenues		
Interest Rate:	$2,786,051	$249,716,401
	$2,231,609	$227,431,595
	$1,789,401	$207,690,259
Present Value of Non-Project Revenues less Net Cash Flow		
Interest Rate:	$2,008,669	$199,211,182
	$1,608,931	$181,278,390
	$1,290,110	$165,380,079

Dulles Airport Project
Public Case - Full Capital Cost

Fare Revenue		1990	1991	1992	1993	1994	1995
Annual Revenue (1985 $)		5,253,769	5,437,592	5,621,415	5,805,238	5,989,061	6,172,884
Inflation Factor		1.338	1.419	1.504	1.594	1.689	1.791
Fare Revenue (Current $)		$7,029,543	$7,715,943	$8,454,606	$9,253,549	$10,115,524	$11,055,635

O & M Expenses	1985	1990	1991	1992	1993	1994	1995
Cost Base	$7,350,000						
Inflation Factor	6.00 %						
O & M Expenses		$9,835,958	$10,426,115	$11,051,682	$11,714,783	$12,417,670	$13,162,731

Equipment Finance		1990	1991	1992	1993	1994	1995
Issuance Cost							
Capitalized Interest							
Net Interest Expense		$1,819,750	$3,554,500	$3,375,750	$3,179,000	$2,[illegible],750	$2,725,000
Principal Repayment		$0	$1,700,000	$1,875,000	$2,060,000	$2,265,000	$2,490,000
Lease Expense		$1,819,750	$5,254,500	$5,250,750	$5,239,000	$5,227,750	$5,215,000

Transit Sys Revenue Bonds		1990	1991	1992	1993	1994	1995
Net Interest Expense		$9,934,900	$22,510,900	$22,290,900	$22,048,900	$21,782,900	$21,490,400
Principal Repayment		$0	$2,095,000	$2,305,000	$2,535,000	$2,785,000	$3,065,000
Net Debt Service		$9,934,900	$24,605,900	$24,595,900	$24,583,900	$24,567,900	$24,555,400
Coverage Ratio		1.25	1.25	1.25	1.25	1.25	1.25

Equity Account	1987	1990	1991	1992	1993	1994	1995
Paid in Capital	$26,023,265						
Net Benefit Received		$0	$0	$0	$0	$0	$0
Internal Rate of Return (after tax)		0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

Depreciation		1990	1991	1992	1993	1994	1995
5 Year Assets							
Depreciable Base	$28,096,093						
Depreciation Schedule		20.00 %	20.00 %	20.00 %	20.00 %	20.00 %	
Depreciation Amount		$5,619,219	$5,619,219	$5,619,219	$5,619,219	$5,619,219	$0
Investment Tax Credit		$2,957,483					
18 Year Assets							
Depreciable Base	$0						
Depreciation Schedule		5.556 %	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %
Depreciation Amount		$0	$0	$0	$0	$0	$0
Depreciation		$5,619,219	$5,619,219	$5,619,219	$5,619,219	$5,619,219	$0

Fare Revenue	1996	1997	1998	1999	2000	2001	2002
Annual Revenue (1985 $)	6,356,708	6,540,531	6,724,354	6,908,177	7,422,540	7,613,016	7,805,092
Inflation Factor	1.898	2.012	2.133	2.261	2.397	2.540	2.693
Fare Revenue (Current $)	$12,065,032	$13,159,548	$14,343,047	$15,619,368	$17,791,828	$19,339,093	$21,019,113

O & M Expenses	1996	1997	1998	1999	2000	2001	2002
Cost Base							
Inflation Factor							
O & M Expenses	$13,952,494	$14,789,644	$15,677,023	$16,617,644	$17,614,703	$18,671,585	$19,791,880

Equipment Finance	1996	1997	1998	1999	2000	2001	2002
Issuance Cost							
Capitalized Interest							
Net Interest Expense	$2,463,500	$2,175,750	$1,859,250	$1,511,000	$1,127,750	$706,250	$242,750
Principal Repayment	$2,740,000	$3,015,000	$3,315,000	$3,650,000	$4,015,000	$4,415,000	$4,855,000
Lease Expense	$5,203,500	$5,190,750	$5,174,250	$5,161,000	$5,142,750	$5,121,250	$5,097,750

Transit Sys Revenue Bonds	1996	1997	1998	1999	2000	2001	2002
Net Interest Expense	$21,168,650	$20,814,650	$20,425,150	$19,996,650	$19,525,150	$19,006,650	$18,436,400
Principal Repayment	$3,370,000	$3,710,000	$4,080,000	$4,490,000	$4,940,000	$5,430,000	$5,975,000
Net Debt Service	$24,538,650	$24,524,650	$24,505,150	$24,486,650	$24,465,150	$24,436,650	$24,411,400
Coverage Ratio	1.25	1.25	1.25	1.25	1.25	1.25	1.25

Equity Account	1996	1997	1998	1999	2000	2001	2002
Paid in Capital							
Net Benefit Received	$0	$0	$0	$0	$0	$0	$0
Internal Rate of Return (after tax)	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

Depreciation	1996	1997	1998	1999	2000	2001	2002
5 Year Assets							
Depreciable Base							
Depreciation Schedule							
Depreciation Amount	$0	$0	$0	$0	$0	$0	$0
Investment Tax Credit							
18 Year Assets							
Depreciable Base							
Depreciation Schedule	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %
Depreciation Amount	$0	$0	$0	$0	$0	$0	$0
Depreciation	$0	$0	$0	$0	$0	$0	$0

Dulles Airport Project
Public Case - Full Capital Cost

Fare Revenue	2003	2004	2005	2006	2007	2008	2009
Annual Revenue (1985 $)	7,996,368	8,187,644	8,378,920	8,570,196	8,761,472	8,952,748	9,144,024
Inflation Factor	2.854	3.026	3.207	3.400	3.604	3.820	4.049
Fare Revenue (Current $)	$22,821,634	$24,775,811	$26,871,196	$29,138,666	$31,576,345	$34,199,497	$37,024,153

O & M Expenses	2003	2004	2005	2006	2007	2008	2009
Cost Base							
Inflation Factor							
O & M Expenses	$20,979,393	$22,239,156	$23,572,446	$24,986,792	$26,486,000	$28,075,160	$29,759,670

Equipment Finance	2003	2004	2005	2006	2007	2008	2009
Issuance Cost							
Capitalized Interest							
Net Interest Expense							
Principal Repayment							
Lease Expense							

Transit Sys Revenue Bonds	2003	2004	2005	2006	2007	2008	2009
Net Interest Expense	$17,809,150	$17,119,150	$16,359,900	$15,524,650	$14,605,900	$13,595,400	$12,483,900
Principal Repayment	$6,570,000	$7,230,000	$7,955,000	$8,750,000	$9,625,000	$10,585,000	$11,645,000
Net Debt Service	$24,379,150	$24,349,150	$24,314,900	$24,274,650	$24,230,900	$24,180,400	$24,128,900
Coverage Ratio	1.25	1.25	1.25	1.25	1.25	1.25	1.25

Equity Account	2003	2004	2005	2006	2007	2008	2009
Paid in Capital							
Net Benefit Received	$0	$0	$0	$0	$0	$0	$0
Internal Rate of Return (after tax)	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

Depreciation	2003	2004	2005	2006	2007	2008	2009
5 Year Assets							
Depreciable Base							
Depreciation Schedule							
Depreciation Amount	$0	$0	$0	$0	$0	$0	$0
Investment Tax Credit							
18 Year Assets							
Depreciable Base							
Depreciation Schedule	5.556 %	5.556 %	5.556 %	5.556 %	5.556 %		
Depreciation Amount	$0	$0	$0	$0	$0	$0	$0
Depreciation	$0	$0	$0	$0	$0	$0	$0

Fare Revenue	2010
Annual Revenue (1985 $)	9,335,300
Inflation Factor	4.292
Fare Revenue (Current $)	$40,067,108

O & M Expenses	2010
Cost Base	
Inflation Factor	
O & M Expenses	$31,545,250

Equipment Finance	2010
Issuance Cost	
Capitalized Interest	
Net Interest Expense	
Principal Repayment	
Lease Expense	

Transit Sys Revenue Bonds	2010
Net Interest Expense	$11,261,150
Principal Repayment	$12,810,000
Net Debt Service	$24,071,150
Coverage Ratio	1.25

Equity Account	2010
Paid in Capital	
Net Benefit Received	$0
Internal Rate of Return (after tax)	0.00 %

Depreciation	2010
5 Year Assets	
Depreciable Base	
Depreciation Schedule	
Depreciation Amount	$0
Investment Tax Credit	
18 Year Assets	
Depreciable Base	
Depreciation Schedule	
Depreciation Amount	$0
Depreciation	$0

DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO

SOURCES AND USES OF FUNDS

DELIVERY DATE: 1/ 1/87

SOURCES

PAR AMOUNT OF BONDS..................	$253,615,000.00	
+PREMIUM /-DISCOUNT..................	$0.00	
BOND PROCEEDS..		253,615,000.00
EQUITY...		3,902,153.00
		$257,517,153.00

USES OF FUNDS

UNDERWRITERS DISCOUNT (% or $)..........(2.500000%)...		6,340,375.00
COST OF ISSUANCE.......................(1.000000%)...		2,536,150.00
BOND INS.{% OF TOTAL D/S-ACCR.-CAP.INT.}(0.900000%)...		6,676,789.04
CAPITALIZED INTEREST.................................		75,528,550.78
DEBT SERVICE RESERVE.................................		27,458,500.00
NET CONSTRUCTION FUND AMOUNT.........................		138,975,199.04
CONTINGENCY..		1,589.14
		$257,517,153.00

RUNDATE: 09-30-1985 RUNTIME: 10:53:44

DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO

CONSTRUCTION FUND

DELIVERY DATE: 1/ 1/87

DRAW DATE	CONSTRUCTION FUND BALANCE	CONSTRUCTION DRAW NEEDED	NET CONSTR. FUND DRAW	INV. RATE OF DRAW	CONSTR. FUND EARNINGS	DEBT SERVICE RESERVE (10.000000 %)	CAPITALIZED INT. EARNINGS (9.000000 %)	REMAINING CONSTR. FUNDS
1/ 1/87	138,975,199.04	968,400.00	968,400.00	8.000000				138,006,799.04
2/ 1/87	138,006,799.04	1,188,000.00	267,954.67	8.000000	920,045.33			137,738,844.37
3/ 1/87	137,738,844.37	2,679,600.00	1,761,341.04	8.000000	918,258.96			135,977,503.33
4/ 1/87	135,977,503.33	4,071,600.00	3,165,083.31	8.000000	906,516.69			132,812,420.02
5/ 1/87	132,812,420.02	4,261,200.00	3,375,783.87	8.000000	885,416.13			129,436,636.15
6/ 1/87	129,436,636.15	7,377,600.00	6,514,689.09	8.000000	862,910.91			122,921,947.06
7/ 1/87	122,921,947.06	10,324,800.00	4,669,242.49	8.000000	819,479.65	1,372,925.00	3,463,152.87	118,252,704.57
8/ 1/87	118,252,704.57	7,518,000.00	6,729,648.64	8.000000	788,351.36			111,523,055.94
9/ 1/87	111,523,055.94	4,724,400.00	3,980,912.96	8.000000	743,487.04			107,542,142.98
10/ 1/87	107,542,142.98	4,911,600.00	4,194,652.38	8.000000	716,947.62			103,347,490.60
11/ 1/87	103,347,490.60	5,784,000.00	5,095,016.73	8.000000	688,983.27			98,252,473.87
12/ 1/87	98,252,473.87	5,463,600.00	4,808,583.51	8.000000	655,016.49			93,443,890.36
1/ 1/88	93,443,890.36	5,302,800.00	425,203.59	8.000000	622,959.27	1,372,925.00	2,881,712.14	93,018,686.77
2/ 1/88	93,018,686.77	5,510,400.00	4,890,275.42	8.000000	620,124.58			88,128,411.34
3/ 1/88	88,128,411.34	6,019,200.00	5,431,677.26	8.000000	587,522.74			82,696,734.09
4/ 1/88	82,696,734.09	5,858,400.00	5,307,088.44	8.000000	551,311.56			77,389,645.65
5/ 1/88	77,389,645.65	5,936,400.00	5,420,469.03	8.000000	515,930.97			71,969,176.62
6/ 1/88	71,969,176.62	5,803,200.00	5,323,405.49	8.000000	479,794.51			66,645,771.13
7/ 1/88	66,645,771.13	6,079,200.00	1,961,698.45	8.000000	444,305.14	1,372,925.00	2,300,271.41	64,684,072.68
8/ 1/88	64,684,072.68	6,136,800.00	5,705,572.85	8.000000	431,227.15			58,978,499.83
9/ 1/88	58,978,499.83	5,978,400.00	5,585,210.00	8.000000	393,190.00			53,393,289.83
10/ 1/88	53,393,289.83	6,334,800.00	5,978,844.73	8.000000	355,955.27			47,414,445.09
11/ 1/88	47,414,445.09	6,165,600.00	5,849,503.70	8.000000	316,096.30			41,564,941.39
12/ 1/88	41,564,941.39	5,816,400.00	5,539,300.39	8.000000	277,099.61			36,025,641.00
1/ 1/89	36,025,641.00	5,180,400.00	1,848,473.38	8.000000	240,170.94	1,372,925.00	1,718,830.68	34,177,167.62
2/ 1/89	34,177,167.62	4,705,200.00	4,477,352.22	8.000000	227,847.78			29,699,815.40
3/ 1/89	29,699,815.40	5,188,800.00	4,990,801.23	8.000000	197,998.77			24,709,014.17
4/ 1/89	24,709,014.17	3,679,200.00	3,514,473.24	8.000000	164,726.76			21,194,540.93
5/ 1/89	21,194,540.93	3,822,000.00	3,680,703.06	8.000000	141,296.94			17,513,837.87
6/ 1/89	17,513,837.87	3,721,200.00	3,604,441.08	8.000000	116,758.92			13,909,396.79
7/ 1/89	13,909,396.79	3,646,800.00	1,043,755.74	8.000000	92,729.31	1,372,925.00	1,137,389.95	12,865,641.05
8/ 1/89	12,865,641.05	2,940,000.00	2,854,229.06	8.000000	85,770.94			10,011,411.99
9/ 1/89	10,011,411.99	2,817,600.00	2,750,857.25	8.000000	66,742.75			7,260,554.74
10/ 1/89	7,260,554.74	2,521,200.00	2,472,796.30	8.000000	48,403.70			4,787,758.43
11/ 1/89	4,787,758.43	2,371,200.00	2,339,281.61	8.000000	31,918.39			2,448,476.82
12/ 1/89	2,448,476.82	2,464,800.00	2,448,476.82	8.000000	16,323.18			0.00
		173,272,800.00	138,975,199.04		15,931,618.93	6,864,625.00	11,501,357.03	

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DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO

NET DEBT SERVICE REQUIREMENTS

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	PRINCIPAL	COUPON	INTEREST	TOTAL DEBT SERVICE	CONSTR. FUND EARNINGS	DEBT SVC. RES. + CAP. INT.	NET DEBT SERVICE	SURPLUS FUNDS REMAINING
7/ 1/87			12,680,750.00	12,680,750.00		75,528,550.78		62,847,800.78
1/ 1/88			12,680,750.00	12,680,750.00				50,167,050.78
7/ 1/88			12,680,750.00	12,680,750.00				37,486,300.78
1/ 1/89			12,680,750.00	12,680,750.00				24,805,550.78
7/ 1/89			12,680,750.00	12,680,750.00				12,124,800.78
1/ 1/90			12,680,750.00	12,680,750.00		1,928,874.22		1,372,925.00
7/ 1/90			12,680,750.00	12,680,750.00		1,372,925.00	9,934,900.00	
1/ 1/91	2,095,000.00	10.000000	12,680,750.00	14,775,750.00		1,372,925.00	13,402,825.00	
7/ 1/91			12,576,000.00	12,576,000.00		1,372,925.00	11,203,075.00	
1/ 1/92	2,305,000.00	10.000000	12,576,000.00	14,881,000.00		1,372,925.00	13,508,075.00	
7/ 1/92			12,460,750.00	12,460,750.00		1,372,925.00	11,087,825.00	
1/ 1/93	2,535,000.00	10.000000	12,460,750.00	14,995,750.00		1,372,925.00	13,622,825.00	
7/ 1/93			12,334,000.00	12,334,000.00		1,372,925.00	10,961,075.00	
1/ 1/94	2,785,000.00	10.000000	12,334,000.00	15,119,000.00		1,372,925.00	13,746,075.00	
7/ 1/94			12,194,750.00	12,194,750.00		1,372,925.00	10,821,825.00	
1/ 1/95	3,065,000.00	10.000000	12,194,750.00	15,259,750.00		1,372,925.00	13,886,825.00	
7/ 1/95			12,041,500.00	12,041,500.00		1,372,925.00	10,668,575.00	
1/ 1/96	3,370,000.00	10.000000	12,041,500.00	15,411,500.00		1,372,925.00	14,038,575.00	
7/ 1/96			11,873,000.00	11,873,000.00		1,372,925.00	10,500,075.00	
1/ 1/97	3,710,000.00	10.000000	11,873,000.00	15,583,000.00		1,372,925.00	14,210,075.00	
7/ 1/97			11,687,500.00	11,687,500.00		1,372,925.00	10,314,575.00	
1/ 1/98	4,080,000.00	10.000000	11,687,500.00	15,767,500.00		1,372,925.00	14,394,575.00	
7/ 1/98			11,483,500.00	11,483,500.00		1,372,925.00	10,110,575.00	
1/ 1/99	4,490,000.00	10.000000	11,483,500.00	15,973,500.00		1,372,925.00	14,600,575.00	
7/ 1/99			11,259,000.00	11,259,000.00		1,372,925.00	9,886,075.00	
1/ 1/ 0	4,940,000.00	10.000000	11,259,000.00	16,199,000.00		1,372,925.00	14,826,075.00	
7/ 1/ 0			11,012,000.00	11,012,000.00		1,372,925.00	9,639,075.00	
1/ 1/ 1	5,430,000.00	10.000000	11,012,000.00	16,442,000.00		1,372,925.00	15,069,075.00	
7/ 1/ 1			10,740,500.00	10,740,500.00		1,372,925.00	9,367,575.00	
1/ 1/ 2	5,975,000.00	10.000000	10,740,500.00	16,715,500.00		1,372,925.00	15,342,575.00	
7/ 1/ 2			10,441,750.00	10,441,750.00		1,372,925.00	9,068,825.00	
1/ 1/ 3	6,570,000.00	10.000000	10,441,750.00	17,011,750.00		1,372,925.00	15,638,825.00	
7/ 1/ 3			10,113,250.00	10,113,250.00		1,372,925.00	8,740,325.00	
1/ 1/ 4	7,230,000.00	10.000000	10,113,250.00	17,343,250.00		1,372,925.00	15,970,325.00	
7/ 1/ 4			9,751,750.00	9,751,750.00		1,372,925.00	8,378,825.00	
1/ 1/ 5	7,955,000.00	10.000000	9,751,750.00	17,706,750.00		1,372,925.00	16,333,825.00	
7/ 1/ 5			9,354,000.00	9,354,000.00		1,372,925.00	7,981,075.00	
1/ 1/ 6	8,750,000.00	10.000000	9,354,000.00	18,104,000.00		1,372,925.00	16,731,075.00	
7/ 1/ 6			8,916,500.00	8,916,500.00		1,372,925.00	7,543,575.00	
1/ 1/ 7	9,625,000.00	10.000000	8,916,500.00	18,541,500.00		1,372,925.00	17,168,575.00	
7/ 1/ 7			8,435,250.00	8,435,250.00		1,372,925.00	7,062,325.00	
1/ 1/ 8	10,585,000.00	10.000000	8,435,250.00	19,020,250.00		1,372,925.00	17,647,325.00	

DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO

NET DEBT SERVICE REQUIREMENTS

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	PRINCIPAL	COUPON	INTEREST	TOTAL DEBT SERVICE	CONSTR. FUND EARNINGS	DEBT SVC. RES. + CAP. INT.	NET DEBT SERVICE	SURPLUS FUND REMAINING
7/ 1/ 8			7,906,000.00	7,906,000.00		1,372,925.00	6,533,075.00	
1/ 1/ 9	11,645,000.00	10.000000	7,906,000.00	19,551,000.00		1,372,925.00	18,178,075.00	
7/ 1/ 9			7,323,750.00	7,323,750.00		1,372,925.00	5,950,825.00	
1/ 1/10	12,810,000.00	10.000000	7,323,750.00	20,133,750.00		1,372,925.00	18,760,825.00	
7/ 1/10			6,683,250.00	6,683,250.00		1,372,925.00	5,310,325.00	
1/ 1/11	14,090,000.00	10.000000	6,683,250.00	20,773,250.00		1,372,925.00	19,400,325.00	
7/ 1/11			5,978,750.00	5,978,750.00		1,372,925.00	4,605,825.00	
1/ 1/12	15,500,000.00	10.000000	5,978,750.00	21,478,750.00		1,372,925.00	20,105,825.00	
7/ 1/12			5,203,750.00	5,203,750.00		1,372,925.00	3,830,825.00	
1/ 1/13	17,045,000.00	10.000000	5,203,750.00	22,248,750.00		1,372,925.00	20,875,825.00	
7/ 1/13			4,351,500.00	4,351,500.00		1,372,925.00	2,978,575.00	
1/ 1/14	18,750,000.00	10.000000	4,351,500.00	23,101,500.00		1,372,925.00	21,728,575.00	
7/ 1/14			3,414,000.00	3,414,000.00		1,372,925.00	2,041,075.00	
1/ 1/15	20,630,000.00	10.000000	3,414,000.00	24,044,000.00		1,372,925.00	22,671,075.00	
7/ 1/15			2,382,500.00	2,382,500.00		1,372,925.00	1,009,575.00	
1/ 1/16	22,690,000.00	10.000000	2,382,500.00	25,072,500.00		1,372,925.00	23,699,575.00	
7/ 1/16			1,248,000.00	1,248,000.00		1,372,925.00		124,925.0
1/ 1/17	24,960,000.00	10.000000	1,248,000.00	26,208,000.00		28,831,425.00		2,748,350.0
	253,615,000.00		563,779,000.00	817,394,000.00		179,053,875.00	641,088,475.00	

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DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO

DEBT SERVICE SCHEDULE

DELIVERY DATE: 1/ 1/87

DATE	PRINCIPAL	COUPON	INTEREST	PERIOD TOTAL	FISCAL TOTAL
1/ 1/88			25,361,500.00	25,361,500.00	25,361,500.00
1/ 1/89			25,361,500.00	25,361,500.00	25,361,500.00
1/ 1/90			25,361,500.00	25,361,500.00	25,361,500.00
1/ 1/91	2,095,000.00	10.000000	25,361,500.00	27,456,500.00	27,456,500.00
1/ 1/92	2,305,000.00	10.000000	25,152,000.00	27,457,000.00	27,457,000.00
1/ 1/93	2,535,000.00	10.000000	24,921,500.00	27,456,500.00	27,456,500.00
1/ 1/94	2,785,000.00	10.000000	24,668,000.00	27,453,000.00	27,453,000.00
1/ 1/95	3,065,000.00	10.000000	24,389,500.00	27,454,500.00	27,454,500.00
1/ 1/96	3,370,000.00	10.000000	24,083,000.00	27,453,000.00	27,453,000.00
1/ 1/97	3,710,000.00	10.000000	23,746,000.00	27,456,000.00	27,456,000.00
1/ 1/98	4,080,000.00	10.000000	23,375,000.00	27,455,000.00	27,455,000.00
1/ 1/99	4,490,000.00	10.000000	22,967,000.00	27,457,000.00	27,457,000.00
1/ 1/ 0	4,940,000.00	10.000000	22,518,000.00	27,458,000.00	27,458,000.00
1/ 1/ 1	5,430,000.00	10.000000	22,024,000.00	27,454,000.00	27,454,000.00
1/ 1/ 2	5,975,000.00	10.000000	21,481,000.00	27,456,000.00	27,456,000.00
1/ 1/ 3	6,570,000.00	10.000000	20,883,500.00	27,453,500.00	27,453,500.00
1/ 1/ 4	7,230,000.00	10.000000	20,226,500.00	27,456,500.00	27,456,500.00
1/ 1/ 5	7,955,000.00	10.000000	19,503,500.00	27,458,500.00	27,458,500.00
1/ 1/ 6	8,750,000.00	10.000000	18,708,000.00	27,458,000.00	27,458,000.00
1/ 1/ 7	9,625,000.00	10.000000	17,833,000.00	27,458,000.00	27,458,000.00
1/ 1/ 8	10,585,000.00	10.000000	16,870,500.00	27,455,500.00	27,455,500.00
1/ 1/ 9	11,645,000.00	10.000000	15,812,000.00	27,457,000.00	27,457,000.00
1/ 1/10	12,810,000.00	10.000000	14,647,500.00	27,457,500.00	27,457,500.00
1/ 1/11	14,090,000.00	10.000000	13,366,500.00	27,456,500.00	27,456,500.00
1/ 1/12	15,500,000.00	10.000000	11,957,500.00	27,457,500.00	27,457,500.00
1/ 1/13	17,045,000.00	10.000000	10,407,500.00	27,452,500.00	27,452,500.00
1/ 1/14	18,750,000.00	10.000000	8,703,000.00	27,453,000.00	27,453,000.00
1/ 1/15	20,630,000.00	10.000000	6,828,000.00	27,458,000.00	27,458,000.00
1/ 1/16	22,690,000.00	10.000000	4,765,000.00	27,455,000.00	27,455,000.00
1/ 1/17	24,960,000.00	10.000000	2,496,000.00	27,456,000.00	27,456,000.00
	253,615,000.00		563,779,000.00	817,394,000.00	
ACCRUED					
	253,615,000.00		563,779,000.00	817,394,000.00	

DATED 1/ 1/87 WITH DELIVERY OF 1/ 1/87
BOND YEARS 5,637,790.000
AVERAGE COUPON 10.000
AVERAGE LIFE 22.230
N I C % 10.000000 % USING 100.0000000

BOND INSURANCE: ... 0.900000 % OF
(TOTAL DEBT SERVICE - ACCRUED - CAP. INT.) = 6,676,789.04

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DULLES AIRPORT ACCESS PROJECT
PUBLIC OWNERSHIP SCENARIO

CAPITALIZED INTEREST FUND

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	BEGINNING BALANCE	ACCRUED INTEREST	CONSTR. FUND EARNINGS	DEBT SERVICE RESERVE (10.000000 %)	CAPITALIZED INT. EARNINGS (9.000000 %)	TOTAL FUNDS AVAILABLE	BOND INTEREST CAPITALIZED (100.000000 %)	ENDING BALANCE
7/ 1/87	75,528,550.78					75,528,550.78	12,680,750.00	62,847,800.78
1/ 1/88	62,847,800.78					62,847,800.78	12,680,750.00	50,167,050.78
7/ 1/88	50,167,050.78					50,167,050.78	12,680,750.00	37,486,300.78
1/ 1/89	37,486,300.78					37,486,300.78	12,680,750.00	24,805,550.78
7/ 1/89	24,805,550.78					24,805,550.78	12,680,750.00	12,124,800.78
1/ 1/90	12,124,800.78				555,949.22	12,680,750.00	12,680,750.00	
					555,949.22		76,084,500.00	

RUNDATE: 09-30-1985 RUNTIME: 10:53:33

S C R E E N - A

```
------ G E N E R A L   B O N D   I N F O R M A T I O N ------

PAR AMOUNT ---------------------------------------- (    253,615,000)
DATED DATE -------------------------------------- * (      1/ 1/87   )
DELIVERY DATE ----------------------------------- * (      1/ 1/87   )
1ST COUPON DATE --------------------------------- * (      7/ 1/87   )
1ST MATURITY DATE ------------------------------- * (      1/ 1/91   )
LAST MATURITY DATE ------------------------------ * (      1/ 1/17   )
FISCAL DATE FOR BOND SOLUTIONS AND REPORTS ------ (      1/ 1/91   )
BOND INTEREST  FREQUENCY <ANN,SEM,QUA,MON> ------ (SEMI-ANNUAL     )
BOND PRINCIPAL FREQUENCY <ANN,SEM,QUA,MON> ------ (ANNUAL          )
YEAR <360 OR 365> ------------------------------- (             360)
BOND DENOMINATION ------------------------------- (           5,000)
FILENAME FOR SAVINGS THIS ISSUE ----------------- (DART            )
KEYNAME OF THIS ISSUE --------------------------- (LEVPUBESC       )

---------------- R E P O R T   T I T L E S ----------------
(DULLES AIRPORT ACCESS PROJECT                                     )
(PUBLIC OWNERSHIP SCENARIO                                         )
(                                                                  )
```

SCREEN - B

NO.	DATE	AMOUNT	COUPON	YIELD	PRICE
1)	1/ 1/91	2,095,000.00	10.000000	0.000000	100.000000
2)	1/ 1/92	2,305,000.00	10.000000	0.000000	100.000000
3)	1/ 1/93	2,535,000.00	10.000000	0.000000	100.000000
4)	1/ 1/94	2,785,000.00	10.000000	0.000000	100.000000
5)	1/ 1/95	3,065,000.00	10.000000	0.000000	100.000000
6)	1/ 1/96	3,370,000.00	10.000000	0.000000	100.000000
7)	1/ 1/97	3,710,000.00	10.000000	0.000000	100.000000
8)	1/ 1/98	4,080,000.00	10.000000	0.000000	100.000000
9)	1/ 1/99	4,490,000.00	10.000000	0.000000	100.000000
10)	1/ 1/ 0	4,940,000.00	10.000000	0.000000	100.000000
11)	1/ 1/ 1	5,430,000.00	10.000000	0.000000	100.000000
12)	1/ 1/ 2	5,975,000.00	10.000000	0.000000	100.000000
13)	1/ 1/ 3	6,570,000.00	10.000000	0.000000	100.000000
14)	1/ 1/ 4	7,230,000.00	10.000000	0.000000	100.000000
15)	1/ 1/ 5	7,955,000.00	10.000000	0.000000	100.000000
16)	1/ 1/ 6	8,750,000.00	10.000000	0.000000	100.000000
17)	1/ 1/ 7	9,625,000.00	10.000000	0.000000	100.000000
18)	1/ 1/ 8	10,585,000.00	10.000000	0.000000	100.000000
19)	1/ 1/ 9	11,645,000.00	10.000000	0.000000	100.000000
20)	1/ 1/10	12,810,000.00	10.000000	0.000000	100.000000
21)	1/ 1/11	14,090,000.00	10.000000	0.000000	100.000000
22)	1/ 1/12	15,500,000.00	10.000000	0.000000	100.000000
23)	1/ 1/13	17,045,000.00	10.000000	0.000000	100.000000
24)	1/ 1/14	18,750,000.00	10.000000	0.000000	100.000000
25)	1/ 1/15	20,630,000.00	10.000000	0.000000	100.000000
26)	1/ 1/16	22,690,000.00	10.000000	0.000000	100.000000
27)	1/ 1/17	24,960,000.00	10.000000	0.000000	100.000000

S C R E E N - C

NO.	DATE	MAXIMUM D/S
1)	1/ 1/91	1ØØ,ØØØ,ØØØ
2)	1/ 1/92	1ØØ,ØØØ,ØØØ
3)	1/ 1/93	1ØØ,ØØØ,ØØØ
4)	1/ 1/94	1ØØ,ØØØ,ØØØ
5)	1/ 1/95	1ØØ,ØØØ,ØØØ
6)	1/ 1/96	1ØØ,ØØØ,ØØØ
7)	1/ 1/97	1ØØ,ØØØ,ØØØ
8)	1/ 1/98	1ØØ,ØØØ,ØØØ
9)	1/ 1/99	1ØØ,ØØØ,ØØØ
1Ø)	1/ 1/ Ø	1ØØ,ØØØ,ØØØ
11)	1/ 1/ 1	1ØØ,ØØØ,ØØØ
12)	1/ 1/ 2	1ØØ,ØØØ,ØØØ
13)	1/ 1/ 3	1ØØ,ØØØ,ØØØ
14)	1/ 1/ 4	1ØØ,ØØØ,ØØØ
15)	1/ 1/ 5	1ØØ,ØØØ,ØØØ
16)	1/ 1/ 6	1ØØ,ØØØ,ØØØ
17)	1/ 1/ 7	1ØØ,ØØØ,ØØØ
18)	1/ 1/ 8	1ØØ,ØØØ,ØØØ
19)	1/ 1/ 9	1ØØ,ØØØ,ØØØ
2Ø)	1/ 1/1Ø	1ØØ,ØØØ,ØØØ
21)	1/ 1/11	1ØØ,ØØØ,ØØØ
22)	1/ 1/12	1ØØ,ØØØ,ØØØ
23)	1/ 1/13	1ØØ,ØØØ,ØØØ
24)	1/ 1/14	1ØØ,ØØØ,ØØØ
25)	1/ 1/15	1ØØ,ØØØ,ØØØ
26)	1/ 1/16	1ØØ,ØØØ,ØØØ
27)	1/ 1/17	1ØØ,ØØØ,ØØØ

S C R E E N - D

——————— GENERAL CONSTRUCTION FUND INFORMATION ———————

```
TOTAL CONSTRUCTION FUND AMOUNT ————————— (     173,272,800)
1ST DRAW DATE ———————————————————— * (     1/ 1/87    )
2ND DRAW DATE ———————————————————— * (     2/ 1/87    )
TOTAL NUMBER OF DRAWS —————————————— * (              36)
CONSTRUCTION DRAWS <ANN,SEM,QUA,MON,IRR> — * (MONTHLY         )
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     FLOW OF INTEREST EARNINGS
A - To The Construction Fund
B - To Pay Bond Debt Service ————————————————— * (A )
```

S C R E E N - E

NO.	DATE	DRAW AMOUNT	INV. RATE	EARNINGS	NET FUNDING
1)	1/ 1/87	968,400.00	8.000000	0.00	968,400.00
2)	2/ 1/87	1,188,000.00	8.000000	920,045.33	267,954.67
3)	3/ 1/87	2,679,600.00	8.000000	918,258.96	1,761,341.04
4)	4/ 1/87	4,071,600.00	8.000000	906,516.69	3,165,083.31
5)	5/ 1/87	4,261,200.00	8.000000	885,416.13	3,375,783.87
6)	6/ 1/87	7,377,600.00	8.000000	862,910.91	6,514,689.09
7)	7/ 1/87	10,324,800.00	8.000000	819,479.65	9,505,320.35
8)	8/ 1/87	7,518,000.00	8.000000	788,351.36	6,729,648.64
9)	9/ 1/87	4,724,400.00	8.000000	743,487.04	3,980,912.96
10)	10/ 1/87	4,911,600.00	8.000000	716,947.62	4,194,652.38
11)	11/ 1/87	5,784,000.00	8.000000	688,983.27	5,095,016.73
12)	12/ 1/87	5,463,600.00	8.000000	655,016.49	4,808,583.51
13)	1/ 1/88	5,302,800.00	8.000000	622,959.27	4,679,840.73
14)	2/ 1/88	5,510,400.00	8.000000	620,124.58	4,890,275.42
15)	3/ 1/88	6,019,200.00	8.000000	587,522.74	5,431,677.26
16)	4/ 1/88	5,858,400.00	8.000000	551,311.56	5,307,088.44
17)	5/ 1/88	5,936,400.00	8.000000	515,930.97	5,420,469.03
18)	6/ 1/88	5,803,200.00	8.000000	479,794.51	5,323,405.49
19)	7/ 1/88	6,079,200.00	8.000000	444,305.14	5,634,894.86
20)	8/ 1/88	6,136,800.00	8.000000	431,227.15	5,705,572.85
21)	9/ 1/88	5,978,400.00	8.000000	393,190.00	5,585,210.00
22)	10/ 1/88	6,334,800.00	8.000000	355,955.27	5,978,844.73
23)	11/ 1/88	6,165,600.00	8.000000	316,096.30	5,849,503.70
24)	12/ 1/88	5,816,400.00	8.000000	277,099.61	5,539,300.39
25)	1/ 1/89	5,180,400.00	8.000000	240,170.94	4,940,229.06
26)	2/ 1/89	4,705,200.00	8.000000	227,847.78	4,477,352.22
27)	3/ 1/89	5,188,800.00	8.000000	197,998.77	4,990,801.23
28)	4/ 1/89	3,679,200.00	8.000000	164,726.76	3,514,473.24
29)	5/ 1/89	3,822,000.00	8.000000	141,296.94	3,680,703.06
30)	6/ 1/89	3,721,200.00	8.000000	116,758.92	3,604,441.08
31)	7/ 1/89	3,646,800.00	8.000000	92,729.31	3,554,070.69
32)	8/ 1/89	2,940,000.00	8.000000	85,770.94	2,854,229.06
33)	9/ 1/89	2,817,600.00	8.000000	66,742.75	2,750,857.25
34)	10/ 1/89	2,521,200.00	8.000000	48,403.70	2,472,796.30
35)	11/ 1/89	2,371,200.00	8.000000	31,918.39	2,339,281.61
36)	12/ 1/89	2,464,800.00	8.000000	16,323.18	2,448,476.82

S C R E E N - F

——————— CAPITALIZED INTEREST FUND ———————

MINIMUM CAPITALIZED INTEREST AMOUNT ———— (0)

FINAL CAPITALIZED INTEREST CUTOFF DATE ——— (12/31/89)

REINVESTMENT RATE OF FUNDS (%) —————— (9.000000)

COMPOUNDINGS FOR ALL FUNDS <1,2,4,12> —— * (12)

% OF BONDS CAPITALIZED ——————————— (100.000000)

FLOW OF INTEREST EARNINGS
A - To The Construction Fund
B - To Pay Capitalized Interest Fund ——————— * (A)

SCREEN - G

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——  D E B T   S E R V I C E   R E S E R V E   F U N D  ——

Debt Service Reserve Fund Amount ———————— (       27,458,5ØØ)
Interest Start Calculation Date ————————— (        1/ 1/87   )
1st Interest Payment Date ———————————— * (        7/ 1/87   )
Interest Frequency <AMM,SEM,QUA,MON> ———— (SEMI-ANNUAL        )
Interest Rate on Funds <%> —————————————— (        1Ø.ØØØØØØ)
Maturity Date ———————————————————————— * (        1/ 1/17   )
Year <36Ø or 365> ——————————————————————— (              36Ø)

A) DSRF = Max Ann. Debt Service    E) DSRF = Fixed Dollar Amount
B) DSRF = Max Ann. Bond Interest   F) % of Total Bond Size (PAR)
C) DSRF = Max Semi Debt Service    G) DSRF = Average Annual  D/S
D) DSRF = Max Semi Bond Interest   H) Option A for CUR + PRI D/S
DSRF option (A-H) ——————————————————————————————————————— (A )

% factor to apply to DSRF options A-H ——— (       1ØØ.ØØØØØØ)

Interest Flows to: A) Construction Fund, B) Pay Bond D/S - (A )
```

SCREEN - H

——— OTHER SOURCES OF FUNDS ———

(EQUITY	) — (	3,9Ø2,153.ØØ
(	) — (	Ø
(	) — (	Ø)
(	) — (	Ø
(	) — (	Ø)
(	) — (	Ø
(	) — (	Ø)
(	) — (	Ø,
(	) — (	Ø

SCREEN - I

OTHER USES OF FUNDS

(	) — (	Ø)
(UNDERWRITERS DISCOUNT (% or $)	) — (	2.500000)
(COST OF ISSUANCE	) — (	1.000000)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(BOND INS.[% OF TOTAL D/S-ACCR.-CAP.INT.])	— (	Ø.900000)

TRADE FINANCING

DULLES AIRPORT ACCESS PROJECT
TRADE FINANCING
RUN DATE 9/6/85

S O U R C E S   A N D   U S E S   O F   F U N D S

DELIVERY DATE: 1/ 1/87

SOURCES

PAR AMOUNT OF BONDS..................	$36,395,000.00	
+PREMIUM /-DISCOUNT..................	$0.00	
BOND PROCEEDS..		36,395,000.00
		$36,395,000.00

USES OF FUNDS

UNDERWRITERS DISCOUNT (% or $)..........(	2.000000%)...	727,900.00
COST OF ISSUANCE......................(	1.000000%)...	363,950.00
CAPITALIZED INTEREST....................................		10,838,718.55
NET CONSTRUCTION FUND AMOUNT..........................		24,463,904.72
CONTINGENCY..		526.73
		$36,395,000.00

RUNDATE: 09-25-1985 RUNTIME: 11:42:44

DULLES AIRPORT ACCESS PROJECT
TRADE FINANCING
RUN DATE 9/6/85

CONSTRUCTION FUND

DELIVERY DATE: 1/ 1/87

DRAW DATE	CONSTRUCTION FUND BALANCE	CONSTRUCTION DRAW NEEDED	NET CONSTR. FUND DRAW	INV. RATE OF DRAW	CONSTR. FUND EARNINGS	DEBT SERVICE RESERVE	CAPITALIZED INT. EARNINGS (9.000000 %)	REMAINING CONSTR. FUNDS
1/ 1/87	24,463,904.72			8.000000				24,463,904.72
2/ 1/87	24,463,904.72	310,200.00	147,107.30	8.000000	163,092.70			24,316,797.42
3/ 1/87	24,316,797.42	345,300.00	183,188.02	8.000000	162,111.98			24,133,609.40
4/ 1/87	24,133,609.40	336,000.00	175,109.27	8.000000	160,890.73			23,958,500.13
5/ 1/87	23,958,500.13	349,100.00	189,376.67	8.000000	159,723.33			23,769,123.46
6/ 1/87	23,769,123.46	339,900.00	181,439.18	8.000000	158,460.82			23,587,684.29
7/ 1/87	23,587,684.29	868,300.00	214,069.31	8.000000	157,251.23		496,979.47	23,373,614.98
8/ 1/87	23,373,614.98	872,800.00	716,975.90	8.000000	155,824.10			22,656,639.08
9/ 1/87	22,656,639.08	849,800.00	698,755.74	8.000000	151,044.26			21,957,883.34
10/ 1/87	21,957,883.34	883,500.00	737,114.11	8.000000	146,385.89			21,220,769.23
11/ 1/87	21,220,769.23	859,400.00	717,928.21	8.000000	141,471.79			20,502,841.03
12/ 1/87	20,502,841.03	893,400.00	756,714.39	8.000000	136,685.61			19,746,126.63
1/ 1/88	19,746,126.63	898,000.00	352,819.29	8.000000	131,640.84		413,539.86	19,393,307.34
2/ 1/88	19,393,307.34	845,000.00	715,711.28	8.000000	129,288.72			18,677,596.06
3/ 1/88	18,677,596.06	908,700.00	784,182.69	8.000000	124,517.31			17,893,413.36
4/ 1/88	17,893,413.36	884,500.00	765,210.58	8.000000	119,289.42			17,128,202.78
5/ 1/88	17,128,202.78	919,300.00	805,111.98	8.000000	114,188.02			16,323,090.80
6/ 1/88	16,323,090.80	894,800.00	785,979.39	8.000000	108,820.61			15,537,111.41
7/ 1/88	15,537,111.41	930,000.00	496,319.00	8.000000	103,580.74		330,100.26	15,040,792.41
8/ 1/88	15,040,792.41	935,300.00	835,028.05	8.000000	100,271.95			14,205,764.36
9/ 1/88	14,205,764.36	911,100.00	816,394.90	8.000000	94,705.10			13,389,369.45
10/ 1/88	13,389,369.45	946,800.00	857,537.54	8.000000	89,262.46			12,531,831.92
11/ 1/88	12,531,831.92	921,400.00	837,854.45	8.000000	83,545.55			11,693,977.46
12/ 1/88	11,693,977.46	957,400.00	879,440.15	8.000000	77,959.85			10,814,537.31
1/ 1/89	10,814,537.31	963,500.00	644,742.43	8.000000	72,096.92		246,660.65	10,169,794.88
2/ 1/89	10,169,794.88	875,100.00	807,301.37	8.000000	67,798.63			9,362,493.51
3/ 1/89	9,362,493.51	974,200.00	911,783.38	8.000000	62,416.62			8,450,710.14
4/ 1/89	8,450,710.14	948,700.00	892,361.93	8.000000	56,338.07			7,558,348.20
5/ 1/89	7,558,348.20	985,700.00	935,311.01	8.000000	50,388.99			6,623,037.19
6/ 1/89	6,623,037.19	959,700.00	915,546.42	8.000000	44,153.58			5,707,490.77
7/ 1/89	5,707,490.77	997,900.00	796,629.01	8.000000	38,049.94		163,221.05	4,910,861.76
8/ 1/89	4,910,861.76	1,003,200.00	970,460.92	8.000000	32,739.08			3,940,400.84
9/ 1/89	3,940,400.84	976,700.00	950,430.66	8.000000	26,269.34			2,989,970.17
10/ 1/89	2,989,970.17	1,015,400.00	995,466.87	8.000000	19,933.13			1,994,503.31
11/ 1/89	1,994,503.31	987,800.00	974,503.31	8.000000	13,296.69			1,020,000.00
12/ 1/89	1,020,000.00	1,026,800.00	1,020,000.00	8.000000	6,800.00			-0.00
		29,574,700.00	24,463,904.72		3,460,293.99		1,650,501.28	

DULLES AIRPORT ACCESS PROJECT
TRADE FINANCING
RUN DATE 9/6/85

NET DEBT SERVICE REQUIREMENTS

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	PRINCIPAL	COUPON	INTEREST	TOTAL DEBT SERVICE	CONSTR. FUND EARNINGS	DEBT SVC. RES. + CAP. INT.	NET DEBT SERVICE	SURPLUS FUNDS REMAINING
7/ 1/87			1,819,750.00	1,819,750.00		10,838,718.55		9,018,968.55
1/ 1/88			1,819,750.00	1,819,750.00				7,199,218.55
7/ 1/88			1,819,750.00	1,819,750.00				5,379,468.55
1/ 1/89			1,819,750.00	1,819,750.00				3,559,718.55
7/ 1/89			1,819,750.00	1,819,750.00				1,739,968.55
1/ 1/90			1,819,750.00	1,819,750.00		79,781.45		0.00
7/ 1/90			1,819,750.00	1,819,750.00			1,819,750.00	
1/ 1/91	1,700,000.00	10.000000	1,819,750.00	3,519,750.00			3,519,750.00	
7/ 1/91			1,734,750.00	1,734,750.00			1,734,750.00	
1/ 1/92	1,875,000.00	10.000000	1,734,750.00	3,609,750.00			3,609,750.00	
7/ 1/92			1,641,000.00	1,641,000.00			1,641,000.00	
1/ 1/93	2,060,000.00	10.000000	1,641,000.00	3,701,000.00			3,701,000.00	
7/ 1/93			1,538,000.00	1,538,000.00			1,538,000.00	
1/ 1/94	2,265,000.00	10.000000	1,538,000.00	3,803,000.00			3,803,000.00	
7/ 1/94			1,424,750.00	1,424,750.00			1,424,750.00	
1/ 1/95	2,490,000.00	10.000000	1,424,750.00	3,914,750.00			3,914,750.00	
7/ 1/95			1,300,250.00	1,300,250.00			1,300,250.00	
1/ 1/96	2,740,000.00	10.000000	1,300,250.00	4,040,250.00			4,040,250.00	
7/ 1/96			1,163,250.00	1,163,250.00			1,163,250.00	
1/ 1/97	3,015,000.00	10.000000	1,163,250.00	4,178,250.00			4,178,250.00	
7/ 1/97			1,012,500.00	1,012,500.00			1,012,500.00	
1/ 1/98	3,315,000.00	10.000000	1,012,500.00	4,327,500.00			4,327,500.00	
7/ 1/98			846,750.00	846,750.00			846,750.00	
1/ 1/99	3,650,000.00	10.000000	846,750.00	4,496,750.00			4,496,750.00	
7/ 1/99			664,250.00	664,250.00			664,250.00	
1/ 1/ 0	4,015,000.00	10.000000	664,250.00	4,679,250.00			4,679,250.00	
7/ 1/ 0			463,500.00	463,500.00			463,500.00	
1/ 1/ 1	4,415,000.00	10.000000	463,500.00	4,878,500.00			4,878,500.00	
7/ 1/ 1			242,750.00	242,750.00			242,750.00	
1/ 1/ 2	4,855,000.00	10.000000	242,750.00	5,097,750.00			5,097,750.00	
	36,395,000.00		38,621,500.00	75,016,500.00		10,918,500.00	64,098,000.00	

RUNDATE: 09-25-1985 RUNTIME: 11:42:06

DULLES AIRPORT ACCESS PROJECT
TRADE FINANCING
RUN DATE 9/6/85

DEBT SERVICE SCHEDULE

DELIVERY DATE: 1/ 1/87

DATE	PRINCIPAL	COUPON	INTEREST	PERIOD TOTAL	FISCAL TOTAL
1/ 1/88			3,639,500.00	3,639,500.00	3,639,500.00
1/ 1/89			3,639,500.00	3,639,500.00	3,639,500.00
1/ 1/90			3,639,500.00	3,639,500.00	3,639,500.00
1/ 1/91	1,700,000.00	10.000000	3,639,500.00	5,339,500.00	5,339,500.00
1/ 1/92	1,875,000.00	10.000000	3,469,500.00	5,344,500.00	5,344,500.00
1/ 1/93	2,060,000.00	10.000000	3,282,000.00	5,342,000.00	5,342,000.00
1/ 1/94	2,265,000.00	10.000000	3,076,000.00	5,341,000.00	5,341,000.00
1/ 1/95	2,490,000.00	10.000000	2,849,500.00	5,339,500.00	5,339,500.00
1/ 1/96	2,740,000.00	10.000000	2,600,500.00	5,340,500.00	5,340,500.00
1/ 1/97	3,015,000.00	10.000000	2,326,500.00	5,341,500.00	5,341,500.00
1/ 1/98	3,315,000.00	10.000000	2,025,000.00	5,340,000.00	5,340,000.00
1/ 1/99	3,650,000.00	10.000000	1,693,500.00	5,343,500.00	5,343,500.00
1/ 1/ 0	4,015,000.00	10.000000	1,328,500.00	5,343,500.00	5,343,500.00
1/ 1/ 1	4,415,000.00	10.000000	927,000.00	5,342,000.00	5,342,000.00
1/ 1/ 2	4,855,000.00	10.000000	485,500.00	5,340,500.00	5,340,500.00
	36,395,000.00		38,621,500.00	75,016,500.00	
ACCRUED					
	36,395,000.00		38,621,500.00	75,016,500.00	

DATED 1/ 1/87 WITH DELIVERY OF 1/ 1/87
BOND YEARS 386,215.000
AVERAGE COUPON 10.000
AVERAGE LIFE 10.612
N I C % 10.000000 % USING 100.0000000

RUNDATE: 09-25-1985 RUNTIME: 11:41:48

TRADE FINANCING
RUN DATE 9/6/85

CAPITALIZED INTEREST FUND

DELIVERY DATE: 1/ 1/87

PERIOD ENDING	BEGINNING BALANCE	ACCRUED INTEREST	CONSTR. FUND EARNINGS	DEBT SERVICE RESERVE	CAPITALIZED INT. EARNINGS (9.000000 %)	TOTAL FUNDS AVAILABLE	BOND INTEREST CAPITALIZED (100.000000 %)	ENDING BALANCE
7/ 1/87	10,838,718.55					10,838,718.55	1,819,750.00	9,018,968.55
1/ 1/88	9,018,968.55					9,018,968.55	1,819,750.00	7,199,218.55
7/ 1/88	7,199,218.55					7,199,218.55	1,819,750.00	5,379,468.55
1/ 1/89	5,379,468.55					5,379,468.55	1,819,750.00	3,559,718.55
7/ 1/89	3,559,718.55					3,559,718.55	1,819,750.00	1,739,968.55
1/ 1/90	1,739,968.55				79,781.45	1,819,750.00	1,819,750.00	0.00
					79,781.45		10,918,500.00	

RUNDATE: 09-25-1985 RUNTIME: 11:42:35

S C R E E N - A

G E N E R A L   B O N D   I N F O R M A T I O N

PAR AMOUNT		(36,395,000)
DATED DATE	*	(1/ 1/87)
DELIVERY DATE	*	(1/ 1/87)
1ST COUPON DATE	*	(7/ 1/87)
1ST MATURITY DATE	*	(1/ 1/91)
LAST MATURITY DATE	*	(1/ 1/ 2)
FISCAL DATE FOR BOND SOLUTIONS AND REPORTS		(1/ 1/91)
BOND INTEREST FREQUENCY <ANN,SEM,QUA,MON>		(SEMI-ANNUAL)
BOND PRINCIPAL FREQUENCY <ANN,SEM,QUA,MON>		(ANNUAL)
YEAR <360 OR 365>		(360)
BOND DENOMINATION		(5,000)
FILENAME FOR SAVINGS THIS ISSUE		(DART)
KEYNAME OF THIS ISSUE		(TRADE)

R E P O R T   T I T L E S

(DULLES AIRPORT ACCESS PROJECT)
(TRADE FINANCING)
(RUN DATE 9/5/85)

S C R E E N - B

NO.	DATE	AMOUNT	COUPON	YIELD	PRICE
1)	1/ 1/91	1,700,000.00	10.000000	0.000000	100.000000
2)	1/ 1/92	1,875,000.00	10.000000	0.000000	100.000000
3)	1/ 1/93	2,060,000.00	10.000000	0.000000	100.000000
4)	1/ 1/94	2,265,000.00	10.000000	0.000000	100.000000
5)	1/ 1/95	2,490,000.00	10.000000	0.000000	100.000000
6)	1/ 1/96	2,740,000.00	10.000000	0.000000	100.000000
7)	1/ 1/97	3,015,000.00	10.000000	0.000000	100.000000
8)	1/ 1/98	3,315,000.00	10.000000	0.000000	100.000000
9)	1/ 1/99	3,650,000.00	10.000000	0.000000	100.000000
10)	1/ 1/ 0	4,015,000.00	10.000000	0.000000	100.000000
11)	1/ 1/ 1	4,415,000.00	10.000000	0.000000	100.000000
12)	1/ 1/ 2	4,855,000.00	10.000000	0.000000	100.000000

S C R E E N - C

NO.	DATE	MAXIMUM D/S
1)	1/ 1/91	100,000,000
2)	1/ 1/92	100,000,000
3)	1/ 1/93	100,000,000
4)	1/ 1/94	100,000,000
5)	1/ 1/95	100,000,000
6)	1/ 1/96	100,000,000
7)	1/ 1/97	100,000,000
8)	1/ 1/98	100,000,000
9)	1/ 1/99	100,000,000
10)	1/ 1/ 0	100,000,000
11)	1/ 1/ 1	100,000,000
12)	1/ 1/ 2	100,000,000

S C R E E N - D

———————— GENERAL CONSTRUCTION FUND INFORMATION ————————

TOTAL CONSTRUCTION FUND AMOUNT ———————— (29,574,700)

1ST DRAW DATE ———————————————— * (1/ 1/87)

2ND DRAW DATE ———————————————— * (2/ 1/87)

TOTAL NUMBER OF DRAWS ———————————— * (36)

CONSTRUCTION DRAWS <ANN,SEM,QUA,MON,IRR> — * (MONTHLY)

FLOW OF INTEREST EARNINGS
A - To The Construction Fund
B - To Pay Bond Debt Service ———————————————— * (A)

S C R E E N - E

NO.	DATE	DRAW AMOUNT	INV. RATE	EARNINGS	NET FUNDING
1)	1/ 1/87	0.00	8.000000	0.00	0.00
2)	2/ 1/87	310,200.00	8.000000	163,092.70	147,107.30
3)	3/ 1/87	345,300.00	8.000000	162,111.98	183,188.02
4)	4/ 1/87	336,000.00	8.000000	160,890.73	175,109.27
5)	5/ 1/87	349,100.00	8.000000	159,723.33	189,376.67
6)	6/ 1/87	339,900.00	8.000000	158,460.82	181,439.18
7)	7/ 1/87	868,300.00	8.000000	157,251.23	711,048.77
8)	8/ 1/87	872,800.00	8.000000	155,824.10	716,975.90
9)	9/ 1/87	849,800.00	8.000000	151,044.26	698,755.74
10)	10/ 1/87	883,500.00	8.000000	146,385.89	737,114.11
11)	11/ 1/87	859,400.00	8.000000	141,471.79	717,928.21
12)	12/ 1/87	893,400.00	8.000000	136,685.61	756,714.39
13)	1/ 1/88	898,000.00	8.000000	131,640.84	766,359.16
14)	2/ 1/88	845,000.00	8.000000	129,288.72	715,711.28
15)	3/ 1/88	908,700.00	8.000000	124,517.31	784,182.69
16)	4/ 1/88	884,500.00	8.000000	119,289.42	765,210.58
17)	5/ 1/88	919,300.00	8.000000	114,188.02	805,111.98
18)	6/ 1/88	894,800.00	8.000000	108,820.61	785,979.39
19)	7/ 1/88	930,000.00	8.000000	103,580.74	826,419.26
20)	8/ 1/88	935,300.00	8.000000	100,271.95	835,028.05
21)	9/ 1/88	911,100.00	8.000000	94,705.10	816,394.90
22)	10/ 1/88	946,800.00	8.000000	89,262.46	857,537.54
23)	11/ 1/88	921,400.00	8.000000	83,545.55	837,854.45
24)	12/ 1/88	957,400.00	8.000000	77,959.85	879,440.15
25)	1/ 1/89	963,500.00	8.000000	72,096.92	891,403.08
26)	2/ 1/89	875,100.00	8.000000	67,798.63	807,301.37
27)	3/ 1/89	974,200.00	8.000000	62,416.62	911,783.38
28)	4/ 1/89	948,700.00	8.000000	56,338.07	892,361.93
29)	5/ 1/89	985,700.00	8.000000	50,388.99	935,311.01
30)	6/ 1/89	959,700.00	8.000000	44,153.58	915,546.42
31)	7/ 1/89	997,900.00	8.000000	38,049.94	959,850.06
32)	8/ 1/89	1,003,200.00	8.000000	32,739.08	970,460.92
33)	9/ 1/89	976,700.00	8.000000	26,269.34	950,430.66
34)	10/ 1/89	1,015,400.00	8.000000	19,933.13	995,466.87
35)	11/ 1/89	987,800.00	8.000000	13,296.69	974,503.31
36)	12/ 1/89	1,026,800.00	8.000000	6,800.00	1,020,000.00

S C R E E N - F

——— CAPITALIZED INTEREST FUND ———

```
MINIMUM CAPITALIZED INTEREST AMOUNT ———— (                Ø)

FINAL CAPITALIZED INTEREST CUTOFF DATE ——— (   12/31/89    )


REINVESTMENT RATE OF FUNDS (%) ———————— (        9.ØØØØØØ)

COMPOUNDINGS FOR ALL FUNDS  <1,2,4,12> —— * (            12)


% OF BONDS CAPITALIZED ———————————— (      1ØØ.ØØØØØØ)

      FLOW OF INTEREST EARNINGS
A - To The Construction Fund
B - To Pay Capitalized Interest Fund ——————————— * (A )
```

S C R E E N - G

—— D E B T   S E R V I C E   R E S E R V E   F U N D ——

```
Debt Service Reserve Fund Amount ———————— (                Ø)
Interest Start Calculation Date ———————— (     Ø/ Ø/ Ø    )
1st Interest Payment Date ———————————— * (     Ø/ Ø/ Ø    )
Interest Frequency <AMM,SEM,QUA,MON> ——— (SEMI-ANNUAL      )
Interest Rate on Funds <%> ———————————— (                Ø)
Maturity Date —————————————————————— * (     Ø/ Ø/ Ø    )
Year <360 or 365> ——————————————————— (              36Ø)

A) DSRF = Max Ann. Debt Service     E) DSRF = Fixed Dollar Amount
B) DSRF = Max Ann. Bond Interest    F) % of Total Bond Size (PAR)
C) DSRF = Max Semi Debt Service     G) DSRF = Average Annual  D/S
D) DSRF = Max Semi Bond Interest    H) Option A for CUR + PRI D/S
DSRF option (A-H) ——————————————————————————————— (E )

% factor to apply to DSRF options A-H ——— (                Ø)

Interest Flows to: A) Construction Fund, B) Pay Bond D/S - (A )
```

S C R E E N - H

——— O T H E R S O U R C E S O F F U N D S ———

(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)

S C R E E N - I

——— O T H E R U S E S O F F U N D S ———

(	) — (	Ø)
(UNDERWRITERS DISCOUNT (% or $)	) — (	2.ØØØØØØ)
(COST OF ISSUANCE	) — (	1.ØØØØØØ)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)
(	) — (	Ø)

APPENDIX C

APPENDIX C:
PROJECTED REAL ESTATE DEVELOPMENT AND NON-USER BENEFIT VALUE CAPTURE REVENUE ESTIMATES

APPENDIX C:

PROJECTED REAL ESTATE DEVELOPMENT AND NON-USER BENEFIT VALUE CAPTURE REVENUE ESTIMATES

Introduction

The concept that non-users receive benefits from transportation improvements has long been accepted. Futhermore, there are numerous examples where a portion of the value of these non-user benefits has been captured to support the implementation and operation of these improvements. These benefits accrue to developers, people traveling in the corridor, existing businesses, property owners, individuals seeking access to employment, employers, and users of airports.

The purpose of this appendix was, first, to focus on the analyses of existing real estate development patterns along the Dulles Access Road and to project potential real estate development along the corridor through the year 2005. Subsequently, forecasts of potential revenues generated from the capture of the value of the non-user benefits resulting from the proposed LRT transit improvements were made. This revenue could then be utilized to pay for the proposed transit improvements. While not a complete list of mechanisms of value capture, the effort focused on the following five scenarios:

(1) creating a single special benefit assessment district encompassing the entire 16.5-mile Access Road corridor;

(2) creating special benefit assessment districts to include properties within a quarter-mile radius of potential station sites;

(3) creating a tax increment financing district within the Dulles corridor which considers only increases in value of existing property and new development;

(4) creating a two-tiered special assessment district which assesses all property along the corridor but includes a higher assessment rate for properties in close proximity to station sites; and

(5) examining the amount of development within the Dulles Airport property which would be required to support the implementation of the transit improvements.

The analysis focused on new and existing office development and is, therefore, somewhat constrained. Retail and hotel developments will cause some of the revenue estimates to be somewhat understated. Ultimate total development is determined by market forces. Other revenue sources, including joint development, connection fees, and so forth, would be estimated on a parcel-by-parcel basis at a later date.

For purposes of this study, the Dulles Access Road corridor is defined to consist of available, developable acreage adjacent to the Dulles Access Road. The corridor extends on the east from Falls Church to the Dulles Airport on the west and includes the city of Herndon and the mixed-use developments of Reston and Tysons Corner. It includes the Washington Area Council of Governments traffic planning boundary analysis districts of 545 A, B, C and E; 558 A, B, C and D; 559 B and C; 568 A, B, D and E; 576 A, B, E and F; 577 C, D, E, G, H and J; and 670 A.

The Dulles Access Road Corridor: Current Conditions

Fairfax County is one of the most rapidly growing areas of the metropolitan Washington, D.C. area. Reflective of Fairfax County's growth has been the rapid development of office space since the Dulles Airport was built in 1962. Additionally, the planned new town of Reston, Virginia was developed in the early 1960s between the airport and downtown Washington.

A further reflection of Fairfax County's growth has been the significant increase in population, employment and commercial development. Between 1960 and 1980, Fairfax County's population grew from 248,897 to 596,901, an increase of 240 percent.

Since January of 1972 office space in Fairfax County has increased from 10.4 million square feet to approximately 36.5 million square feet as of July 1985. This is an increase of more than 350 percent. Estimates are that nearly six million square feet are currently under construction throughout the county. Data assembled from the Fairfax County Economic Development Authority indicate that the total inventory of office space along the corridor ranges from 13.5 million square feet to 16.0 million square feet. The total current inventory of office space in the Dulles Access Road corridor is estimated to be approximately 15.0 million square feet.

Total office development between 1985 and 2005 is based upon projected levels of office and industrial employment within the Dulles Access Road corridor area, as defined earlier. The employment forecasts come from the Washington COG Round III estimates refined by recent Fairfax County estimates. The employment forecasts indicate that between 1985 and the year 2000, approximately 44,106 new jobs may be created in the corridor. Between 2000 and 2005, an additional 7,514 new jobs may be added. Based on an average ratio of 300 square feet of office space per new job created, total office inventory can be expected to increase by approximately 15,486,000 square feet. For purposes of annual projections of new construction, development from 1985 to 1990 is based on actual, current developer plans reported by the Fairfax County Economic Development Authority (EDA) and Black's Office Leasing Guide for the Washington and Baltimore metropolitan areas. Office development during the 1990s and to 2005 are shown on an annual pro rata basis based on projected employment and space per employee figures.

SCENARIO I: BENEFIT ASSESSMENT DISTRICT INVOLVING THE ENTIRE CORRIDOR

The first scenario considers levying a fixed assessment per square foot of developed office space along the entire corridor. Rice Center has estimated yearly development within the corridor commencing in calendar year 1985 running to the year 2005 (see Table 1). During this 21-year period, Rice Center estimates that new office development will total approximately 15.5 million square feet of space, thus doubling the current inventory. Three different levies or assessments were considered:

(1) 10-cents per square foot;

(2) 20-cents per square foot; and

(3) 50-cents per square foot.

At an assessment of 10-cents per square foot per year on existing as well as new development, the private sector would contribute $55.9 million over the time period involved. This would generate $2.43 million annually by 1990 while the twenty-one year average would be $2.66 million per year. At an assessment of 20 cents per square foot, total private collections would double to $111.86 million. This is an average of $5.33 million per year. At an assessment of 50-cents per square foot, total private collections would be $279.64 million, an average of $13.32 million per year. Annual revenues are depicted on Table 1.

SCENARIO II: BENEFIT ASSESSMENT DISTRICTS IN PROXIMITY TO POTENTIAL STATION SITES

Five rail station sites have been identified with apparent high value-capture potential along the existing median right-of-way of the Dulles Access Road. The stations identified correspond, in general, to the locations assumed for the ridership forecasts. The five potential station sites are:

(1) Sully Road Station located east of the intersection of the Airport Access Road and Sully Road (Route 28);

(2) Herndon Station located between Centreville Road (Route 657) and Monroe Street (Route 666);

(3) Reston Station situated approximately mid-point between the proposed Springfield Bypass and Reston Avenue (Route 602);

(4) Hunter Mill Road Station located equidistant between Wiehle Avenue and Hunter Mill Road (Route 674); and

(5) Tysons-Spring Hill Road Station located just east of the intersection of Spring Hill Road and the Dulles Access Road.

The is no potential for value capture at Wolf Trap Farm Park since land use restrictions in the area prohibit significant future development. The analysis further assumes that the rail line would follow the median right-of-way along the Dulles Access Road from West Falls Church to the Dulles International Airport. An alternative rail line routing through Tysons Corner along Leesburg Pike (Route 7) was not considered in detail although a cursory examination was made to assess the capital cost, operating revenue, and transit ridership of such an alignment modification (see Chapter 2). The value capture potential for such an alignment may be sufficient to cover much of the costs of construction.

Table 2 contains estimates of potential new development within a one-quarter-mile radius of each of the five potential station sites. New development potential was estimated based on the availability of vacant land currently zoned for commercial development and according to existing floor area ratio (FAR) allowances which ranged from .5 to 1.0. Moreover, the probable timing of development around each station was estimated on an annual pro rata basis.

The existing floor area ratios (FAR) was used since a premise of this analysis was that there would be no change in the Fairfax County Master Plan and current zoning requirements.

Once potential annual new development was estimated for each station, three potential levies: 10-cents per square foot; 20-cents per square foot; and 50-cents per square foot. It should be noted that estimated total development within proximity of the five proposed rail stations accounts for approximately 61 percent, or 9.45 million square feet, of the total estimated future development along the corridor. The balance of the total projected development is expected to occur in Tysons Corner and throughout the rest of the corridor.

At the Sully Road Station, total potential new development was estimated to be slightly more than 1.1 million square feet. Based on a levy of 10-cents per square foot, total revenues are estimated to increase from $11,000 per year in 1990 to $111,623 per year by 2005. At 20-cents per square foot, revenues range from $22,000 per year to more than $223,000 per year; at 50-cents per square foot, revenues range from $55,811 per year to $558,110 per year.

Financing the station and pedestrian bridge estimated to cost $530,000 for 20 years at 10 percent annually would require a 55 cent per square foot assessment in 1990 decreasing to a 5-cents per square foot assessment by 2000.

Total development potential at the Herndon Station based upon the existing FAR under current zoning amounts to 2,256,000 square feet. At a 10 cents per square foot levy, annual revenues would range from $15,000 to $225,600; at 20 cents per square foot, annual revenues range from $30,080 to $451,200; and at 50 cents per square foot, annual revenues range from $75,200 to $1,128,000. Again, based on the Parsons Brinckerhoff estimate of total station costs of $530,000, and if the station and pedestrian bridge costs were financed for 20 years at 10 percent annually, a 41 cents per square foot assessment would need to be levied in 1990, decreasing to 3 cents per square foot by 2005.

Total development potential is greatest at the Reston station which is situated adjacent to the proposed Reston Town Center. The Reston Town Center is anticipated to include 4.5 million square feet of office space, 200,000 square feet of retail space, and up to 2,000 residential units. Development on the south side of the station would allow another 228,000 square feet of office development. Development of Reston Town Center and the adjacent area is estimated to commence in the next three years and is shown in Table 2.

Based on a 10 cents per square foot levy, revenues would range from $37,829 to $472,869 per annum; at a 20 cents per square foot levy, revenues would range from $75,658 to $945,738; and at a 50 cents per square foot levy, revenues would range from $189,145 to $2,364,345. Again assuming the cost of a platform station and pedestrian bridge to be $530,000, financing the station and pedestrian bridge for 20 years at 10 percent annually would require a 5 cents per square foot levy in 1990, decreasing to a 1 cent per square foot levy by 2005.

Development potential at the Hunter Mill Station is the lowest of the five stations because of the lack of available developable land. Approximately 610,000 square feet of office space already exist around the station based on current zoning. Vacant land would allow another 392,040 square feet of space to be build around the station. Potential revenues at 10 cents per square foot would range from $68,825 to $100,188 per year; at 20 cents per square foot, annual revenues would range from $137,650 to $200,376; and at 50 cents per square foot, annual revenues range from $344,125 to $500,940.

Financing the Hunter Mill Station construction costs at 10 percent annually over 20 years would require an assessment of 9 cents per square foot in 1990, decreasing to 6 cents per square foot in 2005.

Development at the Tysons-Spring Hill Road Station is all on the south side of the Dulles Access Road where the Tysons-Dulles Office Park consisting of three buildings with a 165,000 square feet each currently is under construction. Tysons-Dulles Office Park is estimated to be completed by the end of 1986. Other potential development in the area is substantial along the South Toll Road on land owned by the West Park Association. Total development potential for this area is 1,765,500 square feet. Based on a 10 cents per square foot levy, revenues would range from $24,750 to $176,550 per annum; at a 20 cents per square foot levy, revenues would range from $49,500 to $353,100; and at a 50 cents per square foot levy, revenues would range from $133,750 to $882,750. Financing the construction costs at the Tyson Corner-Spring Hill Stations at 10 percent annually over 20 years would require a levy of 10 cents per square foot in 1990, decreasing to 3 cents per square foot in 2005.

SCENARIO III: TAX INCREMENT FINANCING

Tax increment financing is based upon the increase in value of existing development, of new development that occurs in the assessment district, and the increased value of undeveloped land. This scenario is based upon several simplifying assumptions by Rice Center (1) current land values will increase at five percent per annum; (2) current building values are $80 per square foot and will increase by six percent per annum; (3) land is absorbed (based on an average FAR of .5; (4) the 1985 real property tax rate is $13.90 per $1,000 of assessed value, (5) 70 percent of that rate is assumed to be for local schools and educational purpose. Again, non-office development is not included and therefore causes revenues estimates to be somewhat understated.

Rice Center has estimated the growth in value of the existing 15 million square feet of office space already in existence in the corridor based upon an assumed growth rate of 6 percent per annum, as depicted on Table 3. New development is based on the same data as contained in Scenario I and assigned the same 6 percent per annum growth rate. Land values throughout the corridor currently range from $3.00 to approximately $20.00 per square foot, and average $8 per square foot. Land values are highest in Tysons Corner and lowest at the far western end of the corridor at the Loudon County/Fairfax County line.

Based upon the incremental growth in value of existing development, of new development projected to occur, and of increasing undeveloped land value, real estate values in the corridor could reach $4.74 billion by 2005 from $331.4 million today. Assuming a $4.20 per $1,000 levy revenues would be $1,381,971 in 1985 and increase to $19,758,611 by 2005.

SCENARIO IV: FLAT RATE FOR CORRIDOR AND HIGHER ASSESSMENT AT STATIONS

Table 4 depicts the final scenario that could be employed to assist in financing the construction of the Dulles Access Road rail line. Existing and new development within a quarter-mile radius of the potential station sites would be assessed at 50 cents per square foot, while development in the rest of the corridor would be assessed at 20 cents per square foot. Development near the stations would produce $438,670 in 1985 increasing to $5,434,145 by 2005. Development in the rest of the corridor would produce another $1,705,337 in 1905 increasing to $1,961,785 by 2005. Total annual revenues produced under this scenario therefore would range from $2,144,007 in 1985, 3,450,039 in 1990 to $7,395,930 by 2005.

SCENARIO V: DULLES AIRPORT DEVELOPMENT

It is recommended that potential development at Dulles Airport be closely examined by any potential developer and local officials in conjunction with this project for purposes of value capture.

It should be emphasized that such development, in and of itself, is not essential for the feasibility of the project. Also, such development should be the decision of local officials and citizens consistent with overall local land use plans.

Based on the assumptions, it can be shown that an investor "receives" approximately $3.74 per square foot of building area in benefits from tax exemption and nominal ground rent. If annual ground rent on the 600 acres were based on 8 percent of the land's current average value of an assumed $1 per square foot, the investor would otherwise owe $2,160,000 per year in ground rent. Property taxes on the land would run approximately $1,080,000 (an effective four percent tax rate). Finally, at $80 per square foot the improvements would be worth approximately $480 million with annual taxes of $19,200,000, or $3.20 per FAR square foot.

To raise revenues sufficient to ensure the project's financial feasibility, $3.33 per square foot must be assessed to earn the required return on building investment, building rents would have to be between $11.33 per square foot (for a 10 percent return) and $19.33 (for a 20 percent return). These returns are based on net revenues, before any debt service. It is important to note that this analysis is based on what rents would need to be, these figures do not represent a forecast of what rents are expected to be. However, the rent figures are 1990 rents and from the perspective that a rail line is in place. The developer would almost surely have to have a major or lead tenant or tenants. Moreover, as the area becomes increasingly developed the property would become more valuable.

Development on Dulles Airport property has the potential to generate significant revenue. However, such development is against current Federal policy. The legality of any such development at the airport would depend on the legislation that transfers the airport to a local authority. In addition, local governments may resist any such development and may expect to receive taxes or payments in lieu of taxes for the services used by the development. This report should not, in anyway, be taken as committing the Department of Transportation to supporting such development, either before or after transfer.

TABLE 1

SCENARIO I
ESTIMATED COMMERCIAL CONSTRUCTION AND REVENUES PER YEAR
FOR ENTIRE CORRIDOR

YEAR	NEW SPACE S/F	CUMULATIVE TOTAL S/F	LEVY 10¢/S.F.	LEVY 20¢/S.F.	LEVY 50¢/S.F.
Existing	-	$15,000,000	$1,500,000	$3,000,000	$7,500,000
1985	2,930,716	17,930,716	1,793,072	3,586,143	8,965,358
1986	3,197,466	21,128,182	2,112,819	4,225,636	10,564,091
1987	801,250	21,929,432	2,192,943	4,385,886	10,964,715
1988	801,250	22,730,682	2,273,068	4,546,136	11,365,340
1989	801,250	23,531,932	2,353,193	4,706,386	11,765,965
1990	801,250	24,333,182	2,433,318	4,866,636	12,166,590
1991	389,862	24,723,044	2,472,304	4,944,608	12,361,520
1992	389,862	25,112,906	2,511,290	5,022,580	12,556,450
1993	389,862	25,502,768	2,550,277	5,100,554	12,751,385
1994	398,862	25,892,630	2,589,263	5,178,526	12,946,315
1995	389,862	26,282,492	2,628,249	5,256,498	13,141,245
1996	389,862	26,672,354	2,667,235	5,334,470	13,336,175
1997	389,862	27,062,216	2,706,222	5,412,440	13,531,110
1998	389,862	27,452,078	2,745,208	5,490,416	13,726,040
1999	398,862	27,841,940	2,784,194	5,568,388	13,920,970
2000	389,862	28,231,800	2,823,180	5,646,360	14,115,900
2001	450,869	28,682,669	2,868,267	5,736,534	14,341,335
2002	450,869	29,133,538	2,913,354	5,826,708	14,566,770
2003	450,869	29,584,406	2,958,441	5,916,882	14,792,205
2004	450,869	30,035,275	3,003,528	6,007,056	15,017,640
2005	450,869	30,486,144	3,048,614	6,097,229	15,243,072
TOTALS	15,486,144	30,486,144	55,928,039	111,860,000	279,640,000

TABLE 2

SCENARIO II
BENEFIT ASSESSMENT DISTRICTS IN PROXIMITY TO STATIONS

	SULLY ROAD STATION					HERNDON STATION				
YEAR	NEW DEVELOPMENT (S.F.)	CUMULATIVE TOTAL (S.F.)	LEVY 10¢/S.F.	LEVY 20¢/S.F.	LEVY 50¢/S.F.	NEW DEVELOPMENT (S.F.)	CUMULATIVE TOTAL (S.F.)	LEVY 10¢/S.F.	LEVY 20¢/S.F.	LEVY 50¢/S.F.
Existing	0	0	-	-	-	0	0	-	-	-
1985	0	0	-	-	-	0	0	-	-	-
1986	8	0	-	-	-	0	0	-	-	-
1987	0	0	-	-	-	0	0	-	-	-
1988	0	0	-	-	-	0	0	-	-	-
1989	0	0	-	-	-	0	0	-	-	-
1990	111,622	111,622	$11,162	$22,324	$55,811	150,400	150,400	$15,040	$30,080	$75,200
1991	111,622	223,244	22,324	44,649	111,622	150,400	300,800	30,080	60,160	150,400
1992	111,622	334,866	33,487	66,973	167,433	150,400	451,200	45,120	90,240	225,600
1993	111,622	446,488	44,649	89,298	223,244	150,400	601,600	60,160	120,320	300,800
1994	111,622	558,110	55,811	111,622	279,055	150,400	752,000	75,200	150,400	376,000
1995	111,623	669,732	66,973	133,946	334,866	150,400	902,400	90,240	180,480	451,200
1996	111,623	781,354	78,135	156,271	390,677	150,400	1,052,800	105,280	210,560	526,400
1997	111,623	892,976	89,298	178,595	446,488	150,400	1,203,200	120,320	240,640	601,600
1998	111,623	1,004,598	100,460	200,920	502,299	150,400	1,353,600	135,360	270,720	676,800
1999	111,623	1,116,225	111,623	223,244	558,110	150,400	1,504,000	150,400	300,800	752,000
2000	0	1,116,225	111,623	223,244	558,110	150,400	1,654,400	165,440	330,880	827,200
2001	0	1,116,225	111,623	223,244	558,110	150,400	1,804,800	180,480	360,960	902,400
2002	0	1,116,225	111,623	223,244	558,110	150,400	1,955,200	195,520	391,040	977,600
2003	0	1,116,225	111,623	223,244	558,110	150,400	2,105,600	210,560	412,210	1,052,800
2004	0	1,116,225	111,623	223,244	558,110	150,400	2,256,000	225,600	457,200	1,128,000
2005	0	1,116,225	111,622	223,244	558,110	150,400	2,256,000	225,600	451,200	1,128,000
TOTALS	1,116,225		$1,283,653	$2,567,306	$6,418,265	2,256,000		$2,030,400	$4,060,800	$10,152,000

TABLE 2
-Continued-

SCENARIO II
BENEFIT ASSESSMENT DISTRICTS IN PROXIMITY TO STATIONS

YEAR	RESTON STATION NEW DEVELOPMENT (S.F.)	CUMULATIVE TOTAL (S.F.)	LEVY 10¢/SF	LEVY 20¢/SF	LEVY 50¢/SF	HUNTER MILL STATION NEW DEVELOPMENT (S.F.)	CUMULATIVE TOTAL (S.F.)	LEVY 10¢/SF	LEVY 20¢/SF	LEVY 50¢/SF
EXISTING	0	0	-	-	-	0	609,840	$60,984	$121,968	$304,920
1985	0	0	-	-	-	0	609,840	60,984	121,968	304,920
1986	0	0	-	-	-	0	609,840	60,984	121,968	304,920
1987	0	0	-	-	-	0	609,840	60,984	121,968	304,920
1988	378,295	378,295	$378,829	$ 75,658	$189,145	0	609,840	60,984	121,968	304,920
1989	378,295	756,590	75,659	151,318	378,295	0	609,840	60,984	121,968	304,920
1990	378,295	1,134,885	113,489	226,978	567,445	78,408	688,248	68,825	137,650	344,125
1991	378,295	1,513,180	151,318	302,636	756,590	78,408	766,656	76,666	153,332	383,330
1992	378,295	1,891,475	189,148	378,296	945,740	78,408	845,064	84,506	169,012	422,530
1993	378,295	2,269,770	226,977	453,954	1,134,885	78,408	923,472	92,347	184,694	461,735
1994	378,295	2,648,065	264,807	529,614	1,324,035	78,408	1,001,880	100,188	200,376	500,940
1995	378,295	3,026,360	302,636	605,272	1,513,180	0	1,001,880	100,188	200,376	500,940
1996	378,295	3,404,655	340,466	690,932	1,702,330	0	1,001,880	100,188	200,376	500,940
1997	378,295	3,782,950	378,295	756,590	1,891,475	0	1,001,880	100,188	200,376	500,940
1998	118,217	3,901,167	390,117	780,234	1,950,585	0	1,001,880	100,188	200,376	500,940
1999	118,217	4,019,384	401,938	803,876	2,009,690	0	1,001,880	100,188	200,376	500,940
2000	118,217	4,137,601	413,760	827,520	2,068,800	0	1,001,880	100,188	200,376	500,940
2001	118,217	4,255,818	425,582	851,164	2,127,910	0	1,001,880	100,188	200,376	500,940
2002	118,217	4,374,035	437,404	874,808	2,187,020	0	1,001,880	100,188	200,376	500,940
2003	118,217	4,492,252	449,225	898,450	2,246,125	0	1,001,880	100,188	200,376	500,940
2004	118,217	4,610,469	461,047	922,094	2,305,235	0	1,001,880	100,188	200,376	500,940
2005	118,217	4,728,686	472,869	$ 945,738	2,364,345	0	1,001,880	100,188	200,376	500,940
TOTALS	4,728,686	-	$5,464,466	$10,928,932	$27,322,330	392,040		$1,890,504	$3,781,008	$9,452,520

TABLE 2
-Continued-

SCENARIO II
BENEFIT ASSESSMENT DISTRICTS IN PROXIMITY TO STATIONS

TYSONS CORNER/SPRING HILL

YEAR	NEW DEVELOPMENT (S.F.)	CUMULATIVE TOTAL (S.F.)	LEVY 10¢/SF	LEVY 20¢/SF	LEVY 50¢/SF
EXISTING	0	0	-	-	-
1985	247,500	247,500	24,750	49,500	133,750
1986	247,500	495,000	49,500	99,000	247,500
1987	0	495,000	49,500	99,000	247,500
1988	0	495,000	49,500	99,000	247,500
1989	0	495,000	49,500	99,000	247,500
1990	101,640	596,640	59,664	119,328	298,320
1991	101,640	698,280	69,828	139,656	349,140
1992	101,640	799,920	79,992	159,984	399,960
1993	101,640	901,560	90,156	180,312	450,780
1994	101,640	1,003,200	100,320	200,640	501,600
1995	101,640	1,104,840	110,484	220,968	552,420
1996	101,640	1,206,480	120,648	241,296	603,240
1997	101,640	1,308,120	130,812	261,624	654,060
1998	101,640	1,409,760	140,976	281,952	704,880
1999	101,640	1,511,400	151,140	302,280	755,700
2000	42,350	1,553,750	155,375	310,750	776,875
2001	42,350	1,596,100	159,610	319,220	798,050
2002	42,350	1,638,450	163,845	327,690	819,225
2003	42,350	1,680,800	168,080	336,160	840,400
2004	42,350	1,723,150	172,315	344,630	861,575
2005	42,350	1,765,500	176,550	353,100	882,750
TOTALS	1,765,500		$2,272,545	$4,545,090	$11,362,725

TABLE 3

SCENARIO III
TAX INCREMENT FINANCING

	GROWTH* IN VALUE EXISTING ($000's)	CUMULATIVE NEW SPACE (SF)	VALUE PER SF AT 6% GROWTH	VALUE OF NEW DEVEL. ($000's)	DEVELOPED LAND/YR (ACRES)	VAC. LAND (ACRES)	INCREMENTAL** LAND VALUE PER SF @ 5%/ANNUM	INCREMENTAL VACANT LAND VALUE ($000's)	INCREMENTAL VALUE OF NEW DEVEL. AND VACANT LAND ($000's)	1985 MAX. MILLAGE $13.90/$1000	70% SCHOO MILLS MAX MILLAGE 4.2/$1000
Existing						1567					
1985	$72,000	2,930,716	$80.00	$234,457	135	1432	$.40	$24,951	$331,408	$4,606,571	1,381,97
1986	76,320	6,128,182	84.80	519,669	147	1282	.82	45,792	641,781	8,920,756	2,676,22
1987	80,899	6,929,432	89.88	622,817	37	1248	1.26	68,497	772,213	10,733,761	3,220,12
1988	85,753	7,730,682	95.28	736,579	37	1211	1.72	90,732	913,064	12,691,590	3,807,47
1989	90,898	8,531,932	101.00	861,725	37	1174	2.21	113,020	1,065,643	14,812,438	4,443,73
1990	96,352	9,333,182	107.06	999,211	37	1137	2.72	134,720	1,230,283	17,100,934	5,130,28
1991	102,133	9,723,044	113.48	1,103,371	18	1119	3.16	158,904	1,364,408	18,965,271	5,689,58
1992	108,261	10,112,906	120.29	1,216,482	18	1101	3.82	183,210	1,507,953	20,960,547	6,288,16
1993	114,757	10,502,768	127.51	1,339,208	18	10835	4.41	208,040	1,662,005	23,101,870	6,930,56
1994	121,642	10,892,630	135.16	1,472,248	18	1065	5.03	233,350	1,827,240	25,398,636	7,619,59
1995	128,941	11,282,492	143.27	1,616,443	18	1048	5.68	259,300	2,004,684	27,865,108	8,359,53
1996	136,678	11,672,354	151.86	1,772,564	18	1030	6.37	285,800	2,195,042	30,511,084	9,153,32
1997	144,878	12,062,216	160.98	1,941,776	18	1012	7.08	312,110	2,398,764	33,342,820	10,002,84
1998	153,571	12,452,078	170.63	2,124,698	18	994	7.84	339,460	2,617,729	36,386,433	10,915,93
1999	162,785	12,841,940	180.87	2,322,722	18	976	8.63	366,900	2,852,407	39,648,457	11,894,53
2000	172,552	13,231,802	191.73	2,536,933	18	958	9.46	394,770	3,104,255	43,149,145	12,944,74
2001	182,905	13,682,671	203.23	2,780,729	20	938	10.34	422,485	3,386,119	47,067,054	14,120,11
2002	193,800	14,133,540	215.42	3,044,647	20	918	11.25	449,866	3,688,393	51,268,663	15,380,69
2003	205,512	14,584,409	228.35	3,330,350	20	898	12.22	478,008	4,013,870	55,792,793	16,737,83
2004	217,843	15,035,278	242.05	3,639,289	20	878	13.23	505,990	4,363,122	60,647,396	18,194,21
2005	230,914	15,486,147	256.57	3,973,281	20	858	14.29	534,081	4,738,276	65,862,036	19,758,61

*15 million S.F. at $80/S.F. = $1.2 billion growing at 6% per annum.
**Average $8/S.F. current value.

TABLE 4

SCENARIO IV
FLAT RATE FOR CORRIDOR
PLUS HIGHER ASSESSMENT AT STATIONS

YEAR	SULLY ROAD 50¢/SF	HERNDON 50¢/SF	RESTON 50¢/SF	HUNTER MILL 50¢/SF	TYSONS CORNER 50¢/SF	TOTAL STATION AREA 50¢/SF	TOTAL REMAINING CORRIDOR 10¢/SF	TOTAL CORRIDOR AND STATIONS
1985	-	-	-	304,920	133,750	438,670	1,705,337	2,144,007
1986	-	-	-	304,920	247,500	552,420	2,002,334	2,554,754
1987	-	-	-	304,920	247,500	552,420	2,082,459	2,634,879
1988	-	-	189,145	304,920	247,500	741,565	2,124,755	2,866,320
1989			378,275	304,920	247,500	930,695	2,167,054	3,097,749
1990	$55,811	75,200	567,445	344,125	298,320	1,270,901	2,179,138	3,450,039
1991	111,622	150,400	756,590	383,330	349,140	1,751,082	2,122,088	3,873,170
1992	167,433	225,600	945,740	422,530	399,960	2,161,263	2,079,037	4,240,300
1993	223,244	300,800	1,134,885	461,735	450,780	2,571,444	2,035,988	4,607,432
1994	279,055	376,000	1,324,035	500,940	501,600	2,981,630	1,992,937	4,974,567
1995	334,866	457,200	1,513,180	500,940	552,420	3,358,606	1,956,528	5,315,134
1996	390,677	526,400	1,702,330	500,940	603,240	3,724,247	1,922,386	5,646,633
1997	446,488	601,600	1,891,475	500,940	654,060	4,094,563	1,887,309	5,981,872
1998	502,299	676,800	1,950,585	500,940	704,880	4,335,504	1,878,107	6,213,611
1999	558,110	752,000	2,009,690	500,940	755,700	4,576,440	1,868,906	6,445,346
2000	558,110	827,200	2,068,800	500,940	776,875	4,731,925	1,876,795	6,608,720
2001	558,110	902,400	2,127,910	500,940	798,050	4,887,410	1,890,785	6,778,195
2002	558,110	977,600	2,187,020	500,940	819,225	5,042,895	1,904,775	6,947,670
2003	558,110	1,052,800	2,246,125	500,940	840,400	5,198,375	1,918,766	7,097,141
2004	558,110	1,128,000	2,305,235	500,940	861,575	5,353,860	1,932,756	7,286,616
2005	558,110	1,128,000	2,364,345	500,940	882,750	5,434,145	1,961,785	7,395,930

APPENDIX D

APPENDIX D:
ADDITIONAL NON-USER BENEFICIARIES REVENUE ESTIMATES

APPENDIX D:
ADDITIONAL NON-USER BENEFICIARIES REVENUE ESTIMATES

A broad range of individuals and entities, although not necessarily users of transportation services and facilities, receive indirect benefits. Chapter Four identified over fifteen different groups which receive indirect benefits yet are not necessarily users of the proposed system. Airlines and airline passengers as well as users of the Dulles Access Road Tollroad and other travelers within the corridor will benefit from the proposed transit improvements.

Viable mechanisms for use in transferring these non-user benefits would be a head tax on airline passengers, (certainly at Dulles, but also at Washington National Airport), dedication of a toll increase and possibly an increase in the regional gasoline tax currently collected by the Northern Virginia Transportation District. The head tax would require legislative action, while the dedication of a toll increase would require refunding of the tollroad bonds to make available that revenue stream for the issuance of additional bonds for the proposed transit improvements.

AIRLINE PASSENGER HEAD TAX

The following table reflects current forecasts of airline passenger activity at Dulles International and Washington National airports. As can be seen a $1.00 per passenger head tax at both airports will generate in excess of $20,000,000 in 1990. It should be noted that in order to collect a head tax congressional action would be required which at this time, appears unlikely. In and of itself an airline passenger head tax would be sufficient to ensure the financial viability of the proposed project. Perhaps a more equitable non-user benefit assessment would be a combination of mechanisms.

Toll Road Revenues

The Dulles Access Toll Road, which shares the right-of-way being considered for this project, was opened in 1984. Ridership levels have exceeded projects, with daily usage an averaging of 65,000 vehicles a day. Toll collections, at current rates, will total $8 million a year, well over the $6.5 million estimated in the feasibility study of the road.

With continued growth in the corridor and in Loudoun County, fare collections should continue to increase. Moreover, congestion on competitive arterials will likely increase. These factors could allow a toll increase and greater total revenues. Toll Road users would benefit from operation of the rail line since it would reduce congestion, already appearing, on the Toll Road.

DEDICATION OF TOLL INCREASE
PASSENGERS WITH TRIP ORIGINS OR DESTINATIONS AT
DULLES AIRPORT

	NUMBER OF PASSENGERS (in millions)		
YEAR	NATIONAL	DULLES	TOTAL
1990	14.6	6.1	20.6
1991	14.6	6.7	21.3
1992	14.6	7.2	21.8
1993	14.6	7.7	22.3
1994	14.6	8.2	22.8
1995	14.6	8.8	23.4
1996	14.6	9.3	23.9
1997	14.6	9.8	24.4
1998	14.6	10.3	24.9
1999	14.6	10.9	25.5
2000	14.6	11.4	26.0
2001	14.6	11.9	26.5
2002	14.6	12.5	27.1
2003	14.6	13.0	27.6
2004	14.6	13.5	28.1
2005	14.6	14.0	28.6
2006	14.6	14.6	29.2
2007	14.6	15.1	29.7
2008	14.6	15.6	30.2
2009	14.6	16.1	30.7
2010	14.6	16.7	31.3

The Toll Road is generating revenues beyond those required for debt service and maintenance of the Toll Road. Moreover, before these revenues would be available, the existing bonds would have to be refunded and new bonds issued, permitting funding of the rail line.

A 10 cent fare increase on the Toll Road would generate approximately $2 million a year, with a potential for additional for growth in the future due to higher usage and toll increases.

UMTA Formula Funds

The majority of the UMTA capital program is distributed by a formula based partially on the share of fixed guideway (i.e. rail) route miles and vehicle miles each urbanized area has of the national total of route miles and vehicles miles. The operation of the proposed rail line would increase the Washington urbanized area's share of route miles and vehicle miles, thereby increasing its share of the apportionment under the formula. The actual increase in funds received by Washington would depend on the total appropriated and the development or termination of such services in other areas. However, as a practical matter, the Washington apportionment would increase by between $1 million and $2 million when the data associated with the rail line is incorporated in the data base.

While the Federal funds could not be directly used to pay the service fee, they could be used by local governments for eligible capital projects and the local funds thereby made available could be used for the service fee. A similar arrangement is now used in Montgomery County, Maryland, where the Ride-On service receives no federal assistance, but the increase in the Washington apportionment attributed to its data is credited to Montgomery County's share of the overall WMATA summary.

Regional Gasoline Tax

The value accruing to auto travelers in the Dulles Corridor and the larger community could be captured through a regional gasoline tax. The Northern Virginia Transportation Commission receives approximately $9-10.5 million annually from a state imposed two percent sales tax on the retail sale of motor vehicle fuels sold in the counties and cities that make-up the Northern Virginia Transportation district. Portions of their revenue or the revenues generated from an increase in the taxing rate could be used to help ensure the financial feasibility of the Dulles LRT project.

APPENDIX E

APPENDIX E:
PRIVATE/PUBLIC COST REDUCTION OR COST SHARING MEASURES

APPENDIX E:
PRIVATE/PUBLIC COST REDUCTION OR COST SHARING MEASURES

The following steps could result in a cost reduction or cost sharing of the Dulles Corridor improvements:

1. Safety Barriers and Fences

   Negotiate with the Virginia Department of Highways & Transportation to provide and install these items to isolate the right-of-way.
   Potential net savings = $12,010,000

2. Bridges

   Require developers of adjacent property to be responsible for bridge and underpass improvements, including the approved design.
   Potential net savings = $6,145,000

3. Yard/Shops

   Negotiate with WMATA to provide storage and light repair facilities at West Falls Church.
   Potential net savings = $597,500

4. Stations

   Require developers of adjacent property to be responsible for station construction.
   Potential net savings = $3,110,000

5. Aerial Structure at Dulles

   Negotiate with the F.A.A. to pay for access to Dulles Airport, including the design, procurement, and construction of any access scheme on airport property.
   Potential net savings = $23,905,000

6. Pedestrian Tunnel or other interface at West Falls Church

   Negotiate with WMATA to pay for patron access to their Orange Line transfer point.
   Potential net savings = $1,195,000 or more

7. Traction Power Substations

Negotiate with VEPCO to make the connections to traction power equipment, and provide the connection lines to the substation.
Potential net estimated savings = $500,000

8. Pedestrian Bridges

Require developers to provide these items with the stations.
Potential net savings = $592,000

9. Parking

Require developers to provide parking facilities.
Potential net savings = $3,280,000 plus cost of land that is currently being determined.

10. Phased purchase of vehicles

Reduce initial cost of rolling stock by phased requirements to be determined.
Potential net savings to be determined.

It is also important to note that the cost of contingency could be reduced somewhat if these items are implemented. The thought here is that contingency for the owner/operator would be transferred to others. Agency coordination costs would be unchanged.

These suggestions, if implemented, could save in excess of $50 million on the initial capital cost.

ACTIVITIES	1986	1987	1988	1989	CONSTRUCTION COST
DEVELOP & ISSUE REQUEST-FOR-PROPOSALS					
BIDDERS DEVELOP & SUBMIT PROPOSALS					
EVALUATE PROPOSALS, AWARD CONTRACT					
CONTRACTOR MOBILIZATION					
SYSTEMWIDE DESIGN CRITERIA & STANDARDS					
CLEARING & GRUBBING					$5,390,000.
DRAINAGE STRUCTURES					2,775,000.
SAFETY BARRIERS & FENCES					11,225,000.
BRIDGES					5,345,000.
YARD & SHOP					560,000.
EARTHWORK & SUBBALLAST & PAVED SHOULDER					5,025,000.
STATIONS(7) (INCL. LANDSCAPING)					4,910,000.
AERIAL STRUCTURE AT DULLES TERMINAL					20,905,000.
PEDESTRIAN TUNNEL AT W.F.C.					1,060,000.
VEHICLES					21,150,000.
TRACTION POWER SUBSTATIONS & SYSTEM					1,750,000.
TRACKWORK					17,675,000.
PEDESTRIAN BRIDGES					565,000.
SIGNALS & COMMUNICATION					700,000.
PARKING, KISS & RIDE (INCL. LANDSCAPING)					8,879,500.
FARE CARD SYSTEM					800,000.
SYSTEM STATIC & DYNAMIC TESTS					
START-UP TRAINING & OPERATION					
REVENUE SERVICE					

$108,714,500.	CONSTRUCTION
15,086,250.	CONTINGENCY
2,313,225.	AGENCY COORD
17,349,185.	PM, CM, DESIGN
$143,463,160.	

LEGEND: DESIGN; PROCUREMENT & FABRICATION; CONSTRUCTION/INSTALLATION

DULLES RAIL TRANSIT SYSTEM
DESIGN & CONSTRUCTION SCHEDULE