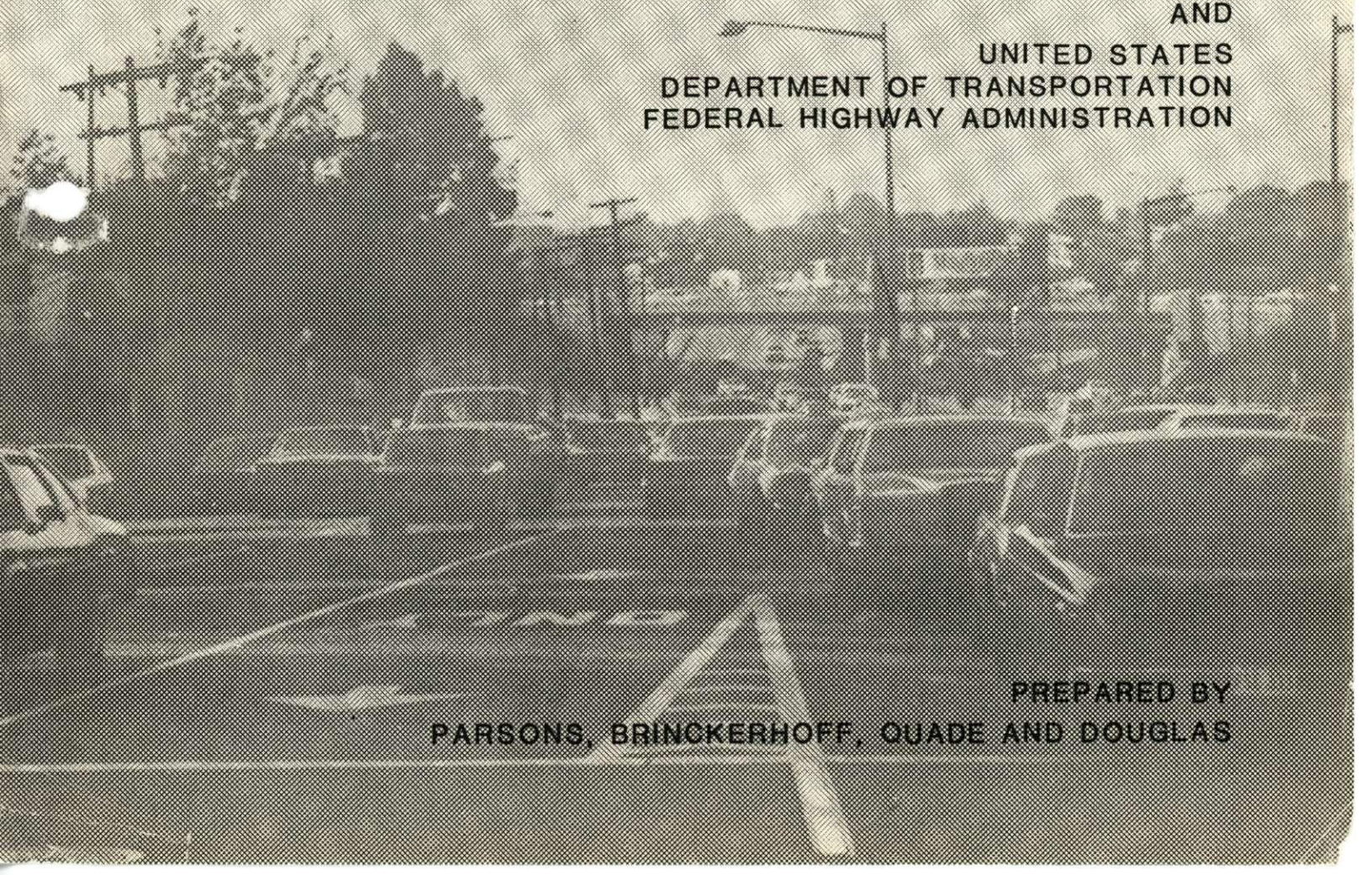
BARNEY CIRCLE FREEWAY MODIFICATION STUDY

TRAFFIC

FINAL TECHNICAL REPORT NUMBER ONE

FEBRUARY 1983

PREPARED FOR
DISTRICT OF COLUMBIA
DEPARTMENT OF TRANSPORTATION
AND
UNITED STATES
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



PREPARED BY
PARSONS, BRINCKERHOFF, QUADE AND DOUGLAS

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PREFACE

This technical report is one of 12 which have been prepared to provide technical back-up to certain sections of the Barney Circle Freeway Modification Study Draft Environmental Impact Statement. The technical reports cover the following subject areas:

1. Traffic;
2. Ecology;
3. Geotechnic;
4. Water;
5. Social;
6. Air;
7. Noise;
8. Energy;
9. Historic;
10. Visual;
11. Geometric; and
12. Archaeology.

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1. TRAFFIC

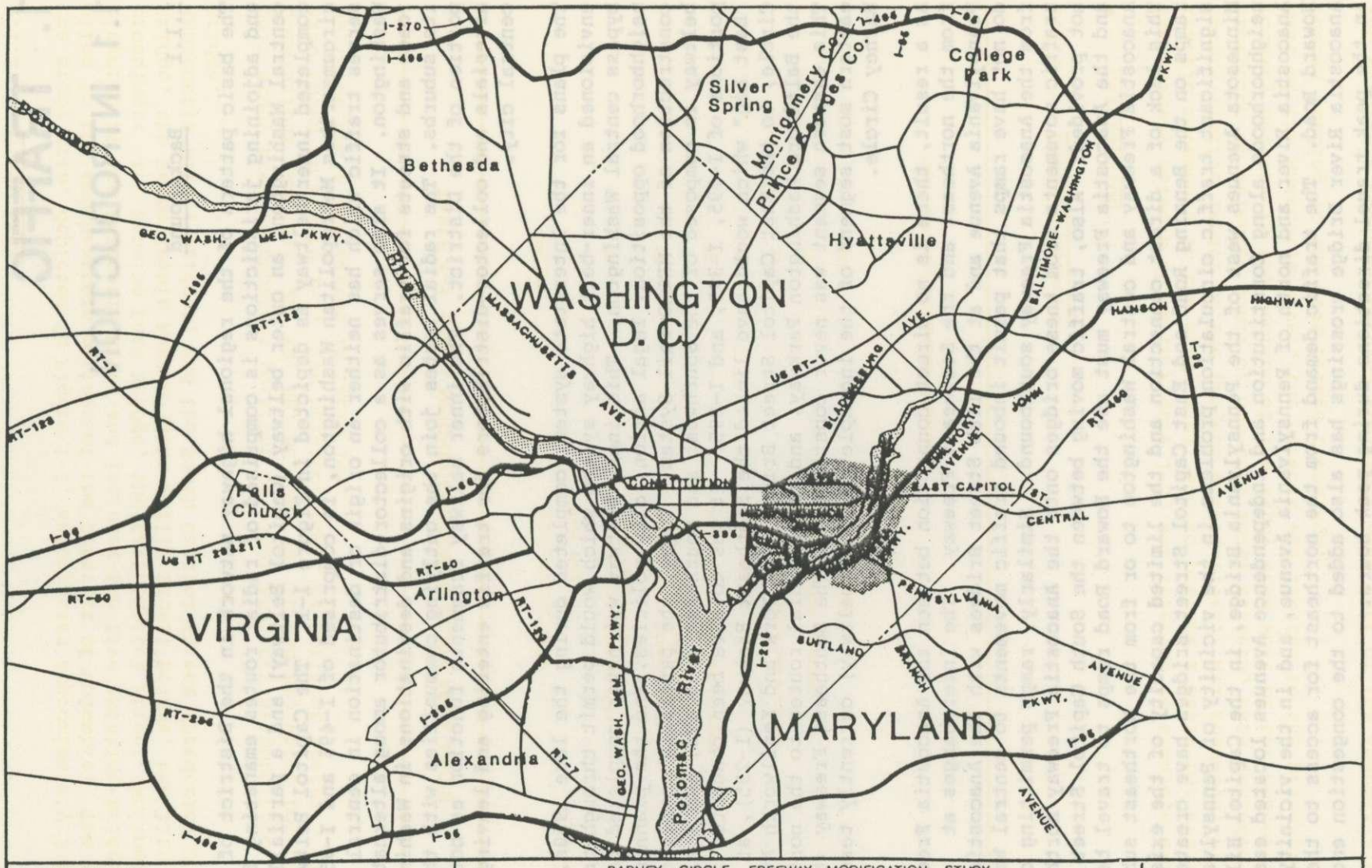
1.1 INTRODUCTION

1.1.1 Background

The basic pattern of the regional highway network in the District of Columbia and adjoining jurisdictions is comprised of radial routes emanating from central Washington, an outer beltway (Capitol Beltway) and a partially completed inner beltway as depicted in Figure 1-1. The Capitol Beltway, which circumscribes Metropolitan Washington, is comprised of I-495 and I-95. It serves traffic which has neither an origin or destination in central Washington. It also serves as a collector-distributor among alternate radial roads and streets for traffic with origins and destinations in Washington and its suburbs. The radial routes join the outlying communities with the central portion of the District. The inner beltway fragments function as both arterials and collector-distributors for traffic entering and leaving the central city.

The plans for the Interstate system, completed during the late 1950s, envisioned an inner-belt highway system which would permit through traffic to bypass central Washington. This inner beltway was never completed due to neighborhood opposition, legal action, city policies, and the planning and construction of the METRO-rail System. Today, the partially completed inner beltway is composed of the Southwest and Southeast Freeways, and includes portions of I-295, I-395, and I-695. It was to have been connected to an "East Leg" which would have linked the Southeast Freeway (I-295), at Barney Circle, to the East Capitol Street Bridge, New York and Kenilworth Avenues, the Baltimore Washington Parkway, and major radial routes to the northeast. This eastern segment was never constructed. The Southeast Freeway (the eastern most segment of the incompleted inner beltway) currently terminates at Barney Circle.

As a result, there is no direct connection between the Anacostia Freeway to or from the northeast and the Southeast Freeway. The interchanges at Pennsylvania Avenue and at the 11th Street Bridges with the Anacostia Freeway do not have ramps that permit inbound traffic movements to central Washington from the Anacostia Freeway southbound. Similarly, ramps permitting outbound traffic movements from these bridges onto the Anacostia Freeway northbound are not provided. Also, traffic moving between the South Capitol Street Bridge and the Anacostia Freeway must use the Howard Road ramps to travel between the Anacostia Freeway and central Washington to or from the Northeast suburbs. This lack of a direct connection and the limited capacity of the existing ramps on the Benning Road and East Capitol Street Bridges have created significant traffic circulation problems in the vicinity of Pennsylvania and Minnesota Avenues west of the Pennsylvania Bridge, in the Capitol Hill neighborhoods along Constitution and Independence Avenues located east of the Anacostia River and north of Pennsylvania Avenue, and in the vicinity of Howard Road. The traffic demand from the northeast for access to the existing Anacostia River Bridge crossings has also added to the congestion encountered in the peak travel directions during peak hours.


WASHINGTON D.C.
VIRGINIA
MARYLAND
Bethesda
Silver Spring
College Park
Hyattsville
Falls Church
Arlington
Alexandria
Potomac River
Rock Creek
Anacostia River
Montgomery Co.
Prince Georges Co.
GEO. WASH. MEM. PKWY.
MASSACHUSETTS AVE.
US RT-1
BLADENSBURG AVE.
BALTIMORE-WASHINGTON PKWY.
HANSON HIGHWAY
KENILWORTH AVENUE
JOHN RT-450
EAST CAPITOL ST.
CENTRAL AVENUE
CONSTITUTION AVE.
PENNSYLVANIA AVENUE
SUITLAND PKWY.
BRANCH AVENUE
GEO. WASH. MEM. PKWY.
US RT 29&211
RT-50
RT-7
RT-123
RT-244
I-66
I-95
I-495
I-270
I-295
I-395
I-695
LEGEND
Study Area
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
REGIONAL LOCATION MAP
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-1
MILES
0 1 2 3

1.1.2 Study Area

The study area, depicted in Figure 1-2, encompasses approximately 5 square miles in the southeastern portion of the District of Columbia. The area is bisected by the Anacostia River and includes the five existing bridge crossings: the Benning Road Bridge, the East Capitol Street (Whitney Young) Bridge, the Pennsylvania Avenue (John Philip Sousa) Bridge, the 11th Street (Anacostia River) Bridges, and the South Capitol Street (Frederick Douglass) Bridge.

This study area encompasses portions of eight Advisory Neighborhood Commissions (ANC's): 2D, 6A, 6B, 6C, 7A, 7B, 7D and 8A, whose boundaries are also shown on Figure 1-2. The neighborhoods, or portions thereof, which make up these ANC's are listed in Table 1-1.

TABLE 1-1 LOCAL NEIGHBORHOODS IN STUDY AREA ANC'S

ANC'S*	Local Neighborhoods
2D	Navy Yard
6A	Stanton Park, Kingman Park and Capitol East
6B	Capitol Hill, Lincoln Park and Near Southeast
6C	Fairlawn, Twining and Greenway
7A	River Terrace (portion)
7B	Randle Highlands and Woodland
7D	River Terrace (portion)
8A	Old Anacostia

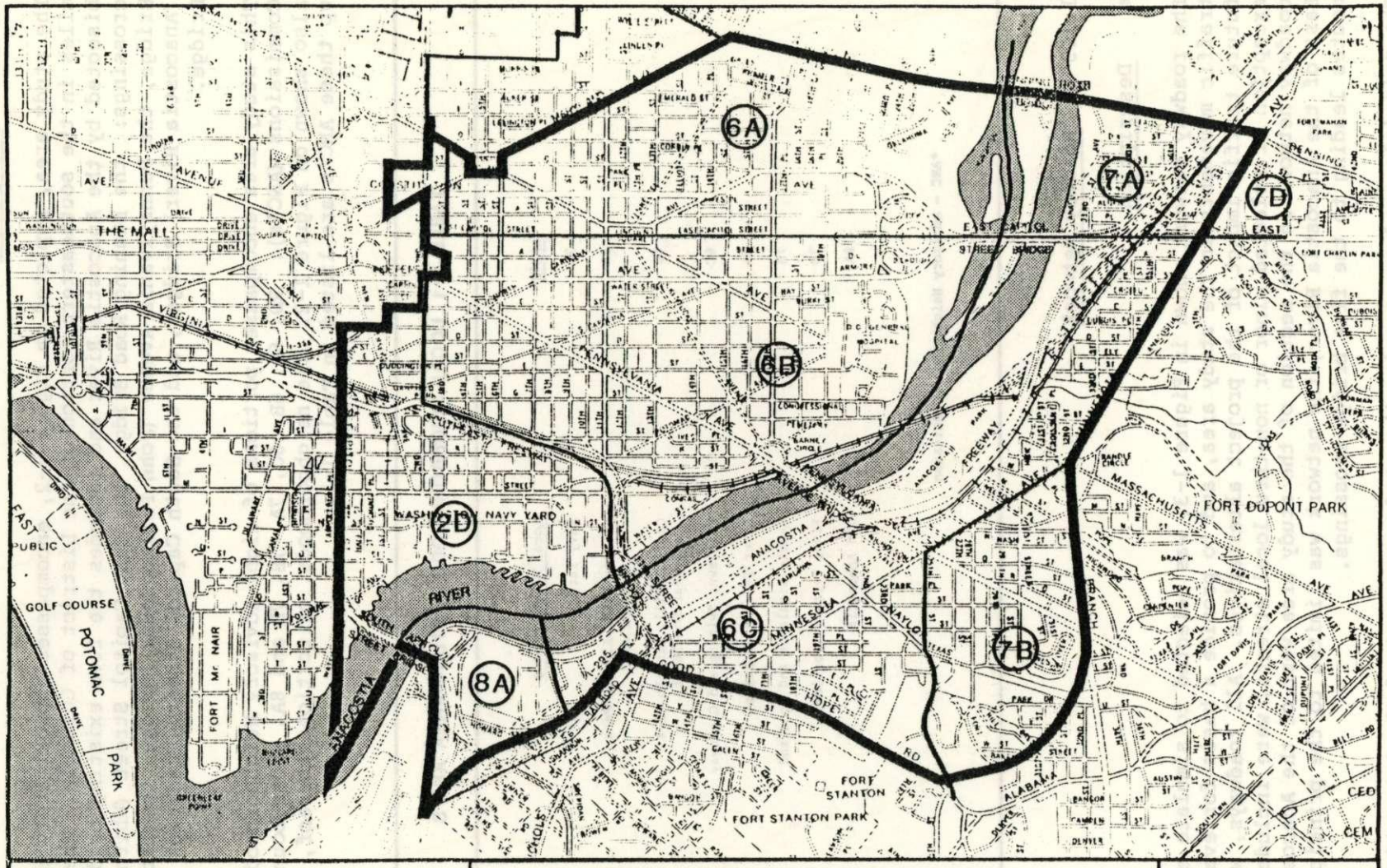
*ANC - Advisory Neighborhood Commission

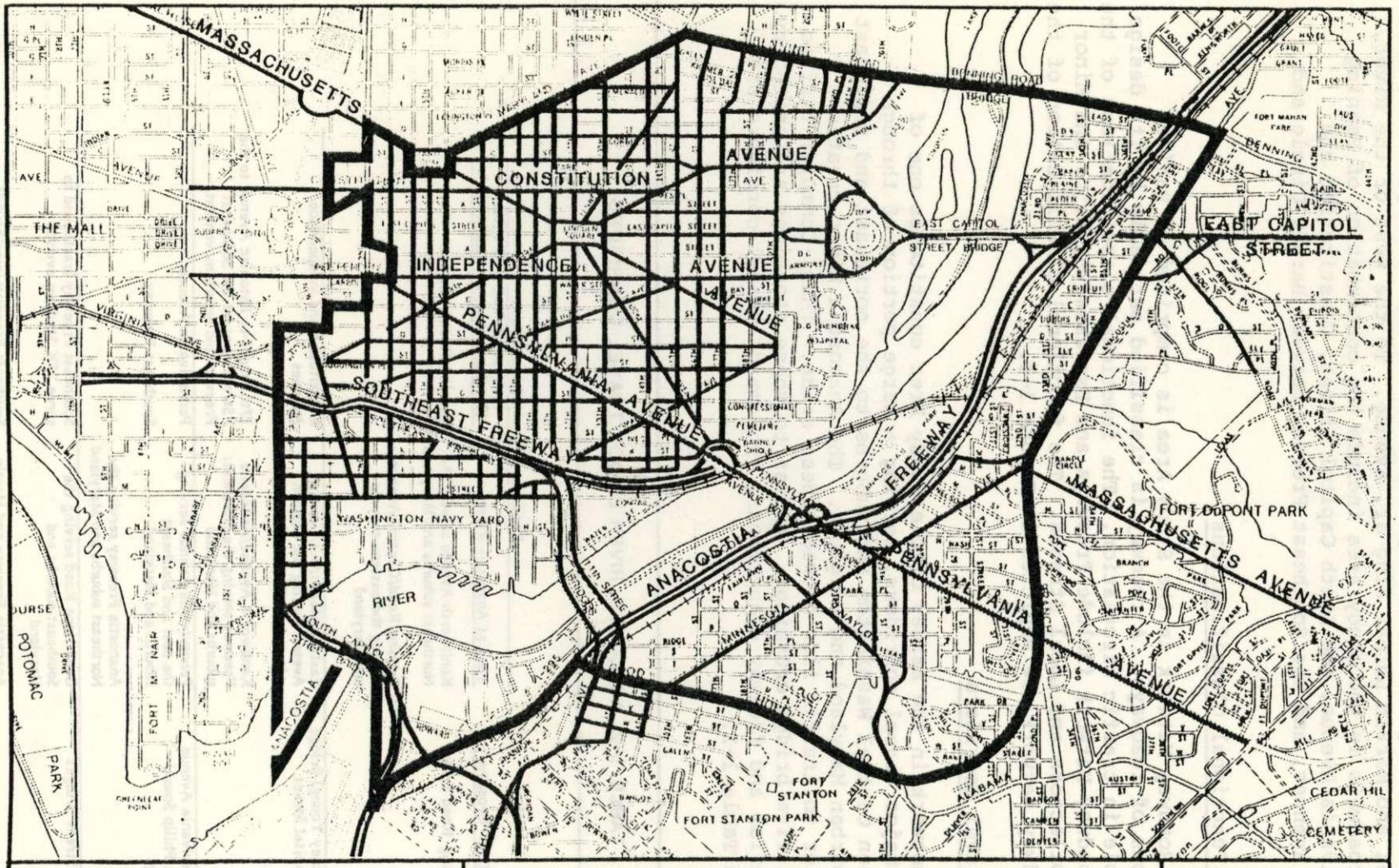
1.1.3 Roadway Network

- Description

The roadway network shown in Figure 1-3, was selected to simulate existing traffic movements in the study area, and to provide a basis for evaluating the future traffic impact of the project alternatives. All roadways, with the exception of selected minor or non-thru local streets, were included in the roadway network in the section of the study area west of the Anacostia River. East of the Anacostia River, the network was limited to the principle commuter routes leading to the five bridge crossings.

The principle roadways serving the study area east of the Anacostia River include Kenilworth Avenue, the Anacostia Freeway, Pennsylvania Avenue, East


6A
7A
7D
EAST
6B
2D
6C
7B
8A
THE MALL
NAVY YARD
ANACOSTIA
RIVER
FREEWAY
MASSACHUSETTS
FORT DUPONT PARK
FAST
PUBLIC
GOLF COURSE
POTOMAC
PARK
FORT
Mr NAIR
MINNESOTA
HOPE
FORT
STANTON
FORT STANTON PARK
ALABAMA
CEM
LEGEND
Study Area
ANC Boundary
6A
ANC Number
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
STUDY AREA ANCs
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-2
0
400
800
1600
FEET



LEGEND

Study Area

Major Roadway System

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

STUDY AREA NETWORK

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-3

400 0 800 1600

FEET

Capitol Street, Benning Road, Good Hope Road, Suitelands Parkway, I-295, South Capitol Street and Martin Luther King Jr. Avenue. To the west of the River, the primary roadways in the study area include the continuation of Benning Road, Pennsylvania Avenue, and South Capitol Street, Constitution and Independence Avenues, and the Southeast Freeway between Barney Circle and I-395.

- Roadway Functional Classifications

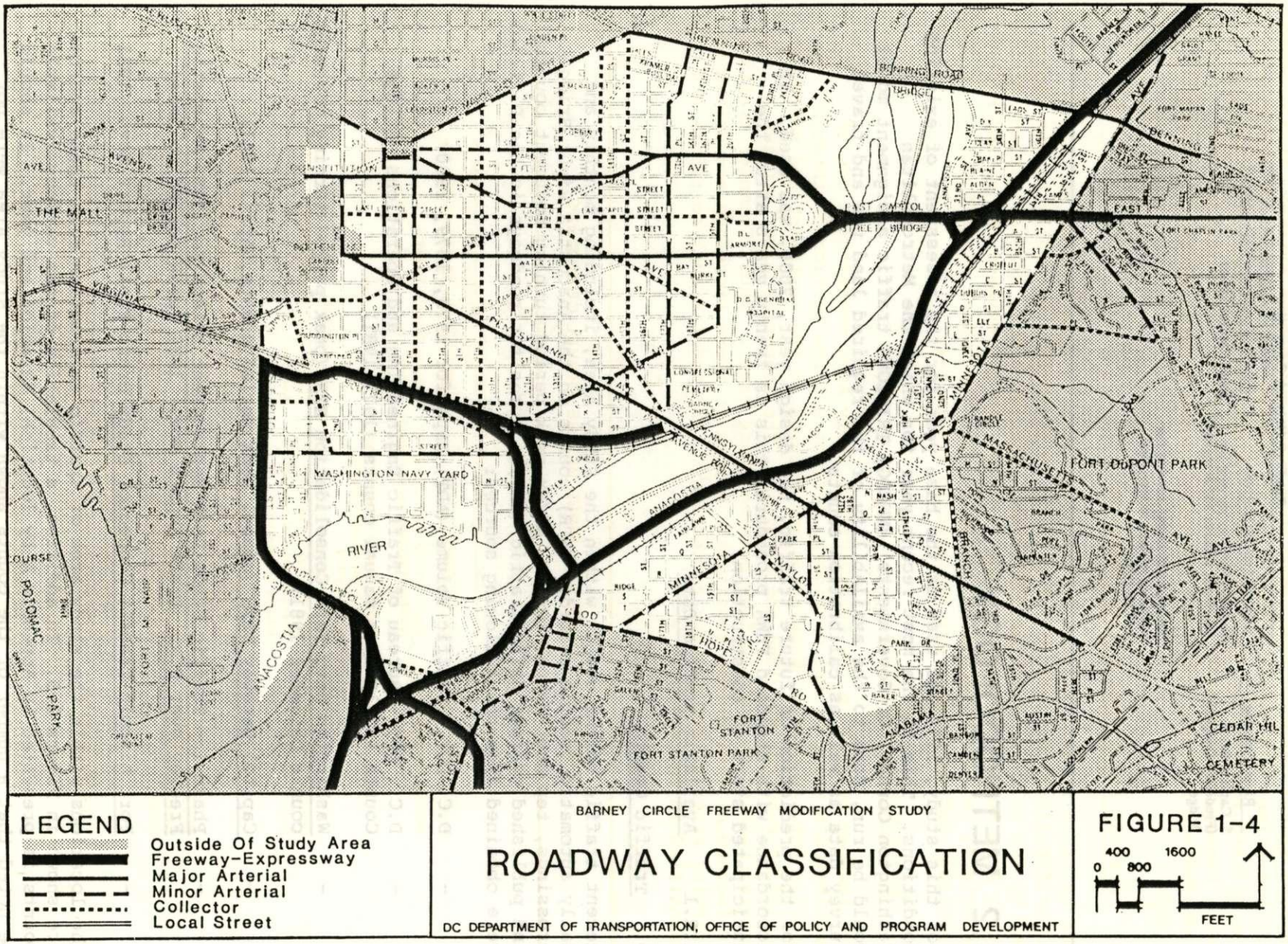
The existing Roadway Network in the Study Area is comprised of various classifications of roadways. A roadway is classified partially by its design and by its role in traffic circulation. The functional classifications of the Study Area Roadway Network include Freeways and Expressways, Major and Minor Arterials, Collectors and Local Streets. The functional classification of the existing roadway network are depicted in Figure 1-4.

- Major Travel Corridors

The roadway network in the Barney Circle Study Area constitutes one of Washington's major travel corridors, serving a large portion of through traffic between Central Washington and suburbs to the northeast and southeast including suburban Maryland and Virginia. The Anacostia River creates a natural barrier to traffic flow between these areas. Thus, Commuter traffic is focused at five bridge crossings. Access to these crossings are united by existing arterial and freeway connections. The major travel corridors are identified in Table 1-2.

TABLE 1-2 ANACOSTIA RIVER BRIDGE TRAVEL CORRIDORS

River Crossing	Roadway Network Connection	
	East of Anacostia River	West of Anacostia River (Serving Downtown Washington)
Benning Road Bridge	Kenilworth Avenue serving the Northeast suburbs and Maryland	Benning Road/H Street
	Benning Road/Central Avenue serving the eastern suburbs and Maryland	
(Whitney Young) Bridge E. Capital Street	East Capital Street/Central Avenue serving the eastern suburbs and Maryland	Constitution and Indepedence Avenues
	Kenilworth Avenue/Anacostia Freeway serving the Northeast suburbs and Maryland	17th Street to Potomac Avenue to the I Street ramp of the Southeast Freeway and return movement
Pennsylvania Avenue (John Philip Sousa) Bridge	Pennsylvania Avenue serving the east and Southeast suburbs and Maryland	Pennsylvania Avenue Southeast Freeway
	Anacostia Freeway serving the Northeast suburbs and Maryland	
11th Street Bridges	Good Hope Road serving the Southeast suburbs and Maryland	Southeast Freeway (eastbound to serve JFK Stadium events)
	Anacostia Freeway and Martin Luther King, Jr. Avenue serving the southern suburbs	Southeast Freeway (westbound)


THE MALL
WASHINGTON NAVY YARD
RIVER
POTOMAC
ANACOSTIA
FORT STANTON
FORT STANTON PARK
FORT DUPONT PARK
CEDAR HIL
CEMETERY
EAST
LEGEND
Outside Of Study Area
Freeway-Expressway
Major Arterial
Minor Arterial
Collector
Local Street
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ROADWAY CLASSIFICATION
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-4
0
400
800
1600
FEET

River Crossing	Roadway Network Connection	
	East of Anacostia River	West of Anacostia River (Serving Downtown Washington)
S. Capital Street (Frederick Douglass) Bridge	Suitland Parkway serving the Southeast suburbs and Maryland Anacostia Freeway serving the southern suburbs in Maryland and Virginia	South Capital Street

1.2 METHODOLOGY

For this study, 1979 was used as the base year for the assessment of existing conditions. This is the most recent year for which the Metropolitan Washington Council of Governments' (MWCOG) TRIMZONE traffic assignment model could be run, done to the availability of the required land use and travel survey data as well as calibration counts.

For the prediction of future traffic, the design year, 2006, was used. In accordance with standard FHWA procedure, this is twenty years after the anticipated start of construction.

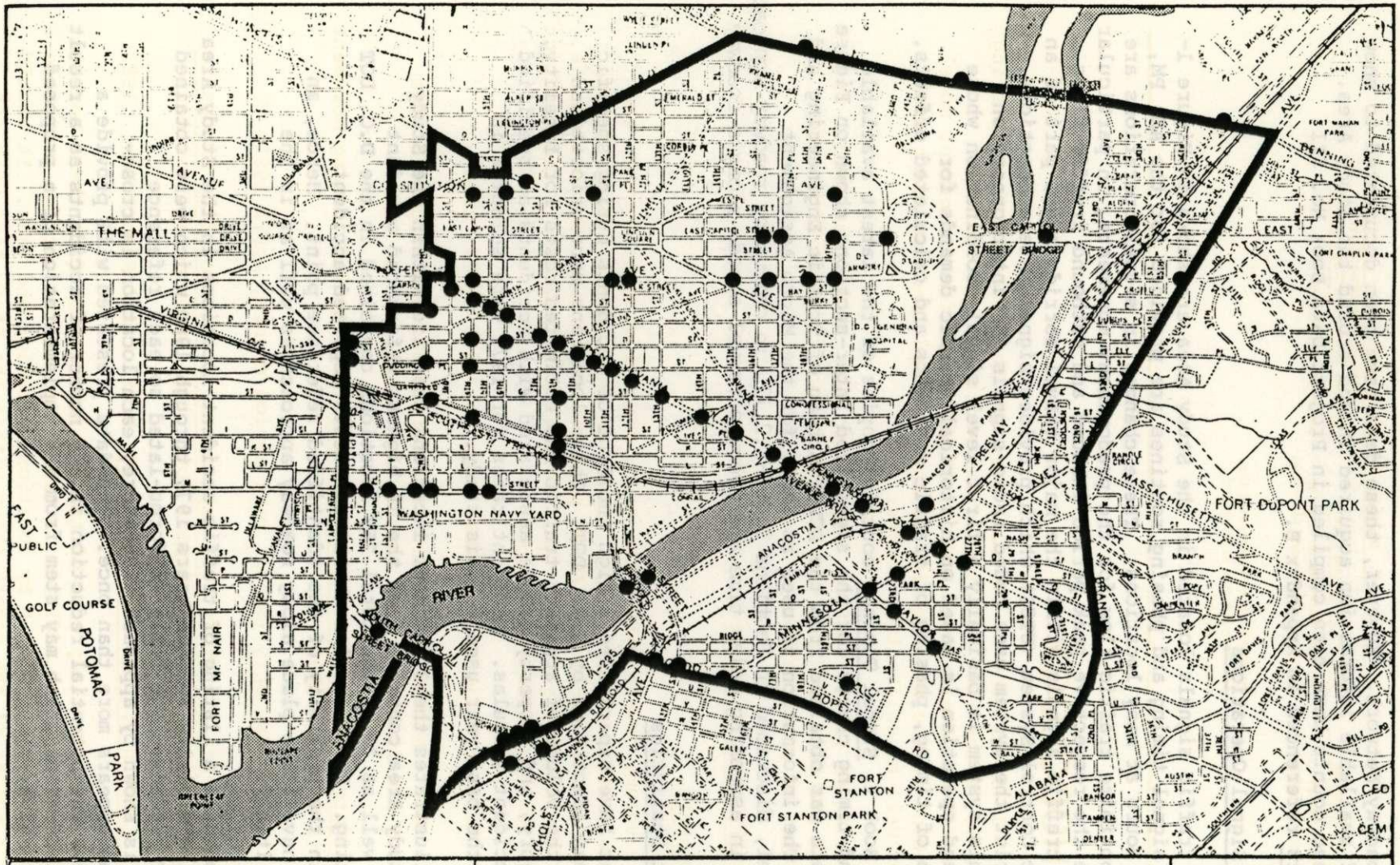
1.2.1 Available Traffic Data

- Traffic Counts

Recent traffic volume counts within the Study Area, including monthly and daily automatic traffic recorder (ATR) counts on the Anacostia River Bridge crossings, ten hour manual counts, AM/PM peak period turning movement counts, and published average daily traffic (ADT) volumes for roadways in the District were obtained from the following sources:

- D.C. DOT - Traffic Volume (ADT) Maps for 1978, 1979, 1980
- D.C. DOT - Bureau of Traffic Engineering and Operations, Bridge Counts and 10 hour manual counts (1977-1981)
- Washington Navy Yard Consolidation EIS (peak period turning movement counts December 1981)
- Capitol Gateway DEIS (manual peak period counts, April 1981)
- Phase I - Traffic Study Deck Replacement Bridge No. 505, Anacostia Freeway over R.R. Draft Report Nov. 1981 (peak period volumes)
- Fort Lincoln Transit Connector Study Draft Final Report Nov. 1981

The locations within the study area of traffic information from these sources are shown in Figure 1-5. In addition, a tabulation of the various available counts is presented in Appendix A by location, duration and year. It should be noted that a number of the counts shown within the Study Area were not pertinent to development of the typical peak period traffic flows for the



LEGEND

- Study Area
- Count Location

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

LOCATIONS OF AVAILABLE TRAFFIC COUNTS IN STUDY AREA

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-5

0 400 800 1600

FEET

Study Area Roadway Network. However, these data have been documented to show the extent of available information acquired in and around the Study Area. Copies of these counts have been compiled in Project Data Book No. XII Traffic Counts referenced in Appendix B.

- Traffic Signal Operations

The existing traffic signals located in the Study Area are shown in Figure 1-6. Separate signal timing and phasing routines are provided for the AM, PM, and off-peak hours at many locations. These changes in signal operations are intended to optimize traffic flow for the predominant movements, in particular to facilitate the respective peak period inbound and outbound traffic flows. The existing traffic signals within the major travel corridors are part of an Urban Traffic Control System (UTCS) which provides signal interconnections. In the Dist-rict the system uses coded radio signals for interconnection controls. This system is basically a first level signal coordination whose performance and operation is based on historical traffic demands for determination of timing, phasing of traffic movements and calculated offsets.

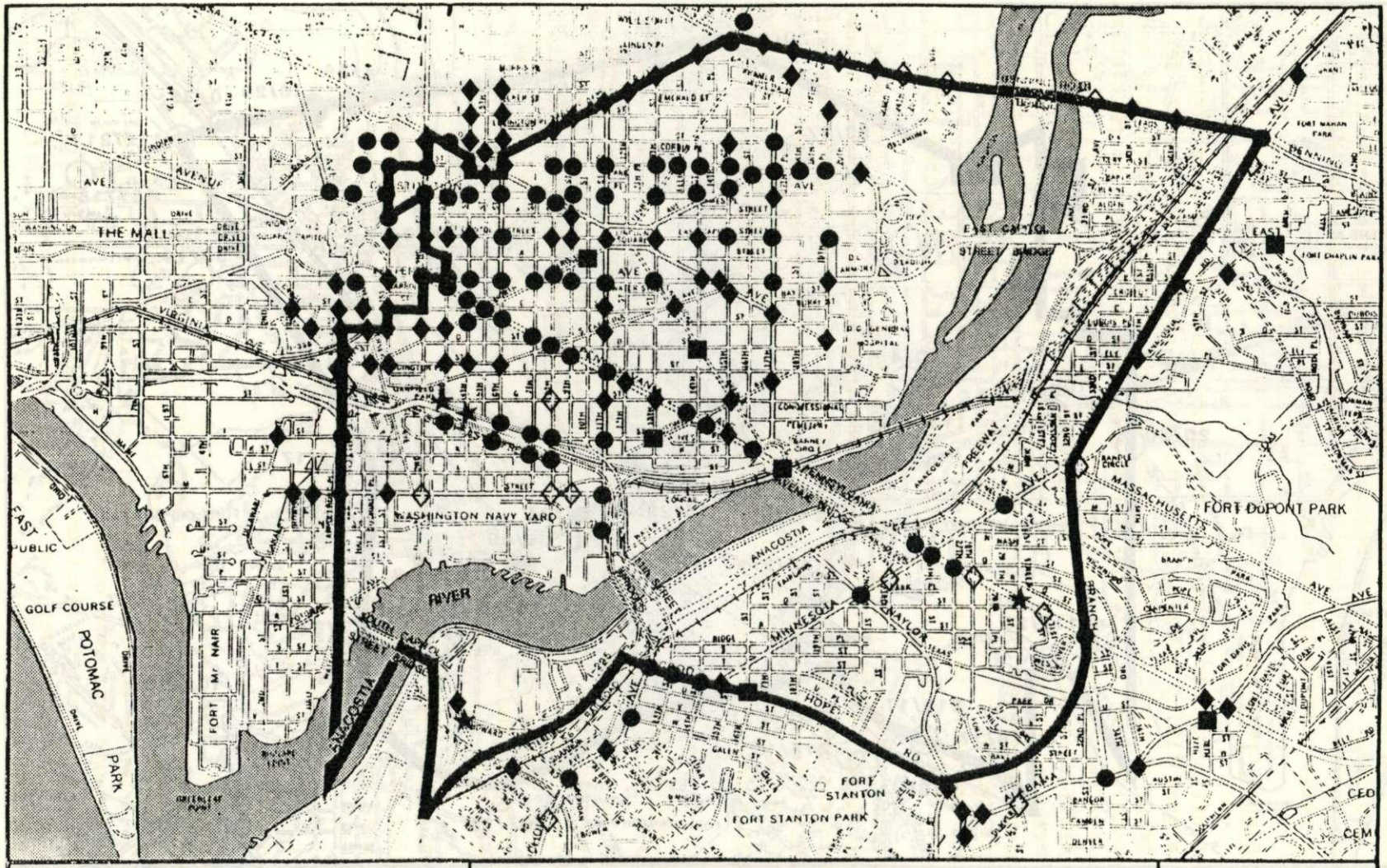
Project Data Book I, Signal Timings contains copies of the latest available sequencing and timing charts for the signalized inter-sections shown on Figure 1-6. This data was obtained from the DCDOT Bureau of Traffic Engineering and Operations. The information is used as input for the Micro Assignment Computer Model, discussed in Sections 1.2.5-1.2.11, in computing roadway approach capacity and in assessing delay time and average travel speeds along a roadway segment.

- Accident Statistics

Locations that have experienced a high incident of accidents during specific years have been identified by D.C. DOT. These locations were prioritized according to the volume of approach traffic and estimated costs for fatality, non-fatal injury, and property damage associated with accidents as specified by Federal accident formulas. Accident rates for 1979 were selected in keeping with the base year used in this study.

Figure 1-7 illustrates the 3 accident locations that lie within the Study Area. The Study Area contains 5 of the 10 highest referenced accident locations as well as 33 of the total 259 locations contained in the D.C. DOT Priority listing. Each location shown represents reported accident occurrences in the proximity of the identified reference point. Hence, an accident may have taken place along roadway approach as well as in the intersection itself.

Appendix C contains a listing of traffic accident locations in the Study Area and surrounding vicinity for the years 1977 through 1980 which were obtained from D.C. DOT records. The table is formu-lated so each reference intersection is shown by approach; therefore, each location is cross-referenced and appears more than once. The data presented will provide a basis to assess the potential reduction in the number of accidents as a result of traffic diver-sions which may stem from the implementation of a proposed project alternative.


THE MALL
WASHINGTON NAVY YARD
ANACOSTIA RIVER
FREEWAY
FORT DUPONT PARK
FORT STANTON
FORT STANTON PARK
FORT MC NAIR
POTOMAC PARK
GOLF COURSE
EAST CAPITOL STREET
PENNSYLVANIA AVE
MINNESOTA AVE
BRANCH AVE
HOPE RD
ALABAMA AVE
LEGEND
24 Hours A Day
Flash At Night
Study Area
Semi-actuated (isolated-24 Hrs)
Semi-actuated (Flash At Night)
Semi-actuated, Coordinated (24 Hours)
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
EXISTING
TRAFFIC SIGNAL LOCATIONS
1982
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-6
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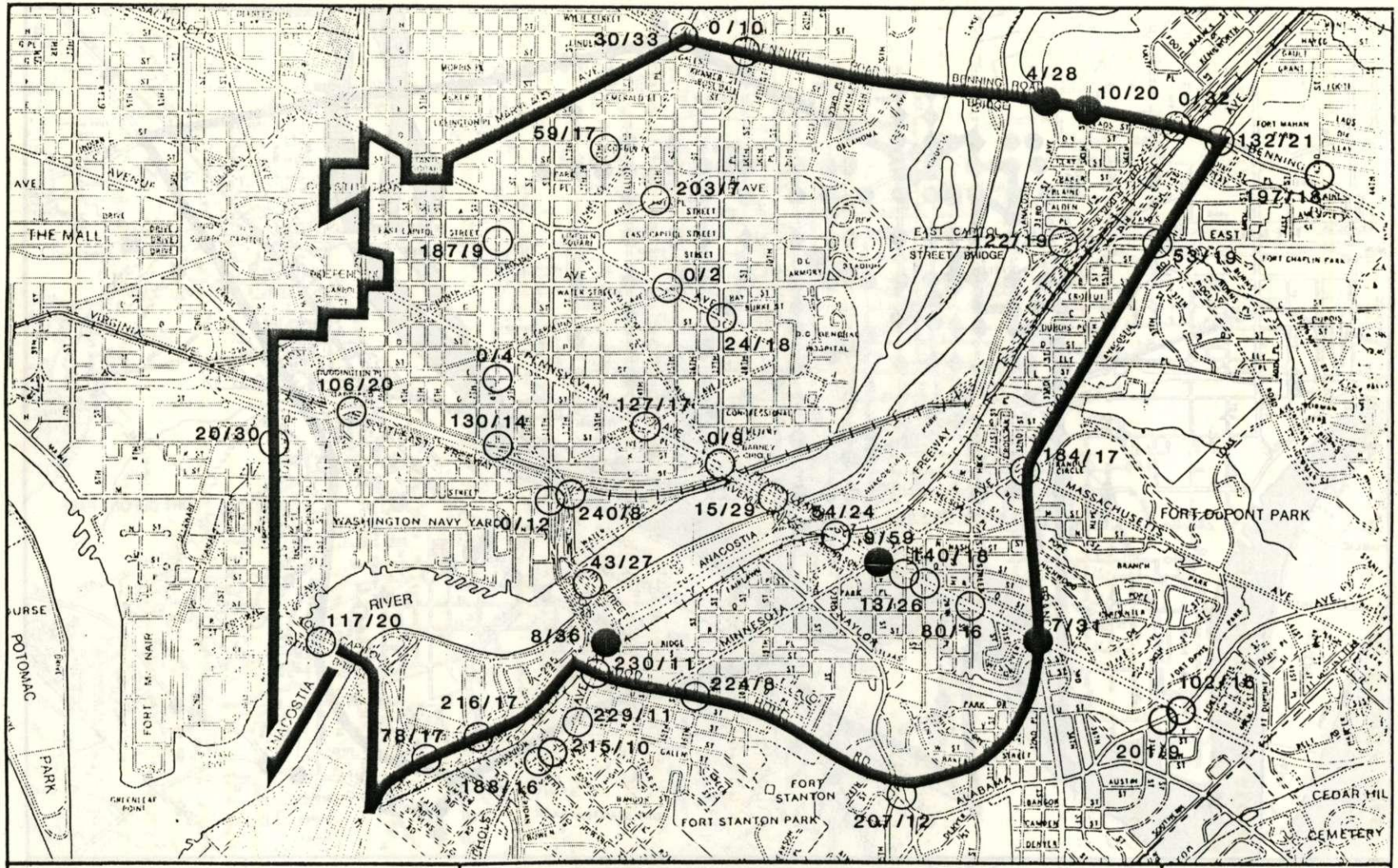
FEET



LEGEND

- Study Area
- ● Within Top 10 Worst Locations
- ○ Other Accident Locations
- xx/x Ranking/Number Of Reported Accidents

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

HIGH ACCIDENT LOCATIONS (1979)

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-7

0 400 800 1600 FEET

1.2.2 Supplemental Traffic Surveys

- Traffic Count Program

Additional manual and machine traffic counts were made by the Consultants and by D.C. DOT at several potentially sensitive locations within the Study Area. These counts provide verification and an update of available counts on major roadway segments where counts were unavailable. These in turn were used to provide a more realistic simulation and calibration of the base year traffic assignments and development of Micro traffic inputs for the environmental analyses.

The locations where manual turning traffic movement counts were made are depicted on Figure 1-8. The counts were made in September 1981 and in May and June of 1982. Copies of these counts are contained in Project Data Book No. XII. They are designated by a 200 series reference number as shown in Figure 1-8. Since this study was limited to the peak commuting-hours, the counts were taken from 7 AM to 9 AM and 4 PM to 6 PM.

In addition to the manual counts, automatic traffic recorder (ATR) machine counts were made by D.C. DOT at the request of the Consultant at 15 locations in and adjacent to the Study Area. The location of these counts are also shown on Figure 1-8 . Summaries of these counts are likewise provided in Project Data Book No. XII and are designated by a series 300 reference number. These counts represent minimum one day traffic counts recorded hourly by direction of traffic flow.

The available as well as supplemental traffic counts are intended for calibration of the base year traffic assignments and development of inputs for the environmental traffic analysis.

- Vehicle Classification Counts

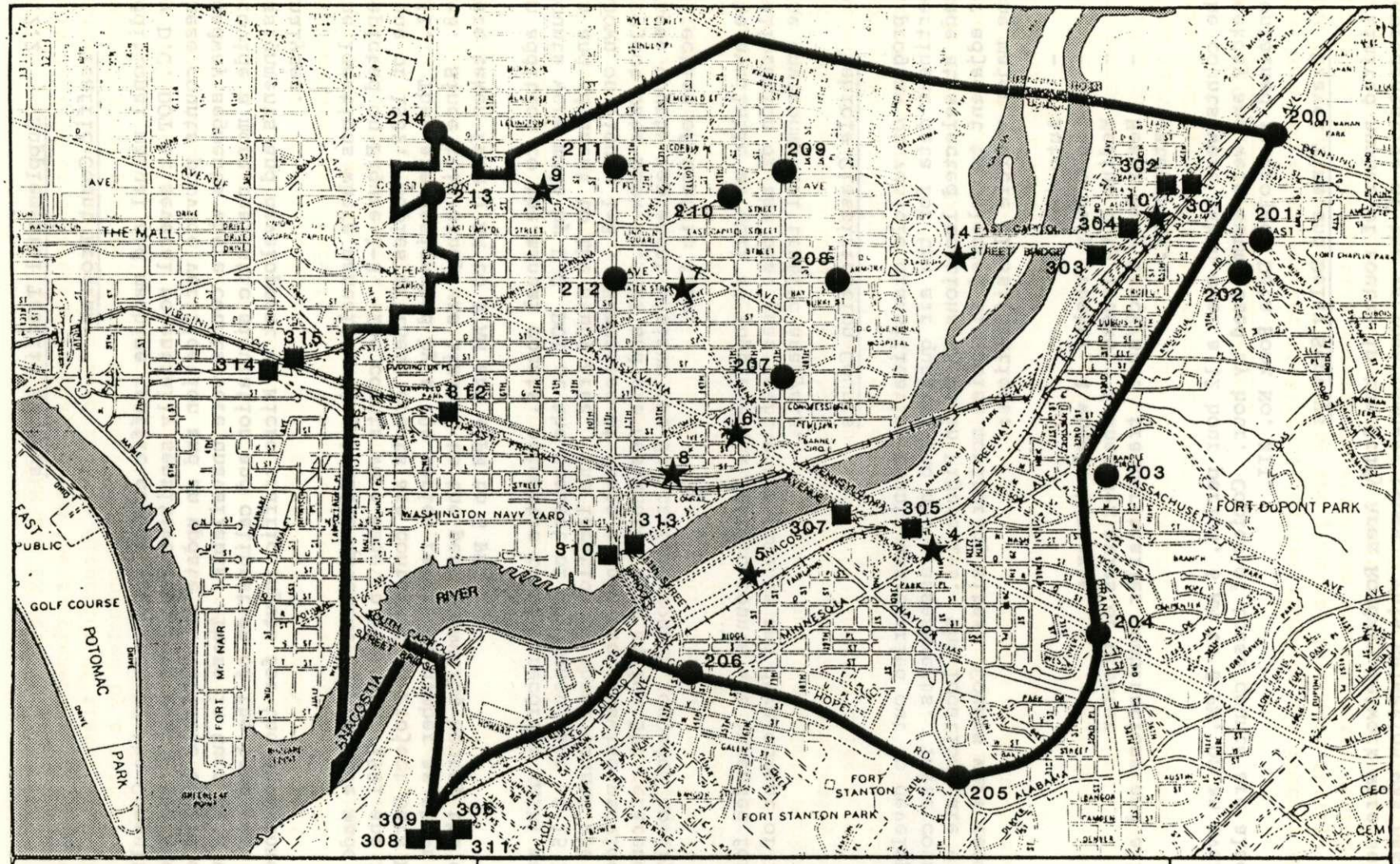
A program of vehicle classification counts was carried out to develop pertinent data for the air quality and noise assessments. These counts were made at selected locations shown in Figure 1-8. The locations are either at or adjacent to selected air-noise monitoring sites. Counts were recorded by the major vehicle classifications:

- Auto
- Light Duty Trucks: 4 wheels-two axle
- Medium Duty Trucks: 6 wheels-2 axles or greater
- Heavy Duty Truck/Bus: tractor-trailer combinations and all bus categories.

The counts were taken over a 12 hour period, 6 AM to 6 PM, on an average weekday and were summarized by hour. Copies of these counts are also contained in Project Data Book No. XII.

- Travel Time and Delay Surveys

A limited number of routes in the Study Area Roadway Network were selected as representative of the various roadway types. This selection was based on their use as commuter, local or through travel routes. These routes, shown in


LEGEND
Vehicle Classification At Air/Noise Site
Study Area
Peak Hour Turning Movements
Minimum 1 Day Machine Count
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
LOCATION OF SUPPLEMENTAL TRAFFIC COUNTS
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-8
400 1600
0 800
FEET
THE MALL
WASHINGTON NAVY YARD
FORT DUPONT PARK
FORT STANTON PARK
FORT STANTON
POTOMAC PARK
GOLF COURSE
RIVER
ANACOSTIA
PENNSYLVANIA AVE
EAST CAPITOL STREET
FREEWAY
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315

Figure 1-9, were travelled during the AM and PM peak periods 7 AM to 9 AM and 4 PM to 6 PM on an average weekday during the supplemental traffic count surveys. A minimum of three runs in each direction of travel was made during each of these peak periods. The survey was conducted by a team traveling at the pace of traffic flow under prevailing traffic conditions. The travel time and measured distances between ramps or locations where the character of the roadway changed were recorded for the expressway roadways; for non-expressway-type routes the time between intersections was recorded. In addition, the duration, location and cause of delays encountered during these surveys was noted. This survey data was compiled for computation of average directional travel and operating speed for each representative roadway segment. These computations were made for the two survey periods and can be found in Project Data Books X and XI. Average operating speed as presented in these computer printouts is defined as the speed at which a vehicle might travel under prevailing traffic volume conditions less both recorded fixed and variable delays. This data was necessary to provide still another means of calibrating the base year average travel speed computations developed as part of the Micro Assignment process.

- Roadway Physical and Operational Inventory

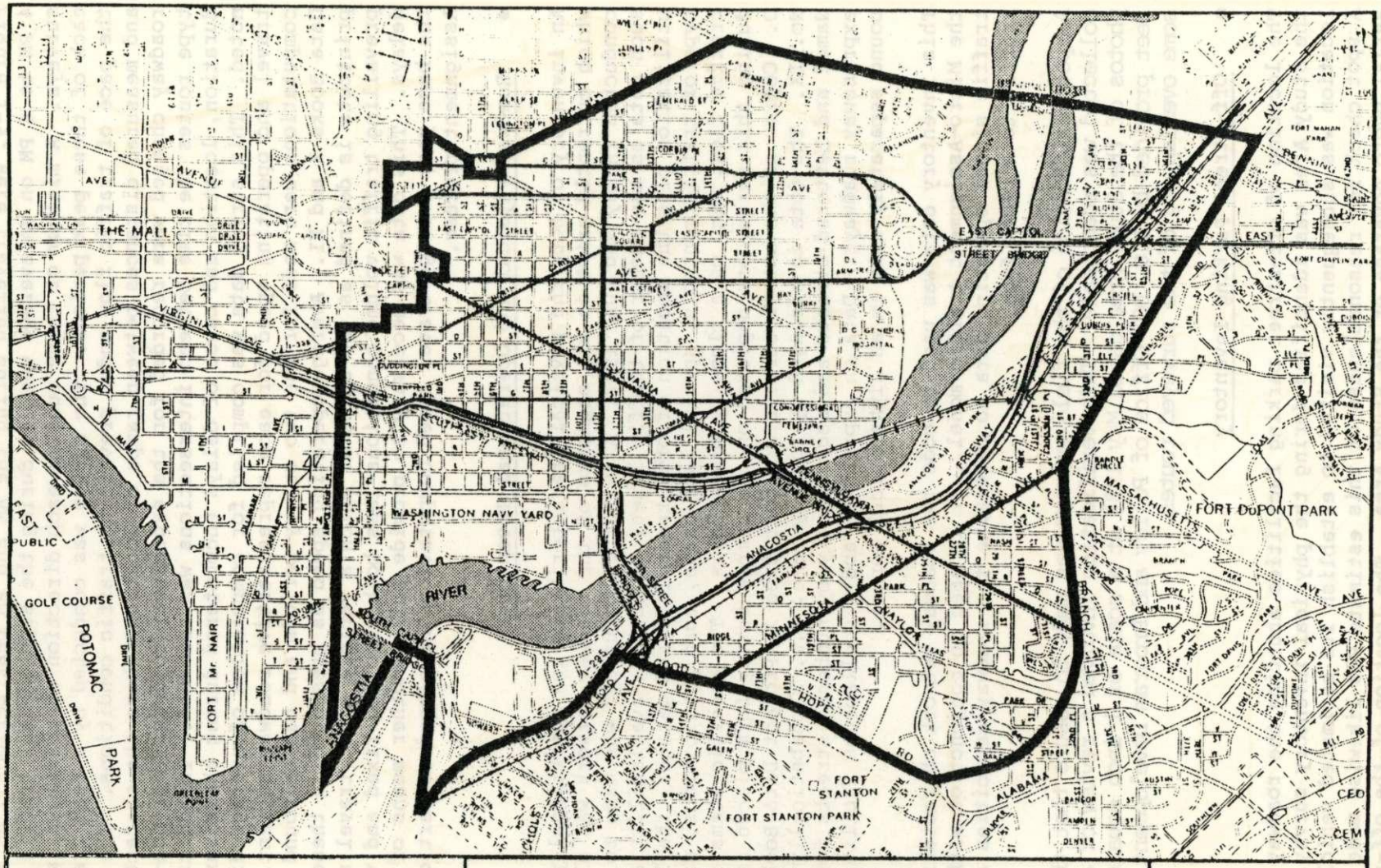
An inventory of both the physical characteristics and operational practices which currently exist on all segments of the roadway network was also conducted in May and June 1982. A "windshield survey" was made to collect such data as the number of traffic lanes, on parking availability and utilization plus the location of off-street lots and garages, the location and type of traffic controls, special lane usage, turn prohibitions, direction of traffic flow, etc. on a block by block basis. The specific items inventoried during this survey are depicted on the sample survey form placed in Appendix D. Copies of the actual surveys are contained in Project Data Books No. II to No. IX. The data is arranged by roadway name, i.e. alphabetically by State, Named and Lettered streets and sequentially by numbered streets for non-expressway roadways. Data on expressway and miscellaneous facilities are bound separately also in an alphabetical format.

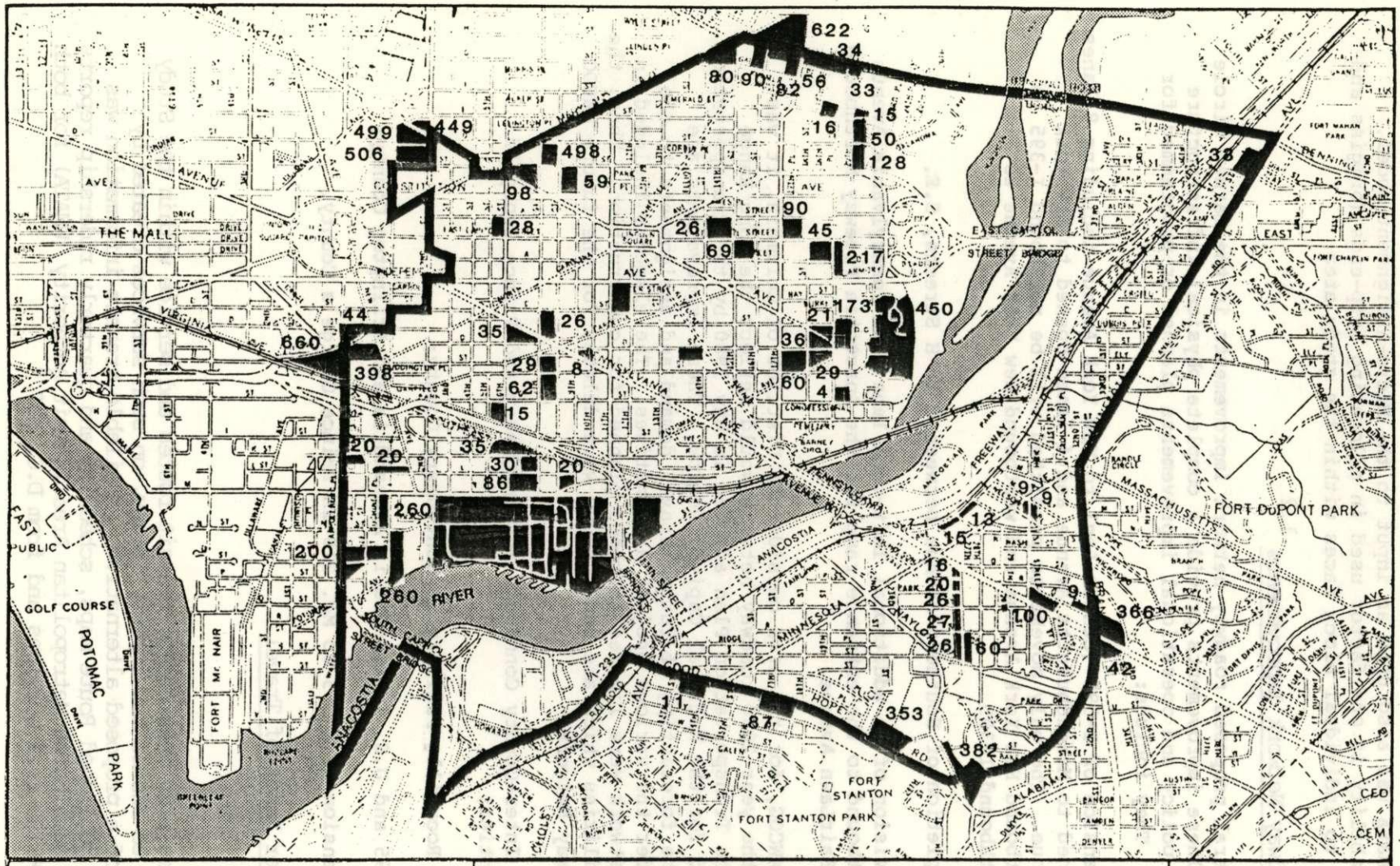
This inventory data was used to code the roadway network characteristics for the Micro-Assignment traffic model. It is used in conjunction with the traffic signal operating data to determine the roadway capacities and assign traffic to a block face.

A spot verification of the field surveys was made to assure that the data collected was reasonable. This verification involved a review of aerial photos of the Study Area dated May 1981 at a scale of 1 inch equals 200 feet provided by D.C. DOT Office of Policy and Program Development and by some overlapping of the surveyed routes.

- Off-street Parking Inventory

The location of off-street parking facilities abutting the roadway network in the Study Area was identified during the physical inventory survey. Each location was subsequently visited to establish its estimated vehicle capacity. A spot check for reasonableness of this estimate was likewise made using the aerial photo coverage of the Study Area. The location of the off-street parking facilities and their estimated capacities are shown on Figure 1-10.


THE MALL
WASHINGTON NAVY YARD
FORT DUPONT PARK
FORT STANTON
FORT STANTON PARK
GOLF COURSE
POTOMAC PARK
FORT Mc NAIR
EAST PUBLIC
ANACOSTIA RIVER
FREEWAY
PENNSYLVANIA AVE
MASSACHUSETTS AVE
MINNESOTA AVE
GOOD HOPE RD
ALABAMA AVE
EAST CAPITOL STREET
SOUTH CAPITOL STREET
LEGEND
Study Area
Survey Route
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
TIME AND DELAY SURVEY ROUTES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-9
0 400 800 1600
FEET



LEGEND

- Study Area
- Parking Lot/Garage
- xxx Number Of Spaces

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

EXISTING OFF-STREET PARKING FACILITIES

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-10

0 400 800 1600 FEET

This parking data was also used as input to the Micro-Assignment model. Parking availability is one factor used in allocating trip-ends (origins and destinations) to individual block faces within the study area.

1.2.3 Roadway Network Improvements [1,2]

There are several proposed roadway network improvements in the Barney Circle Study Area. These improvements provide a complete physical infrastructure when added to policy and operational improvements planned or programmed for the District. They include:

- Extension of I-395 (Center Leg) to New York Avenue including 8 lanes opened to Maasachusetts Avenue and 4 lanes opened to New York Avenue. The only movements permitted will be northbund I-395 to eastbound New York Avenue and westbound New York Avenue to southbound I-395.

- Completion of Southern Avenue between C to H Streets, S.E.

- Provision of an additional left-turn lane from Pennsylvania Avenue Eastbound to the entrance ramp for the Anacostia Freeway Northbound at FairLawn Avenue.

According to MWCOG, for the area outside the District of Columbia, it was assumed that the year 2000 roadway network would reflect the Long Range Elements of the Transportation Plan adopted in May 1980 by the Transportation Planning Board for the National Capitol Region. These improvements are included in the forecasting of future travel demand and assignments to the Study Area under the various project alternatives. The elements included in this future network were limited to those planned for construction. Thus, the following facilities which are under study were deleted for the future MWCOG Regional Highway Network.

- The Inter-County Connector in Montgomery and Prince George's Counties;

- The Rockville Facility in Montgomery County;

- I-595 and U.S. 1 extended in Alexandria and Arlington County;

- Extension of I-295 to Md. 210 in Prince George's County.

1.2.4 Other Modes of Travel

- Metro

Information was also obtained on transit routes and service within the Study Area in order to assess the impact, if any, on such services created by construction of a proposed alternative. Available transit information was obtained from published Route maps, schedules and quarterly ridership reports issued by the Washington Metropolitan Area Transit Authority (WMATA) for both Metrobus and METRO-rail services and from D.C. DOT.[3]

Particular emphasis was given to the bus service provided across the Anacostia River bridges in the Study Area and nearby potential METRO station intermodal transfer points. Both Metrobus and METRO-rail routes in the Study Area are shown on Figure 1-11. Summaries of data on peak period bus crossings and METRO ridership can be found in Appendix E.

A future extension of the METRO line within the Study Area, to be designated the Green Line, will have termini in Greenbelt and Rosecroft. The proposed station locations within the study area, as shown in Figure 1-11, are at Anacostia and the Washington Navy Yard, as provided in the Urban Mass Transportation Administration's approved Final Environmental Impact Statement.

- Metrobus[3]

Proposed 1990 local Metrobus changes along the Pennsylvania Avenue, S.E. corridor include a number of route modifications and extentions. A number of which are intended to serve existing and proposed METRO stations in or near the Study Area.

  - Route 34 will operate between the Potomac Avenue METRO Station and the Southern Avenue METRO Station, with selected peak period trips operating to and from Naylor Gardens. Route 36 service will operate between Hillcrest and Potomac Avenue METRO Station. A reduction in the number of Prince George's County buses operating in central Washington will result from the opening of the METRO Green Line, thus enabling other buses to terminate at the Potomac Avenue Station.

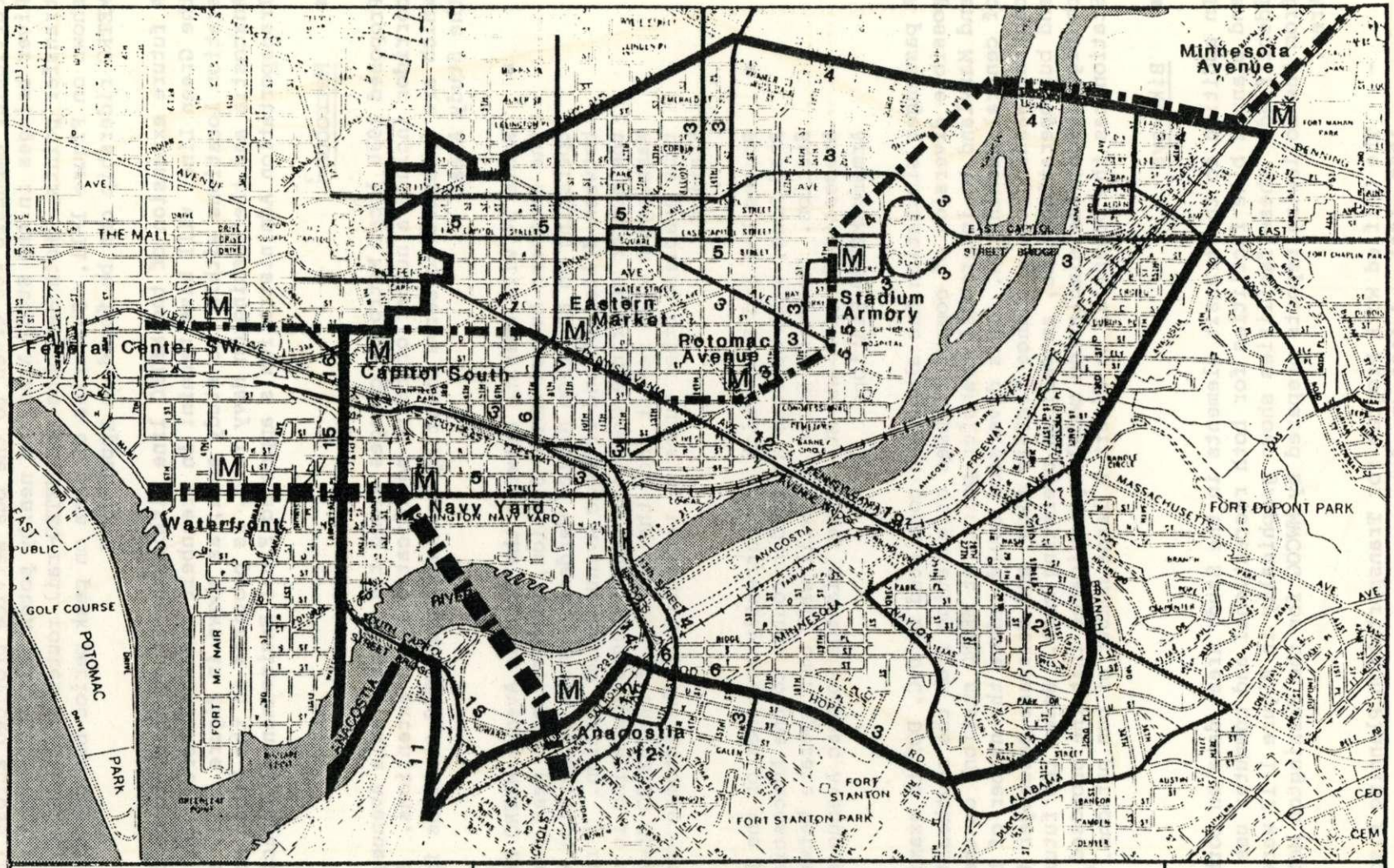
  - Routes B-4 and B-5, which are currently branches of the Bladensburg Road Line, will operate as feeder routes to the Anacostia METRO Station. Existing Route B-2 will will then operate between the Anacostia Station and Mt. Ranier via the Potomac Avenue adn Stadium-Armory METRO Stations.

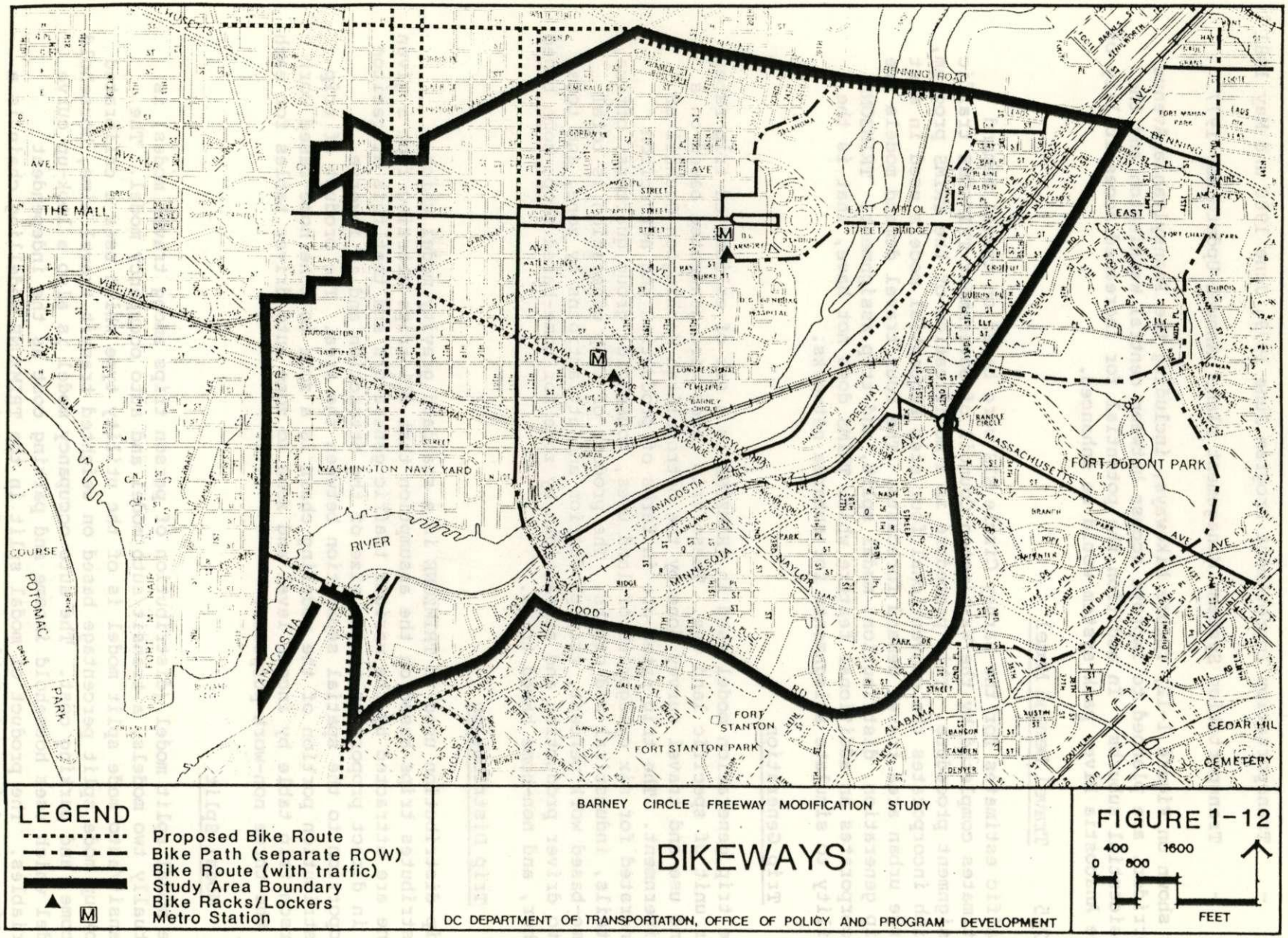
A passenger simulation has also been completed by D.C. DOT to examine the possible diversion of commuter buses originating from the southeast suburbs and Maryland to intermodal transfer points at METRO stations on the periphery of central Washington. This diversion could reduce the number of buses in central Washington, enchance traffic flow, and decrease passenger travel-time and bus operating time, as well as operating cost. Under the future METRO configuration, the simulation modeling indicated that the proposed Anacostia Station has the potential to divert a large number of bus patrons.[4]

- Bikeways

In addition to the transit elements in the Study Area, data on both existing and planned bike facilities for both recreational and commuter use were identified. These facilities shown graphically in Figure 1-12 were extracted from the following reports prepared by MWCOG for the Washington Metropolitan Area.

  - The Unified Work Program for Transportation Planning Fiscal Years 1980, 1981 and 1982 (Draft).


Minnesota Avenue
THE MALL
EAST CAPITOL
EAST
Stadium Armory
Eastern Market
Potomac Avenue
Federal Center SW
Capitol South
Navy Yard
Waterfront
FREEWAY
MASSACHUSETTS
FORT DUPONT PARK
ANACOSTIA
MINNESOTA
Anacostia
FORT STANTON
FORT STANTON PARK
ALABAMA
GOLF COURSE
POTOMAC
PARK
FORT Mr. NAIR
EAST PUBLIC
LEGEND
Major Bus Line
10 Number Of Bus Lines On Route
Study Area
Proposed Metro Line
Metro Station
Metro Line
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
TRANSIT ROUTES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-11
0 400 800 1600
FEET


THE MALL
EAST CAPITOL STREET BRIDGE
BENNING ROAD
WASHINGTON NAVY YARD
ANACOSTIA RIVER
POTOMAC PARK
FORT DuPONT PARK
FORT STANTON
FORT STANTON PARK
CEDAR HILL CEMETERY
FREEWAY
MASSACHUSETTS AVE
MINNESOTA AVE
ALABAMA AVE
GOOD HOPE RD
LEGEND
Proposed Bike Route
Bike Path (separate ROW)
Bike Route (with traffic)
Study Area Boundary
Bike Racks/Lockers
Metro Station
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
BIKEWAYS
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-12
0 400 800 1600
FEET

- Transportation Improvement Program June 1979, June 1980 and May 1981

- Transportation Systems Management Plan. Annual Update May 1977.

As shown on Figure 1-12, future bikeways, including the Pennsylvania Avenue corridor, are planned to improve access between central Washington and the residential suburbs. In addition the potential for increased accessibility of the Anacostia River park system would be enhanced.

1.2.5 Travel Demand Model

Traffic estimates for the Barney Circle EIS were based on travel demand estimates completed by the Washington Council of Government TRIMZONE traffic assignment procedure. This procedure is a modification of the TRIMS program, which incorporates the conventional four step sequential models used in most large urban area travel demand forecasts. The four travel demand models are trip generation, distribution, modal split, and trip assignment. TRIMZONE incorporates an additional feature which TRIMS does not have, that is the ability to simulate asisgnments for subarea networks.

- Trip Generation

The trip generation model used in TRIMZONE is a set of calibrated trip rates per unit of specific land use. These trip rates were generated based on a land use and travel survey done by the Metropolitan Washington Council of Goivernment. The trip rates are in terms of production and attraciton generated for six categories of land uses, household, group quarters, office, retails, inducstiral and others. The product of trip generation is total home-based work percent, trip production and attractioins by zone, and total auto driver production and attractiosn by zone for home-based shop, home based other, and non-home based trips.

- Trip Distribution

Trip distribution used in TRIMZONE is a standard gravity model which distributes trips based on the assumption that all trips starting from a given zone are attracted by the various traffic generators and that this attraciton is in direct proportion to the size of the attraction and in inverse proportion to the spatial separation between the area. The product of trip distribution portion of the modeling chain is a zone to zone home-based work person trip table by income level and zone to zone auto driver tables for each of the three non-work purposes.

- Modal Split

The modal split model (distribution of person trips among travel modes) is actually two models, a transit/auto model and auto occupancy model. The transit/auto mode split model is of the utility type which uses a calibrated look-up mode split percentage based on weighted transit travel time, household income, and parking cost. The auto occupancy model is also a look-up curve model which uses household income and parking cost as the independent variables. The product of modal split in the TRIMZONE modelling chain is a single auto drive trip table converted to origin/destination format.

- Trip Assignment

The result of the modal split model (a 24-hour O/D auto drive trip table) is then assigned to a highway network. The assignment procedure uses the minimum path capacity restraint process which adjusts speed according to the following relation:

$$S = \frac{So}{1 + \alpha (v/c)^4}$$

S = Adjusted Speed
So = Unloaded Speed calculated from a given level of service "C" speed
Sc = Level of Service "C" speed
V = Volume assigned
C = Capacity
α = Alpha Factor (area-specific correlation factor)

The product of TRIMZONE trip assignment process is a 24-hour directional auto volume for each link in the highway network.

1.2.6 Micro-Assignment Model

The Micro-Assignment Computer Model used in the development of the traffic forecasts for the Barney Circle Project was originally developed for the Bureau of Public Roads, U.S. Department of Transportation by Creighton Hamburg, Inc. The model is capable of simulating the detail traffic movements for small area studies and used for assessing traffic impacts on traffic control plans or changes in highway facilities.

Basic network data and origin/destination (O/D) demand data were abstracted from the Washington Council of Governments TRIMZONE Model, refined to simulate the peak hours of 7-8 AM and 4:30-5:30 PM for the Barney Circle Study Area and then calibrated to 1979 by using available traffic volumes and travel characteristics. Future alternatives were tested using the calibration procedure derived for the base year with adjustments made to reflect land-use changes and parking. MWCOG future TRIMZONE O/D traffic patterns were assigned to these alternative networks.

A detailed description of the model structure can be found in the report "Micro-Assignment - Final Report, 1969" prepared from the U.S. Department of Transportation inter Contract FH-11-6755 by Creighton Hamburg Inc. A brief description of the basic model structure is given here.

The model strategy of the micro-assignment process has two distinct stages. First a determination is made of the impact on the micro-area of the traffic throughout the entire region within which it lies. The trip population used in the model is derived from the total trip population for the region. Specifically it consists of all trips which, as determined by a region-wide minimum path traffic assignment, use roads within the micro area for some portion of their length. The micro area trip file is then constructed from those parts of these trips which lie within the micro area. Since the model does not treat any part of the region outside the micro area, trips which cross the micro area boundary are regarded by the model as having their

origins (or destinations) at the boundary crossing point. Trip origins and destinations within the micro area are assigned to individual blocks or block faces based on land use and parking data.

Second, a minimum path traffic assignment is made over the micro-area for each selected time period of the day. At specified intervals during each time period (i.e., after a given number of travel paths have been loaded) delays due to traffic congestion are computed at each intersection and the network link times changed accordingly. This procedure exhibits a dynamic response to congestion which more closely represents actual traffic behavior than does the "capacity restraint" mechanism in conventional assignments.

1.2.7 Coding of Base Year Network

The basic inputs for the base year network were obtained from two sources; the regional network from MWCOG, and the physical roadway characteristics obtained from the data inventory process. These data were incorporated into a computerized roadway network comprising roadway links and nodes. These nodes are located at the mid-block. Aproaches to an intersection and each permissible traffic movement at the intersection is represented by a one-way link. At each mid-block, there are two nodes, one on each side of the street representing the origin or destination. This convention prohibits U-turns.

Specific physical traffic characteristics for each link include the following:

- Link length
- Legal speed
- Intersection control type
- Cycle time
- Green time
- Interference to street
- Synchronization
- Specific movement to prohibitins
- Number of lanes
- Lane share characteristics
- Parking conditions
- Lane reversal characteristics

1.2.8 Development of Base Year Trip Table

In the development of the base year trip table, the original O/D demand data was abstracted from the MWCOG's TRIMZONE Regional Assignment Model. This model gives total daily travel demand for the Washington metropolitan area. Trips within, into, from and through the study area roadway network were selected out and incorporated into a sub-area trip table. Trips with origins or destinations outside of the study area were assigned to origins or destinations on the study area cordon boundary. Trip-ends within the study area were assigned to individual nodes (block faces). The daily trip table was then factored down to select only AM peak (7-8 AM) and PM peak (4:30-5:30 PM) trips.

The AM and PM micro-area trip tables were then assigned to the base network, and the model was calibrated by comparing the resulting calculated traffic volumes and travel times against observed values, as shown in Table 1-3.

TABLE 1-3 CALIBRATION COMPARISON

Morning -- East to West Volume Analysis

SCENARIO	TRIP FILE VOLUME DAILY (LOG)	TRIP FILE VOLUME PEAK (PROJ)	PEAK %	ASSIGNMENT	ASSIGNMENT %	VS NULL
BASE	156,719	21,000	13.4	20,604	98.1	-
	+ 21.5%					
NULL	190.383	25,511	13.4	25,528	100.1	-
NULL/TSM	190,383	25,511	13.4	25,639	100.5	-
ALT 1/2	198,979	26,663	13.4	26,785	100.5	+4.9%
ALT 1	196,129	26,281	13.4	26,438	100.6	+3.6%
ALT 2	200,360	26,849	13.4	26,697	100.5	+4.6%
ALT 3	198,264	26,568	13.4	26,697	100.5	+4.6%

Evening -- West to East Volume Analysis

SCENARIO	TRIP FILE VOLUME DAILY (LOG)	TRIP FILE VOLUME PEAK (PROJ)	PEAK %	ASSIGNMENT	ASSIGNMENT %	VS NULL
BASE	155,375	17,558	11.3	17,315	98.6	-
	+33.7%					
NULL	207,729	23,474	11.3	23,085	98.3	-
NULL/TSM	207,729	23,474	11.3	23,009	98.0	-
ALT 1/2	221,416	25,019	11.3	24,273	97.0	+5.1%
ALT 1	219,113	24,758	11.3	24,244	97.9	5.0%
ALT 2	221,639	25,046	11.3	24,882	99.3	7.8%
ALT 3	215,882	24,395	11.3	24,412	100.1	5.7%

Source: Sterling System Dec. 1/20/83

1.2.9 Definition of Future Network

Five alternative networks were developed and evaluated using the Micro-Assignment process. Preliminary engineering plans for each alternative have been completed and the network as coded in the Micro-Assignment Model are consistent with these plans. The alternatives are defined as follows:

- Alternative 1

Alternative 1 connects the western terminus of the East Capitol Street Bridge with the Southeast Freeway at Barney Circle via a 0.9-mile long, four-lane, fully access controlled freeway. Ramp connections at the East Capitol Street Bridge have a 40 mph design speed, while the remainder of the alignment has a 65 mph design speed.

The inbound movement of Alternative 1 begins at the western terminus of the East Capitol Street Bridge. At present, the bridge's three inbound lanes continue around RFK Stadium on the C Street extension to 21st Street. Implementation of Alternative 1 would permit only the right lane to continue around the stadium, while the middle and left lanes would proceed south under realigned Independence Avenue and through the stadium's south parking area. These two southbound lanes continue along an alignment similar to the existing stadium access road.

The outbound movement leaves Barney Circle as three eastbound lanes, but narrows to two lanes before turning north near Congressional Cemetry. It continues north along an alignment similar to the existing stadium access road and merges with the realigned one-lane extension of Independence Avenue to become the three east-bound lanes of the East Capitol Street Bridge. Implementation of Alternative 1 requires that the Independence Avenue extension be narrowed from three lanes to one lane between 25th Street, SE, and the western terminus of the East Capitol Street Bridge.

- Alternative 2

Alternative 2 connects the Anacostia Freeway Bridge with the Southeast Freeway at Barney Circle via a 1.5-mile long, four-lane, fully access controlled freeway. Ramp connections at the Anacostia Freeway Bridge have a 65 mph design speed, while the remainder of the alignment has a 70 mph design speed.

The inbound movement of Alternative 2 begins on the Anacostia Freeway south of East Capitol Street. From East Capitol Street, the Anacostia Freeway continues south as two lanes until it merges with the realigned ramp from eastbound East Capitol Street to southbound Anacostia Freeway at which point it would be widened to three lanes. It was necessary to realign this one-lane ramp from a right-hand merge to a left-hand merge in order to avoid potential double weave conflicts. The alignment continues as three lanes southbound and requires the widening of the Anacostia Freeway Bridge. Mid-way between the bridge's northern abutment and the Conrail tracks, the three-lane structure splits into two lanes continuing south as the existing Anacostia Freeway and a new two-lane structure proceeding west. This new freeway bridge continues through Anacostia Park along the northern side of the Conrail yard and crosses the Anacostia River parallel to the Conrail Bridge. The facility returns to grade mid-way between the western shoreline and Barney Circle and continues west to Barney Circle as two lanes.

The outbound movement leaves Barney Circle as three east bound lanes, but narrows to two lanes before becoming elevated and crossing the Anacostia River. On the eastern shore of the Anacostia River, the facility returns to grade mid-way between the shoreline and the Anacostia Freeway Bridge. It

continues east under the Anacostia Freeway Bridge, then turns north to merge with the two northbound lanes of the Anacostia Freeway. From this merge north to East Capitol Street, the Anacostia Freeway is widened from two lanes to three lanes.

- Alternative 1/2

Alternative 1/2 combines the freeway element of Alternative 2 with an urban boulevard along the west bank of the Anacostia River. It connects the Southeast Freeway at Barney Circle with both the western terminus of the East Capitol Street Bridge and the Anacostia Freeway Bridge.

The portion of the alternative which connects the Southeast Freeway at Barney Circle with the western temrinus of the East Capitol Street Bridge is a 1.1-mile long, four-lane, controlled access, urban bouleveard with right-turn and left-turn storage lanes. It has a design speed of 35 mph. The other protion of the alternative, which connects the Anacostia Freeway with the Southeast Freeway at Barney Circle via a 1.5-mile long, four-lane, fully access controlled freeway bridge, is identical to Alternative 2.

The inbound movement of the urban boulevard begins at the western terminus of the East Capitol Street Bridge. The bridge's three westbound lanes currently continue around RFK Stadium on the C Street extension to 21st Street, NE. Implementing Alternative 1/2 would allow only the right lane to continue along this alignment, while the middle and left lanes would proceed south and intersect the realigned Independence Avenue extension at-grade. From this signalized, at-grade intersection, the boulevard's two southbound lanes cross the stadium's south parking area and continue south toward Congressional Cementery. Before turning west, the boulevard narrows from two lanes to one lane, avoids the southeast corner of Congressional Cemetery and merges with the two eastbound lanes of the freeway portion of this alternative. Together, they proceed to Barney Circle as three lanes.

The outbound movement leaves Barney Circle as three eastbound lanes. Mid-way between Barney Circle and the western shoreline, the facility splits with two lanes becoming elevated and crossing the Anacostia River as a freeway bridge, and one lane turning norht and going under the elevated structure to become the urban boulevard. The one-lane urban boulevard proceeds east before turning north and under the freeway bridge. North of the southeast corner of Congressional Cemetery, the boulevard expands from one lane to two lanes and proceeds through the stadium's south parking area. It merges with the realigned one-lane extension of Independence Avenue to become the three eastbound lanes of the East Capitol Street Bridge. Construction of this merge requires that the Independence Avenue extension be narrowed from three lanes to two lanes between 25th Street, SE and its intersection with the urban boulevard.

- Alternative 3

Alternative 3 connects the Anacostia Freeway with both the Pennsylvania Avenue Bridge and the Southeast Freeway. The 1.7-mile long, two-lane, inbound freeway ramp has a design speed of 50 mph, whereas the 2.4-mile long, two-lane, outbound freeway bridge has a design speed of 65 mph.

The inbound movement of Alternative 3 begins on the Anacostia Freeway at East Capitol Street. From East Capitol Street, the Anacostia Freeway continues south as two lanes until it merges with the ramp from eastbound East Capitol Street to southbound Anacostia Freeway and becomes three lanes. The alignment continues as three lanes across the Anacostia Freeway Bridge. Mid-way between the southern abutment of the Anacostia Freeway Bridge and Pennsylvania Avenue, the three lanes split into two lanes continuing south as the Anacostia Freeway and into a new two-lane ramp proceeding around the Anacostia Freeway/Pennsylvania Avenue interchange. It becomes an elevated structure, proceeds over the Anacostia Park river-front road, and narrows to one lane before merging with the three inbound lanes of the Pennsylvania AVenue Bridge. From this merge to Barney Circle, the Pennsylvania Avenue Bridge is four lanes inbound. The bridge's two right lanes would connect with the Southeast Freeway using the existing ramp, whereas the two left lanes would continue northwest along Pennsylvania Avenue.

The outbound movement begins on the Southeast Freeway at 9th Street as four lanes. It continues to 13th Street where it splits with to lanes continuing east as the Southeast Freeway and two lanes proceeding southeast as a new freeway bridge across the Anacostia River. This freeway bridge continues southeast, crosses over the existing Anacostia Freeway/Pennsylvania Avenue interchange, and turns northeast before returning to grade mid-way between the interchange and the south abutment of the Anacostia Freeway Bridge. It merges with the two northbound lanes of the Anacostia Freeway and narrows from four lanes to three lanes before crossing the Anacostia Freeway Bridge. From the Anacostia Freeway Bridge north, the Anacostia Freeway operates as a three-lane facility.

- No-build Alternative

The No-build Alternative consists of the existing roadway network and only those regional highway improvements programmed and proposed for completion by the year 2006. The only programmed and proposed improvement other than rehabilitation that is expected to occur within the study area by the year 2006 is the construciton of a new median cut on Pennsylvania Avenue, SE, at Fairlawn Avenue. This modification would allow a signal controlled left turn movement from southeastbound Pennsylvania Avenue to the existing entrance ramp to northbound Anacostia Freeway.

Other planned and programmed improvements are described in Sections 1.2.3-1.2.4 were incorporated into the network structure.

1.2.10 Development of Design Year Forecasts

Design year traffic forecasts for the No-build and the four build alternatives were developed using the same modeling procedures used in the base year studies. Travel demand was derived from MWCOG's TRIMZONE model for the year 2000. These figures were extrapolated to the design year, 2006, using regional growth factors developed by MWCOG. Inputs for the peak hour Micro-Assignment runs were derived from the regional data as described previously.

1.2.11 Description of Micro-Assignment Outputs

The major output report of the Micro assignment model is a table for each time

period which contains a complete description of the network roadway link characteristics (input to the model) plus selected items computed for this study. These items include computed daily, free flow travel time and volume, and vehicle-miles and vehicle-hours of travel. For each time period these items are summarized by traffic movements e.g., left, thru and right.

The specifics of this report are described below. Sample reports are included in Appendix F.

- Link volume Report: This report summarizes each link volume together with the specific turns and delays. Capacity of each link is also listed.

- VMT Report: This report summarizes the vehicle miles of travel (VMT), vehicle-hours of travel, average speed, vehicle-miles of capacity (VMC) and the VMT/VMC ratio. Each particular category is disaggregated into Advisory Neighborhood Commissions by major facility type and 8 major compass directions of travel.

- Select Link Report: This report summarize the origin/destination travel patterns of traffic entering selected roadway sections.

- Air/Noise Impact Parameters: Micro-Assessment results are selected for Air and Noise Impact Model (TRANMIC) based on roadway links selected for each site. Values produced in this report for direct input into the TRANMIC program include: AM and PM traffic volumes, total delays, link distances and capacity.

1.3 DESCRIPTION OF EXISTING CONDITIONS

1.3.1 Adjustment of Micro Assignment

A hand adjustment of the Micro traffic assignment outputs in the vicinity of the intersection of Pennsylvania Avenue and Minnesota Avenue and to Fairlawn Avenue were necessary:

- To account for unusual traffic manuevers which presently persist in the vicinity of the former intersection such as illegal movements, U-turns, etc., which cannot be replicated by the Micro computer model.

- To reassign an inordinate volume of traffic placed on Fairlawn Avenue. The model deemed Fairlawn Avenue as a viable alternate, route parallel to Minnesota Avenue when peak hour congested traffic conditions exist in the vicinity of Minnesota Avenue and Pennsylvania Avenue. Such a large assigned diversion though does not occur because of the local character of Fairlawn Avenue, and its indirect access.

The adjustments were based on field observations, supplemental counts and origin-destination data developed as part of the Micro Assignment process. The resulting revised traffic movements and volumes therefore provide a more realistic simulation of the typical commuter's reaction to an existing network

limitations. Thus, a more reasonable analysis of traffic operating conditions and assessment of air/noise quality at this sensitive location was possible.

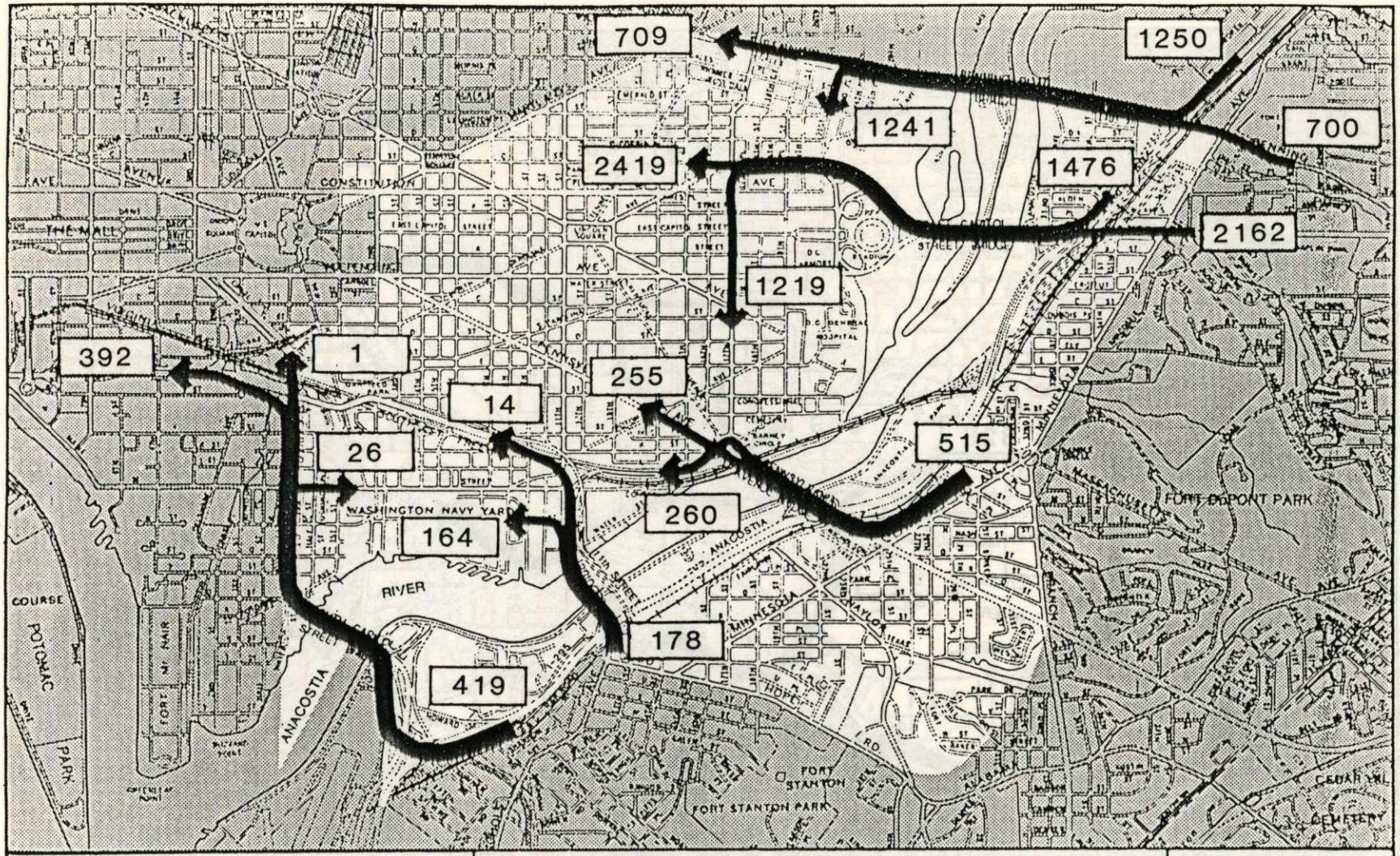
1.3.2 Distribution of Bridge Crossing Traffic

An assessment of the origins and destinations of trips between central Washington and the northeast suburbs was completed to determine the present travel patterns of vehicles using the Major Travel Corridors in the Study Area. This assessment was based on typical AM- and PM-peak hour traffic estimates for 1979 developed from the Micro Assignment computer model and on the subsequent simulation of travel patterns, using regional travel statistics compiled by the Metropolitan Washington Council of Governments (MWCOG).

The predominant travel patterns followed by inbound AM and outbound PM peak hour bridge crossing traffic within the study area for the year 1979 are depicted in Figures 1-13 and 1-14, respectively. The volumes shown indicate the portion of the total bridge traffic from and to the northeast suburbs using the major bridge travel corridors in the Study Area.

The Northeast (NE) suburban traffic includes all trips with an origin and/or destination East of the Anacostia River and North of East Capitol Street. The only exceptions are those trips which presently begin and end in ANC's 6C, 7B, 7E and 7F located north of Pennsylvania Avenue and South of East Capitol Street designated by MWCOG as Sequential Zone 31. The assessment was limited to the Northeast surburbs since these trips represent the potential diversions which would result from implementation of the project alternatives. Such emphasis is in keeping with the major goal of this Study, that is to complete the inner beltway and provide a freeway connection between the Southeast Freeway and the Northeast suburbs. Thus, the true benefit of such a connection in terms of diverting through traffic from the local neighborhoods can be seen by limiting this assessment to the Northeast trips. It should be noted that not all trips to or from the Northeast will be diverted by construction of a new freeway connection. The diversion is limited to those travelers with one portion of their trip in areas of central Washington which are served by the Southeast Freeway or I-395 and have access to the freeway system under the proposed alternatives.

- An inspection of the inbound AM distributions indicates:
  - The heaviest concentration of trips from the N.E. suburbs to Central Washington is on the Benning Road and E. Capitol Street Bridges. These trips amount to approximately 83 percent of the total traffic from the Northeast using the 5 bridge crossings. The major portion of these trips follow the Constitution Avenue, 'C' Street and Benning Road corridors west while about one-third traverse the local North-South Streets in the Capitol Hill neighborhoods.
  - Approximately 300 vehicles from the Anacostia Freeway southbound exit at Pennsylvania Avenue and make U-Turns in the vicinity of Minnesota Avenue to access Central Washington. Others from the Northeast suburbs use local streets to avoid the congestion on the E. Capitol Street Bridge and the circuitous trip thru local streets west of the River. These


709
1250
1241
700
2419
1476
2162
1219
392
1
255
14
515
26
260
164
178
419
LEGEND
XXX
AM-Peak Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
1979 BASE YEAR
AM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE1-13
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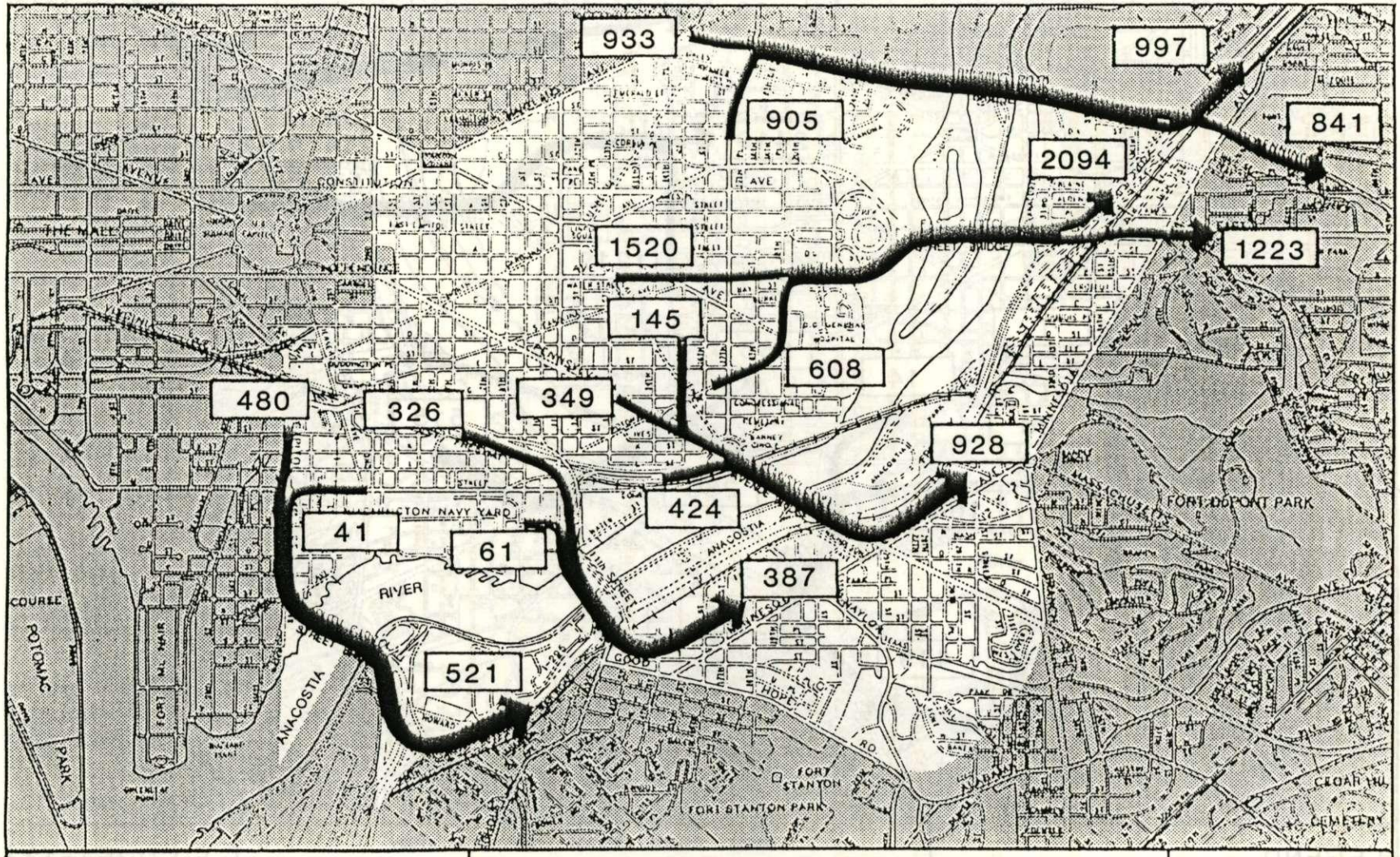


LEGEND

XXX PM-Hour Volumes

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

1979 BASE YEAR
PM-PEAK HOUR VOLUMES

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-14

0 400 800 1600 FEET

travel patterns add to the congestion and delays experienced in the vicinity of the east end of the Pennsylvania Avenue Bridge. On the west side of the River, approximately 50 percent of the Pennsylvania Avenue Bridge traffic from the northeast continues its inbound journey via the Southeast Freeway while the remainder find access to their destination in central Washington more direct and accessible by using the non-expressway roadways to the west.

- The remaining portion of the inbound traffic from the Northeast suburbs, about 9 percent, crosses the River at the 11th St. and So. Capitol St. Bridges. This traffic uses the Howard Road ramp from the Anacostia Freeway southbound to access these crossings. The majority of those using the 11th St. Bridge are destined for the Navy Yard while those using the So. Capitol Street Bridge continue their inbound trip on the Freeway system. Access to the So. Capitol Street Bridge from Howard Road though is restricted in the AM peak hour forcing these motorists to use the Anacostia Park access ramp. Direct bridge access inbound from Howard Road is limited to bus and taxis in the AM peak period in an effort to deter such commuter traffic from this already congested crossing.

- An inspection of the outbound PM Peak Hour distributions indicate:

  - During the PM peak, roughly 75 percent of the traffic headed to the Northeast suburbs is focused on the Benning Road and E. Capitol Street Bridge corridors. Nearly 40 percent of the total crossings to the Northeast on the 5 bridges flows along the Constitution-Independence Avenue corridor. This demand for access to the E. Capitol St. Bridge eastbound in turn leads to a capacity demand at the entry ramp to the Anacostia Freeway northbound. North of Constitution Avenue, approximately 50 percent of the Northeast trips using the Benning Road Bridge traverse the local streets through Stanton Park and Kingman Park.

  - Fourteen percent of the total trips destined to the Northeast cross the Pennsylvania Avenue Bridge. Due to a lack of a direct connection to the Anacostia Northbound, these vehicles add to the congestion encountered in the vicinity of Minnesota Avenue. Of these trips, some 600 circulate thru the area to access the Freeway via the Fairlawn Avenue ramp while the remainder use local arterials such as Minnesota Avenue to the Northeast suburbs. This local routing results from the lack of connections at E. Capitol St. from the Anacostia Freeway northbound and congestion both on the E. Capitol Street Bridge and the Anacostia Freeway to the north.

  - Outbound traffic headed to the Northeast uses the remaining crossings predominantly as a connector between the Southeast and Anacostia Freeways. Although a major portion of this traffic remains on the freeway system, a small number elect to travel local streets West of the River to the Northeast

suburbs. This local routing is again largely due to the limited connections at E. Capitol Street eastbound and congested conditions north along the Anacostia Freeway.

1.3.3 Traffic Operation

An assessment of existing (1979) traffic conditions was completed, using the traffic statistics compiled by the Micro Assignment model. For the purpose of this assessment, roadways in the Study Area were classified as either Expressway or Non-Expressway. Expressways include Kennilworth Avenue, Anacostia Freeway/I-295, South Capitol Street Bridge and approaches, 11th Street Bridges, East Capitol Street Bridge, portions of the RFK Stadium Road north and south of the Stadium, and the Southeast Freeway between I-395 and Pennsylvania Avenue. Non-expressways include the major and minor arterials, collectors, and local streets shown on Figure 1-4.

This assessment is aimed at identifying present traffic operations within the Study Area and on major roadway segments in the network. In addition, the four problem locations identified by D.C. DOT and the community were evaluated. Two bases for comparisons were used in this assessment.

The first basis of comparison involves a general assessment of traffic operating conditions during the typical peak commuting hours. The criteria used in this comparison includes the vehicle-miles of travel (VMT), vehicle-hours of travel (VHT) and average travel speed on the roadway network produced by the Micro Assignment.

The second basis for comparison involves identification of existing traffic operations on the roadway network during typical peak commuting hours in terms of level of service. This assessment is aimed at identifying capacity constraints where traffic operates at Level of Service 'E' or Level of Service (LOS) 'F'. These traffic operating conditions are considered unacceptable and are generally characterized by unstable vehicle flow marked by sudden stops and starts, traffic back-ups and low vehicle speeds with operations verging on complete breakdown.

- Definitions

Level of Service (LOS) is defined in terms of degress of congestion which depict prevailing operating conditions for the various roadway classifications. For urban arterial streets, where traffic flow is generally controlled by signalized intersection operations, LOS is defined by the average travel speed, demand traffic volume to capacity (V/C) ratio and load factor. For this assessment, the analysis has been limited to the v/c ratio and average travel speed parameters which are outputs from the Micro Alignment model.

Levels of service for freeways and expressways, on the other hand, are typically a function of roadway design, e.g. geometrics, configuration of access/egress, number of lanes, and demand volume. Traffic operation on such facilities are basically defined by overall operating speed and demand volume to capacity ratio. They are evaluated in terms of limiting design features such as a ramp merge or diverge condition, the number of travel lanes and highway cross section or weaving conditions between entry and exit ramps.

In general, the relative difference in traffic flow and driving freedom experienced by a motorist can best describe operating conditions at the various levels of services. These conditions are described as follows for each level of service.

- Level of Service A describes a free flow condition with low traffic volumes and density, and high speeds controlled by driver desires, speed limits and physical roadway conditions. Maneuverability is not restricted and drivers can maintain their desired speeds.

- Level of Service B is in the zone of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and lane of operation.

- Level of Service C is still in the zone of stable flow, but speeds and manueverability are more closely controlled by the higher traffic volumes. A relatively satisfactory operating speed is still obtained, however, most drivers are restricted in their selection of travel speed.

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

- Level of Service E cannot be described by speed alone, but represents operations at even lower operating speeds than in level D with volumes at or near the capacity of the roadway. Flow is unstable, and there may be stoppages of momentary duration.

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

The capacity of non-expressway roadways in general is defined by the number of moving traffic lanes, the percentage of commercial traffic, parking conditions, abutting land-use and/or the physical cross-section of the roadway. More specifically on urban streets, the traffic capacity is further influenced by transit vehicle operations and traffic operations at signalized intersections, e.g. traffic turning movements; the number, width and designated usage of approach lanes; and the phasing and timing of the traffic signal. For expressway type roadways, the traffic carrying capacity is the function of the number of travel lanes, the pavement cross-section, lateral clearances, the traffic demand, the percent commercial vehicles, roadway design speed and grades.

For this assessment, a non-expressway roadway segment is considered to be operating at an unacceptable LOS when its v/c ratio exceeds 0.90.[5] An expressway segment though is assumed to be operating at or near capacity when its v/c ratio exceeds 0.73. This latter reduction in the v/c is based on the

assumption that the existing urban freeway system with its tight geometric constraints has an average design speed of 60 miles per hour.[6]

- General Travel Conditions

To provide an understanding of the impact of the present and forecast traffic conditions in the local communities in the study area, the roadway network was aggregated by Advisory Neighborhood Commissions (ANC) (Figure 1-2). Table 1-4 presents the 1979 Base Year summaries of VMT, VHT and travel speed for the study area.

Currently, less than 45 percent of all peak hour travel occurs on expressways. This accounts for nearly 30 percent of the peak hour travel time. Roughly 90 percent of non-expressway travel is at speeds less than 15 miles per hour. Overall average travel speed during AM- and PM-peak hours for expressways is less than 30 mph. These speeds indicate that traffic operating conditions on many roadways in the Study Area are at or near capacity.

TABLE 1-4 VEHICLE MILES OF TRAVEL (VMT), VEHICLE HOURS OF TRAVEL (VHT) AND AVERAGE SPEED FOR EXPRESSWAYS AND NON-EXPRESSWAYS IN THE STUDY AREA DURING 1979 AM- AND PM-PEAK HOURS

	Vehicle Miles of Travel			Vehicle Hours of Travel			Average Speed (mph)		
Period	Expwy.	Non-Expwy.	Total	Expwy.	Non-Expwy.	Total	Expwy.	Non-Expwy.	Total
AM	39,290	49,216	88,506	1,510	3,665	5,175	26.0	13.4	17.1
PM	38,589	43,600	82,189	1,352	2,951	4,303	28.5	14.7	19.1

- Areawide-Level of Service

AM- and PM-peak hour traffic volume to roadway capacity ratios developed as part of the Micro Assignment output were examined to provide an indication of the level of service in the area. The results of this examination are presented in Appendix G for the Study Area and for each ANC, by the major directions of travel.

An assessment of these results indicates that there is sufficient corridor capacity to accommodate peak hour traffic on the overall non-expressway. However, the vehicle miles of capacity includes many local streets which are not heavily traveled commuter routes. Many of these major commuter roadway segments, within the non-expressway street network, are currently operating near or at capacity. Traffic conditions on these routes are described in the following analysis on Selected Major Roadway segments.

The expressway segment of this assessment though does provide a representation of actual traffic operating conditions. It is evident that many expressways throughout the Study Area are operating near capacity during the AM- and PM-

peak traffic hours. During the AM-peak traffic hour, the Southeast Freeway, the South Capitol Street Bridges, the 11th Street Bridges, and the East Capitol Street Bridge are operating under congested conditions. The South Capitol Street Bridge, Southeast Freeway, and Anacostia Freeway are operating near capacity during the evening peak traffic period.

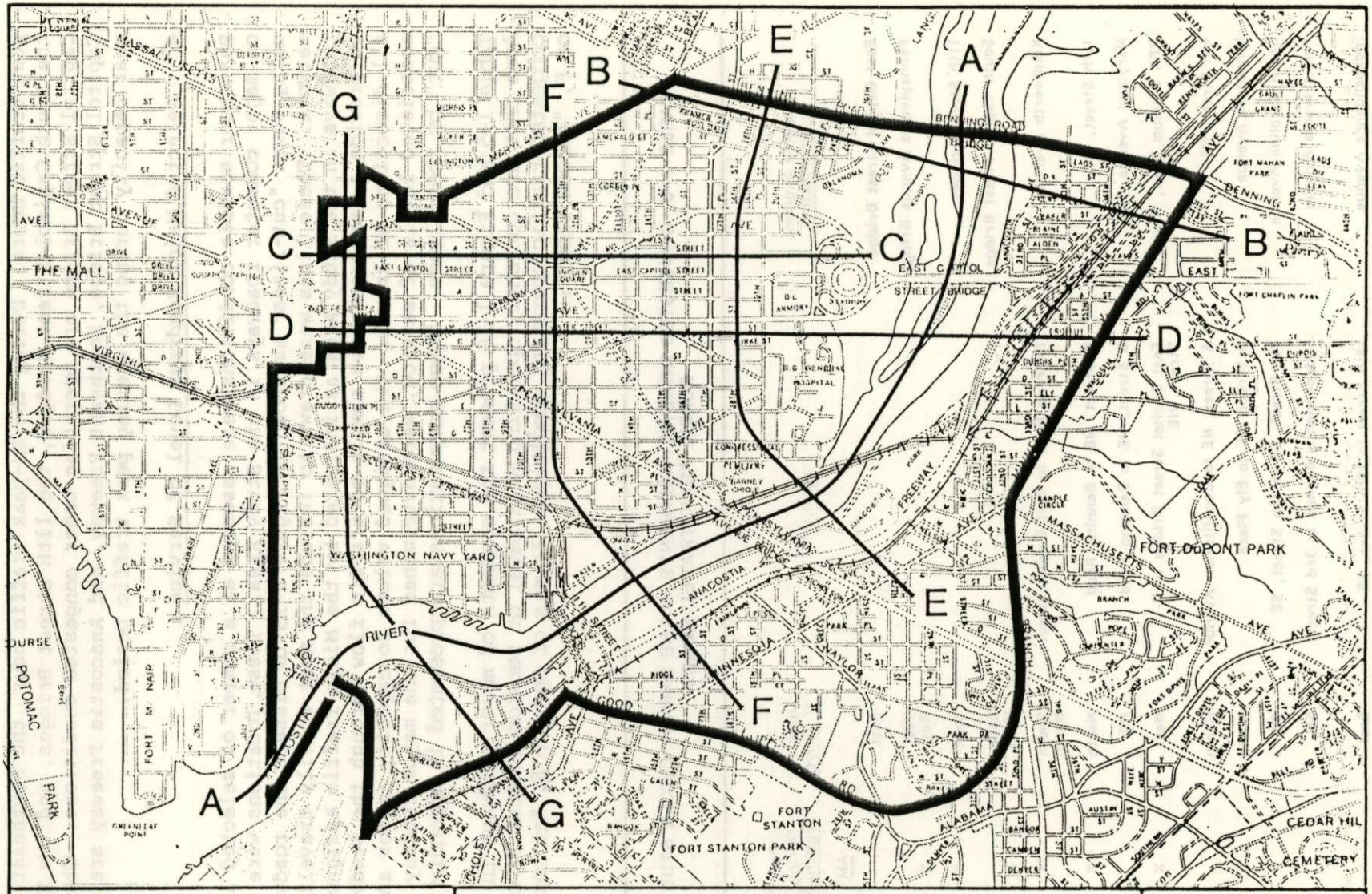
- Selected Major Roadways Level of Service

Peak hour traffic conditions were assessed at a number of selected locations on major commuter roadways in the Study Area. These locations were chosen using seven "cut-lines" as shown in Figure 1-15 to dissect the roadway network. These lines were drawn to include the most heavily travelled roadways in the Study Area as indicated by the Micro Traffic Assignments and to provide a representative sample of traffic flow through the Study Area in all directions of travel. The assigned volume to capacity ratios and associated levels of service, were determined for the major roadway segments "cut" by these lines. These computations are presented in Appendix H.

Table 1-5 and Figure 1-16 present the segments of major roadways in the Study Area that are currently operating at a level of service indicative of congested traffic operating conditions (Levels of Service E, "at capacity", or F, "forced flow").

TABLE 1-5 CONGESTED ROADWAY SEGMENTS IN THE BARNEY CIRCLE STUDY AREA DURING PEAK TRAVEL HOURS

Roadway Segment or Intersection	Location[1]	Direction of Travel	Peak Travel Period During Which Roadway Segment is Congested (2)	
			AM	PM
East Capitol Street Bridge	-	East		X
Pennsylvania Avenue Bridge	-	East		X
		West	X	
11th Street Bridges	-	West	X	
South Capitol Street Bridge	-	East		X
		West	X	
Kenilworth Avenue	Benning Road to East Capitol Street	South	X	
		North		X
15th Street, NE	G Street, NE to Benning Road	North	X	
Maryland Avenue, NE	G Street, NE to Benning Road	NE		X
RFK Stadium Road, North	East Capitol Street Bridge to C Street, NE	West	X	
6th Street, NE	A Street, NE to Constitution Avenue	North		X
Minnesota Avenue	B Street, SE to Ely Place	North		X
South Carolina Avenue	7th Street, SE to 6th Street, SE	SW	X	
Pennsylvania Avenue	Independence Avenue to 3rd Street, SE	SE		X
Independence Avenue	18th Street to 19th Street, SE	East		X
I-295	South Capitol Street Bridge to 11th Street Bridge	North		X
		South		X


A
B
C
D
E
F
G
THE MALL
PENNSYLVANIA AVENUE
CONSTITUTION AVENUE
MASSACHUSETTS AVENUE
BENNING ROAD
EAST CAPITOL STREET
EAST CAPITOL STREET BRIDGE
FREEWAY
WASHINGTON NAVY YARD
ANACOSTIA RIVER
POTOMAC
FORT McNAIR
FORT DUPONT PARK
FORT STANTON
FORT STANTON PARK
CEDAR HILL CEMETERY
ALABAMA AVE
GOOD HOPE RD
PARK RD
MINNESOTA AVE
BRANCH AVE
DENNING TERR
FORT MAHAN PARK
FORT CHAPLIN PARK
LEGEND
A — A Cutline
Study Area
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
CUT-LINES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-15
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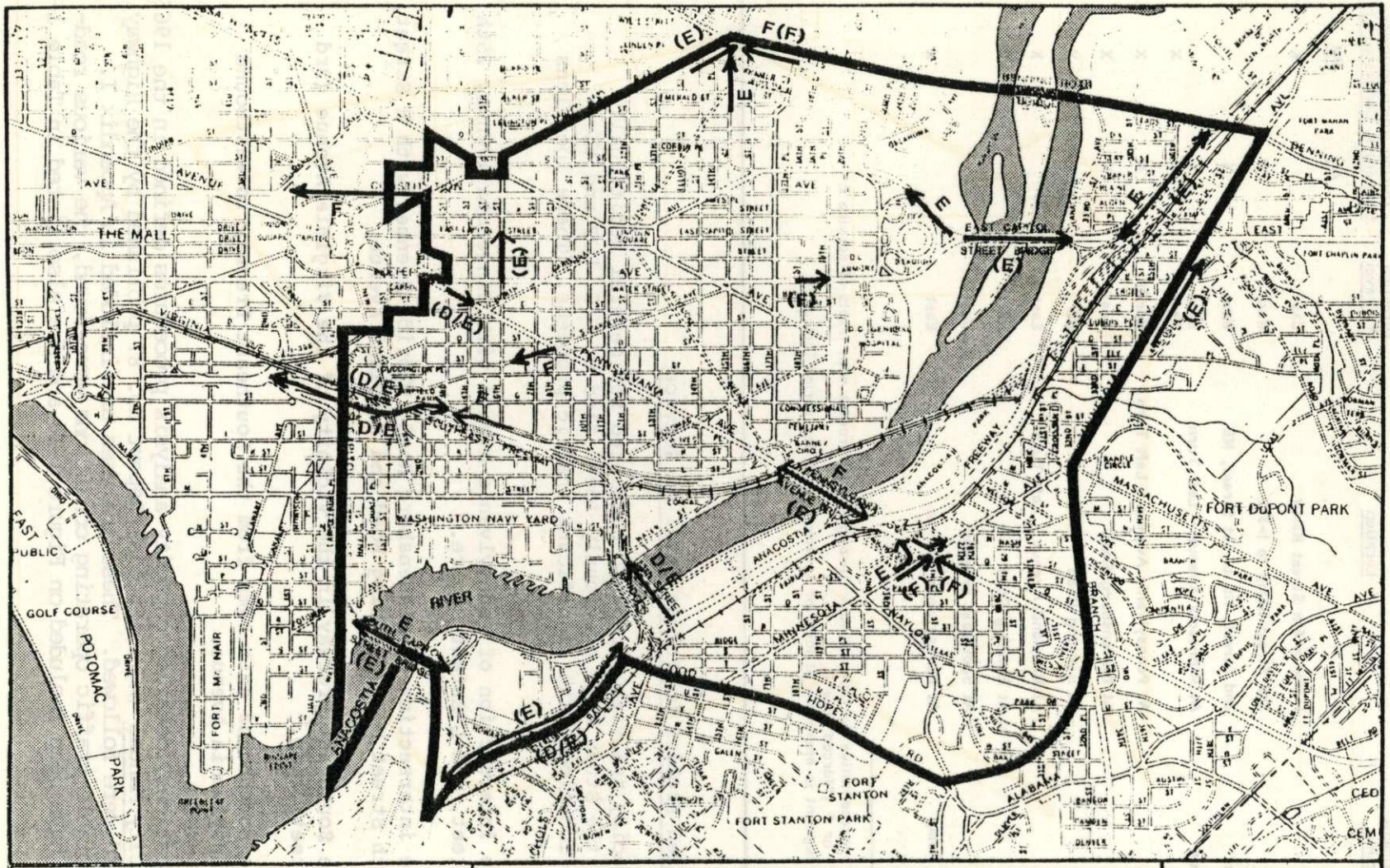


LEGEND ← Deficient Roadway Link

- Study Area
- E — AM Level Of Service By Direction Of Traffic
- (E) — PM Level Of Service By Direction Of Traffic

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

1979 BASE YEAR REPRESENTATIVE SEGMENTS CONGESTED MAJOR ROADWAYS

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-16

0 400 800 1600 FEET

Roadway Segment or Intersection	Location	Direction of Travel	Peak Travel Period During Which Roadway Segment is Congested (2)	
			AM	PM
Southeast Freeway	I-395 to 6th Street Ramp	East		X
	3rd Street Ramp to I-395	West	X	
Constitution Avenue	2nd Street, NE to 1st Street, NE	West	X	
Pennsylvania Avenue	At Minnesota Avenue - Left Turn	East	X	
		West	X	X
Minnesota Avenue	At Pennsylvania Avenue - Left Turn	North	X	X
Benning Road	At Bladensburg Road	West	X	X
Maryland Avenue	At Benning Road	NE		X
H Street	At Maryland Avenue - Left Turn	East		X
15th Street	At Benning Road	North		X
3rd Street Ramp	At Southeast Freeway	West	X	
Southeast Freeway Ramp	At Pennsylvania Avenue	East		X

(1) Segments are representative portions of major through traffic routes with levels of service E ("at capacity") or F ("forced flow").
(2) "X" indicates segment is operating at level of service E or F for period indicated.

- Identified Problem Locations Level of Service

Detailed capacity analyses were also completed for several additional locations in the Study Area previously identified by D.C. DOT and the community as locations with significant traffic problems. These locations include:

- The intersection of Pennsylvania Avenue with Minnesota Avenue, 25th Street, and L'Enfant Square.
- The intersection of Bladensburg Road, Florida Avenue, with H Street, 15th Street N.E., Benning Road and Maryland Avenue.
- The Southeast Freeway in the vicinity of the Virginia Avenue (3rd Street) ramp.
- The northbound exit ramp from the Southeast Freeway to westbound Pennsylvania Avenue.

For these locations, detailed capacity analysis procedures defined in the 1965 Highway Capacity Manual (HCM), Special Report No. 87 published by the Highway Research Board were followed. These analyses are included in Appendix I. Where unacceptable traffic operating conditions were found, the various roadway segments have been included on Figure 1-16 and are also listed in Table 1-5.

1.3.4 Accident Statistics

Accident statistics compiled by D.C. DOT for the year 1979 show that five of the highest ten, and 38 out of the highest 259 accident locations in the District as shown in Figure 1-7 were located in the Study Area. These locations accounted for more than 700 accidents in 1979. Typical accident rates for the two basic roadway types in the network were calculated based on these accidents and the estimates of the vehicle-miles of travel by major roadway type.

- Expressway-1.45 accidents/million-vehicle miles (MVM) traveled
- Non-Expressway-1.69 accidents/million vehicle miles (MVM) traveled

Assuming that these accident rates remain constant and the number of accidents is directly related to the volume of traffic, this data provides a basis to assess the potential for a reduction in the number of accidents at the high accident locations as a result of traffic diversions which may stem from the proposed alternative.

1.3.5 Transit Service

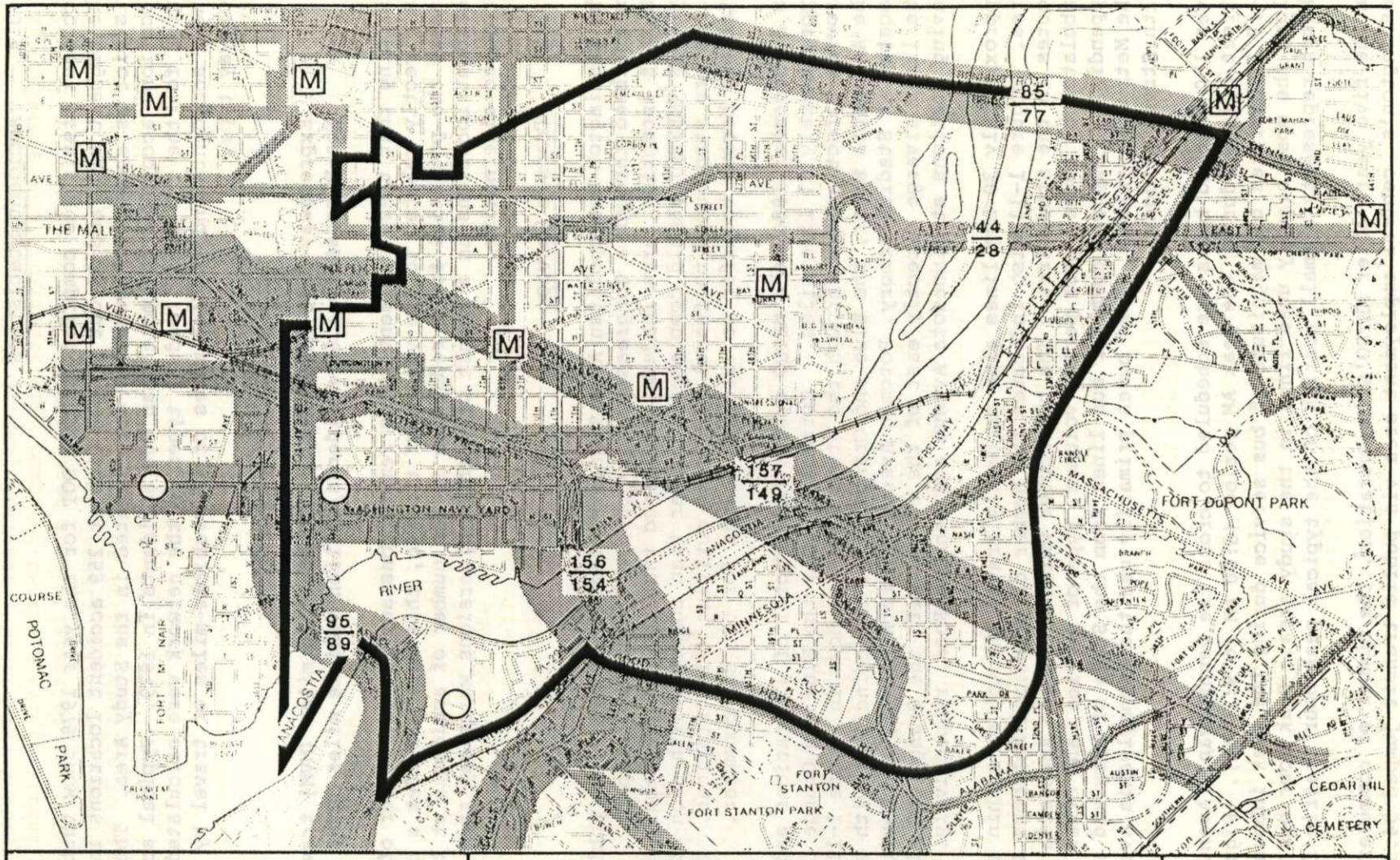
The Washington Metropolitan Area Transit Authority (WMATA) is a public agency established through a Congressionally approved interstate compact. From WMATA's inception, area leaders determined that the bus (Metrobus) and rail systems (METRO) should complement, rather than compete, with each other. Bus lines are structured to funnel riders to outlying METRO stations. These stations become transfer or turnback points for the bus commuter.

As of November 1980, the METRO system had a total of 41 stations and approximately 37 line miles.[7] Currently, only the Blue and Orange Lines provide direct access through the Study Area as shown in Figure 1-11. West of the Anacostia River, the Blue and Orange lines run coincident with stations located at Stadium-Armory, Potomac Avenue, Eastern Market, and Capitol South. The lines diverge directly east of the river, with the Orange and Blue Lines having stations at Minnesota Avenue and Benning Road, respectively.

Approximately 70 bus lines also currently travel through or within the Study Area. Figure 1-11 also indicates the number of principal Metrobus lines and routes in the Study Area. The bus routes which cross the Anacostia River are tabulated by route, peak period volumes, type of service, and other data in Appendix E. Express commuter bus lines from the State of Maryland supplement the Metrobus system. These buses primarily use the Pennsylvania Avenue and 11th Street Bridges.

Over 150 inbound buses are scheduled to cross the Pennsylvania Avenue and 11th Street bridges during the peak AM period (6:00 AM to 9:30 AM). Figure 1-17 illustrates the magnitude of bus service during the peak inbound period along the most heavily used lines in the study area. Peak hour bus traffic though represents a small portion of the typical peak hour traffic flows.

In the five years after METRO'S inauguration, the number of commuters entering Washington's central employment area via public transit jumped 34.5 percent. Total transit ridership (bus and rail combined) in fiscal year 1980, increased



LEGEND

M — Existing Metrorail Stations

○ — Proposed Metrorail Stations

XX / XX — AM Inbound Peak Period Bus Volumes (6:00-9:30); PM Outbound Peak Period Bus Volumes (3:00-6:30)

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

INBOUND BUS VOLUMES DURING AM-PEAK PERIOD

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE1-17

0 400 800 1600 FEET

to 154.3 million trips, a 21.5 percent increase. Ridership, through March 1981, showed a slight decrease when compared to the previous fiscal year. This decrease can be partially attributed to the impact of the substantial peak period fare increases in July and in January. Metrobus ridership in this same period increased, due in part to changes in service to Washington's outlying suburbs. Such Metrobus service changes and the further extension of the METRO into the suburbs are anticipated to reduce the growth of internal and commuter trips. These factors are included in the regional trip forecasts produced by MWCOG for the Micro Assignment modeling process discussed in Section 1.2.5-1.2.11.[7]

1.3.6 Stadium Access

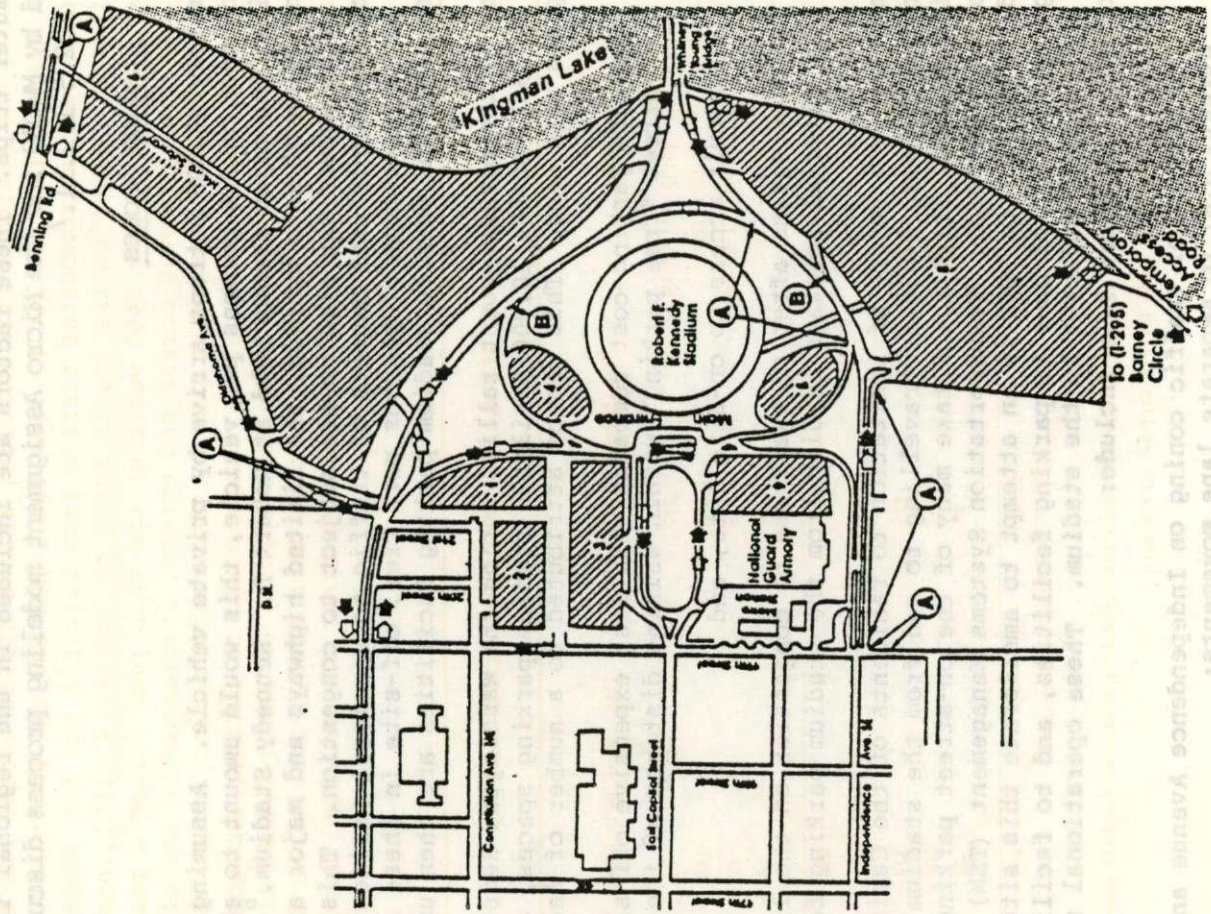
Approximately 40,000 patrons arrive by private vehicle. Assuming an average auto occupancy of 2.6 persons per vehicle, this would amount to about 15,000 automobiles for major events held at Robert F. Kennedy Stadium.[8] With such a concentration of auto traffic, the limited highways and major arterial streets which access the stadium are subject to congestion. This restricted access causes significant amounts of traffic to use local residential streets. Thus, a large percentage of patrons park free, off-site in these residential neighborhoods. The on-site stadium parking facilities are then underutilized.

According to the parking count tallied during the Washington Redskins game on October 4, 1981, of the 10,000 available stadium parking spaces,[9] approximately 7,000 spaces were used. This can be attributed to a number of factors:

- on-site parking cost compared with less expensive off-site lots and on-street "free parking" within walking distance of the stadium,
- difficult access to on-site lots, and
- easier egress after an event due to congestion on the limited number of arterial roadways leading from the stadium parking facilities.

This condition is a source of irritation to residents of the Capitol Hill neighborhoods because vehicles travelling to and from the stadium cause congestion on local streets and take many of the on-street parking spaces in the local neighborhoods. Transportation Systems Management (TSM) measures were undertaken by D.C. DOT in an attempt to ameliorate this situation, to encourage utilization of on-site parking facilities, and to facilitate traffic flow on the roadways adjacent to the stadium. These operational measures which are shown in Figure 1-18 include:

- The placing of traffic coning on Independence Avenue and 19th Street, S.E. to separate lane movements;
- The coning of the traffic merge from parking lot #5 to Independence Avenue to aid merging vehicles and restrict the exit movement to the East Capitol Street Bridge from stadium parking facilities;
- The coning of C Street to 21st Street N.E. to prohibit right turns;
- Coning of Benning Road to aid the merging of the traffic discharge from parking lot #6;



LEGEND
- Traffic Flow Inbound
- Traffic Flow Outbound
- (A) Coning
- (B) Ramp Closure
- Parking Lot

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

RFK STADIUM TSM MEASURES

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-18

0 400 800 1600 FEET

- Closure of the ramp from Kenilworth Avenue to Benning Road.

While all of these operational measures are aimed at ameliorating traffic conditions in the local neighborhoods and channelize traffic flow in the vicinity of the stadium, the one pertinent to this Study is the possible upgrading and enhancement of the present temporary access road from Barney Circle along the west bank of the Anacostia River. This road, operated under permit from the National Park Service, allows direct access and egress to the southern stadium parking lot #8 from the I-295 and the Southeast Freeway. This access road accommodates traffic from Virginia and the southeast suburbs of Washington. Based on the counts taken on October 4, 1981, summarized in Table 1-6, approximately 2400 vehicles use this road during a peak event. Use of this facility improves access and egress, increases the use of on-site parking, and reduces on-street parking and traffic circulation through local streets in the Capitol Hill area. Usage would be further enhanced by providing direct connections from the vicinity of Pennsylvania Avenue. As part of the traffic considerations under this Study, provisions for such direct connections to the stadium parking areas are provided in the Build Alternatives.

TABLE 1-6 RFK STADIUM ACCESS ROAD TRAFFIC

Time	Access Road Traffic - Autos	11th Street/12th Street Ramps*
Inbound		
10:30 - 11:00 AM	147	29
11:00 - 12:00	1,241	168
12:00 - 1:00 PM	889	62
1:00 - 1:30	56	1
	2,333	260
Outbound		
3:30 - 4:00 PM	528	113
4:00 - 5:00	1,655	300
5:00 - 5:30	64	22
	2,247	435

Source:
October 4, 1981 counts made by BPDE during a Washington Redskins scheduled football game.

* Portion of I-295 traffic to/from access road

1.3.7 Bikeways

The role of bicycles in reducing congestion and improving access throughout Washington, D. C. is recognized by the Government of the District of Columbia and is demonstrated by the network of bicycle routes and facilities established or planned in the Washington Metropolitan area as shown on Figure 1-12.

The use of bicycles is encouraged through the designation of bikeways, the distribution of bikeway maps by the Metropolitan Washington Council of Governments and D.C. DOT, the provision of racks and lockers at several METRO Stations and allowing bicycles on some METRO trains.

However, direct bicycle access to the capitol district and its recreational areas from the east side of the Anacostia River is restricted. The most direct route over the Pennsylvania Avenue Bridge discourages many bicyclists because of difficult travel conditions. The narrow traffic lanes that carry heavy vehicle traffic on Pennsylvania Avenue between 3rd Street S.W. and the bridge are unsuitable for most bicyclists, and on the bridge itself, the narrow sidewalk and several merging freeway ramps make crossing the bridge difficult. As a result, bicycle travelers must follow a circuitous route to the Benning Road Bridge or the South Capitol Bridge to cross the Anacostia River.

1.3.8 Summary

In determining the traffic transportation needs for the Barney Circle Study Corridor, existing traffic characteristics were collected and analyzed. In addition, existing and future travel patterns were simulated, using the Micro Assignment Computerized traffic model, to assess base and design year conditions in a consistent and comprehensive manner. The results of the Base Year 1979 traffic and transportation assessments indicate that:

- On the west side of the Anacostia River, a significant portion of existing river crossing traffic uses local streets in the Capitol Hill, Lincoln Park and Kingman Park neighborhoods during both the AM and PM-peak travel hours; and

- On the east side of the Anacostia River, a significant portion of river crossing traffic use Pennsylvania and Minnesota Avenues, in the vicinity of the Pennsylvania Avenue Bridge, and Howard Road, in the vicinity of the 11th Street and South Capitol Street Bridges, during both the AM- and PM-peak travel hours.

- Currently, less than 45 percent of all peak hour miles of travel occurs on expressways. This accounts for approximately 30 percent of the time spent by vehicles traveling during the peak travel periods. Average travel speed during the AM- and PM-peak travel hours for vehicles using expressways is less than 30 mph. Average AM- and PM-peak hour travel speed on the non-expressway type roadways is below 15 mph. These relatively low travel speeds indicate that many roadways in the study area are operating at or near capacity.

- Congestion along sections of Pennsylvania Avenue on the east side of the Anacostia River, particularly at Minnesota Avenue, is due, in part to the circuitous routing of through traffic to neighborhood streets. Approximately 300 vehicles destined for Central Washington in the AM-peak hour make U-turns to go from eastbound Pennsylvania Avenue (after leaving the southbound Anacostia Freeway) to westbound Pennsylvania Avenue. A similar situation exists in the outbound peak when U-turns are made at Minnesota Avenue to access the Anacostia Freeway northbound.

- Traffic on the single-lane, traffic-signal-controlled exit ramp from the Southeast Freeway to the Pennsylvania Avenue Bridge frequently backs beyond the ramps to the 11th Street Bridge during the evening peak hours. This is due to the deficiencies in ramp and merge capacity on the Pennsylvania Avenue Bridge.

- A considerable amount of through traffic using the Benning Road Bridge follows local streets in the Capitol Hill, Lincoln Park and Kingman Park neighborhoods west of the Anacostia River. This traffic uses such local north-south streets as 17th Street, NE and Oklahoma Avenue, NE to enter and leave central Washington.

- Traffic entering Central Washington from the East Capitol Street Bridge generally is routed onto C Street where it follows one of two predominant routes. The first route, which follows C Street, NE at North Carolina Avenue to Constitution Avenue, brings traffic directly into central Washington. The second route follows C Street, NE to 17th Street and then makes a right turn to Potomac Avenue. From Potomac Avenue, through traffic proceeds onto Eye Street and takes a ramp, located approximately at 3rd and Virginia Avenue SE onto the Southeast Freeway westbound. There is a short difficult weaving section on the Southeast Freeway between this ramp and the I-395 (Center Leg) connection. This weaving section creates a bottleneck during the AM-peak period. In the outbound direction, traffic uses local streets and Independence and Constitution Avenues to access the East Capitol Street and Benning Road Bridges, or if heading south, uses the on-ramp at 8th Street SE adjacent to the Navy Yard to access the Southeast Freeway eastbound.

- Congestion occurs during the Am-peak period at the multi-legged intersection of Maryland Avenue, Benning Road, H Street, Florida Avenue, 15th Street and Baldensburg Road NE. This problem is caused by the added demand of inbound Kenilworth Avenue and eastern Maryland traffic which uses the Benning Road Bridge to access central Washington.

- During the evening peak travel period, through traffic from the vicinity of the Navy Yark uses either the South Capitol Street Bridge or the 11th Street Bridge via the Howard Road ramp to gain access onto the northbound lanes of the Anacostia freeway. Portions of this traffic pass through local streets in Ward 6 to enter the Anacostia Freeway further north on access East Capitol Street.

- Southbound Anacostia Freeway AM-peak hour traffic uses Howard Road ramp via the Park Road to access the South Capitol Street Bridge causing local congestion problems along Howard Road.

1.4 POTENTIAL IMPACTS OF PROJECT

The four build alternatives differ significantly in their potential effect on the traffic and travel patterns within the Barney Circle study area. This section identifies and assesses both the consequences of forecast design year

2006 traffic growth under a No-Build (NULL) alternative as compared to base year traffic conditions and the impact of the four build alternatives as compared to the No-Build Alternative.

The traffic and travel related issues are evaluated in four different traffic contexts including:

- The Distribution of Traffic Crossing the Anacostia River: A major issue in this study was the infiltration of commuter traffic onto local neighborhood streets in the Capitol Hill District and neighborhoods east of the Anacostia River. Thus, development of the proposed alternatives was to assume that commuter traffic remain in designated corridors preferably on the expressway system and away from residential neighborhoods.

- The Vehicle Miles of Travel (VMT), Vehicle Hours of Travel (VHT) and Average Speed: These values are standard indices of aggregate traffic operating conditions. VMT is the sum of the miles traveled by all vehicle on the roadway system in an area. VHT is the sum of time spent (in hours) by these vehicles on the roadway system including travel time, and congestion and delay penalties. The average speed of a vehicle in the area is equal to the vehicle-miles of travel in an area divided by the vehicle-hour of travel. The MWCOG TRIMZONE model was used to estimate total regional VMT for the Washington metropolitan area. The Micro-Assignment model gave AM and PM peak hour VMT, VHT, and average speeds for the study area network. These results are presented for the No-build and the four build alternatives in Table 1-7.

TABLE 1-7 VMT, VHT AND AVERAGE SPEED

		VEHICLE - MILES				VEHICLE - HOURS				AVERAGE - SPEED			
OPTIONS		ARTERIAL,	EXPRESSWAY,	BOULEVARD	TOTAL	ARTERIAL,	EXPRESSWAY,	BOULEVARD	TOTAL	ARTERIAL,	EXPRESSWAY,	BOULEVARD	TOTAL
1979 Base	AM	49.216	39.290	-	88,506	3,665	1,510	-	5,175	13.4	26.0	-	17.1
	PM	42,600	38,589	-	82,189	2,951	1,352	-	4,303	14.7	28.5	-	19.1
2006 NULL		63,335	48,304	-	111,639	8,156	2,732	-	10,888	7.8	17.6	-	10.2
		58,584	46,730	-	105,314	6,740	2,208	-	8,948	8.7	21.1	-	11.8
2006 ALT. 1		61,365	54,681	-	116,046	7,579	2,914	-	10,493	8.1	18.6	-	11.0
		55,535	59,152	-	114,687	7,384	3,181	-	10,565	7.5	18.6	-	10.8
2006 ALT. 2		63,067	54,480	-	117,547	7,300	3,303	-	10,603	8.6	16.5	-	11.0
		58,037	55,026	-	113,063	9,914	2,550	-	11,744	6.3	21.6	-	9.6
2006 ALT. 1/2		59,280	55,582	1,932	116,794	6,190	3,221	86	9,497	9.6	17.2	22.5	12.2
		54,518	58,225	2,000	115,732	8,238	2,762	1,030	12,030	6.6	21.1	7.8	9.4
2006 ALT. 3		63,186	52,614	-	115,300	7,726	3,012	-	10,736	8.2	17.5	-	10.7
		57,619	54,743	-	112,362	7,894	2,435	-	10,329	7.3	22.5		10.9

- Identified Problem Locations: Specific locations within the Study Area have been identified as having significant traffic problems.

These locations are in part adversely affected by northeast suburban traffic being forced into circuitious travel routes due to the lack of freeway continuity and accessibility. The impact of the proposed alternatives on reducing congestion at these locations is addressed.

These identified problem locations which are shown in Figure 1-19 include;

A. Intersection of Pennsylvania Avenue, Minnesota Avenue and L'Enfant Square.

B. Howard Road and related access to the South Capitol Street - 11th Street Bridges.

C. Third Street Southeast Entry Ramp to the Southeast Freeway.

D. Intersection of Benning Road, Bladensburg Road, 15th Street N.E., H Street N.E., Florida Avenue and Maryland Avenue.

E. Southeast Freeway Exit Ramp northbound to Pennsylvania Avenue eastbound.

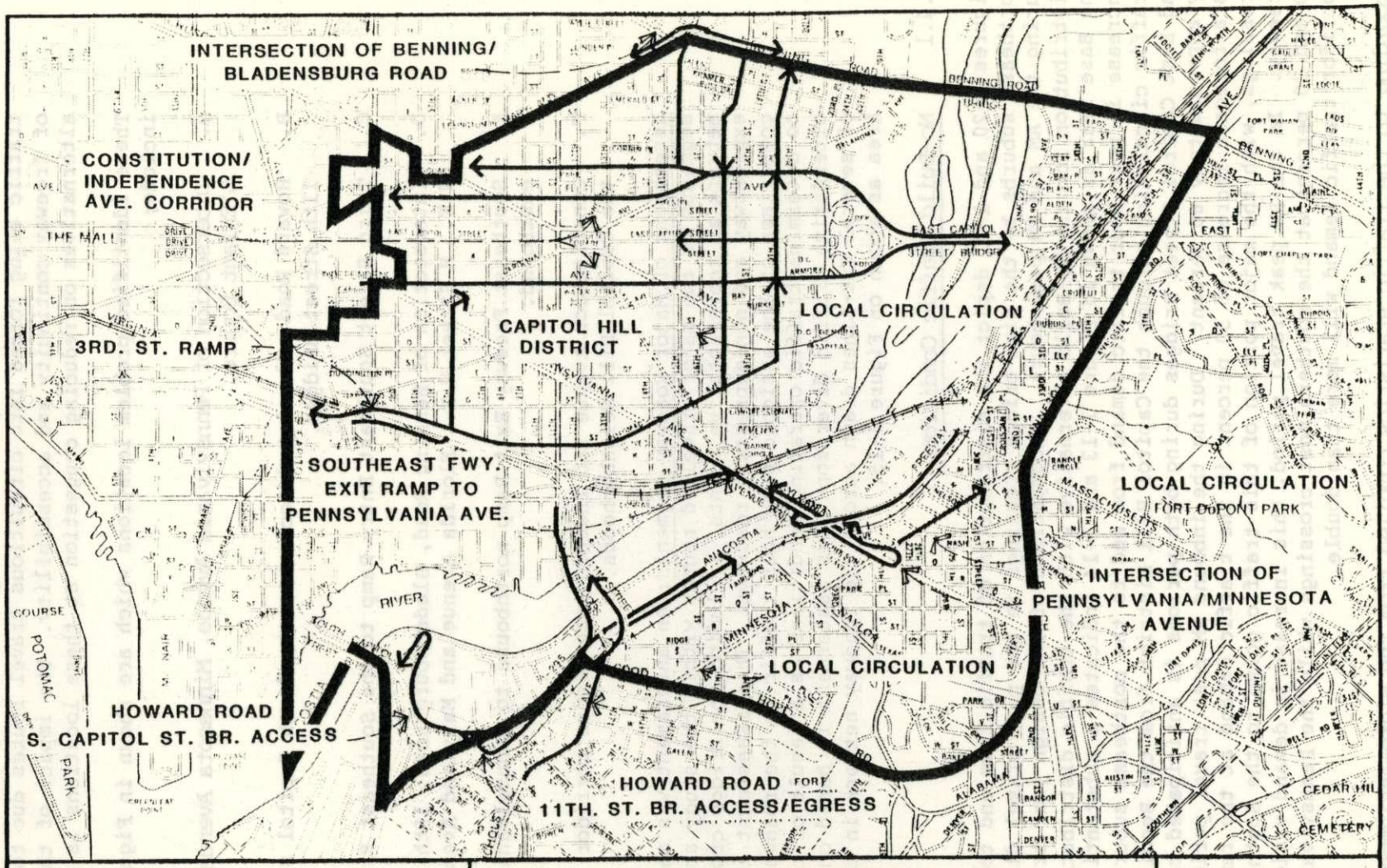
F. Constitution Avenue and Independence Avenue corridor through the Capitol Hill Neighborhoods.

- Assessment of Major Roadway Segments: An assessment was made of segments of the major travelled routes within the study area roadway network at representative points, including the bridge crossings and expressway and non-expressway roadways. This assessment involved a comparison of the assigned peak hour traffic to the roadway capacity to determine traffic operating conditions as a result of the various alternative traffic diversions This assessment is based on a series of several Cut-Lines drawn across the roadway network in the Study Area as shown on Figure 1-15.

1.4.1 No-Build Traffic Conditions

Figures 1-20 and 1-21 depict the distribution of traffic from and to the northeast suburbs by the five bridge crossings in the peak travel direction during the AM and PM peak hours. A comparison of the design year traffic distribution for the No-Build Alternative with the traffic distribution for the Base Year as shown in Figure 1-13 and 1-14 indicates a substantial increase in peak hour traffic demand from and to the northeast suburbs. Traffic circulating through the Capitol Hill District from the Benning Road and East Capitol Street Bridges during both periods is anticipated to increase by approximately 60 percent. During the inbound AM peak travel period, there is a forecast increase of 50 percent in the traffic demand at the remaining crossings, with the major portion of this traffic going to the Southeast Freeway. In the PM peak travel period, this increase in demand varies between 10 and 30 percent at the southern most crossings while the Pennsylvania Avenue Corridor traffic demand will more than double.

According to the traffic statistics compiled from the Micro-Assignment presented in Table 1-7, vehicle miles of travel (VMT) under the No-Build



LEGEND
Study Area
Through Traffic Routes

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

IDENTIFIED PROBLEM LOCATIONS

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-19

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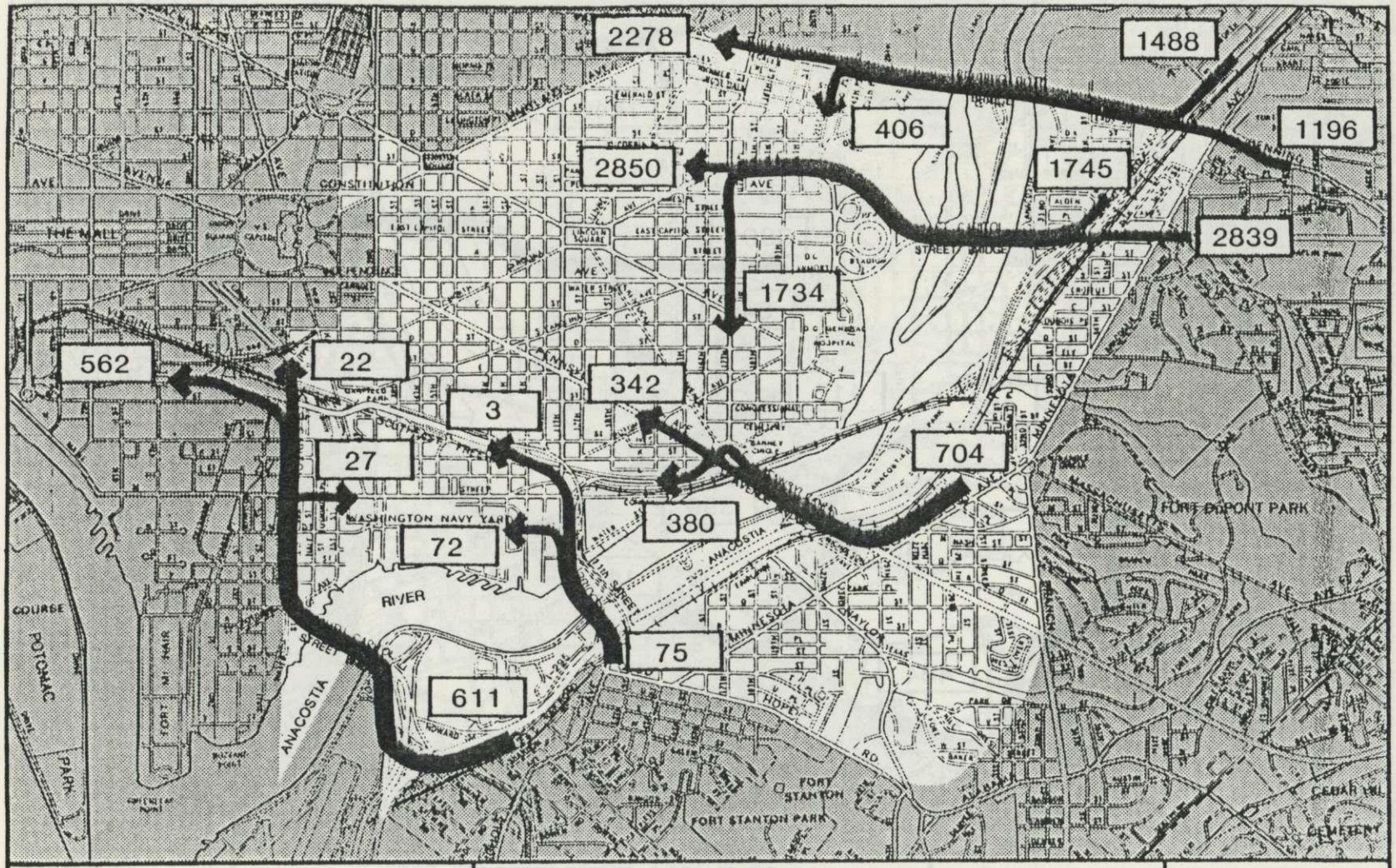
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342
3
704
27
380
72
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611
FORT DUPONT PARK
WASHINGTON NAVY YARD
RIVER
POTOMAC
ANACOSTIA
FORT STANTON
FORT STANTON PARK
CEMETERY
LEGEND
XXX
AM-Peak Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
NO-BUILD ALTERNATIVE
AM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-20
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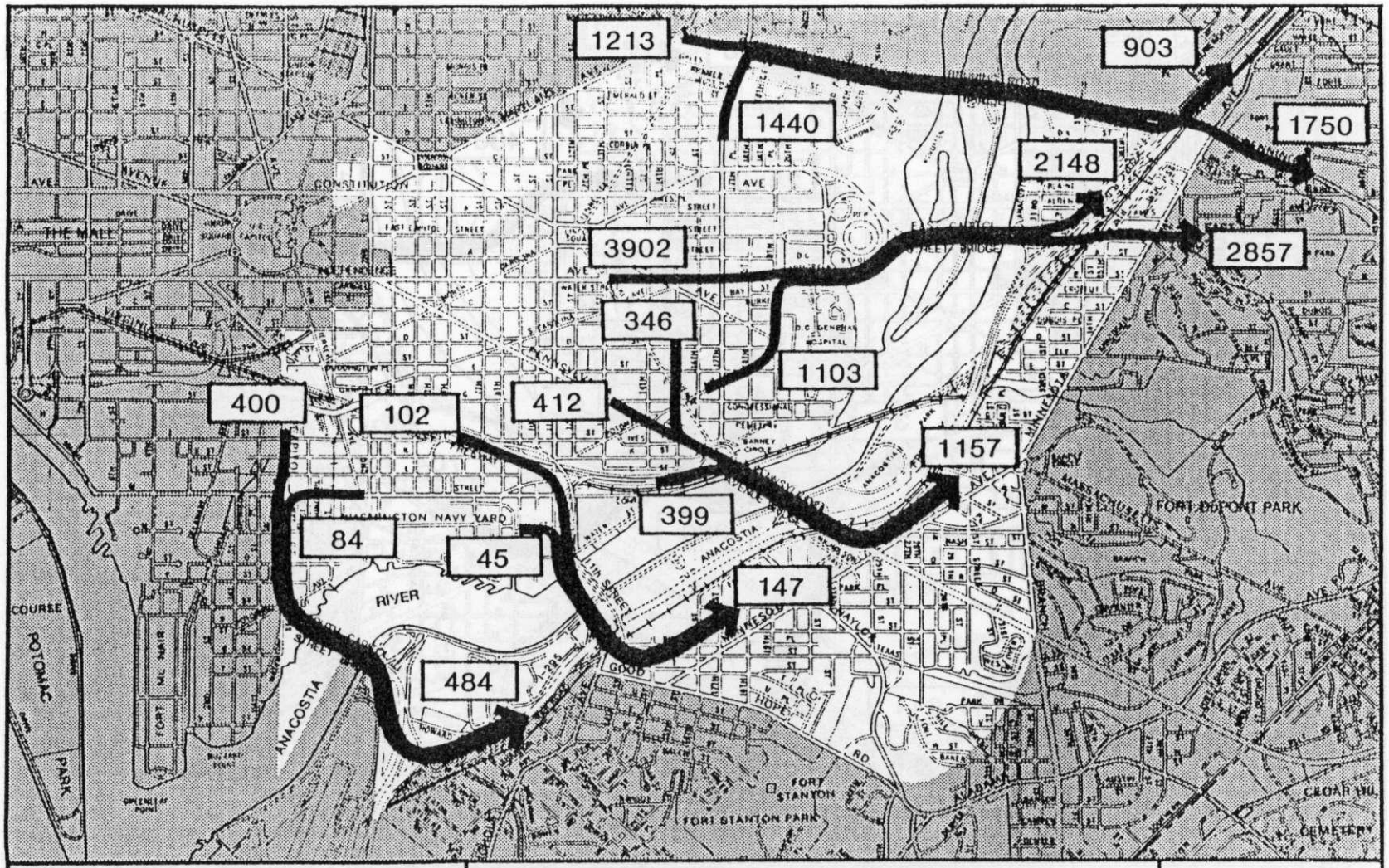
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1103
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102
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1157
399
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45
147
484
LEGEND
XXX
PM-Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
NO-BUILD ALTERNATIVE
PM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-21
400 1600
0 800
FEET

alternative increases 33 percent on the non-expressway portion of the network and about 22 percent on the expressway portion as compared to the Base Year. Vehicle hours of travel (VHT) on the non-expressway roadways will increase by more than 200 percent while the VHT on expressways only rises 70 percent. Average travel speeds on the non-expressway roadways decrease by approximately 6 miles per hour and on expressways by approximately 7.5 miles per hour. The increase in VHT on the non-expressway roadways is indicative of increased traffic congestion on the major commuter thoroughfares.

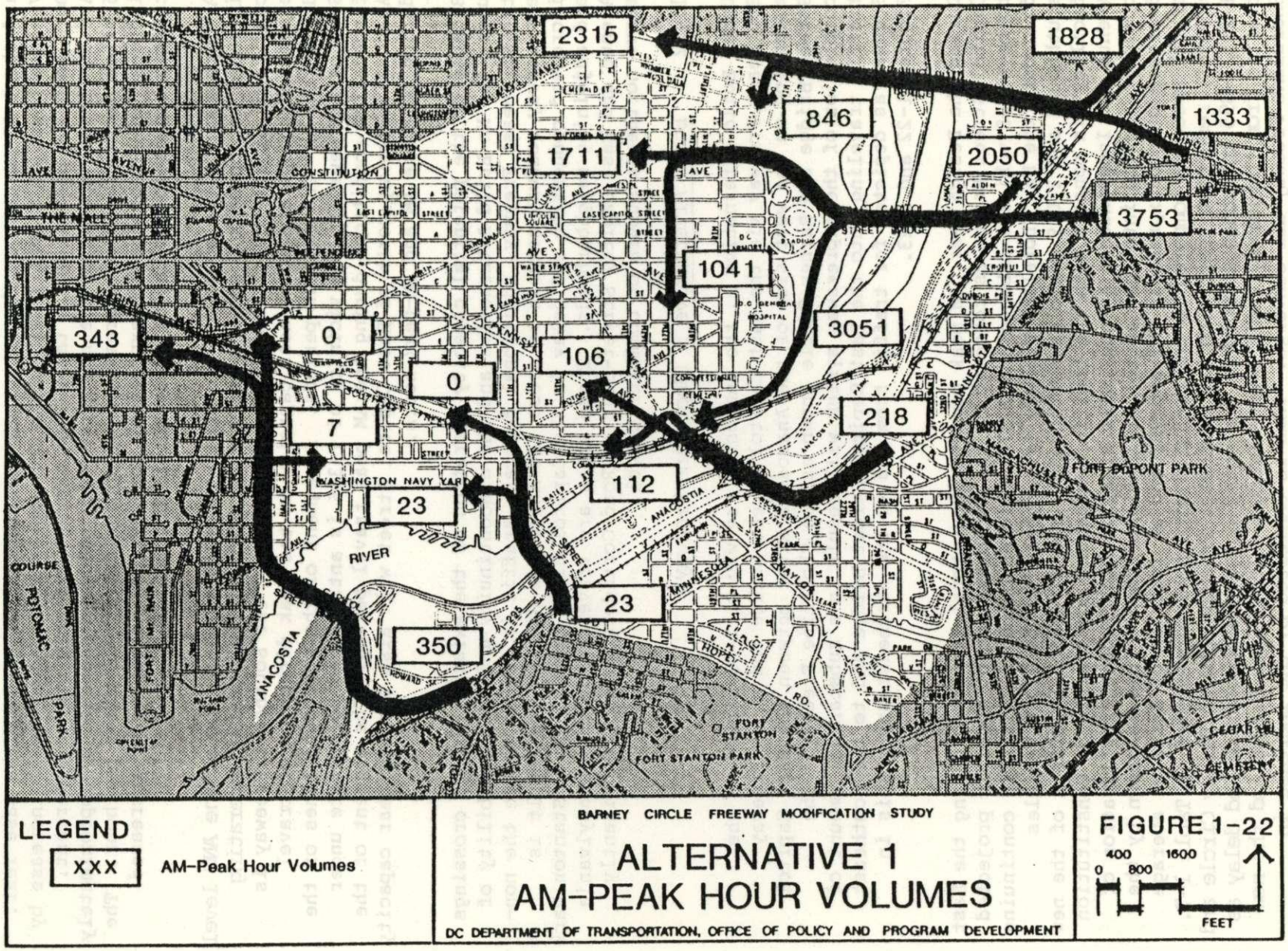
A comparison of the aggregate volume to capacity (V/C) ratios at the ANC level included in Appendix G shows a general deterioration in traffic operating conditions at all the existing bridge crossings. The Southeast Freeway is estimated to operate at or near capacity in the peak direction of travel during the AM- and PM-peak periods. A segment of the westbound lanes of the Southeast Freeway in the vicinity of I-395 is anticipated to operate under forced-flow conditions during the AM peak travel period. The segment of the Anacostia Freeway north of East Capitol Street will also operate near capacity during both the AM and PM-peak hours.

Because of the potential capacity operation of the existing bridge crossings under the No-Build Alternative and the discontinuity and inaccessibility of the Southeast Freeway, additional forecast traffic is forced to use the non-expressway roadway network to cross the Anacostia River. The result is increased congestion and delay in the Capitol Hill, Lincoln Park, Stanton Park and adjoining neighborhoods. These areas are traversed by the Pennsylvania Avenue and East Capitol Street-Benning Road Corridors which predominantly serve northeast suburb or commuter travel.

1.4.2 Build Alternative 1 (Shoreline Freeway)

Under Build Alternative 1, the Anacostia Freeway will be linked to the Southeast Freeway via the East Capitol Street Bridge and a new Freeway extension on the west side of the Anacostia River between the East Capitol Street Bridge and Barney Circle known as the Shoreline Freeway. The completion of the expressway system will result in a substantial amount of traffic traveling onto the East Capitol Street Bridge and to the Southeast Freeway as depicted for traffic from and to the northeast suburbs is in Figures 1-22 and 1-23.

During the Design Year, AM peak commuter hour total traffic crossing the East Capitol Street Bridge as forecast by the Micro Assignment model is projected to be 6,538 vehicles inbound and 2,576 vehicles outbound. Traffic continuing down onto the New Shoreline Freeway is projected to be 3,290 vehicles southbound and 2,019 vehicles northbound. The diversionary effect of the new facility, in concert with the traffic management constraints on Constitution Avenue and Independence Avenue, will significantly reduce infiltration of commuter traffic into the Capitol Hill neighborhood. This is shown by the decrease of non-expressway VMT and VHT and an increase of arterial average travel speed as compared to the No-Build alternative presented in Table 1-7. However, resultant traffic on the Southeast Freeway between Barney Circle and I-295/I-395 interchange would be subjected to severe congestion and delay as traffic from the Pennsylvania Avenue Bridge, 11th Street Bridge and the new Shoreline Freeway all converge. This is exhibited by the increase in expressway VMT and VHT and the decrease of average travel speed. An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1041
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LEGEND
XXX
AM-Peak Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ALTERNATIVE 1
AM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-22
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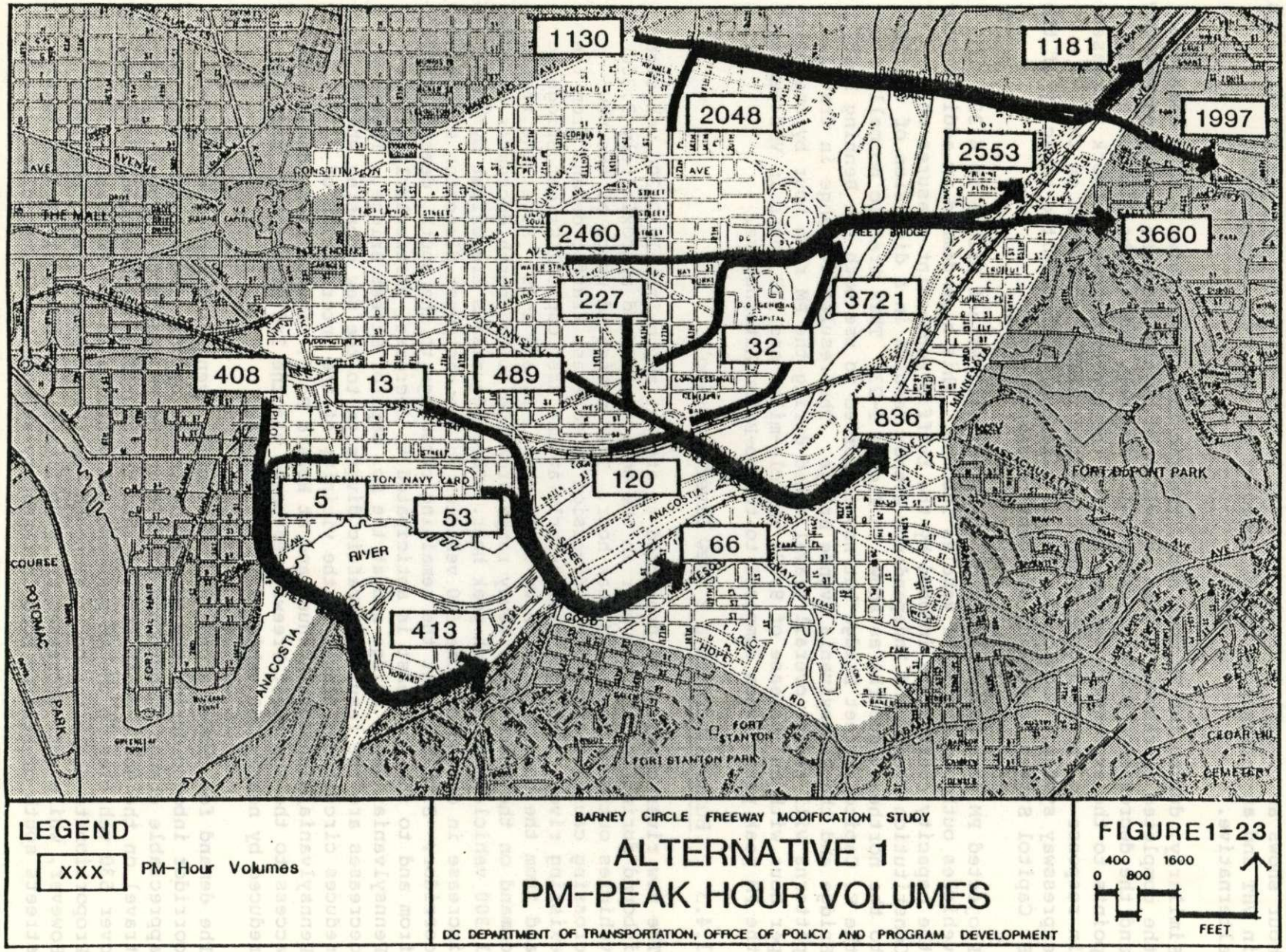
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2553
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3721
32
408
13
489
836
120
5
53
66
413
THE MALL
CONSTITUTION AVE
INDEPENDENCE AVE
D.C. GENERAL HOSPITAL
WASHINGTON NAVY YARD
ANACOSTIA RIVER
POTOMAC
FORT DUPONT PARK
FORT STANTON
FORT STANTON PARK
HOPE
CEDAR HILL CEMETERY
LEGEND
XXX PM-Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ALTERNATIVE 1
PM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-23
0 400 800 1600
FEET

examination of total network VMT, VHT and average speed during the AM peak hour shows an overall increase of 4,407 Vehicle-Miles, a decrease of 395 hours in VHT and an increase in travel speed of 0.8 mph over the no-build alternative.

Similarly, during the PM peak hour, traffic flow again shows a high demand on the completed expressway system as evidenced by the increase in expressway VMT and the decrease on non-expressway VMT. However, due to the limited access points to the expressway system, VHT for the non-expressway network increases in response to the high demand and congested traffic condition on the expressway system. Such congestion is also due to the limited capacity of the E. Capitol Street Bridge and adjacent crossings.

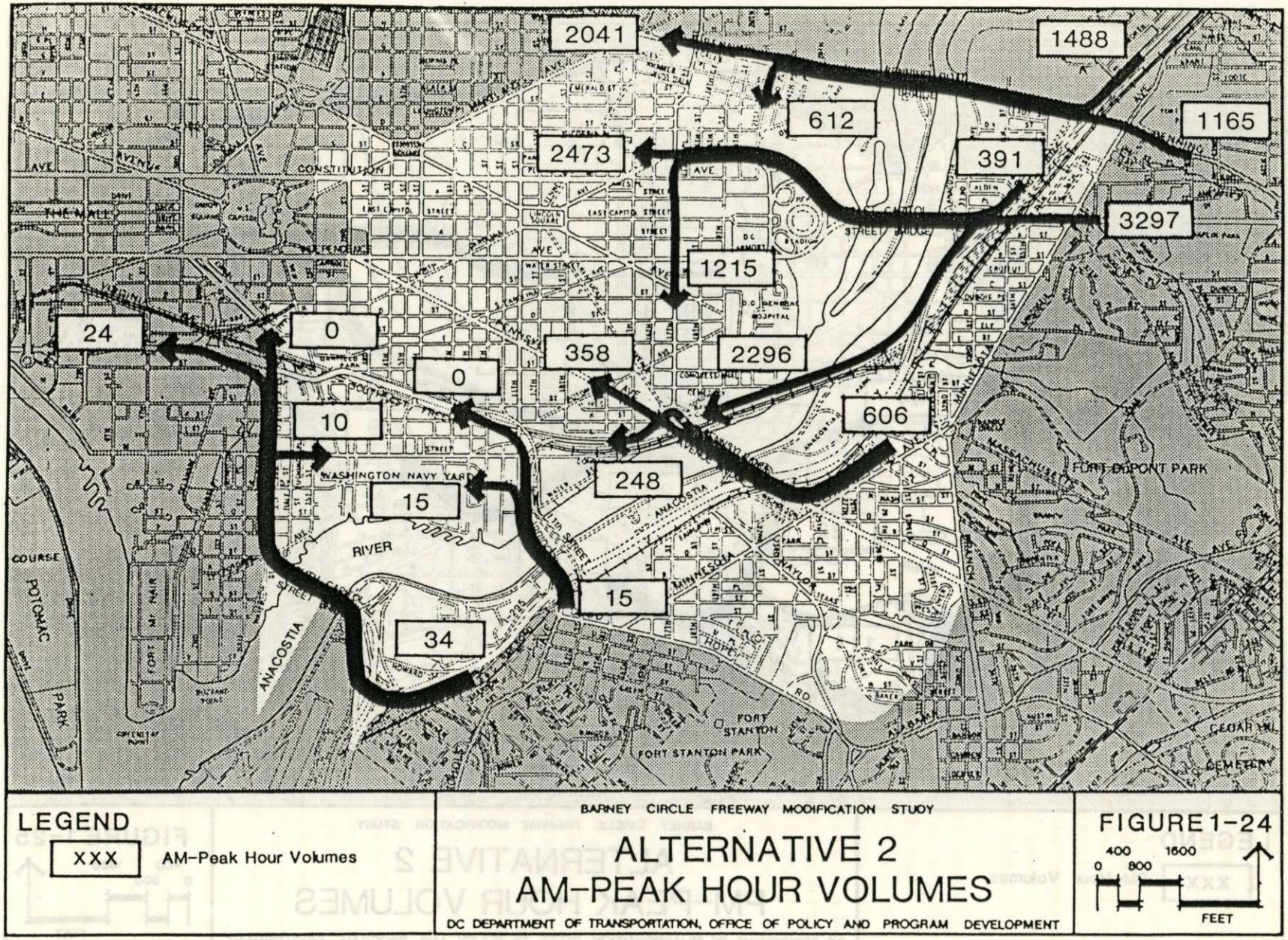
Projected PM peak hour traffic on the E. Capitol Street Bridge is 6,390 vehicles outbound and 3,311 vehcles inbound. This high demand in addition to the capacity constraints imposed by the traffic constraint measures on Constitution Avenue and Independence Avenue results in a diversion of traffic to the northeast suburbs as shown in Figure 1-23. This traffic normally uses the E. Capitol Street Bridge but now is forced to use both the Benning Road Bridge and the Pennsylvania Avenue Bridge. The resultant change in travel patterns will reduce overall travel speed during the PM rush hour by one mile per hour with an increase of 9,373 vehicle-miles and 973 hours in VHT during the PM peak period when compared to the No-Build Alternative.

1.4.3 Build Alternative 2 (New River Crossing)

The new river crossing is projected to attract approximately 2,300 vehicles inbound during the AM peak hour in the design year and approximately 3,300 vehicles outbound in the PM peak hour. This projected usage of the new crossing causes a significant diversion in forecast traffic demand from the existing river crossings, particularly at the East Capitol Street Bridge to and from the northeast as shown in Figures 1-24 and 1-25. Here, the traffic demand on the Anacostia Freeway ramps from and to the north decreases by over 1,300 vehicles during each peak hour. These decreases are offset by an increase in demand of some 500 vehicles in the east/west direction along this corridor. Similarly, at the remaining crossings to the south, demand traffic from and to the northeast is anticipated to decrease, particularly at the Pennsylvania Avenue Bridge and at the So. Capitol Street Bridge. These decreases are the result of traffic diversion to the new crossing which reduces circuituous travel in the vicinity of the intersection of Pennsylvania/Minnesota Avenues and at Howard Road. In addition, demand for access to the Southwest Freeway westbound via the 3rd Street S.E. ramp is reduced by nearly 250 vehicles in the AM peak.

The demand for travel along the Constitution Avenue/Independence Avenue corridor inbound during the AM peak decreases by only 400 vehicles with no appreciable change in outbound traffic in the PM peak hour. However, forecast travel on the north-south streets thru the abutting neighborhoods decreases by over 530 vehicles in the AM peak and 670 vehicles in the PM peak. Proportionate decreases occur along the east-west Benning Road corridor. However, while such decreases are significant, northbound travel on local streets south of Benning Road increases by as much as 275 vehicles.

Projected travel from and to the northeast on Minnesota Avenue using the Pennsylvania Avenue Bridge shows an increase of 300 vehicles during the AM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358
2296
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248
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LEGEND
XXX
AM-Peak Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ALTERNATIVE 2
AM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-24
0 400 800 1600
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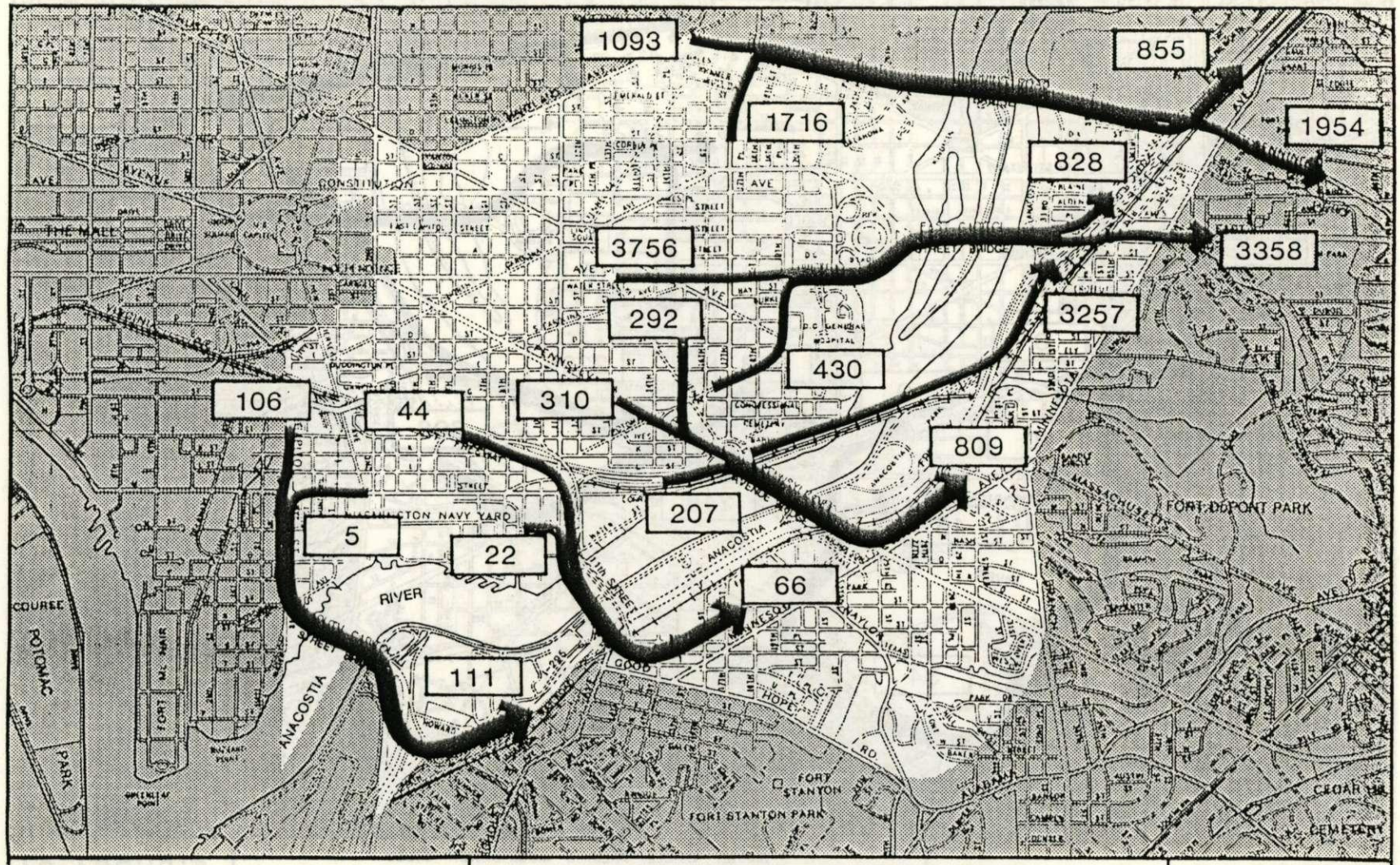
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LEGEND
XXX
PM-Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ALTERNATIVE 2
PM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-25
400
1600
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FEET

peak direction and over 200 vehicles in the outbound direction during the PM peak. This increase in local travel east of the river may be explained in part by the constrained travel conditions imposed on the East Capitol Street Bridge corridor and congestion on the Anacostia Freeway north of the new connection.

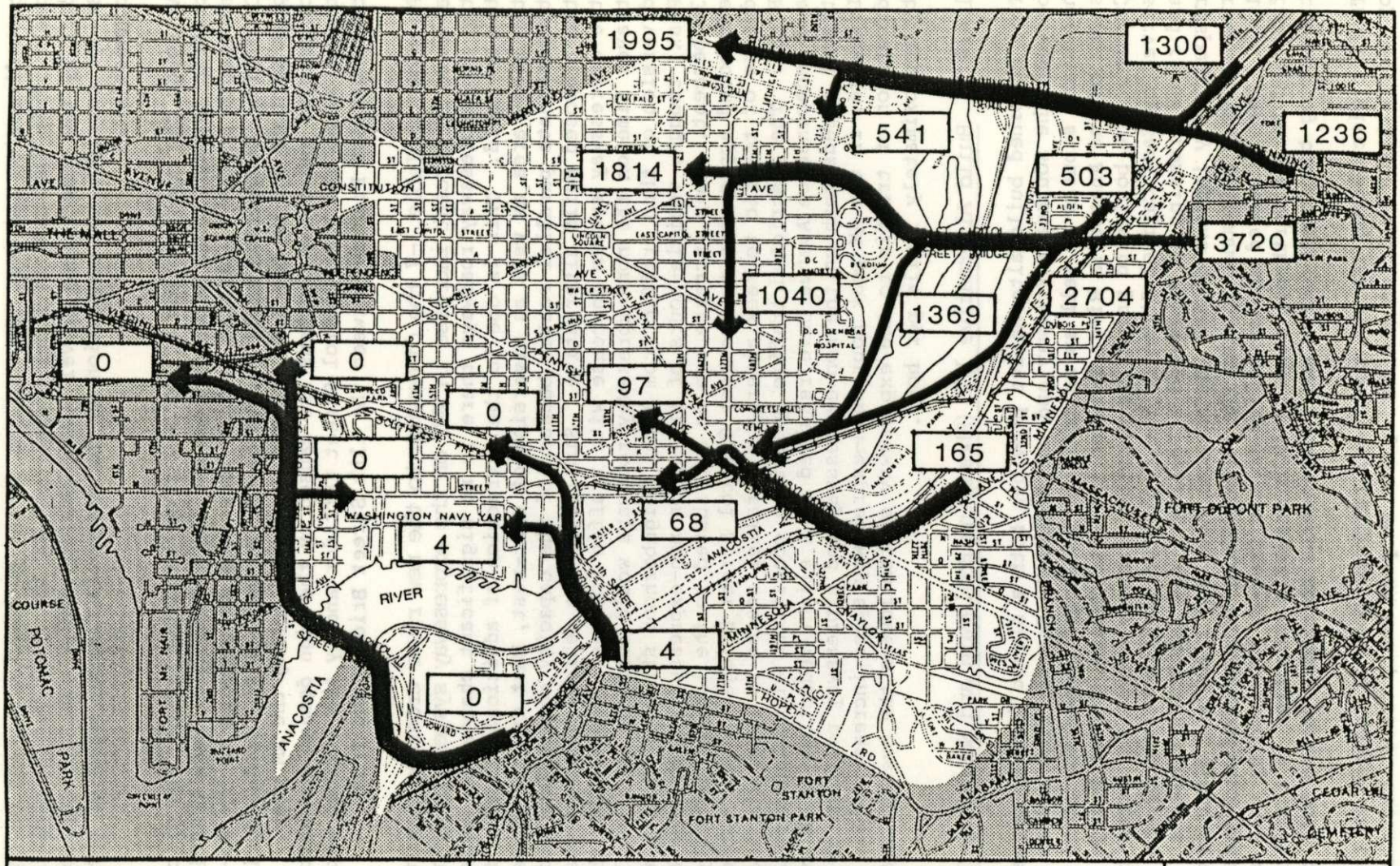
Although the construction of the new river crossing reduces the circulation of traffic through local neighborhoods and the volume of certain traffic movements at the identified problem locations as compared to the No-Build Condition, congestion still exists on the E. Capitol St. Bridge during both peak periods and on the S.E. Freeway westbound during the AM peak. These congestion and delay problems are caused by the high demand for east-west travel along the East Capitol Street Corridor and by the limited capacity on the Southeast Freeway between the 11th Street Bridges and I-395.

As shown in Table 1-7 the diversion to the new river crossing results in a 13 to 18 percent increase in VMT on the expressway system; however, on the non-expressway roadways there is no significant change was compared to the No Build. This is due to the attraction of additional traffic from outside the study area as well as diversion of east-west, East Capitol Street traffic to alternate parallel routes because of the capacity constraints built into the proposed build alternative. Similarly, the vehicle hours of travel on the expressway system increase with traffic volumes. Conversely, the AM travel time on the non-expressway roadways would decrease as a result of diversion of thru traffic from local neighborhood streets. During the PM Peak, though, vehicle-hours of travel on non-expressways increases by roughly 36 percent. This increase can be attributed to the limited capacity of the eastbound approaches to the East Capitol Street Bridge and the subsequent desire of traffic to seek alternate parallel routes to cross the Anacostia River. The restricted traffic operating conditions along Constitution Avenue and Independence Avenue have resulted in a slight reduction in PM average travel speeds both on the non-expressway and expressway portions of the network. Likewise, in the AM peak hour, non-expressway speed increases while the high diversion of traffic to the expressway system lowers the average travel speed by approximately 1 mile per hour.

1.4.4 Build Alternative 1/2 (Shoreline Boulevard and New River Crossing)

This combined build alternative provides both a direct freeway connection between the Southeast Freeway and the Anacostia Freeway from and to the northeast suburbs as well as an indirect boulevard connection along the west shore of the Anacostia River between the East Capitol Street Bridge and Barney Circle. The boulevard primarily provides freeway access for areas to the East served by East Capitol Street. The projected traffic served by the boulevard and river crossing is estimated at nearly 1,400 and 2,700 vehicles respectively inbound during the AM peak hour and 2,200 and 3,000 vehicles respectively outbound, during the PM peak hour as depicted in Figure 1-26 and 1-27. The increased accessibility to the freeway provided by this alternative from and to the northeast results in a dramatic reduction in traffic traversing the Constitution and Independence corridors during both peak hours.

Traffic circulating through the local neighborhoods is reduced in the AM peak by nearly 1,900 vehicles and during the PM peak hour, travel decreases by over 2,900 vehicles. However, circulation through local streets in Stanton Park,



LEGEND

XXX AM-Peak Hour Volumes

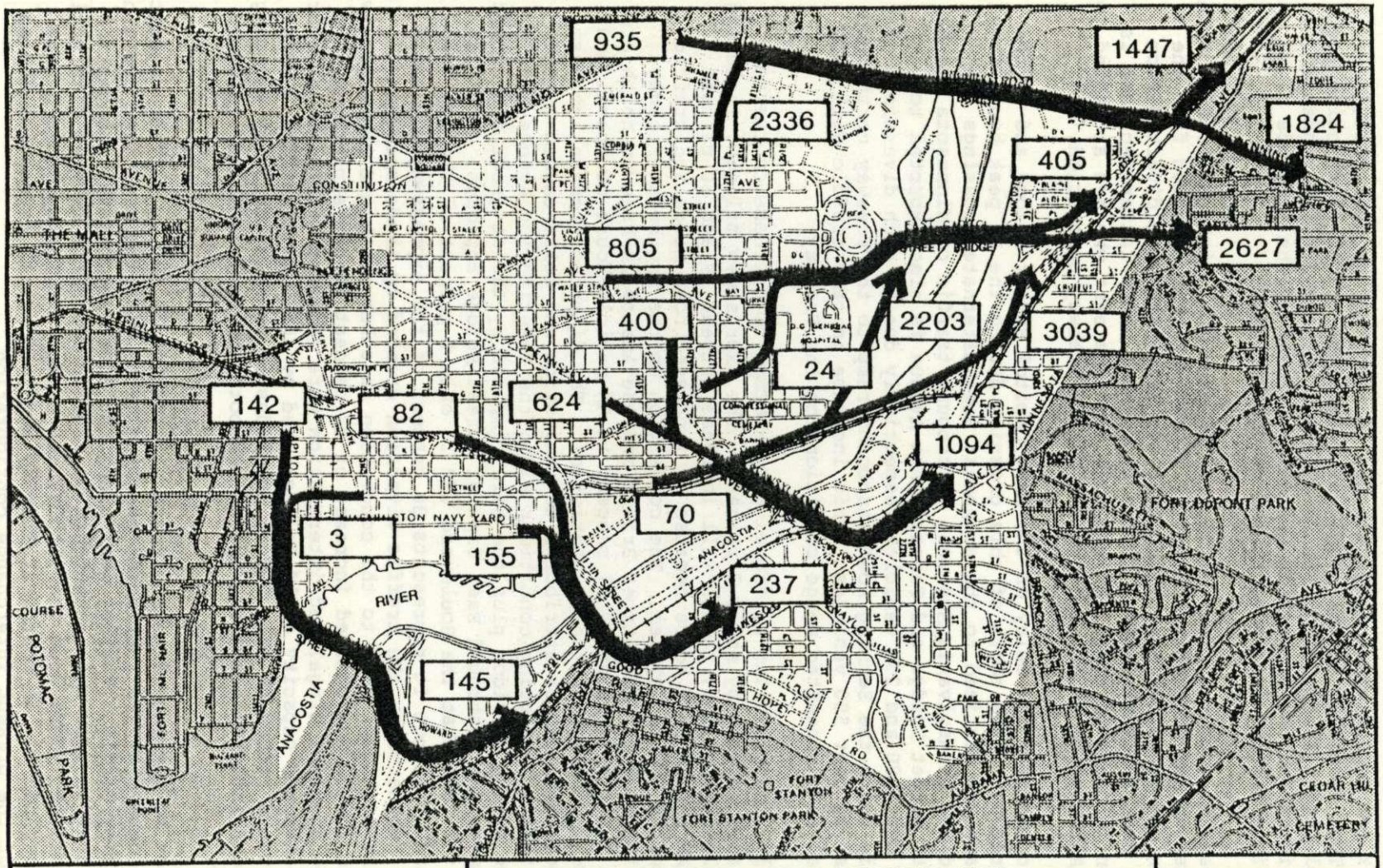
BARNEY CIRCLE FREEWAY MODIFICATION STUDY

ALTERNATIVE 1/2
AM-PEAK HOUR VOLUMES

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-26

0 400 800 1600 FEET



LEGEND

XXX PM-Hour Volumes

BARNEY CIRCLE FREEWAY MODIFICATION STUDY

ALTERNATIVE 1/2
PM-PEAK HOUR VOLUMES

DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT

FIGURE 1-27

400 0 800 1600

FEET

Kingman Park and Capitol East neighborhoods is increased by nearly 900 vehicles. This diversion is the result of restricted travel approaching the East Capitol Street Bridge along the Constitution Avenue and Independence Avenue corridors and the congestion and delays caused by the at-grade signalized intersection on the eastbound bridge approach.

Along the east side of the river during the AM peak hour, inbound traffic from the northeast on the Anacostia Freeway is almost entirely diverted from the southerly bridge crossings approximately 1,400 trips are also diverted from the Benning Road and East Capitol Street crossings. This latter decrease is offset by an increase of about 900 vehicles from the east who are attracted to this Build Alternative as a result of the direct freeway connection.

Because of congestion and delay on the East Capitol Street Bridge and on the Anacostia Freeway to the north of this crossing during the PM peak hour, some outbound travelers destined to the northeast seek alternate crossings via Benning Road and Pennsylvania Avenue. Northbound traffic on Minnesota Avenue from the 11th Street Bridge and Pennsylvania Avenue is also expected to increase by over 100 and 250 vehicles respectively due to such diversions while traffic using the Benning Road eastbound ramp to the Freeway northbound will increase by over 500 vehicles. This increase in ramp traffic will only add to the already congested merge conditions on the Freeway.

From Table 1-7 vehicle-miles of travel are expected to decrease on the non-expressway road network by about 7 percent. The expressway mileage, including the new boulevard portion, though will increase between 19 and 30 percent during the AM and PM peak hours because of increased road miles and traffic diversion to the freeway system. The congestion on the Southeast Freeway westbound, the East Capitol Street Bridge and the Anacostia Freewav north are responsible for the increase of 21 percent in AM vehicle-hours of travel and the 72 percent increase in the PM statistics. The disproportionate increase in the PM peak hour can be attributed to congestion and delay caused by the restricted traffic operating conditions along the Constitution Avenue and Independence Avenue corridor plus the delay imposed by the at-grade signalized intersection on the eastbound East Capitol Street Bridge approach. This is evident by the fact that the Boulevard VMT is only 5 percent of the Expressway-Boulevard total but it represents 30 percent of the expressway-boulevard VHT total. Furthermore, the traffic diversion created by these measures during the PM peak hour adds to the congestion on other eastbound non-expressway roadways results in a projected increase of 27 percent in non-expressway VHT. If the at-grade singalized intersection were replaced with a grade separated crossing, eastbound capacity could be increased by 60%. Elimination of this bottleneck would reduce PM peak VHT by hundredss of vehicle hours, by reducing congestion and increasing average speeds on both the boulevard and eastbound arterials.

The diversion to the Shoreline Boulevard alternative is met by further capacity constraints caused by the restricted one-lane merge with the New River Crossing north of Barney Circle. Further west along the Southeast Freeway, congestion and forced traffic flow are encountered as traffic movements between Alternative 1/2 southbound and those from the 11th Street Bridge and Pennsylvania Avenue westbound destined to the Southwest Freeway and I-395 north exceed the design capacities of the present interchange configuration.

During the PM peak hour, outbound traffic will encounter near capacity operation on the Anacostia Freeway northbound in the vicinity of the junction of the New River Crossing. Congestion is also likely to increase on the East Capitol Street Bridge. Similarly, the demand for travel northbound on the new boulevard exceeds the design capacity of the proposed one lane connection with the new crossing, resulting in a forced traffic flow.

1.4.5 Build Alternative 3

For Alternative 3, the linking of Anacostia Freeway with the Southeast Freeway is accomplished by providing a direct link from the Anacostia Freeway southbound onto the Pennsylvania Avenue Bridge and a new crossing from the Southeast Freeway onto the Anacostia Freeway northbound between the 11th Street and Pennsylvania Avenue Bridges. These connections will attract some 2,100 vehicles during the AM peak period and 1,750 during the PM peak period southbound and 1,590 vehicles during the AM and 2,950 during the PM peak periods northbound. The diversion of traffic onto the new facilities is shown in Figure 1-28 and 1-29. During the AM peak period the traffic demand for the Benning Road and East Capitol Street Bridge and the Pennsylvania/Minnesota Avenue U-turn in crossing the Anacostia River is decreased. Diversion to the new connection is somewhat limited by the present traffic demand on Pennsylvania Avenue westbound. Total diverted traffic from these three movements is projected to be 1,600 vehicles during the AM peak period and about 1,700 vehicles during the PM peak hour. This diversion in concert with the traffic management constraint on Constitution Avenue and Independence Avenue will reduce a significant infiltration of commuter traffic into the Capitol Hill neighborhoods.

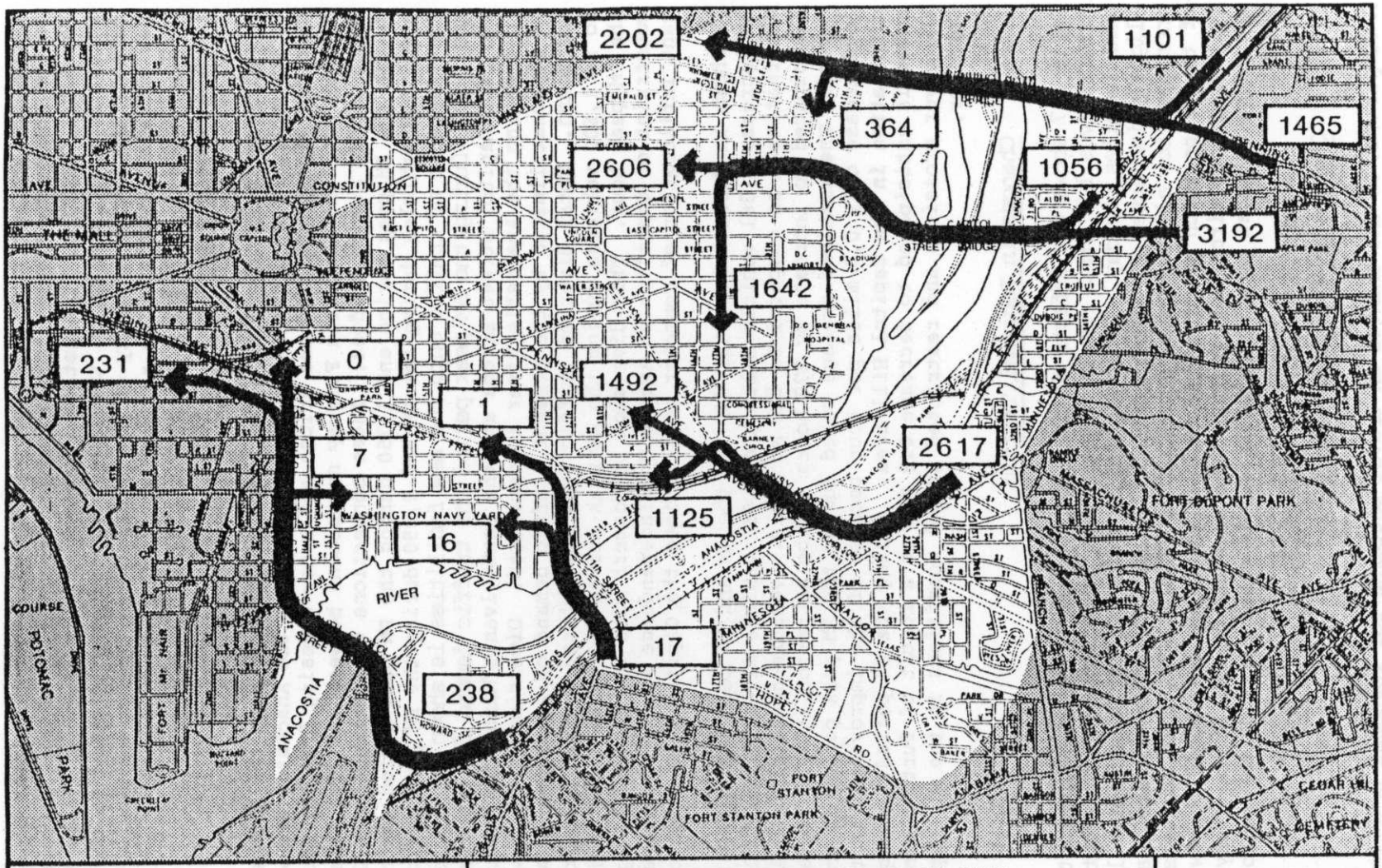
As shown in Table 1-7, total VMT for the AM and PM peak periods is anticipated to increase 3,361 vehicle-miles and 7,051 vehicle-miles respectively under Alternative 3 as compared to the No Build. Vehicle-hours of travel are anticipated to increase by 270 hours in the AM period and 227 hours in the PM period. The combined average speed during the AM peak period is anticipated to increase only 0.5 miles per hour because of the improvement in traffic circulation in the Capitol Hill area. During the PM period, average network speed is anticipated to decrease 0.9 mph as a result of further congestion on the river crossings and restricted travel conditions in the E. Capitol Street Corridor.

1.4.6 Changes in Regional Traffic

Table 1-7 shows the effects of the alternatives on total regional traffic. Alternatives 1/2 and 2 result in decreases in regional VMT of about 80,000 vehicle miles per day. Regional VMT is unchanged for Alternative 1 and slightly increased for Alternative 3. Since VMT within the study area is increased for all the build alternatives (Table 1-7), this suggests that many of the trips which are diverted through the study area would otherwise be following more circuitous routes. The increase in VMT in the study area is therefore balanced by a decrease in VMT in other parts of the regional network.

1.4.7 Changes in Traffic Patterns

A comparison of the changes in travel patterns for forecast traffic using the Bridge crossings is shown in Tables 1-8 and 1-9. These tables depict the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LEGEND
XXX
AM-Peak Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ALTERNATIVE 3
AM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-28
400 1600
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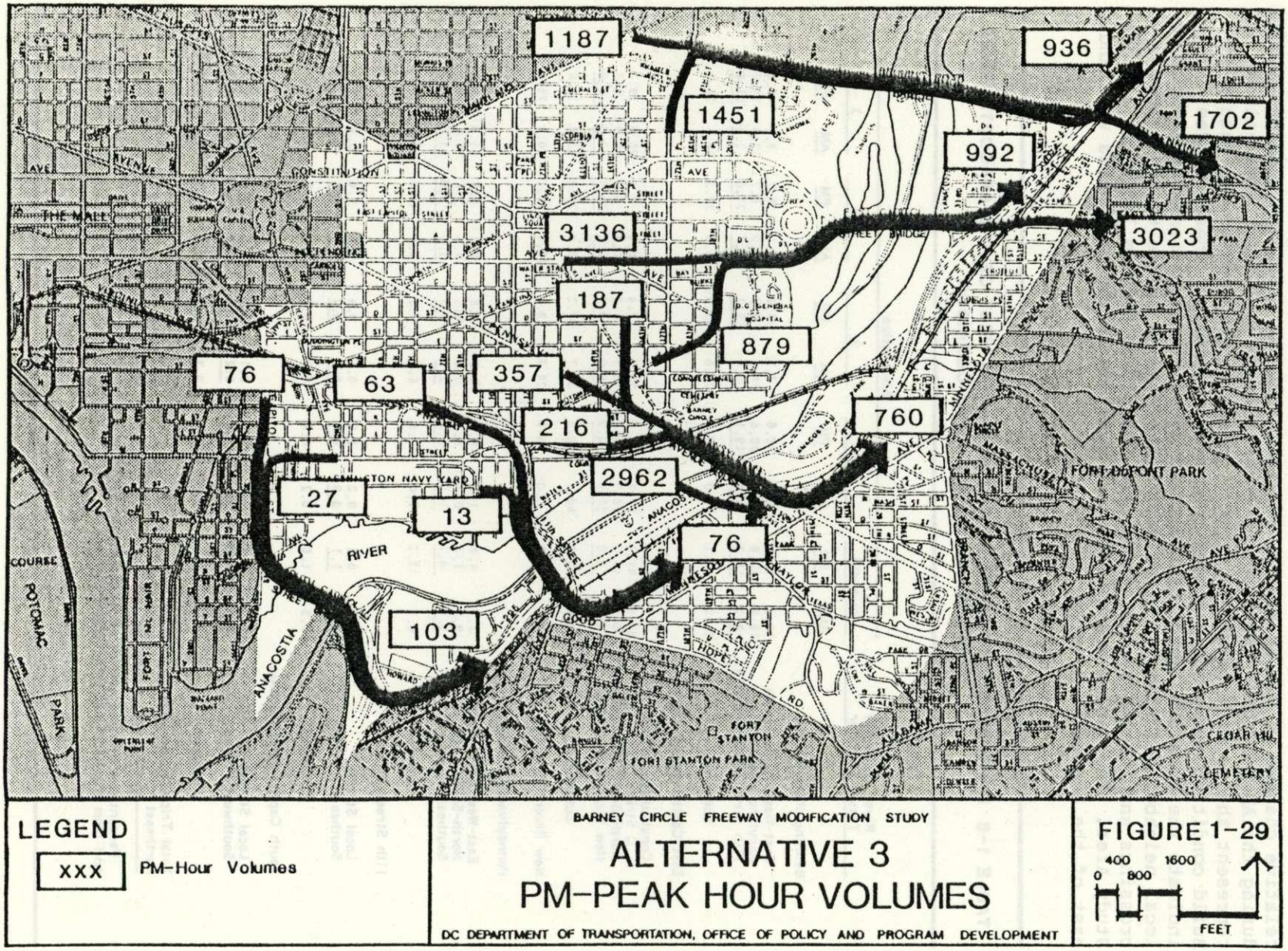
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LEGEND
XXX
PM-Hour Volumes
BARNEY CIRCLE FREEWAY MODIFICATION STUDY
ALTERNATIVE 3
PM-PEAK HOUR VOLUMES
DC DEPARTMENT OF TRANSPORTATION, OFFICE OF POLICY AND PROGRAM DEVELOPMENT
FIGURE 1-29
400 1600
0 800
FEET

relative changes in Bridge traffic destined from the northeast suburbs inbound during the AM peak hour and outbound during the PM peak hour. The values represent the percent change in traffic volume as compared to the future No-Build condition along major travel routes or corridors. These changes indicate the relative impact of the build alternatives on reducing traffic on local neighborhood streets, at primary access/egress points to the bridge crossings and freeway system, and at the identified problem locations in the Study Area. The tables are divided into portions of the Study Area west and east of the Anacostia River.

TABLE 1-8 DISTRIBUTION OF RIVER CROSSING TRAFFIC WEST OF THE ANACOSTIA RIVER PEPCENT OF TRAFFIC USING CORRIDOR

River Crossing/ Travel Corridor	Alternative									
	No-build		1		2		1/2		3	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Benning Road Bridge										
East-West Local Streets	10.3	12.8	6.7	10.6	7.3	9.7	6.6	8.7	8.9	11.2
Maryland Avenue	16.0	12.8	17.5	10.6	14.7	9.7	14.0	8.7	12.8	11.2
17th Street/Oklahoma Ave.	4.7	15.3	8.8	19.1	6.6	15.3	5.7	21.6	3.8	13.8
Subtotal	31.0	28.1	33.0	29.7	28.6	25.0	26.3	30.3	26.5	25.0
East Capitol Street Bridge										
Constitution Avenue/ C Street, NE	32.9	41.3	17.9	23.0	26.6	33.4	18.8	7.4	26.9	29.7
North-South Local Streets	20.1	11.7	10.9	0.2	13.1	3.8	10.8	0.2	16.9	8.3
New Shoreline Facility	0.0	0.0	31.9	34.8	0.0	0.0	14.2	20.4	0.0	0.0
Subtotal	53.0	53.0	60.7	58.0	39.7	37.2	43.8	28.0	43.8	38.0
New River Crossing	0.0	0.0	0.0	0.0	24.7	29.0	28.1	28.1	0.0	28.1
Pennsylvania Avenue Bridge										
East-West Local Streets	3.7	4.4	1.1	4.6	3.8	2.8	1.0	5.8	15.4	3.4
North-South Local Streets	0.0	3.7	0.0	0.2	0.0	2.6	0.0	3.7	0.0	1.8
Southeast Freeway	4.4	4.1	1.3	3.0	2.7	1.8	0.8	0.6	11.6	2.0
Subtotal	8.1	12.2	2.4	7.8	6.5	7.2	1.8	10.1	27.0	7.2
11th Street Bridges										
Local Streets	0.1	0.5	0.2	0.5	0.2	0.4	0.0	1.4	0.2	0.1
Southeast Freeway	0.8	1.1	0.0	0.1	0.0	0.2	0.0	0.8	0.0	0.6
Subtotal	0.9	1.6	0.2	0.6	0.2	0.6	0.0	2.2	0.2	0.7
South Capitol Street Bridge										
Local Streets	0.3	0.9	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.3
Southwest Freeway	6.7	4.2	3.6	3.8	0.2	1.0	0.0	1.3	2.4	0.7
Subtotal	7.0	5.1	3.7	3.9	0.3	1.0	0.0	2.3	2.5	1.0
Total Trips to and from Northeast	100.0		100.0		100.0		100.0		100.0	

Percentages indicate portion of total through traffic to and from the Northeast using travel corridor.

TABLE 1-9 DISTRIBUTION OF RIVER CROSSING TRAFFIC EAST OF THE ANACOSTIA RIVER PERCENT OF TRAFFIC USING CORRIDOR

River Crossing/ Travel Corridor	Alternative									
	No-build		1		2		1/2		3	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Benning Road Bridge										
Kenilworth Avenue	17.1	9.6	19.1	11.0	16.0	7.6	13.5	13.4	11.4	8.9
Benning Road	13.9	18.5	13.9	18.7	12.6	17.4	12.8	16.9	15.1	16.1
Subtotal	31.0	28.1	33.0	29.7	28.6	25.0	26.3	30.3	26.5	25.0
East Capitol Street Bridge										
Anacostia/Kenilworth	20.1	22.7	21.4	23.8	4.2	7.4	5.2	3.7	10.9	9.4
East Capitol Street	32.9	30.3	39.3	26.2	35.5	28.9	38.6	24.3	32.9	28.6
Subtotal	53.0	53.0	60.7	58.0	39.7	37.2	43.8	28.0	43.8	38.0
New River Crossing	0.0	0.0	0.0	0.0	24.7	29.0	28.1	28.1	0.0	28.1
Pennsylvania Avenue Bridge										
Anacostia Freeway	6.3	6.7	1.2	2.8	0.0	0.6	0.1	2.9	22.4	1.6
Pennsylvania Avenue/ Minnesota Avenue	1.8	5.5	1.2	5.0	6.5	6.6	1.8	7.2	4.6	5.6
Subtotal	8.1	12.2	2.4	7.8	6.5	7.2	1.9	10.1	27.0	7.2
11th Street Bridges										
Anacostia Freeway	0.7	0.5	0.2	0.4	0.0	0.6	0.0	0.1	0.1	0.0
Minnesota Avenue	0.2	1.1	0.0	0.2	0.2	0.0	0.0	2.1	0.1	0.7
Subtotal	0.9	1.6	0.2	0.6	0.2	0.6	0.0	2.2	0.2	0.7
South Capitol Street Bridge										
Anacostia Freeway	7.0	5.1	3.7	3.9	0.3	1.0	0.0	1.3	2.5	1.0
Total Trips to and from Northeast	100.0		100.0		100.0		100.0		100.0	

During the Inbound peak hour, the most significant decreases in traffic circulation through local neighborhood streets and at the four identified problem locations would result from implementation of Alternative 1/2. Traffic volumes also decline appreciably at the Anacostia Freeway southbound bridge ramps. Similarly, in the Outbound direction during the PM peak hour, the greatest reduction in local street circulation west of the river and on the ramps to the Anacostia Freeway N.B. are expected under Alternative 1/2. However, there is a notable increase in northbound local street traffic north of Constitution Avenue and on the Pennsylvania Avenue Bridge. These increases are due to East-West traffic diverting from the East Capitol Street Bridge corridor severely due to limited capacity and low travel speeds resulting from the TSM measures included as part of the build alternatives to discourage thru traffic from the Capitol Hill neighborhoods.

1.4.8 Roadway Network Traffic Operations

Table 1-7 which summarizes the travel statistics for the Study Area roadway network provides a direct comparison of the vehicle miles of travel (VMT),

vehicle-hours of travel (VHT), and average speed by expressway and non-express-way roadways for the four Build Alternatives, the No-Build Alternative and the Base Year.

These statistics show that in the design year VMT is expected to increase by approximately 30 percent while network VHT would increase by over 200 percent resulting in an average reduction in speed of 7.5 miles per hour under the No-Build scenario. Among the build alternatives, Alternative 1/2 shows the largest total increase in network VMT. However, in terms of the project goals, it provides the greatest diversion of travel from the non-expressway roadway system; thus reducing VMT as compared to the No-Build by over 8,000 vehicle-miles. The shift in travel though produces the larqest increase in VMT on the expressway/boulevard system. The most significant decrease in non-expressway travel occurs under Alternative 2 and on the Freeway network under Alternative 3. This latter decrease is partially due to the limited capacity provided by the design of Alternative 3 inbound which utilizes the existing inbound lanes of the Pennsylvania Avenue Bridge; thus reducing its attractiveness as a freeway connection. The lowest aggregate increase in VHT is also shown under Alternative 3 followed closely by Alternative 1.

In contrast, Alternative 1/2 produces the lowest net decrease in VHT of the build options on the non-expressway network. However, it also shows the highest increase in total systemwide VHT. This increase, which is greatest in the PM peak hour on both the non-expressway and combined expressway-boulevard network, can be attributed to

- the severely restrained capacity imposed by the Build Alternative TSM measure along the East Capitol Street corridor;
- the congestion caused by the high demand for freeway access; and
- the limited capacity on the existing bridge crossings and on the freeway system;
- the congestion and delay imposed by restricted design capacity of the new facilities;
- the congestion and delay imposed on the eastbound approach to the East Capitol Street Bridge by the proposed at-grade signalized intersection.

These conditions are ultimately the cause for the decrease in PM network average travel speed, particularly on the non-expressway system under Alternative 1/2 and on the boulevard component. Under the AM conditions, all alternatives show a marginal increase in network average speed as compared to the No-Build option. This is a direct consequence of continuing growth in the northeast and eastern suburbs. The result of this traffic increase is a decrease in traffic operating levels of service for all the bridge crossings under the No-Build case.

Under any of the four build alternatives, the proposed linking of the Anacostia Freeway with the Southeast Freeway will induce additional trips to the Anacostia Bridges from crossings outside the Study Area. The additional traffic is most predominant under Alternative 2, where approximately 1800 new trips are attracted into the study area.

Because of the added delay created by the proposed signalized intersection under Alternative 1/2, a reasonable comparison of travel statistics cannot be made. However, if the delays placed on the non-expressway and boulevard network by this measure were eliminated, it is conceivable that the change in network VHT would be lower under Alternative 1/2 with an appreciable decrease in total non-expressway travel time assuming no change in VMT. Therefore, the decline in average speed in the PM period would be closer to the decreases exhibited by the other build alternatives. Similarly, with some relaxing of the proposed constraints placed on Constitution Avenue and Independence Avenue, travel speed on the non-expressway network would approximate that of the No-Build condition. It is important to note though that of all the alternatives, the largest peak hour diversions of travel from the non-expressway street network is expected under Alternative 1/2.

1.4.9 Traffic Impact on the Anacostia River Bridges

An important issue of the Barney Circle transportation study is the diversion of traffic and the subsequent impact on the Bridges crossing the Anacostia River. Table 1-10 depicts the base year and design year peak hour directional traffic volumes under the various proposed alternatives.

TABLE 1-10 DESIGN YEAR 2006 TRAFFIC CROSSING THE ANACOSTIA RIVER

Traffic Crossing the Anacostia River[1] AM (inbound), PM (outbound) Peak Hour

River Crossings	Base		Null		1		2		3		1/2	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Benning Road Br.	3,230	2,459	4,261	3,317	4,946	4,024	4,746	3,561	4,342	3,329	4,478	3,936
					+685	+707	+ 85	+214	+81	+12	+217	+619
E. Capitol St. Br.	4,010	3,674	5,477	5,579	6,538	6,390	4,268	4,811	5,124	4,690	4,919	3,114
					+1,061	+811	+1,209	-738	-353	-889	-558	-2,465
New Facilities												
Shore Line Freeway												
New Crossing							2,997	3,284	(2)	2,962	3,052	2,704
Shore Line Blvd.											1,436	2,203
Pennsylvania Ave. Br.	3,974	3,291	4,670	3,853	4,313	4,229	4,486	3,908	6,215	4,130	4,257	4,607
					+357	+376	-184	+55	+1,545	+277	-413	+754
11th St. Br.	6,041	4,982	7,121	7,077	6,743	6,093	6,840	5,693	7,041	5,897	6,511	5,851
					-378	-984	-281	-1,384	- 80	-1,180	-610	-1,226
S. Capitol St. Br.	3,349	2,909	3,999	3,259	3,898	3,508	3,951	3,595	3,993	3,404	6	3,713
					-101	+249	-48	1,336	-6	1,153	-83	+454
Total Peak Hr. Volume	20,604	17,315	25,528	23,085	26,438	24,244	27,288	24,882	26,715	24,412	27,133	23,925
Increase (+), Decrease (-) versus null					+910	+1,159	+1,760	+1,797	+277	+1,327	+1,605	+840

1. Traffic olume on Shore Line Freeway Included in E. Capitol St. Br. Total
2. Traffic Volume on Boulevard Included in E. Capitol St. Br. Total

Under the No-Build Alternative, the total peak hour directional flow is estimated to increase by approximately 4900 vehicles inbound and 5800 vehicles outbound. This is a 24 and 33 percent increase over existing volumes respectively.

The magnitude of these increases in traffic is attributable to the growth in commuter and through travel from outside the Study Area.

For all the build altneratives, the total volume of traffic crossing the Anacostia River within the study area increases. The greatest increase is projected for Alternative 2: about 1800 additional river crossings in both the AM and PM peak hours. Since the new crossing is predicted to carry about 3000 vehicles in those periods, traffic volumes on existing bridges decrease. This is true of all the alternatives except for Alternative 1, which produces a 15-210% increase in trafic on the East Capital Street Bridge.

The relative changes in operational level of service for each build alternative are summarized in Table 1-11. Each of the build alternatives promote some improvement in traffic operating conditions when compared with the No-Build Alternative even in light of the imposition presented by the traffic management constraints on the Constitution Avenue and Independence Avenue Corridor and the added traffic attracted by the build options.

TABLE 1-11 ANACOSTIA BRIDGE CROSSINGS, LEVEL OF SERVICE (LOS)

	Alternatives									
	Null		1		2		3		1/2	
River Crossings	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Benning Road Br.	E .86	D .69	E .99	E .84	E .96	D .74	E .97	D .69	E .90	E .82
E. Capitol St. Br. E. Capitol St. Br.	E 1.00	F 1.05	F 1.20	F 1.21	E .78	E .91	E .94	E .88	E .90	D .59
New Crossing					E .91	E .83	-	E .82	E .78	E 85
Pennsylvania Ave. Br.	F 1.25	F 1.15	F 1.16	F 1.26	F 1.20	F 1.17	F 1.29	F 1.23	F 1.14	F 1.37
11th St. Br.	F 1.01	E 1.00	E .95	E .80	E .97	E .81	E 1.00	E .83	E .92	E .83
S. Capitol St. Br.	F 1.33	F 1.09	F 1.30	F 1.17	F 1.32	F 1.20	F 1.33	F 1.13	F 1.31	F 1.29

1.4.10 Potential Roadway Deficiencies

Under the project alternatives, peak hour congestion will still occur to varying degrees on all bridge crossings. Due to the demand for east-west travel and the capacity constraint measures proposed for Constitution Avenue and Independence Avenue, traffic conditions on these arteries show little improvement over the No-Build conditions. Also, the diversion created by these measures to other parallel arteries as well as the limited bridge crossing capacity has the affect of offsetting the operational improvements anticipated by the traffic diversion to the freeway system. Moreover, the additional trips attracted to the area compound the already congested conditions. Examples of these traffic operating conditions are presented on Table 1-12. The table

lists representative segments of the major roadways in the network which are expected to be congested during the typical AM (Inbound) and PM (Outbound) peak hours for the design year. These are segments of the representative roadway which are anticipated to operate at level of service E or F, that is the volume to capacity ratio generally exceed the limits defined in Sections 1.3.4. It should be noted that while traffic operating conditions may not be appreciably enhanced, the volume of traffic both circulating through local neighborhood streets, on particular crossings and at the identified problem locations would be reduced.

TABLE 1-12 REPRESENTATIVE CONGESTED SEGMENT OF THE ROADWAY NETWORK

Roadway Segment	From - To	1979 Base		2006 Null		2006 Alt. 1		2006 Alt. 2		2006 Alt. 3		2006 Alt. 1/2	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
CUTLINE A-A													
Benning Rd. Br.	Oklahoma Ave-Kenilworth Ave NE						x						x
Benning Rd. Br.	Kenilworth Ave-Oklahoma Ave			x		x		x				x	
Young Br.	RFK Stad.Rd-Anacostia Pkwy.		x		x		x		x		x		
Young Br.	Anacostia Fwy-Stad. Rd.			x		x		x		x		x	
Soisa Br.	Southeast Fwy-Anacostia Fwy.		x		x		x		x		x		x
Sousa Br.	Anacostia Fwy-Southeast Fwy.	x		x		x		x		x		x	
11th St. Br.	Anacostia Fwy-11th St.SE Ramp				x		x		x		x		x
11th St. Br.	Anacostia Fwy-11th St. SE Ramp			x		x		x		x		x	
Douglass Br.	N St. SE - I-295		x		x		x		x		x		x
Douglass Br.	Anacostia Pk.Ramp-MST.SE	x		x		x		x		x		x	
New Crossing	Anacostia Fwy-SE Fwy.							x				x	
New Crossing	SE Fwy-Anacostia Fwy.								x		x		x
CUTLINE B-B													
Anacostia Fwy.	Benning Rd-E.Capitol St.			x		x	x	x	x	x	x	x	x
Anacostia Fwy.	E.Capitol St-Benning Rd.		x		x		x	x	x	x	x	x	x
Oklahoma Ave NE	25th Pl.NE-Benning Rd						x						x
15th St. NE	G St. NE-Benning Rd.	x	x	x	x	x	x	x	x	x	x	x	
Maryland Ave NE	Benning Rd-G St NE			x		x		x		x		x	
Maryland Ave NE	G St.NE-Benning Rd.		x	x	x	x	x	x	x	x	x	x	x
CUTLINE C-C													
RFK Stad.Rd(C St)	Young Br.-SB Peripheral Rd	x					x						x
Massachusetts Ave	9th St NE-8th St NE							x		x			
6th St NE	A St NE-Constitution Ave		x										
2nd St NE	Constitution Ave-A St NE										x		
2nd St NE	A St.NE-Constitution Ave			x		x	x	x		x		x	
CUTLINE D-D													
Minnesota Ave	B St SE - Ely Pl.		x	x	x			x	x	x	x		
Anacostia Fwy.	Young Br. BR 505			x	x			x	x	x		x	x
Anacostia Fwy.	Br. 505 - Young Br.			x					x		x		x
8th St SE	Independence Ave-C St SE							x		x		x	
S.Carolina Ave	7th St SE-6th St. SE	x											
6th St. SE	S.Carolina Ave-Independence Ave.												x
4th St. SE	Independence Ave-Penn Ave.				x				x		x		x
Pennsylvania Ave	Independence Ave -3rd St. SE		x										
Shoreline Conn	E.Capitol St-Barney Cir.					x						x	
Shoreline Conn.	Barney Cir.-E.Capitol St.						x						x

CUTLINE E-E														
Anacostia Fwy.	Br.505 - Penn Ave.			x		x								
Anacostia Fwy.	Penn Ave-Br. 505			x										
Massachusetts Av.	18th St-19th St. SE					x		x						
Independence Ave	18th St-19th St. SE		x			x	x	x		x		x		x
C St. NE	18th St-19th St. SE					x				x		x		
CUTLINE F-F														
Minnesota Ave	S St SE-Naylor Rd					x				x				x
Southeast Fwy.	Penn Ave-11th St.Br.						x		x		x		x	
Southeast Fwy.	11th St Br-Penn Ave.													x
Lincoln Sq.No.	12th St - 11th St. NE						x		x		x			
Constitution Ave	12th St - 11th St. NE								x		x			
Maryland Ave.	12th St - 11th St. NE			x			x		x					
CUTLINE G-G														
Anacostia Fwy.	Douglass Br-11th St.Br.		x	x			x			x		x		
Anacostia Fwy.	11th St.Br.-Douglass Br.		x		x			x		x		x		x
M St. SE	2nd St. SE-N.J. Ave.				x		x	x		x		x	x	x
Southeast Fwy.	I-395-Virginia Ave.Ramp		x	x	x		x	x	x	x	x	x	x	x'
Southeast Fwy.	3rd St. Ramp-I-395	x		x			x	x	x	x	x	x	x	x
Independence Ave.	1st St - 2nd St. SE						x	x	x	x	x	x	x	x
Independence Ave.	2nd St - 1st St. SE						x		x		x		x	
East Capitol St.	1st St - 2nd St. SE									x				
Constitution Ave.	1st St - 2nd St. NE									x				
Constitution Ave.	2nd St - 1st St. NE	x		x			x	x	x	x	x	x	x	x

1.4.11 Potential Accident Impact

Accidents are related to elements such as the roadway type design, land use, time of day and weather conditions. As a consequence, a net diversion of traffic to the freeway/expressway system will not necessarily result in a decrease in the number, type or severity of certain accidents at a particular location. However, proposed alternatives are expected to reduce the total number of accidents on the non-expressway network by diversion of traffic to the expressway system. Accident rates for expressways are approximately 14% lower than the combined accident rate for other roadways in the study area.

Table 1-13 shows an estimate of the number of accidents which may occur at the high accident locations within the Study Area. This assessment is based on a computed accident rate by roadway type using base year (1979) accident statistics described in Section 1.3.4 and the relative change in vehicle miles of travel on each roadway type. These values are intended as a comparative statistic used to assess the potential for a reduction in the number of accidents in the Study Area under the various project alternatives.

TABLE 1-13 COMPARATIVE NUMBER OF ACCIDENTS

Roadway Type	Alt. NULL	Alt. 1	Alt. 2	Alt. 1/2	Alt.3
Expressway	360	430	410	430	400
Non-Expressway	540	520	540	520*	530
Total	900	950	950	950	930

* Includes Boulevard segments

Based on the estimate of yearly VMT, the number of potential accidents indicates a 4 percent reduction in the average number of accidents on non-expressway roads for all alternatives except Alternative 2 and approximately a 15 percent increase in expressway related accidents in the Study Area due to increased freeway travel and miles of roadway.

1.4.12 Traffic Conditions at Identified Problem Locations

As described in previous section 1.4.6 traffic is diverted from local streets in the area. These shifts are a result of increased traffic demand, varying degrees of congestion and proposed capacity constraint measures as described under the various build alternative assessments. Table 1-14 lists the roadway approach movements at four identified problem locations and the level of service which can be anticipated based on the forecast design year traffic for the project alternatives. The table presents a comparison of the expected traffic operating conditions during the AM and PM peak hours. The detailed analyses of these locations is contained in Appendix I and a synopsis of the results is presented below.

TABLE 1-14 IDENTIFIED PROBLEM LOCATIONS, LEVEL OF SERVICE

Selected Problem Locations	Approach Direction	BASE AM	BASE PM	NULL AM	NULL PM	1 AM	1 PM	2 AM	2 PM	3 AM	3 PM	1/2 AM	1/2 PM
Pennsylvania Avenue at Minnesota Avenue	East	A	C-D	A	D	A	D	A	D	A	D	A	D
(right turn)	East	A	A-B	A	A	A	A	A	A	A	A	A	A
(left turn)	East	F	C-D	F	E-F	F	D	F	F	F	F	F	C
	West	E	F	F	F	F	F	F	F	F	F	F	F
Minnesota Avenue at Pennsylvania Avenue	North	A	F	A	A	A	F	A	F	A	F	C-D	F
(left turn)	North	F	F	E	A	A	A	A	A	A	A	A	D
Minnesota Ave at L'Enfant	South			F	F	F	F	F	F	F	F	F	F
Minnesota Ave across Penn	South			A	A	A	A	C	A	D	A	A	A
Pennsylvania Ave at L'Enfant	West			F	A	F	A	F	A	A	A	F	A
L'Enfant to Penn	South			F	A	F	A	F	A	A	A	F	A
Benning Road at Bladensburg Road	West	E	E-E	F	F	F	F	F	F	F	F	F	F
Maryland Avenue at Benning Road	Northeast	A	E	F	F	F	F	F	F	F	F	F	F
Bladensburg Road at Benning Road	South	B-C	A	F	F	F	F	F	F	F	F	F	F
H Street at Maryland Ave. (left turn)	East	A	F	-	-	-	-	-	-	-	-	-	-
	East	A	C	A	F	A	F	A	F	A	F	A	F
15th Street at Benning Rd.	North	D	F	F	F	F	F	F	F	F	F	F	F
Southeast Freeway between 3rd Street and I-395	West (Weave)	E	-	F	D-C	F	E	F	E	F	E	F	E
	(Diverge)	F		F	F	F	F	F	F	F	F	F	F
3rd Street Ramp at Southeast Freeway	West (Merge)	F	-	F	F	F	F	F	F	F	F	F	F
Southeast Freeway Ramp at Pennsylvania Avenue	Merge	A	F	C	C	A	C	B	C	B-C	C	A	B
	Diverge	-	-	C	C	A	B	A	C	B	C	A	A

- Intersection of Pennsyvania Avenue-Minnesota Avenue and L'Enfant Square: There is little or no significant change in the anticipated level of service on the major approaches at this location under any of the build options. The increase in congestion under Alternative

1/2 for the left turn from Pennsylvania Avenue eastbound to Minnesota Avenue northbound in the PM and the movement from L'Enfant Square southbound to Pennsylvania Avenue westbound in Alternative 3 can be attributed to the diversion of traffic through this intersection. This is due to congestion on the Anacostia Freeway and on bridge crossings. The improvements noted on Minnesota Avenue northbound in the AM can be attributed to improved freeway access. Overall the problem at this intersection is insufficient capacity, i.e., an inadequate number of lanes in the peak direction of travel, multi-signal phasing resulting in limited green time and high volume turning movement.

- Intersection of Bladensburg Road, Benning Road, Maryland Avenue, Florida Avenue, H Street, NE and 15th Street, NE: As shown in Table I-14 there is no anticipated change in the already congested operation approaches at this intersection. The complex signal phase, high traffic volume demand on almost all approaches and the lack of an adequate number of lanes all contribute to this poor operation. Conceiveably the demand volume may be lowered by providing greater ramp and bridge capacity on the East Capitol Street Bridge and the ramps with the Anacostia Freeway North.

- 3rd Street SE On-Ramp to the Southeast Freeway: The analysis of this ramp and the attendant vehicle merges, weaving manuevers and diverge movements to I-395 North and the Southwest Freeway indicates that under peak hour forecast traffic conditions forced traffic flow will continue to exist under all alternatives. Further study of measures to improve traffic operations on the interchange complex between the 11th Street Bridge and I-395 are recommended.

- Southeast Freeway Northbound Ramp to Pennsylvania Avenue, Eastbound: This ramp was analyzed under two cases, a normal single lane ramp with a direct lane into the Pennsylvania Bridge and the present pedestrian actuated signal. Both analyses indicate that an acceptable traffic operation can be anticipated under the No-Build condition with some congestion as long as the ramp has a green signal indication for at least 80 percent of the hour and traffic backups along Pennsylvania Avenue eastbound from the east do not close-off egress from the ramp. Conditions under any of the build alternatives are greatly improved with anticipated traffic conditions being best under Alternative 1/2 (LOS'C). Alternatives 2 and 3 are expected to provide somewhat slower operations (LOS'D) during the PM peak. This level of service is still very acceptable.

1.4.13 Stadium Access

Alternative 1 would provide for permanent upgrading of the temporary two-lane RFK Stadium access road currently operated under a National Park Service permit. Access between the Southeast Freeway and the stadium south parking areas (Lot number 8) will be provided by a ramp from the parking area to the southbound lanes of the proposed alternative and a ramp from the alternatives northbound lanes to the parking area. The alternative also includes access for stadium-related traffic between the stadium and Pennsylvania Avenue at Barney Circle; thereby providing accessibility from and to the east. Similar

stadium access will also be provided under Alternatives 2 and 1/2. Since the urban boulevard portion of Alternative 1/2 is designed to permit traffic to operate at low speeds, direct access to the stadium parking lots is provided at several entry/exit driveway cuts along the boulevard. No additional access or changes to the existing two-lane stadium access road will be made under Alternative 3.

Traffic conditions in the Capitol Hill neighborhood during major events at RFK Stadium are expected to improve under Alternatives 1, 2, and 1/2, and remain unchanged under Alternative 3 due to the direct access to the stadium parking facilities from the Southeast Expressway, I-295 and/or the East Capitol Street Bridge. In addition, the provision of access from Pennsylvania Avenue will divert additional traffic particularly from the Lincoln Park local streets.

1.4.14 Mass Transit

The traffic and transportation analysis, used to assess the impacts of the project alternatives, was based on traffic forecast for the Washington Metropolitan area developed by MWCOG for the year 2000. These forecasts reflect the Long Range Elements of the 1980 Transportation Plan adopted by the Transportation Planning Board for the National Capitol Region. The plans include future extension of the METRO line and a number of changes to local Metrobus service in the area as presented in Section 1.2.3-1.2.4.

The proposed alternatives, are intended to meet future travel demands between Southeast Washington and the northeast suburbs, assuming full implementation of the proposed METRO and Metrobus systems. In addition under Alternatives 1, 2, and 1/2 improved connections to RFK Stadium lots (to facilitate use of the lots as parking lots for the Stadium-Armory METRO station) are intended to make transit use more appealing to potential ridership.

The proposed alternatives 1, 2 and 1/2 will also improve transit service by reducing forecast traffic congestion in Pennsylvania Avenue and S. Capitol Street Bridge Corridors. The alternatives are not expected to have any significant adverse impact on transit use when compared to the No Build option.

1.4.15 Bike Travel

Dedicated bikeways have been included as part of the preliminary designs for Alternatives 1, 2, and 1/2. In the case of Alternatives 2 and 1/2, the proposed river crossings have been designed to include sufficient space for designated bikeways. Alternative 3 does not include any additions or modifications to existing bike routes.

1.4.16 Summary

The results of future travel patterns indicate that :

- Under a No Build scenario traffic congestion will only increase infiltration of commuter traffic onto local streets. There is a general shift of traffic though from local and arterial streets to the freeway system, particularly in the neighborhood west of the Anacostia River with all build alternatives. Of the build

alternatives, Alternative 1/2 is the most effective in diverting traffic to the expressway system. This finding is supported by examining both AM- and PM-peak hour traffic patterns.

- During the AM-peak hours, travel patterns indicate that:

  - with Alternatives 2, 1/2 and 3, westbound and southbound traffic levels on local streets west and south of the Benning Road Bridge decrease from levels with the No-build Alternative;

  - in all cases, westbound traffic in the Independence/Constitution Avenue corridor and southbound traffic on local streets south of Constitution Avenue decrease from levels found in the No-build Alternative;

  - with Alternatives 1 and 1/2, westbound traffic levels on local streets west of the Pennsylvania Avenue Bridge decrease from levels with the No-build Alternative;

  - in all cases, the levels of traffic in the M Street, SE corridor, west of the 11th Street and South Capitol Street Bridges, decrease from the levels of traffic with the No-build Alternaitve.

  - traffic levels in the vicinity of the 3rd Street ramp to the Southeast Freeway decrease with Alternatives 1, 2 and 1/2 from traffic levles with the No-build Alternative.

  - on the east side of the Anacostia River, the levels of westbound Benning Road traffic are reduced with Alternatives 1, 2 and 1/2 from traffic levels with the No-build Alternative.

  - traffic levels in the vicinity of the intersection of Pennsylvania and Minnesota Avenue are reduced with Alternatives 1, 2 and 1/2 from levels found in the No-build Alternative; and

- During the PM-peak hour, travel patterns indicate that:

  - on the west side of the Anacostia River, the levels of eastbound traffic on Benning Road decrease with all build alternatives from levels with the No-build Alternative;

  - on the west side of the Anacostia River, traffic levels on roadways approaching the East Capitol Street Bridge, including the Independence/Constitution Avenue corridor and on northbound local streets, decrease with all build alternatives;

  - eastbound traffic levels increase on Pennsylvania Avenue and on local streets in the vicinity of the 11th Street Bridges with Alternatives 1 and 1/2; and

  - traffic levels increase in the vicinity of Minnesota and Pennsylvania Avenues with Alternatives 1 and 1/2 as a result of forced traffic diversion from the East Capitol Street corridor.

- In all cases, VMT and VHT in the design year (2006) is significantly greater than VMT and VHT in the base year (1979), and average speed in the design year is significantly less than average speed in the base year. This is due to the substantial increase in traffic projected for the area between 1979 and 2006.

- Similarly, in all cases, VMT for the build alternatives is greater than the VMT for the No-build Alternative. VHT for the build alternatives though is greater than the VHT for the No-build Alternative during the AM-peak hour. This is due to two factors:

  - Total trips into the study area from other areas in the region are approximately one percent greater with the build alternatives than with the No-build Alternative. This is due to the diversion of trips from other routes between central Washington and areas to the northeast to even quicker routes within the study area.

  - This diversion of trips to faster, though not necessarily shorter, routes within the study area is indicated by the higher average speed during the AM-peak hour for the build alternatives as compared to the No-build Alternative.

- In all cases, the portion of total study area VMT that occurs on the non-expressway portion of the roadway network is less with the build alternatives. The VMT that occurs on the non-expressway portion of the study area roadway network is lowest with Alternative 1/2 during both the AM- and PM-peak hours. In all cases, the VHT that ocurs on the non-expressway portion of the roadway network during the AM-peak hour is less with the build alternatives than with the No-build Alternative.

- AM-peak hour travel speed for the non-expressway portion of the roadway network is highest with Alternative 1/2. Highest PM-peak hour travel speed for the non-expressway portion of the roadway network occurs with the No-build Alternative. Systemwide average travel speed is also highest with Alternative 1/2 during the AM-peak hours and with the No-build Alternative during the PM-peak hour.

- A review of the simulation results indicates that, during peak travel periods, segments of most expressways in the study area, including the five existing Anacostia River crossings and the proposed new facilities, will operate at or near capacity with all project alternatives, including the No-build Alternative. In a number of cases, traffic conditions at certain locations in the freeway system will be worse with the build alternatives than with the No-build Alternative. This is due to the significant diversion of traffic from local streets to the expressway system.

- Traffic conditions on most non-expressway roadways in the study area will be better than on expressways during peak hours. In a number of cases, however, traffic conditions on certain segments of local streets will be better with the No-build Alternative. These include, during the AM-peak hours, except with Alternative 1/2,

Lincoln Square North between 11th and 12th Streets, NE, except with Alternative 1, 8th Street SE, between Independence and Constitution Avenues, and, with all alternatives, Independence and Constitution Avenues west of 1st Street.

- Alternative 1/2 is most effective in diverting traffic to the expressway system, but localized distribution problems will exist unless additional traffic operational improvements are instituted.

- The results of the traffic operations analysis indicate that none of the alternatives is significantly superior to the others in ameliorating localized congestion problems in the study area.

  Detailed microscale traffic improvement studies will be completed upon selection of the preferred alternative to mitigate traffic problems at selected locations. The major goals of the proposed alternatives are to improve traffic conditions on Capitol Hill and other residential areas of southeastern Washington and to provide a direct link between the Southeast and Anacostia Freeways. The alternatives are supported by a number of roadway and operational improvements, including several proposed TSM measures. These "packages" of improvements are intended to improve traffic conditions in southeast Washington neighborhoods. The results of the traffic and transportation analysis indicate that the proposed alternatives succeed to varying degrees in improving traffic conditions in the study area. In certain cases, the analysis indicates that, though the primary objective is improving overall traffic conditions in the study area, some locations will be unaffected or adversely affected during peak traffic hours due to implementaiton of a proposed alternative.

- Adverse impacts of the alternatives can be mitigated by restructuring the group of supportive elements included as part of each alternative, by adding entirely new measures or eliminating certain proposed measures. Final selection of measures will depend on the final selected alternative and will be based on detailed traffic and transportation design studies.

- Under Alternatives 1, 2 and 1/2, the improved connections to RFK Stadium lots also offer the potential for use of the stadium parking lots for the Stadium-Armory METRO station.

- None of the alternatives are expected to have any significant adverse impact on transit use.

1.5 MITIGATION

1.5.1 Construction Impacts

In general, the following measures will be employed to maintain existing traffic conditions during construction of the proposed alternatives:

- Limit the construction activities, to the extent possible, to non-peak traffic hours.

- Maintain the current number of available operating lanes on affected roadways during peak traffic hours.

- Require that construction contractors provide off-road parking for the private vehicles of construction workers.

- Require that construction vehicles travel on designated truck routes.

- Develop detailed traffic maintenance plans for the construction period.

These measures will be enforced by careful monitoring of construction activities, and by incorporating these measures in construction contracts.

1.5.2 Operational Impacts

The major goal of the proposed alternatives is to improve traffic conditions in the Capitol Hill and other residential areas of southeastern Washington. The alternatives are supported by a number of roadway, operational, and transit improvements, including several proposed transportation management measures. The results of the traffic and transportation analysis indicates that the proposed alternatives succeed to varying degrees in detering through traffic movements in the local neighborhoods of the study area. In certain cases, the analysis indicates that, traffic conditions at a number of study area locations will be unaffected or adversely affected during peak traffic hours due to implementation of a proposed alternative. These locations include:

- the East Capitol Street Bridge,
- the intersection of Benning Road, Maryland Avenue and Bladensburg Road,
- the Anacostia Freeway North of the E. Capital Street Bridge,
- the Southeast Freeway westbound lanes near I-395, and
- Pennsylvania Avenue in the vicinity of Minnesota Avenue

Traffic conditions at these locations can be improved by implementing a wide variety of transportation systems management (TSM) measures such as signal modifications, contra-flow laning, ramp metering or closings, restriping of travel lanes, directional changes of traffic flow during certain periods, exclusive turning lanes, turn prohibitions and the regulation of parking.

Certain measures are included as supportive elements to the proposed Build Alternatives. Adverse impacts resulting from the assessment of the proposed alternatives can be mitigated to some extent by restructuring these supportive elements, by adding entirely new measures, or eliminating certain proposed measures. Final selection of TSM measures will depend on the selected alternative and will be based on detailed traffic and transportation studies prior to final design.

Examples of such mitigating measures include:

A. Providing a grade separated crossing of the southbound Boulevard roadway and the eastbound approach to the East Capitol Street Bridge under Alternative 1/2. This grade separation could reduce forecast delay and congestion at this intersection by about 300 vehicle hours, while increasing eastbound capacity by as much as 60 percent.

B. Designing the northbound junction between the Shoreline Boulevard and the New River Crossing with a two-lane diverge to the Boulevard rather than one lane which was originally contemplated. This increase in capacity would eliminate a potential bottleneck, thereby reducing delay and congestion assessed in Alternative 1/2.

C. Restriction of the proposed traffic management measures along Constitution Avenue and Independence Avenue east only as far as 15th Street. This measure would permit present traffic patterns on the one-way north-south minor arterials, 17th and 19th Streets, to be retained, thus providing an alternate routing for traffic with an origin or destination in central Washington.

D. Imposing the above traffic management measure on Constitution Avenue while retaining Independence Avenue as a one-way eastbound minor arterial. Capacity could be constrained by permitting parking during the PM peak. The present signal progression though should be retained. This route will provide an alternate eastbound route through Capitol Hill and Lincoln Park; thus taking north-south traffic from the local neighborhood streets which is anticipated to divert to Benning Road or Pennsylvania Avenue.

E. Providing four lanes in the peak travel direction on the East Capitol Street Bridge between Branch Avenue and the Stadium. This increased capacity would reduce expected congestion on this crossing under Alternatives 1 and 1/2.

F. Reconstructing the ramps connecting the Anacostia Freeway northbound with the East Capitol Street Bridge from one lane to two. This would provide needed capacity to accommodate the peak traffic demands forecasted for Alternatives 1 and 1/2. The increase in capcity at htis interchange may divert traffic from Benning Road and relieve congestion at the Bladensburg Road intersection.

G. Providing four lanes in the peak direction on Pennsylvania Avenue between the Southeast Freeway and Branch Avenue. This increase in capacity would reduce congestion along the corridor. The proposed eastbound left-turn to Fairlawn Avenue though would have to be removed. This movement could be replaced by construction of a new ramp located in the southeast corner of the present interchange with the Anacostia Freeway. Its entrance could be located off the Anacostia Park access road from Fairlawn Avenue. It would also require the relocation of the present northbound exit ramp to a point on the Freeway further south. This exit could also terminate at the park access road. The eastbound left-turn to Minnesota Avenue northbound would have to be prohibited and redirected to the present right-turn to Minnesota Avenue southbound. A U-turn slot to Minnesota Avenue northbound could then be constructed south of 25th

Street S.E. to allow traffic to proceed onto Minnesota Avenue northbound. This rerouting would reduce the number of signal phases at the intersection of Pennsylvania Avenue and permit operation of the proposed contra-flow lanes on Pennsylvania Avenue.

FOOTNOTES

1. D.C. DOT letter Re: Confirmation of Highway Network Configuration; Mr. B. Cima November 1982; 2 p.

2. MWCOG Memorandum Re: Definition of the Year 2000 NULL Highway Network for the Barney Circle Project; Jim Hogan July 24, 1981; 2 p.

3. Letter dated 8/14/81 Re: Metrobus Volumes across the Sousa Bridge; Mr. Anthony M. Rachael, III, Assistant Director D.C. DOT.

4. Meeting w/Mr. Anthony M. Rachael, III, Assist. Director, D.C. DOT June 8, 1981.

5. 1965 Highway Capacity Manaual Special Report No. 87 published by the Highway Research Board. Washington, D.C. p. 323 Table 10.13.

6. Op Cit p. 252-3 Table 9.1

7. "Metro Memo" 1981 Tabloid edition, WMATA, Washington, D.C. June 1981 Issue No. 72.

8. "Car Occupancy Factor", Transportation and Traffic Engineering Handbook 2nd Edition, Institute of Transportation Engineers; Pub. Prentice Hall Inc., Englewood, N.J.; 1982, p. 277.

9. Discussion between Ms. Ann Morris BE/DE and RFK Stadium Parking. Operators Oct. 5, 1981.

10. "Factory Installed Motor Vehicle Engines" and "Passenger Cars in Use by Age"; MVMA Motor Vehicle Facts and Figures '80; by Motor Vehicle Manufacturer's Association; Detroit Michigan p. 5, 38.

11. "U.S. Factory Sales of Diesel Trucks by GVW" and "U.S. Retail Sales by Domestic Manufacturers of New Trucks by GVW and Type; Op.Cit. NVMA p. 21.

12. State Air Pollution Control Board Statistics, 1958-198 Northern Virginia Region 7, 8/26/80.

13. "Characteristics of Private Vehicle Use" Op. Cit MVMA p. 48.

14. "Total Motor Vehicle Registrations by State", "U.S. Motor Bus Registration by State" and "U.S. Total Truck Registration by State" Op. Cit. MVMA p. 24-27.

15. "Characteristics of Trucks Owned" Op. Cit. MVMA.

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APPENDIX A

AVAILABLE TRAFFIC COUNTS

APPENDIX A

AVAILABLE TRAFFIC COUNTS

TRAFFIC COUNTS

Location of Count		1975	1976	1977	1978	1979	1980	1981
C Street at 2nd Street, SE	*				●			
D Street at 4th Street, SE	*				●			
D Street at 6th Street, SE	*				●			
E Street at 2nd Street, SE	*				●			
E Street at 4th Street, SE	*					●		
G Street at 8th Street, SE	*							●
I Street at 8th Street, SE	*			●				
M Street at Half Street, SE	*						●	
M Street at 1st Street, SE	*				●			
M Street at 2nd Street, SE	*	●						
M Street at 4th Street, SE	*					●		
M Street at 5th Street, SE	*					●		
T Place at 21st Place, SE	*						●	
Alabama Avenue at 34th Street, SE							●	
Alabama Avenue at Branch Avenue, SE							●	
Anacostia Freeway at northbound Suitland Parkway ramp	*			●				
Anacostia Freeway at Howard Road ramp	*						⊗	
Anacostia Freeway over Howard Road	*							⊗
Anacostia Freeway north of Pennsylvania Avenue	*						●	
Benning Road at 17th Street, SE	*				●			
Benning Road at Oklahoma Avenue, SE	*			●				
Benning Road east of 36th Street, SE	*	⊗	⊗		⊗	⊗	⊗	
Benning Road at East Capitol Street and Texas Avenue			▨					
Benning Road at East Capitol Street			●					

Constitution Avenue at 4th Street, NE	✳			○				
Constitution Avenue at 6th Stree, NE	✳			◔				
Constitution Avenue at 10th Street, NE	✳		◔		◔			
Constitution Avenue at 19th Street, NE	✳			◔				
East Capitol Street between 16th-17th Streets	✳							⊗
East Capitol Street at 17th Street	✳			◔				
East Capitol Street at 19th Street	✳			◔				
East Capitol Street at 22nd Street	✳			◔				
East Capitol Street at 41st Street				◔				
Firth Sterling Avenue at Howard Road, SE	✳						◔	
Good Hope Road at 13th Street, SE	✳			◔				
Good Hope Road at 14th Street, SE	✳						◔	
Good Hope Road at 22nd Street, SE	✳						◔	
Independence Avenue at 4th Street, SE	✳						◔	
Independence Avenue at 11th Street, SE	✳				◔			
Independence Avenue between 11th-12th Streets, SE	✳							⊗
Independence Avenue at 15th Street and South Carolina Avenue	✳				◔			
Independence Avenue between 16th-17th Streets, SE	✳							⊗
Independence Avenue at 18th Street, SE	✳			◔				
Independence Avenue at 19th Street, SE	✳			◔				
Martin Luther King, Jr. Avenue at Howard Road and Sheridan Road							◔	
Martin Luther King, Jr. Avenue at Good Hope Road	✳			◔				
Massachusetts Avenue between 7th Street and Stanton Square, NE	✳							⊗

Minnesota Avenue at 22nd Street and Naylor Road, SE	X			●				
Minnesota Avenue at 23rd Street, SE	X						●	
Minnesota Avenue at L'Enfant Square,SE	X			●				
Minnesota Avenue at B Street and 36th Street, SE	X						●	
Naylor Road at 23rd Street, SE	X						○	
Naylor Road at 25th Street and S Street, SE	X				●			
Naylor Road at 28th Street and Erie Street, SE					●			
New Jersey Avenue at M Street, SE	X						●	
North Carolina Avenue at 6th Street and Seward Square, SE	X					●		
Pennsylvania Avenue at 3rd Street, SE	X					●		
Pennsylvania Avenue at 4th Street, SE	X						○	
Pennsylvania Avenue at 6th Street, SE	X					●		
Pennsylvania Avenue at North Carolina Avenue	X					●		
Pennsylvania Avenue at 7th Street, SE	X					●		
Pennsylvania Avenue at 8th Street, SE	X					●		
Pennsylvania Avenue at 9th Street, SE	X					●		
Pennsylvania Avenue at 10th Street, SE	X					●		
Pennsylvania Avenue at 11th Street, SE	X					●		
Pennsylvania Avenue at 12th Street, SE	X					●		
Pennsylvania Avenue at 13th Street and G Street, SE	X					●		
Pennsylvania Avenue at Potomac Avenue and 14th Street, SE	X					●		

Pennsylvania Avenue at 15th Street, SE	✳					●		
Pennsylvania Avenue west of the Pennsylvania Avenue Bridge	✳			●				
Pennsylvania Avenue at the northbound Anacostia Freeway ramp	✳			●				
Pennsylvania Avenue at L'Enfant Square	✳							●
Pennsylvania Avenue at 27th Street and O Street, SE	✳			●				
Pennsylvania Avenue at 31st Street, SE	✳				●			
Pennsylvania Avenue at Carpenter Street and 33rd Street, SE							●	
Pennsylvania Avenue at Branch Avenue, SE	✳				●			
Pennsylvania Avenue Bridge at southbound Anacostia Freeway ramp	✳			●				
Pennsylvania Avenue Bridge at Southeast Freeway ramps	✳			●				
South Capitol Street at Canal Street and E Street	✳					●		
South Capitol Street at I Street	✳						●	
South Capitol Street at M Street underpass	✳						●	●
South Capitol Street at M Street surface	✳						●	
South Capitol Street at Canal Street	✳					●		
Southeast Freeway between 1st-2nd Streets and the 3rd Street ramp, SE	✳							●
Southeast Freeway between 4th-5th Streets, SE	✳		●					
Southwest Freeway between 7th-9th Streets, SW	✳	●			●	●	●	●
Suitland Parkway at Firth Sterling Avenue	✳						●	
Suitland Parkway at northbound Anacostia Freeway ramp	✳			●				
Virginia Avenue at 8th Street, SE	✳			●				

Bridge Counts		1975	1976	1977	1978	1979	1980	1981
Benning Road Bridge	✳	⊗	⊗		⊗	⊗	⊗	
East Capitol Street Bridge	✳	⊗	⊗	⊗		⊗		⊗
11th Street Bridges	✳	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Pennsylvania Avenue Bridge	✳	⊗	⊗	⊗				⊗
South Capitol Street Bridge	✳	⊗	⊗	⊗			⊗	
Anacostia Freeway ramp to East Capitol Street Bridge	✳			⊗				

Legend:

✳ Within Study Area Boundary

○ 10 Hour Counts

⊘ Neither 10 nor 24 Hour Counts

⊗ 24 Hour Counts

Bridge Counts	1975	1976	1977	1978	1979	1980	1981
Benning Road Bridge	✳	⊗	⊗	⊗		⊗	⊗
East Capitol Street Bridge	✳	⊗		⊗	⊗	⊗	⊗
11th Street Bridges	✳	⊗	⊗	⊗	⊗	⊗	⊗
Pennsylvania Avenue Bridge	✳	⊗			⊗	⊗	⊗
South Capitol Street Bridge	✳	⊗			⊗	⊗	⊗
Anacostia Freeway ramp to East Capitol Street Bridge	✳				⊗		

Legend:

✳ Within Study Area Boundary

◯ 10 Hour Counts

⊘ Neither 10 nor 24 Hour Counts

⊗ 24 Hour Counts

APPENDIX B

PROJECT DATA BOOK

APPENDIX B

PROJECT DATA BOOK

Book No.	Title
I	Signal Timings
II	Physical Inventory (Lettered Streets SE)
III	Physical Inventory (Lettered Streets NE)
IV	Physical Inventory (State Streets)
V	Physical Inventory (Numbered Streets)
VI	Physical Inventory (Numbered Streets 1-19 Sts. NE)
VII	Physical Inventory (Numbered Streets 1-19 Sts. SE)
VIII	Physical Inventory (Named Streets)
IX	Physical Inventory (Freeways and Ramps)
X	Travel and Delay Times - AM Peak Hour
XI	Travel and Delay Times - PM Peak Hour
XII	Traffic Counts

* Note Data Books are available for reference at the Office of Policy and Program Development District of Columbia Department of Transportation.

Book No.	Title
I	Signal Timings
II	Physical Inventory (Lettered Streets SE)
III	Physical Inventory (Lettered Streets NE)
IV	Physical Inventory (State Streets)
V	Physical Inventory (Numbered Streets)
VI	Physical Inventory (Numbered Streets 1-19 Sts. NE)
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X	Travel and Delay Times - AM Peak Hour
XI	Travel and Delay Times - PM Peak Hour
XII	Traffic Counts

Note: Data Books are available for reference at the Office of Policy and Program Development, District of Columbia Department of Transportation.

APPENDIX C

HIGH ACCIDENT LOCATIONS IN STUDY AREA

Location	Number of Accidents Per Year 1977	1978	1979	1980
Addison Road, Eastern Avenue Minnesota Avenue		10	21	
Alabama Avenue, Naylor Road, SE	11	13		
Alabama Avenue, Branch Avenue, SE	21	22	12	20
Alabama Avenue, 38th Street, SE	8		9	
Alabama Avenue, Pennsylvania Avenue		13	16	
Alabama Avenue, Ridge Road, SE		5	9	
● Anacostia Avenue, Benning Road, NE	23	19	28	20
● Anacostia Freeway, Suitland Parkway	21	19	17	
● Anacostia Freeway, Howard Road		9	17	
● Anacostia Freeway, 11th Street, SE	43	40	36	43
● Anacostia Freeway, Pennsylvania Avenue, Fairlawn Avenue	37	36	24	31
Anacostia Freeway, 505 bridge	10	14		
● Anacostia Freeway, East Capitol Street, Kenilworth Avenue	18	24	19	22
● Barney Circle	9	16	9	16
● Benning Road, 15th Street, H Street, Florida Avenue, Maryland Avenue, Bladensburg Road, NE	29	22	33	16
● Benning Road, 17th Street, NE	18	17	10	22
● Benning Road, 19th Street, NE	12	14		
● Benning Road, Oklahoma Avenue	15	22		
● Benning Road, Anacostia Avenue	23	19	28	20
● Benning Road, 34th Street, NE	17	17	20	20
Benning Road, Kenilworth Avenue			28	32
● Benning Road, Minnesota Avenue	17	23	21	
Benning Road, 42nd Street, NE		8	11	
Benning Road, Texas Avenue, East Capitol Street	32	37	31	18
Benning Road, C Street, SE	4	18		
Benning Road, G Street, SE	12	17	12	
Benning Road, H Street, SE		8	13	10
● Bladensburg Road, 15th Street, H Street Maryland Avenue, Benning Road, Florida Avenue, NE	29	22	33	16
Bladensburg Road, 17th Street, Mt. Olivet Road, NE	21	17	39	

● Indicates a Location Within the Study Area

Location	1977	1978	1979	1980
Branch Avenue, Alabama Avenue	21	22	12	20
● Branch Avenue, Pennsylvania Avenue	24	34	31	33
● Branch Avenue, Minnesota Avenue, Massachusetts Avenue	13	12	17	
C Street, Canal Street, I-395, SW			19	19
C Street, Benning Road, SE	4	18		
C Street, Ridge Road, SE	2	7		
C Street, 1st Street, NE	4	9		
● C Street, 7th Street, NE	7	8		
● C Street, 8th Street, NE	10	13		
● C Street, 13th Street, NE		5	17	8
● C Street, 14th Street, NE	19	12		
Canal Street, C Street, I-395, SW			19	19
Central Avenue, 50th Street, East Capitol Street		10	23	
● Chicago Street, Martin Luther King, Jr. Avenue, Morris Road		7	10	15
● Constitution Avenue, 12th Street, NE	1	7		
● Constitution Avenue, 14th Street, NE		1	9	
D Street, 1st Street, NE	7	9		
Division Avenue, Eastern Avenue, Sheriff Road	18	19	23	22
● E Street, 8th Street, SE	7	7	4	8
● East Capitol Street, 8th Street		5	9	
● East Capitol Street, 15th Street	5	7		
● East Capitol Street Bridge	17	25		
● East Capitol Street, Anacostia Freeway, Kenilworth Avenue	18	24	19	22
● East Capitol Street, Minnesota Avenue, Ridge Road		7	17	
East Capitol Street, Texas Avenue, Benning Road	32	37	31	18
East Capitol Street, 50th Street, Central Avenue		10	23	

Location	1977	1978	1979	1980
Eastern Avenue, Kenilworth Avenue	13	22	20	16
Eastern Avenue, Minnesota Avenue, Addison Road		10	21	
Eastern Avenue, 47th Avenue, Olive Street		5	15	
Eastern Avenue, Division Avenue, Sheriff Road	18	19	23	22
● Ely Place, Minnesota Avenue, 34th Street, SE	5	8		
F Street, 8th Street, NE	6	9		
● Fairlawn Avenue, Pennsylvania Avenue, Anacostia Freeway	37	36	24	31
Firth Sterling Avenue, South Capitol Street	14	10		
Firth Sterling Avenue, Suitland Parkway	12	30		
Florida Avenue, 6th Street, NE		14	18	
● Florida Avenue, 15th Street, H Street, Maryland Avenue, Bladensburg Road, Benning Road	29	22	33	16
● Frederick Douglass Bridge	5	13	20	24
Ft. Dupont Drive, Texas Avenue, Ridge Road	11	8	12	11
G Street, Benning Road, SE	12	17	12	
Galveston Street, 1st Street, South Capitol Street	12	13	16	
● Good Hope Road, Martin Luther King, Jr. Avenue		8	11	
● Good Hope Road, 16th Street, SE	14	10	8	
● Good Hope Road, 25th Street, Naylor Road	14	16	12	25

Location	1977	1978	1979	1980
H Street, Benning Road, SE		8	13	10
H Street, 7th Street, NE	9	9		
H Street, 8th Street, NE	15	9	17	17
H Street, 9th Street, NE	7	7		
H Street, 12th Street, NE	11	9		
H Street, 13th Street, NE	6	11		
H Street, 14th Street, NE	13	11		
●H Street, 15th Street, Florida Avenue, Benning Road, Bladensburg Road, Maryland Avenue	29	22	33	16
Half Street, P Street, SW	4	7		
Howard Road, Sheridan Road, Sumner Road	13	16	16	
●Howard Road, Anacostia Freeway		9	17	
●I Street, South Capitol Street, Southwest Freeway	37	17	30	30
●I Street, 8th Street, SE	9	8	14	10
●Independence Avenue, 15th Street, South Carolina Avenue, Massachusetts Avenue	11	9	2	10
Interstate 395, C Street, Canal Street, SW			19	19
K Street, 8th Street, West Virginia Avenue		5	9	
●Kenilworth Avenue, Anacostia Freeway, East Capitol Street	18	24	19	22
●Kenilworth Avenue, Benning Road		28	32	
Kenilworth Avenue, Nannie Helen Burroughs Avenue			15	13
Kenilworth Avenue, Eastern Avenue	13	22	20	16
L Street, 1st Street, NE			7	8
●L'Enfant Square, Pennsylvania Avenue, 25th Street, Minnesota Avenue	56	50	59	56

Location	1977	1978	1979	1980
M Street, South Capitol Street	4	18		
● M Street, 11th Street, SE			12	17
● M Street, 12th Street, SE		4	8	
M Street, 6th Street, NE		4	8	10
M Street, 17th Street, NE	8	11		
Maine Avenue, 12th Street, SW	2	7		
Martin Luther King, Jr. Avenue Stanton Road, Sumner Road	17	11	20	12
Martin Luther King, Jr. Avenue Howard Road, Sheridan Road	13	16	16	
● Martin Luther King, Jr. Avenue Chicago Street, Morris Road		7	10	15
● Martin Luther King, Jr. Avenue W Street		8	11	15
● Martin Luther King, Jr. Avenue Good Hope Road		8	11	
● Maryland Avenue, 13th Street, NE	3	8		
● Maryland Avenue, 15th Street, Benning Road, Bladensburg Road, Florida Avenue, H Street	29	22	33	16
● Massachusetts Avenue, 15th Street, South Carolina Avenue, Independence Avenue	11	9	2	10
● Massachusetts Avenue, 17th Street, SE	8	9	18	
● Massachusetts Avenue, Branch Avenue Minnesota Avenue	13	12	17	
● Minnesota Avenue, 17th Street, S Street, SE	1	7		
● Minnesota Avenue, 25th Street, Pennsylvania Avenue, L'Enfant Square	56	50	59	56
● Minnesota Avenue, Branch Avenue, Massachusetts Avenue	13	12	17	
● Minnesota Avenue, 34th Street, Ely Place	5	8		
● Minnesota Avenue, East Capitol Street, Ridge Road		7	17	
● Minnesota Avenue, Benning Road	17	23	21	
Minnesota Avenue, Nannie Helen Burroughs Avenue			12	17
Minnesota Avenue, Eastern Avenue, Addison Road		10	21	
● Morris Road, Chicago Street, Martin Luther King, Jr. Avenue		7	10	15

Location	1977	1978	1979	1980
Mt. Olivet, West Virginia Avenue		13	16	14
Mt. Olivet, 17th Street, Bladensburg Road	21	17	39	
Nannie Helen Burroughs Avenue, Kenilworth Avenue			15	13
Nannie Helen Burroughs Avenue, Minnesota Avenue			12	17
● Naylor Road, 25th Street, Good Hope Road	14	16	12	25
Naylor Road, Alabama Avenue	11	13		
● Oklahoma Avenue, Benning Road	15	22		
Olive Street, Eastern Avenue, 47th Avenue		5	15	
P Street, Half Street, SW	4	7		
Pennsylvania Avenue, Southern Avenue	18	17	19	19
Pennsylvania Avenue, Alabama Avenue		13	16	
● Pennsylvania Avenue, Branch Avenue	24	34	31	33
● Pennsylvania Avenue, 30th Street, SE		9	16	
● Pennsylvania Avenue, 28th Street, SE		4	26	
● Pennsylvania Avenue, 27th Street, SE	12	15	18	
● Pennsylvania Avenue, 25th Street, Minnesota Avenue, L'Enfant Square	56	50	59	56
● Pennsylvania Avenue, Fairlawn Avenue, Anacostia Freeway	37	36	24	31
● Pennsylvania Avenue Bridge	22	28	29	35
● Pennsylvania Avenue, 14th Street, Potomac Avenue, SE		12	17	22
● Potomac Avenue, 14th Street, Pennsylvania Avenue, SE		12	17	22
● Randle Circle	13	12	17	
Ridge Road, Alabama Avenue		5	9	
Ridge Road, Ft. Dupont Drive, Texas Avenue	11	8	12	11
Ridge Road, C Street, SE	2	7		
● Ridge Road, Minnesota Avenue, East Capitol Street		7	17	
● S Street, 17th Street, Minnesota Avenue	1	7		

Location	1977	1978	1979	1980
Sheridan Road, Howard Road, Martin Luther King, Jr. Avenue	13	16	16	
Sheriff Road, 49th Street, NE		1	9	11
Sheriff Road, Division Avenue, Eastern Avenue	18	19	23	22
● John Philip Sousa Bridge	22	28	29	35
South Capitol Street, Firth Sterling Avenue	14	10		
● South Capitol Street Bridge	5	13	20	24
● South Capitol Street, M Street	4	18		
South Capitol Street, Galveston Street, 1st Street	12	13	16	
● South Capitol Street, I Street, Southwest Freeway	37	17	30	30
● South Carolina Avenue, 15th Street, Independence Avenue, Massachusetts Avenue	11	9	2	10
● Southeast Freeway, Virginia Avenue	33	29	20	17
Southern Avenue, Pennsylvania Avenue	18	17	19	19
Southwest Freeway, 12th Street, SW			16	16
Southwest Freeway, 9th Street, SW	15	24		
Southwest Freeway, 7th Street, SW		2	10	17
● Southwest Freeway, South Capitol Street, I Street	37	17	30	30
Stanton Road, Suitland Parkway	42	48	27	31
Stanton Road, Sumner Road, Martin Luther King, Jr. Avenue	17	11	20	12
Suitland Parkway, Stanton Road	42	48	27	31
Suitland Parkway, Firth Sterling Avenue	12	30		
● Suitland Parkway, Anacostia Freeway	21	19	17	
Sumner Road, Stanton Road, Martin Luther King, Jr. Avenue	17	11	20	12

Location	1977	1978	1979	1980
Texas Avenue, Ft. Dupont Drive, Ridge Road	11	8	12	
Texas Avenue, Benning Road, East Capitol Street	32	37	31	18
● Virginia Avenue, Southeast Freeway	33	29	20	17
● W Street, Martin Luther King, Jr. Avenue		8	11	15
West Virginia Avenue, K Street, 8th Street, NE		5	9	
West Virginia Avenue, Mt. Olivet Road		13	16	
● Whitney Young Bridge	17	25		
Half Street, P Street, SW	4	7		
1st Street, South Capitol Street, Galveston Street	12	13	16	
1st Street, C Street, NE	4	9		
1st Street, D Street, NE	7	9		
1st Street, L Street, NE			7	8
6th Street, M Street, NE		4	8	
6th Street, Florida Avenue, NE		14	18	
7th Street, Southwest Freeway		2	11	17
● 7th Street, C Street, NE	7	8		
7th Street, H Street, NE	9	9		
● 8th Street, I Street, SE	9	8	14	10
● 8th Street, E Street, SE	7	7	4	8
● 8th Street, East Capitol Street		5	9	
● 8th Street, C Street, NE	10	13		
8th Street, F Street, NE	6	9		
8th Street, H Street, NE	15	9	17	17
8th Street, K Street, West Virginia Avenue		5	9	
9th Street, Southwest Freeway	15	24		
9th Street, H Street, NE	7	7		

Location	1977	1978	1979	1980
● 11th Street, Anacostia Freeway	43	40	36	43
● 11th Street Bridge in-bound	3	37	27	
● 11th Street Bridge out-bound	22	26		
● 11th Street, M Street, SE			12	17
12th Street, Maine Avenue, SW	2	7		
12th Street, Southwest Freeway, SW			16	16
● 12th Street, M Street, SE		4	8	
● 12th Street, Constitution Avenue NE	1	7		
12th Street, H Street, NE	11	9		
● 13th Street, C Street, NE		5	17	8
● 13th Street, Maryland Avenue, NE	3	8		
13th Street, H Street, NE	6	11		
● 14th Street, Pennsylvania Avenue, Potomac Avenue		12	17	22
● 14th Street, Constitution Avenue		1	9	
● 14th Street, C Street, NE	19	12		
14th Street, H Street, NE	13	11		
● 15th Street, South Carolina Avenue, Massachusetts Avenue, Independence Avenue	11	19	2	10
● 15th Street, East Capitol Street	5	7		
● 15th Street, H Street, Maryland Avenue, Benning Road, Bladensburg Road	29	22	33	16
● 16th Street, Good Hope Road	14	10	8	
● 17th Street, S Street, Minnesota Avenue	1	7		
● 17th Street, Massachusetts Avenue, SE	8	9	18	
● 17th Street, Benning Road, NE	18	17	10	22
17th Street, M Street, NE	8	11		
17th Street, Mt. Olivet Road, NE	21	17	39	
● 19th Street, Benning Road, NE	12	14		
● 25th Street, Good Hope Road, Naylor Road, SE	14	16	12	25
● 25th Street, Pennsylvania Avenue, Minnesota Avenue, L'Enfant Square	56	50	59	56
● 27th Street, Pennsylvania Avenue, SE	12	15	18	

Location	1977	1978	1979	1980
● 28th Street, Pennsylvania Avenue, SE		4	26	
● 30th Street, Pennsylvania Avenue, SE		9	16	
34th Street, Ely Place, Minnesota Avenue	5	8		
● 34th Street, Benning Road, NE	17	17	20	20
38th Street, Alabama Avenue, SE	8		9	
42nd Street, Benning Road, NE		8	11	
47th Avenue, Eastern Avenue, Olive Street		5	15	
49th Street, Sheriff Road, NE		1	9	11
50th Street, East Capitol Street, Central Avenue		10	23	

APPENDIX D

SAMPLE PHYSICAL INVENTORY FORM

APPENDIX D

SAMPLE PHYSICAL INVENTORY FORM

PROJECT: _____ SURVEYOR(S): _____

_____ _____

PROJECT NO: _____ TIME: _____

DATE: _____ WEATHER CONDITIONS: _____

_____

PHYSICAL INVENTORY: (*Notes: All data is referenced to your direction of travel)

1. Route (Name/No.) _____

   From: _____ To: _____

2. Type of Facility (check one) - If 1 or 2, complete items 3 and 10 thru 13 only)

   (1) Freeway _____ (2) Ramp _____ (3) Arterial _____ (4) Local Street _____

3. Direction of Travel (check appropriate combination)

   N _____ S _____ E _____ W _____

4. Traffic Flow Permitted

   One Way _____ Two Way _____ Time _____

5. Number of Lanes (traveled)

   Leaving first intersection _____ Midblock _____

6. Parking:

	Posted Regulation		Time Restriction	
A. Along Right Curb	No Parking	_____	_____ to	_____
	No Stopping/Standing	_____	_____ to	_____
	Other (describe)	_____		

   (If one-way street, complete 6B and 6C where appropriate)

B. Along Left Curb	No Parking	_____	_____ to	_____
	No Stopping/Standing	_____	_____ to	_____
	Other (describe)	_____		

   C. Estimate - Available Parking Spaces Right Curb _____

   (If one-way street) Left Curb _____

   (Exclude: Hydrants, driveways, corners, etc.)

7. Poster Speed Limit _____mph

8. Special Land Designations (describe) _____

   _____

9. Intersection Approach

	Designation	Movement Permitted			
A.		Left	Thru	Right	Bus Lane
	Lane 1	L	T	R	B
	Lane 2	L	T	R	B
	Lane 3	L	T	R	B
	Lane 4	L	T	R	B
	Lane 5	L	T	R	B

(circle as many as apply. Lane 1 is the left most lane on approach)

APPENDIX E

PEAK PERIOD BUS SERVICE ACROSS THE ANACOSTIA RIVER

APPENDIX E

PEAK PERIOD BUS SERVICE ACROSS THE ANACOSTIA RIVER

PEAK PERIOD BUSES CROSSING THE ANACOSTIA RIVER
(Weekdays 6:00-9:30 AM and 3:00-6:30 PM)

Bridge Crossed	Route Number	Service: Rush Hour	Service: Non-Rush Hour	Number of Bridge Crossings	Headway in Minutes	Peak Direction
Benning Road	X-1	O		10	*	west
		O		7	20	east
	X-2	O	O	30	6	west
		O	O	32	6	east
	X-3	O		9	20	west
		O		4	30	east
	X-4	O	O	35	6	west
		O	O	26	6	east
	X-6	O	O	1	*	west
		O	O	8	30	east
		Total a.m.		85		west
		Total p.m.		77		east
East Capitol Street	X-9	O		20	10	west
				0	*	east
	40	O	O	24	5	west
		O	O	28	10	east
		Total a.m.		44		west
		Total p.m.		28		east
Pennsylvania Avenue	C-12	O		5	35	west
		O	O	3	*	east
	C-14		O	0	*	west
		O	O	2	2 hr.20	east
	H-11	O		9	10	west
		O		10	10	east
	H-12	O	O	2	2 hr.55	west
		O	O	5	*	east
	H-14	O		4	30	west
		O		2	20	east

Bridge Crossed	Route Number	Rush Hour	Non-Rush Hour	Number of Bridge Crossings	Headway in Minutes	Peak Direction
Pennsylvania Avenue	K-12	O	O	8	*	west
		O	O	11	*	east
	K-19	O		5	30	west
		O		5	30	east
	M-11	O		5	35	west
		O		4	35	east
	V-4	O	O	18	10	west
		O	O	18	12	east
	V-6	O	O	16	10	west
		O	O	16	10	east
	V-12	O	O	12	15	west
		O	O	11	15	east
	W-6	O	O	14	15	west
		O	O	13	15	east
	32	O	O	22	5	west
		O	O	18	*	east
	34	O	O	21	5	west
		O	O	17	*	east
	36	O	O	16	*	west
		O	O	14	10	east
		Total a.m.		157		west
		Total p.m.		149		east
11th Street	A-1	O		4	*	north
				0	*	south
	A-2	O	O	22	10	north
		O	O	19	10	south
	A-3	O		3	*	north
				0	*	south
	A-4	O	O	17	15	north
		O	O	20	15	south
	A-6	O	O	13	25	north
		O	O	14	*	south

Bridge Crossed	Route Number	Rush Hour	Non-Rush Hour	Number of Bridge Crossings	Headway in Minutes	Peak Direction
11th Street	A-8	O	O	11	15	north
		O	O	16	10	south
	V-5	O		12	10	north
		O		12	10	south
	V-7	O		14	10	north
		O		13	15	south
	V-9	O		13	10	north
		O		11	15	south
	91/92	O	O	22	10	north
		O	O	24	10	south
	94	O	O	25	10	north
		O	O	25	10	south
		Total a.m.		156		north
		Total p.m.		154		south
South Capitol Street	A-7	O		3	35	north
		O		2	1 hr.10	south
	A-9	O	O	42	5	north
		O		35	5	south
	C-11	O		6	25	north
		O		6	30	south
	D-12	O	O	4	30	north
		O	O	5	30	south
	P-9	O		5	20	north
		O		3	35	south
	P-17	O		6	15	north
		O		6	15	south
	S-12	O		6	*	north
		O		6	30	south
	V-1	O		5	*	north
		O		5	25	south

APPENDIX F

SIMPLE MICRO ASSIGNMENT REPORTS

BARNEY CIRCLE PROJECT
SUMMARY TRAVEL STATISTICS

2006 ALT 2 -- 7:00 - 8:00 AM

ZONE: 6A

DIR	VEHICLE MILES OF TRAVEL (VMT)	VEHICLE HOURS OF TRAVEL (VHT)	VEHICLE MILES OF CAPACITY (VMC)	SPEED VMT/VHT	VMT/VMC
ARTERIALS					
N	1504.189	366.076	6138.632	4.109	0.245
NE	256.011	160.107	1067.352	1.599	0.240
E	2908.775	161.449	11666.916	18.017	0.249
SE	26.950	4.942	543.537	5.453	0.050
S	1628.331	127.374	7358.039	12.784	0.221
SW	400.469	33.375	1435.516	11.999	0.279
W	9982.823	1518.972	13561.219	6.572	0.736
NW	1197.729	399.379	1119.266	2.999	1.070
ALL	17905.277	2771.674	42890.477	6.460	0.417
EXPRESSWAYS					
N	0.000	0.000	0.000	-----	-----
NE	0.000	0.000	0.000	-----	-----
E	0.000	0.000	0.000	-----	-----
SE	0.000	0.000	0.000	-----	-----
S	373.906	16.448	465.806	22.733	0.803
SW	0.000	0.000	0.000	-----	-----
W	0.000	0.000	0.000	-----	-----
NW	0.000	0.000	0.000	-----	-----
ALL	373.906	16.448	465.806	22.733	0.803
BOULEVARDS					
N	0.000	0.000	0.000	-----	-----
NE	0.000	0.000	0.000	-----	-----
E	0.000	0.000	0.000	-----	-----
SE	0.000	0.000	0.000	-----	-----
S	0.000	0.000	0.000	-----	-----
SW	0.000	0.000	0.000	-----	-----
W	0.000	0.000	0.000	-----	-----
NW	0.000	0.000	0.000	-----	-----
ALL	0.000	0.000	0.000	-----	-----
ALL FACILITY TYPES					
N	1504.189	366.076	6138.632	4.109	0.245
NE	256.011	160.107	1067.352	1.599	0.240
E	2908.775	161.449	11666.916	18.017	0.249
SE	26.950	4.942	543.537	5.453	0.050
S	2002.237	143.822	7823.845	13.922	0.256
SW	400.469	33.375	1435.516	11.999	0.279
W	9982.823	1518.972	13561.219	6.572	0.736
NW	1197.729	399.379	1119.266	2.999	1.070
ALL	18279.183	2788.122	43356.283	6.556	0.422

BARNEY CIRCLE PROJECT
SELECT LINK ORIGIN TO DESTINATION SUMMARY

1979 BASE -- 4:30-5:30 PM

SITE: 93 7TH ST---A ST-CONST AVE

ORIGIN ZONE OR STATION	DESTINATION ZONE OR STATION	TRIPS
S CAPITOL AT SE LINE	COG DISTRICT 11	9
WHEELER AT SE LINE	COG DISTRICT 11	1
NAYLOR AT SE LINE	COG DISTRICT 11	1
BRANCH AT SE LINE	COG DISTRICT 11	8
BRANCH AT SE LINE	COG DISTRICT 21	2
ALABAMA AT SE LINE	COG DISTRICT 22	1
PENN AT SE LINE	COG DISTRICT 11	1
OHIO DRIVE OR 14TH ST BRIDGE	COG DISTRICT 21	28
OHIO DRIVE OR 14TH ST BRIDGE	COG DISTRICT 22	12
OHIO DRIVE OR 14TH ST BRIDGE	COG DISTRICT 31	15
COG DISTRICT 12	COG DISTRICT 21	1
COG DISTRICT 12	COG DISTRICT 22	2
COG DISTRICT 13	COG DISTRICT 21	2
COG DISTRICT 13	COG DISTRICT 22	2
COG DISTRICT 13	COG DISTRICT 31	2
COG DISTRICT 22	N CAPITOL AT RI AVE	14
COG DISTRICT 22	MASS OR 16TH AT RI AVE	1
COG DISTRICT 22	COG DISTRICT 3	2
COG DISTRICT 22	COG DISTRICT 10	1
COG DISTRICT 22	COG DISTRICT 11	6
COG DISTRICT 22	COG DISTRICT 21	4
COG DISTRICT 22	COG DISTRICT 30	1
COG DISTRICT 22	COG DISTRICT 31	1
COG DISTRICT 23	P OR 13TH AT RI AVE	1
COG DISTRICT 23	COG DISTRICT 21	1
COG DISTRICT 23	COG DISTRICT 22	8
COG DISTRICT 24	COG DISTRICT 21	1
COG DISTRICT 24	COG DISTRICT 22	1
COG DISTRICT 34	COG DISTRICT 11	5
COG DISTRICT 34	COG DISTRICT 21	3
COG DISTRICT 35	COG DISTRICT 21	2
	LINK TOTAL	139

2006 BARNEY CIRCLE A2 AM LINK VOLUME REPORT -- 12/19/82

A NODE	INT	CAP	L NODE	VOL	DEL	T NODE	VOL	DEL	R NODE	VOL	DEL	TVOL
(2)	1002	1452	(0)	0	0	(4)	757	14	(16)	16	22	773
(3)	3079	2078	(290)	0	18	(785)	1225	10	(0)	0	0	1225
(4)	1004	488	(2291)	437	693	(2293)	343	687	(0)	0	0	780
(5)	1002	1292	(16)	152	64	(3)	1225	54	(0)	0	0	1377
(6)	1006	3248	(0)	0	0	(8)	1776	24	(3088)	34	30	1810
(7)	1013	2365	(2292)	557	167	(2295)	1935	159	(5841)	638	164	3130
(8)	1007	2740	(0)	0	0	(10)	935	32	(3090)	845	38	1780
(9)	1006	3348	(3088)	6	39	(7)	2630	30	(0)	0	0	2636
(10)	1008	4530	(0)	0	0	(3094)	917	10	(3092)	18	17	935
(11)	1007	1776	(3090)	0	35	(9)	2636	354	(0)	0	0	2636
(12)	3079	2195	(785)	192	14	(0)	0	0	(2)	12	14	204
(14)	1003	778	(3086)	3	30	(12)	204	27	(0)	0	0	207
(16)	1003	2335	(0)	0	0	(3086)	168	4	(12)	0	11	168
(18)	1004	400	(5)	3	761	(2291)	494	758	(2293)	150	761	647
(20)	2009	773	(128)	29	47	(22)	11	39	(5855)	372	44	412
(21)	2014	462	(29)	32	65	(0)	0	0	(30)	0	62	32
(22)	2010	1584	(76)	69	27	(24)	651	17	(0)	0	0	720
(23)	2009	773	(5855)	1066	290	(21)	43	279	(128)	2	287	1111
(24)	2011	2078	(156)	187	22	(3058)	473	12	(0)	0	0	660
(25)	2010	1584	(0)	0	0	(23)	1111	28	(76)	309	36	1420
(26)	2013	400	(104)	0	24	(28)	161	15	(0)	0	0	161
(27)	2001	400	(5847)	409	47	(0)	0	0	(98)	0	21	409
(28)	2014	400	(0)	0	0	(30)	64	30	(112)	47	38	111
(29)	2013	400	(0)	0	0	(27)	409	90	(104)	46	84	455
(30)	2015	400	(0)	0	0	(32)	63	42	(5184)	1	46	64
(31)	2014	400	(112)	43	128	(29)	455	120	(0)	0	0	498
(32)	2016	1000	(5186)	28	11	(34)	86	1	(0)	0	0	114
(33)	2015	1000	(5184)	103	12	(31)	498	2	(0)	0	0	601
(34)	2017	919	(146)	11	19	(36)	89	9	(0)	0	0	100
(35)	2016	400	(0)	0	0	(33)	482	120	(5186)	24	128	506
(36)	2018	400	(158)	17	32	(4068)	69	22	(157)	14	29	100
(37)	2017	1018	(0)	0	0	(35)	558	12	(146)	0	18	558
(38)	2003	400	(101)	524	161	(0)	0	0	(102)	2	161	526
(40)	2019	400	(114)	1	151	(38)	526	148	(0)	0	0	527
(42)	2020	400	(4059)	17	101	(40)	477	98	(126)	3	101	497
(46)	2022	400	(5182)	3	113	(42)	475	109	(134)	7	113	485
(48)	2023	835	(147)	4	21	(46)	483	14	(148)	59	21	546
(50)	2024	400	(159)	13	46	(48)	331	38	(160)	1	46	345
(52)	2026	4084	(0)	0	0	(54)	584	5	(116)	337	13	921
(54)	2028	3637	(120)	124	14	(58)	158	9	(127)	227	17	509
(58)	2029	751	(136)	63	34	(60)	95	27	(135)	0	34	158
(60)	2030	2195	(150)	3	18	(62)	167	11	(149)	8	18	178
(62)	2031	948	(162)	2	32	(64)	133	25	(161)	36	32	171
(64)	2032	2195	(170)	29	18	(3078)	35	11	(169)	35	18	99
(66)	2034	400	(138)	1	29	(68)	3	23	(137)	2	26	6
(67)	2033	400	(0)	0	0	(0)	0	0	(122)	21	44	21
(68)	2035	754	(152)	0	21	(70)	23	11	(151)	0	18	23
(69)	2034	400	(137)	17	30	(67)	26	24	(138)	12	27	55
(70)	2036	400	(164)	1	30	(72)	15	24	(163)	3	27	19
(71)	2035	754	(151)	2	21	(69)	48	11	(152)	7	18	57
(72)	2037	754	(172)	1	21	(6208)	22	11	(171)	0	18	23
(73)	2036	400	(163)	236	35	(71)	51	29	(164)	19	32	306
(74)	2006	3693	(108)	1458	19	(0)	0	0	(110)	150	15	1608
(76)	2051	1242	(0)	0	0	(142)	378	11	(0)	0	0	378
(77)	2010	400	(24)	9	44	(0)	0	0	(23)	0	41	9
(78)	2038	4084	(0)	0	0	(74)	1098	5	(0)	0	0	1098

BARNEY CIRCLE DEIS
TRANMIC INPUT REPORT

124		657	657	150	377		46	46 0609	1518
124	2		0.142		MASS SEB	6-7			
125		400	400	437	213		58	58 0609	1518
125	2		0.142		MASS NWB	7-6			
140		1018	1018	521	496		18	18 0609	1518
140	2		0.123		CONST EB	6-7			
141		761	761	954	356		23	23 0609	1518
141	2		0.123		CONST WB	7-6			
194		400	400	272	120		15	16 0609	1518
194	2		0.019		8TH SB	CONST-MASS			
195		644	644	120	120		8	10 0609	1518
195	2		0.019		8TH NB	MASS-CONST			
408		1242	1242	360	1129		31	31 0609	1518
408	2		0.189		E CAP EB	19-STAD			
409		2335	2335	1250	155		27	27 0609	1518
409	2		0.189		E CAP WB	STAD-19			
462		2195	2195	233	295		11	12 0609	1518
462	2		0.076		19TH NB	A-CONST			
464		2335	2335	230	278		11	11 0609	1518
464	2		0.076		19TH NB	E CAP-A			
466		2195	2195	223	251		11	14 0609	1518
466	2		0.076		19TH NB	A-E CAP			
636		798	798	345	409		14	9 0609	1518
636	2		0.019		MASS SEB	7-CONST			
637		1849	1849	447	228		4	4 0609	1518
637	2		0.019		MASS NWB	CONST-7			
638		456	456	516	492		5	5 0609	1518
638	2		0.019		CONST EB	7-MASS			
639		2700	2700	903	294		4	3 0609	1518
639	2		0.019		CONST WB	MASS-7			
640		609	609	534	531		9	9 0609	1518
640	2		0.047		CONST EB	MASS-8			
641		554	554	563	295		7	8 0609	1518
641	2		0.047		CONST WB	8-MASS			
654		813	813	1205	659		39	40 0609	1518
654	2		0.076		MINN SWB	L'ENF-PENN			
676		648	648	120	335		27	26 0609	1518
676	2		0.057		MASS SEB	CONST-8			
677		798	798	701	138		25	21 0609	1518
677	2		0.057		MASS NWB	8-CONST			
692		414	414	120	120		46	46 0609	1518
692	2		0.189		A EB	17-19			
693		400	400	120	120		43	46 0609	1518
693	2		0.189		A WB	19-17			
732		3316	3316	363	1135		14	14 0609	1518
732	2		0.095		E CAP EB	18-19			
733		3316	3316	1245	328		15	15 0609	1518
733	2		0.095		E CAP WB	19-18			
764		414	414	120	120		33	33 0609	1518
764	2		0.095		A EB	18-19			
765		400	400	120	120		31	27 0609	1518
765	2		0.095		A WB	19-18			
1352		400	400	120	120		39	40 0609	1518
1352	2		0.095		15TH SB	POTOM-PENN			
1354		400	400	120	120		2	5 0609	1518
1354	2		0.002		15TH SB	PENN-PENN			
1356		1242	1242	120	120		3	3 0609	1518
1356	2		0.019		15TH SB	PENN-IVES			
1357		425	425	120	120		15	15 0609	1518
1357	2		0.019		15TH NB	IVES-PENN			
1358		400	400	120	120		21	23 0609	1518

APPENDIX G

VEHICLE MILES OF TRAVEL
VERSUS
VEHICLE MILES OF CAPACITY
BY ANC AND FACILITY TYPE

APPENDIX G

VEHICLE MILES OF TRAVEL VERSUS VEHICLE MILES OF CAPACITY BY ANC AND FACILITY TYPE

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

STUDY AREA TOTAL

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.356	A	0.436	A	0.435	A	0.443	A	0.437	A	0.443	A
NE	0.205	A	0.384	A	0.371	A	0.406	A	0.388	A	0.352	A
E	0.129	A	0.191	A	0.187	A	0.195	A	0.180	A	0.176	A
SE	0.151	A	0.186	A	0.167	A	0.156	A	0.166	A	0.136	A
S	0.157	A	0.209	A	0.204	A	0.216	A	0.217	A	0.197	A
SW	0.297	A	0.401	A	0.300	A	0.377	A	0.407	A	0.287	A
W	0.435	A	0.543	A	0.554	A	0.543	A	0.555	A	0.524	A
NW	0.304	A	0.490	A	0.468	A	0.533	A	0.533	A	0.488	A
ALL	0.273	A	0.352	A	0.348	A	0.356	A	0.355	A	0.336	A
EXPRESSWAYS												
N	0.624	D	0.786	E	0.733	E	0.752	E	0.727	D-E	0.749	E
NE	0.218	B	0.268	B	0.466	D	0.491	D	0.029	D	0.478	D
E	0.355	C	0.450	D	0.552	D	0.511	D	0.485	D	0.556	D
SE	-----		-----		* 0.768	D	* 0.719	C	* 0.519	C	* 0.780	D
S	0.484	D	0.584	D	0.509	D	0.506	D	0.563	D	0.501	D
SW	-----		-----		* 0.914	E	* 0.803	D	-----		* 0.735	D
W	0.746	E	0.903	E	0.959	E	0.966	E	0.973	E	0.981	E
NW	-----		-----		-----		-----		* 0.603	C	-----	
ALL	0.565	D	0.695	D	0.669		0.668		0.673		0.670	
BOULEVARDS												
N											-----	
NE											0.400	A
E											-----	
SE											-----	
S	N A		N A		N A		N A		N A		0.473	A
SW											0.752	C
W											-----	
NW											-----	
ALL											0.510	A
ALL FACILITY TYPES												
N	0.461		0.573		0.552		0.558		0.556		0.558	
NE	0.283		0.381		0.417		0.450		0.380		0.417	
E	0.168		0.236		0.267		0.262		0.239		0.261	
SE	0.151		0.186		0.222		0.217		0.354		0.189	
S	0.292		0.384		0.332		0.333		0.366		0.322	
SW	0.297		0.401		0.478		0.549		0.407		0.499	
W	0.512		0.632		0.656		0.650		0.655		0.640	
NW	0.384		0.490		0.468		0.533		0.548		0.488	
ALL	0.354		0.447		0.450		0.454		0.452		0.444	

* New Facility

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 2D

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.449	A	0.523	A	0.529	A	0.531	A	0.524	A	0.529	A
NE	0.012	A	0.055	A	0.038	A	0.012	A	0.046	A	0.012	A
E	0.071	A	0.124	A	0.151	A	0.151	A	0.146	A	0.151	A
SE	0.003	A	0.005	A	0.023	A	0.008	A	0.005	A	0.014	A
S	0.108	A	0.195	A	0.204	A	0.211	A	0.203	A	0.208	A
SW	0.041	A	0.256	A	0.317	A	0.321	A	0.293	A	0.283	A
W	0.172	A	0.225	A	0.252	A	0.236	A	0.228	A	0.246	A
NW	0.009	A	0.014	A	0.014	A	0.013	A	0.027	A	0.010	A
ALL PHF=0.91	0.198	A	0.267	A	0.283	A	0.282	A	0.275	A	0.282	A
EXPRESSWAYS												
N	0.567	D	0.510	D	0.378	C	0.439	D	0.526	D	0.576	D
NE	-----		-----		-----		-----		-----		-----	
E	0.552	D	0.653	D	0.697	D	0.684	D	0.674	D	0.704	D
SE	-----		-----		-----		-----		-----		-----	
S	0.254	B	0.310	C	0.273	B	0.258	C	0.252	C	0.263	C
SW	-----		-----		-----		-----		-----		-----	
W	0.893	E	1.056	F	1.138	F	1.149	F	1.101	F	1.144	F
NW	-----		-----		-----		-----		-----		-----	
ALL	0.459	D	0.548	D	0.550	D	0.542	D	0.529	D	0.552	D
BOULEVARDS												
N											-----	
NE											-----	
E											-----	
SE											-----	
S	NA		NA		NA		NA		NA		-----	
SW											-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES												
N	0.452		0.523		0.525		0.528		0.524		0.531	
NE	0.012		0.055		0.038		0.012		0.046		0.012	
E	0.214		0.282		0.314		0.310		0.304		0.316	
SE	0.303		0.005		0.023		0.008		0.005		0.014	
S	0.162		0.240		0.229		0.228		0.221		0.220	
SW	0.041		0.256		0.317		0.321		0.293		0.283	
W	0.330		0.406		0.446		0.435		0.419		0.442	
NW	0.009		0.014		0.014		0.013		0.027		0.010	
ALL	0.262		0.336		0.348		0.345		0.337		0.348	

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 6A

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES 1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.153	A	0.261	A	0.236	A	0.245	A	0.241	A	0.250	A
NE	0.096	A	0.138	A	0.209	A	0.240	A	0.231	A	0.219	A
E	0.130	A	0.205	A	0.219	A	0.249	A	0.220	A	0.217	A
SE	0.052	A	0.033	A	0.052	A	0.050	A	0.045	A	0.030	A
S	0.157	A	0.190	A	0.218	A	0.221	A	0.202	A	0.192	A
SW	0.305	A	0.376	A	0.312	A	0.279	A	0.266	A	0.271	A
W	0.606	B	0.746	C	0.738	C	0.736	C	0.742	C	0.702	C
NW	0.619	B	0.871	D	0.804	D	1.070	F	0.936	E	0.890	D
ALL	0.319	A	0.418	A	0.401	A	0.417	A	0.409	A	0.388	A
EXPRESSWAYS												
N	-----		-----		-----		-----		-----		-----	
NE	-----		-----		-----		-----		-----		-----	
E	-----		-----		-----		-----		-----		-----	
SE	-----		-----		-----		-----		-----		-----	
S	0.505	D	0.967	E	0.469	D	0.803	E	0.962	E	0.344	C
SW	-----		-----		-----		-----		-----		-----	
W	-----		-----		-----		-----		-----		-----	
NW	-----		-----		-----		-----		-----		-----	
ALL	0.505	D	0.967	E	0.469	D	0.803	E	0.962	E	0.344	C
BOULEVARDS												
N											-----	
NE											-----	
E											-----	
SE											-----	
S											-----	
SW	N A		N A		N A		N A				-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY	0.153		0.261		0.236		0.245		0.241		0.250	
N TYPES	0.096		0.138		0.209		0.240		0.231		0.219	
NE	0.130		0.205		0.219		0.249		0.220		0.217	
E	0.052		0.033		0.052		0.050		0.045		0.030	
SE	0.177		0.236		0.233		0.256		0.247		0.201	
S	0.305		0.376		0.312		0.279		0.266		0.271	
SW	0.606		0.746		0.738		0.736		0.742		0.702	
W	0.619		0.871		0.804		1.070		0.936		0.890	
NW												
ALL	0.321		0.423		0.402		0.422		0.414		0.387	

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 6 B

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES 1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS	0.232	A	0.282	A	0.295	A	0.301	A	0.283	A	0.313	A
N	0.142	A	0.184	A	0.116	A	0.118	A	0.130	A	0.118	A
NE	0.107	A	0.140	A	0.094	A	0.103	A	0.098	A	0.077	A
E	0.111	A	0.090	A	0.099	A	0.100	A	0.113	A	0.094	A
SE	0.134	A	0.173	A	0.136	A	0.157	A	0.170	A	0.136	A
S	0.149	A	0.219	A	0.085	A	0.127	A	0.195	A	0.094	A
SW	0.235	A	0.300	A	0.314	A	0.332	A	0.366	A	0.312	A
W	0.194	A	0.203	A	0.284	A	0.277	A	0.277	A	0.298	A
NW												
ALL	0.168	A	0.212	A	0.198	A	0.210	A	0.219	A	0.196	A
EXPRESSWAYS	0.837	E	0.992	E	0.922	E	0.942	E	0.972	E	0.892	E
N	-----		-----		0.474	B	0.379	B	-----		0.435	B
NE	0.301	C	0.392	C	0.534	D	0.504	D	0.465	B	0.554	D
E	-----		-----		0.768	E	0.719	D	0.610	D	0.780	E
SE	0.534	D	0.759	E	0.922	E	1.035	F	0.848	E	1.248	F
S	-----		-----		0.914	E	0.832	E	-----		0.761	D
SW	0.754	E	0.892	E	0.942	E	0.959	E	0.975	E	0.972	E
W	-----		-----		-----		-----		-----		-----	
NW												
ALL	0.640	D	0.768	E	0.747		0.752		0.788		0.762	
BOULEVARDS											-----	
N											0.400	A
NE											-----	
E											-----	
SE											0.473	A
S	N A		N A		N A						0.752	C
SW											-----	
W											-----	
NW												
ALL											0.510	A
ALL FACILITY TYPES	0.380		0.455		0.449		0.459		0.452		0.455	
N	0.142		0.184		0.389		0.267		0.130		0.337	
NE	0.150		0.196		0.236		0.228		0.196		0.238	
E	0.111		0.090		0.235		0.245		0.397		0.222	
SE	0.136		0.176		0.211		0.162		0.174		0.167	
S	0.149		0.219		0.589		0.358		0.195		0.470	
SW	0.451		0.547		0.571		0.589		0.600		0.582	
W	0.194		0.203		0.284		0.277		0.277		0.298	
NW												
ALL	0.201		0.345		0.391		0.372		0.366		0.379	

AHS = 70 MPH for 2 lane design

- Cannot be evaluated because of mixed design speed evaluation criteria

evaluated on Arterial criteria T. 10-13 (HCM)

* ∞ alt 1
∞ alt 2
∞
∞ alt 1/2

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 6 C

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS	0.455	A	0.548	A	0.535	A	0.574	A	0.603	B	0.555	A
N	0.414	A	0.573	A	0.541	A	0.603	B	0.581	A	0.541	A
NE	0.191	A	0.258	A	0.209	A	0.229	A	0.225	A	0.196	A
E	0.450	A	0.569	A	0.475	A	0.449	A	0.464	A	0.367	A
SE	0.415	A	0.480	A	0.416	A	0.425	A	0.470	A	0.405	A
S	0.439	A	0.596	A	0.425	A	0.604	B	0.643	B	0.407	A
SW	0.512	A	0.611	B	0.602	B	0.619	B	0.604	B	0.587	A
W	0.702	C	0.851	D	0.777	C	0.768	C	0.763	C	0.716	C
NW												
ALL	0.417	A	0.523	A	0.472	A	0.515	A	0.523	A	0.460	A
EXPRESSWAYS	0.594	D	0.760	E	0.684	D	0.682	D	0.657	D	0.700	D
N	0.218	B	0.268	B	0.086	B	0.553	C	0.029	B	0.507	C
NE	0.481	D	0.564	D	0.662	D	0.281	C	0.353	C	0.236	B
E	-----		-----		-----		-----		0.442	B	-----	
SE	0.560	D	0.653	D	0.529	D	0.562	D	0.645	D	0.565	D
S	-----		-----		-----		0.797	D	-----		0.724	D
SW	0.502	D	0.658	D	0.616	D	0.648	D	0.658	D	0.638	D
W	-----		-----		-----		-----		0.603	C	-----	
NW												
ALL	0.575	D	0.701	D	0.608		0.631		0.631		0.622	
BOULEVARDS											-----	
N											-----	
NE											-----	
E											-----	
SE											-----	
S											-----	
SW	N A		N A		N A		N A		N A		-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES	0.566		0.714		0.655		0.658		0.647		0.668	
N	0.404		0.558		0.517		0.571		0.553		0.519	
NE	0.209		0.277		0.235		0.232		0.233		0.199	
E	0.450		0.569		0.475		0.449		0.448		0.367	
SE	0.533		0.621		0.507		0.535		0.616		0.533	
S	0.439		0.596		0.425		0.719		0.643		0.596	
SW	0.527		0.621		0.605		0.626		0.616		0.598	
W	0.702		0.851		0.777		0.768		0.656		0.716	
NW												
ALL	0.504		0.621		0.546		0.585		0.589		0.558	

* 000 alt 1
000 alt 2
000 alt 3
000 alt 1/2

AHS = 70 MPH for 2-lane design

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7A

TRAVEL DIRECTION	1979 BASE		2005 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N												
NE	0.144	A	0.304	A	0.401	A	0.341	A	0.290	A	0.352	A
E												
SE												
S												
SW	0.693	B	0.931	E	1.097	F	0.867	D	0.904	E	0.901	E
W												
NW												
ALL	0.411	A	0.609	B	0.740	C	0.597	A	0.590	A	0.619	B
EXPRESSWAYS	0.459	D	0.635	D	0.703	D	0.755	E	0.745	E	0.717	D
N												
NE												
E												
SE	0.720	D	0.850	E	0.837	E	0.841	E	0.891	E	0.849	E
S												
SW	0.766	E	1.120	F	1.174	F	1.212	F	1.132	F	1.119	F
W												
NW												
ALL	0.597	D	0.768	E	0.800	E	0.830	E	0.840	E	0.807	E
BOULEVARDS												
N												
NE												
E												
SE												
S												
SW	N A		N A		N A		N A		N A			
W												
NW												
ALL												
ALL FACILITY TYPES	0.459		0.635		0.703		0.755		0.745		0.717	
N												
NE	0.144		0.304		0.401		0.341		0.290		0.352	
E												
SE	0.720		0.850		0.837		0.841		0.891		0.849	
S												
SW	0.703		0.957		1.108		0.915		0.936		0.951	
W												
NW												
ALL	0.502		0.697		0.769		0.711		0.712		0.711	

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7B

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.512	A	0.569	A	0.598	A	0.557	A	0.546	A	0.543	A
NE	0.473	A	0.556	A	0.583	A	0.595	A	0.597	A	0.586	A
E												
SE	0.138	A	0.167	A	0.218	A	0.233	A	0.224	A	0.203	A
S												
SW	0.813	D	0.914	E	0.959	E	0.995	E	0.954	E	0.962	E
W												
NW												
ALL	0.455	A	0.518	A	0.557	A	0.561	A	0.546	A	0.538	A
EXPRESSWAYS												
N												
NE												
E												
SE												
S												
SW												
W												
NW												
ALL												
BOULEVARDS												
N												
NE												
E												
SE												
S												
SW												
W												
NW												
ALL												
ALL FACILITY TYPES												
N	0.512		0.569		0.598		0.557		0.546		0.543	
NE	0.473		0.556		0.583		0.595		0.597		0.586	
E												
SE	0.138		0.167		0.218		0.233		0.224		0.203	
S												
SW	0.813		0.914		0.959		0.995		0.954		0.962	
W												
NW												
ALL	0.455		0.518		0.557		0.561		0.546		0.538	

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7D

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS	0.480	A	0.631	B	0.628	B	0.658	B	0.652	B	0.616	B
N	0.725	C	0.921	E	1.020	F	1.073	F	0.944	E	0.778	C
NE	0.296	A	0.754	C	0.787	C	0.922	E	0.751	C	0.824	D
E	-----		-----		-----		-----		-----		-----	
SE	0.275	A	0.355	A	0.154	A	0.411	A	0.449	A	0.228	A
S	0.261	A	0.300	A	0.390	A	0.443	A	0.457	A	0.402	A
SW	0.792	C	1.196	F	1.285	F	1.304	F	1.200	F	1.217	F
W	-----		-----		-----		-----		-----		-----	
NW												
ALL	0.492	A	0.658	B	0.714	C	0.779	C	0.726	C	0.642	B
EXPRESSWAYS	-----		-----		-----		-----		-----		-----	
N	-----		-----		-----		-----		-----		-----	
NE	0.097	A	0.193	A	0.297	B	0.180	B	0.164	B	0.278	C
E	-----		-----		-----		-----		-----		-----	
SE	-----		-----		-----		-----		-----		-----	
S	-----		-----		-----		-----		-----		-----	
SW	0.663	D	0.985	E	1.182	F	1.046	F	1.091	F	1.190	F
W	-----		-----		-----		-----		-----		-----	
NW												
ALL	0.380	C	0.589	D	0.739	E	0.613	B	0.627	D	0.734	E
BOULEVARDS											-----	
N											-----	
NE											-----	
E											-----	
SE											-----	
S	N A		N A		N A		N A		N A		-----	
SW											-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES	0.480		0.631		0.628		0.658		0.652		0.616	
N	0.725		0.921		1.020		1.073		0.944		0.778	
NE	0.112		0.235		0.334		0.236		0.208		0.319	
E	-----		-----		-----		-----		-----		-----	
SE	0.275		0.355		0.154		0.411		0.449		0.228	
S	0.261		0.300		0.390		0.443		0.457		0.402	
SW	0.682		1.016		1.197		1.084		1.107		1.194	
W	-----		-----		-----		-----		-----		-----	
NW												
ALL	0.430		0.620		0.728		0.687		0.671		0.693	

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7F

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N												
NE												
E												
SE												
S												
SW	0.459	A	0.783	C	0.939	E	0.883	D	0.805	D	0.760	C
W												
NW												
ALL	0.459	A	0.783	C	0.939	E	0.883	D	0.805	D	0.760	C
EXPRESSWAYS												
N												
NE												
E												
SE												
S												
SW												
W												
NW												
ALL												
BOULEVARDS												
N												
NE												
E												
SE												
S	N A		N A		N A		N A		N A			
SW												
W												
NW												
ALL												
ALL FACILITY TYPES												
N												
NE												
E												
SE												
S												
SW	0.459		0.783		0.939		0.883		0.805		0.760	
W												
NW												
ALL	0.459		0.783		0.939		0.883		0.805		0.760	

AM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 8A

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS	0.805	D	0.957	E	0.903	E	0.945	E	0.938	E	0.947	E
N	0.048	A	0.056	A	0.034	A	0.035	A	0.034	A	0.036	A
NE	0.056	A	0.186	A	0.130	A	0.156	A	0.125	A	0.123	A
E	0.106	A	0.193	A	0.130	A	0.106	A	0.121	A	0.114	A
SE	0.183	A	0.237	A	0.224	A	0.218	A	0.227	A	0.215	A
S	0.147	A	0.062	A	0.055	A	0.100	A	0.101	A	0.061	A
SW	0.386	A	0.546	A	0.590	A	0.529	A	0.542	A	0.473	A
W	0.023	A	0.016	A	0.101	A	0.120	A	0.029	A	0.107	A
NW												
ALL	0.387	A	0.496	A	0.472	A	0.478	A	0.475	A	0.468	A
EXPRESSWAYS	0.768	E	0.925	E	0.852	E	0.884	E	0.871	E	0.891	E
N	-----		-----		-----		-----		-----		-----	
NE	-----		-----		-----		-----		-----		-----	
E	-----		-----		-----		-----		-----		-----	
SE	0.381	B	0.476	D	0.406	B	0.384	B	0.396	B	0.389	B
S	-----		-----		-----		-----		-----		-----	
SW	-----		-----		-----		-----		-----		-----	
W	-----		-----		-----		-----		-----		-----	
NW	-----		-----		-----		-----		-----		-----	
ALL	0.496	D	0.610	D	0.539	D	0.533	D	0.537	D	0.539	D
BOULEVARDS											-----	
N											-----	
NE											-----	
E											-----	
SE											-----	
S	NA		NA		NA		NA		NA		-----	
SW											-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES	0.789		0.943		0.881		0.918		0.909		0.923	
N	0.048		0.056		0.034		0.035		0.034		0.036	
NE	0.056		0.186		0.130		0.156		0.125		0.123	
E	0.106		0.193		0.130		0.106		0.121		0.114	
SE	0.317		0.406		0.353		0.336		0.346		0.338	
S	0.147		0.062		0.055		0.100		0.101		0.061	
SW	0.386		0.546		0.590		0.529		0.542		0.473	
W	0.023		0.016		0.101		0.120		0.029		0.107	
NW												
ALL	0.430		0.550		0.503		0.504		0.504		0.501	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

STUDY AREA TOTAL

TRAVEL DIRECTION	1979 BASE V/C	LOS	2006 NULL V/C	LOS	2006 BUILD ALTERNATIVES 1 V/C	LOS	2 V/C	LOS	3 V/C	LOS	1/2 V/C	LOS
ARTERIALS												
N	0.151	A	0.213	A	0.206	A	0.206	A	0.207	A	0.209	A
NE	0.299	A	0.383	A	0.391	A	0.406	A	0.380	A	0.385	A
E	0.342	A	0.472	A	0.454	A	0.483	A	0.477	A	0.426	A
SE	0.277	A	0.408	A	0.487	A	0.492	A	0.483	A	0.425	A
S	0.276	A	0.361	A	0.387	A	0.391	A	0.389	A	0.425	A
SW	0.270	A	0.301	A	0.225	A	0.299	A	0.306	A	0.218	A
W	0.173	A	0.229	A	0.221	A	0.215	A	0.216	A	0.203	A
NW	0.114	A	0.154	A	0.101	A	0.146	A	0.131	A	0.111	A
ALL	0.242	A	0.325	A	0.317	A	0.329	A	0.325	A	0.312	A
EXPRESSWAYS												
N	0.581	D	0.639	D	0.619	D	0.849	F	0.822	D	0.546	D
NE	0.543	D	0.491	D	0.962	E	0.833	E	0.046	B?	0.904	E
E	0.555	D	0.704	D	0.847	E	0.792	E	0.787	E	0.829	E
SE	-----		-----		*0.346	A	*0.381	B	*0.826	D-E	*0.397	B
S	0.585	D	0.769	E	0.714	D	0.701	D	0.711	D	0.733	E
SW	-----		-----		*0.665	C	*0.531	C	-----		*0.485	B
W	0.433	D	0.488	D	0.594	D	0.571	D	0.614	D	0.610	D
NW	-----		-----		-----		-----		*0.500	B	-----	
ALL	0.548	D	0.663	D	0.707		0.659		0.683		0.686	
BOULEVARDS												
N											-----	
NE											1.044	F
E											-----	
SE											-----	
S											0.347	A
SW											0.584	A
W											-----	
NW											-----	
ALL											0.765	C
ALL FACILITY TYPES												
N	0.316		0.377		0.365		0.331		0.376		0.333	
NE	0.304		0.395		0.662		0.623		0.374		0.703	
E	0.385		0.510		0.552		0.559		0.546		0.530	
SE	0.277		0.408		0.474		0.480		0.667		0.422	
S	0.404		0.529		0.524		0.516		0.528		0.547	
SW	0.270		0.301		0.351		0.392		0.306		0.351	
W	0.235		0.291		0.315		0.305		0.311		0.306	
NW	0.114		0.154		0.101		0.148		0.212		0.111	
ALL	0.328		0.420		0.443		0.435		0.437		0.438	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 2D

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.117	A	0.228	A	0.205	A	0.218	A	0.220	A	0.212	A
NE	0.056	A	0.814	D	0.970	E	1.182	F	1.142	F	1.110	F
E	0.098	A	0.211	A	0.268	A	0.253	A	0.273	A	0.354	A
SE	0.015	A	0.060	A	0.164	A	0.130	A	0.180	A	0.296	A
S	0.292	A	0.359	A	0.416	A	0.411	A	0.401	A	0.509	A
SW	0.024	A	0.036	A	0.010	A	0.038	A	0.037	A	0.045	A
W	0.115	A	0.125	A	0.150	A	0.171	A	0.163	A	0.164	A
NW	0.020	A	0.002	A	0.012	A	0.006	A	0.013	A	0.015	A
ALL	0.159	A	0.238	A	0.266	A	0.271	A	0.272	A	0.319	A
EXPRESSWAYS												
N	0.415	D	0.546	D	0.425	D	0.548	D	0.487	D	0.474	D
NE	-----		-----		-----		-----		-----		-----	
E	0.781	E	0.933	E	1.015	F	0.985	E	0.972	E	0.982	E
SE	-----		-----		-----		-----		-----		-----	
S	0.649	D	0.870	E	0.736	E	0.709	D	0.727	D	0.690	D
SW	-----		-----		-----		-----		-----		-----	
W	0.624	D	0.686	D	0.836	E	0.807	E	0.828	E	0.843	E
NW	-----		-----		-----		-----		-----		-----	
ALL	0.679	D	0.850	E	0.831	E	0.806	E	0.813	E	0.800	E
BOULEVARDS												
N											-----	
NE											-----	
E											-----	
SE											-----	
S											-----	
SW											-----	
W											-----	
NW											-----	
ALL	NA		NA		NA		NA		NA		-----	
ALL FACILITY TYPES												
N	0.124		0.236		0.210		0.226		0.226		0.218	
NE	0.056		0.814		0.970		1.182		1.142		1.110	
E	0.307		0.432		0.495		0.478		0.488		0.547	
SE	0.015		0.060		0.164		0.130		0.180		0.296	
S	0.423		0.546		0.533		0.520		0.520		0.575	
SW	0.024		0.036		0.010		0.038		0.037		0.045	
W	0.227		0.249		0.301		0.311		0.310		0.313	
NW	0.020		0.002		0.012		0.006		0.013		0.015	
ALL	0.286		0.387		0.404		0.401		0.404		0.436	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 6A

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.139	A	0.172	A	0.187	A	0.166	A	0.158	A	0.203	A
NE	0.318	A	0.375	A	0.303	A	0.275	A	0.272	A	0.291	A
E	0.358	A	0.467	A	0.475	A	0.504	A	0.482	A	0.453	A
SE	0.055	A	0.072	A	0.041	A	0.300	A	0.221	A	0.035	A
S	0.143	A	0.227	A	0.220	A	0.237	A	0.235	A	0.201	A
SW	0.050	A	0.120	A	0.128	A	0.140	A	0.131	A	0.121	A
W	0.235	A	0.316	A	0.323	A	0.329	A	0.321	A	0.293	A
NW	0.158	A	0.232	A	0.194	A	0.329	A	0.224	A	0.208	A
ALL	0.234	A	0.314	A	0.313	A	0.329	A	0.314	A	0.296	A
EXPRESSWAYS												
N	-----		-----		-----		-----		-----		-----	
NE	-----		-----		-----		-----		-----		-----	
E	-----		-----		-----		-----		-----		-----	
SE	-----		-----		-----		-----		-----		-----	
S	0.321	C	0.529	D	0.052	B	0.494	D	0.486	D	0.042	B
SW	-----		-----		-----		-----		-----		-----	
W	-----		-----		-----		-----		-----		-----	
NW	-----		-----		-----		-----		-----		-----	
ALL	0.321	C	0.529	D	0.052	B	0.494	D	0.486	D	0.042	B
BOULEVARDS												
N											-----	
NE											-----	
E											-----	
SE											-----	
S	N A		N A		N A		N A		N A		-----	
SW											-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES												
N	0.139		0.172		0.187		0.166		0.158		0.203	
NE	0.318		0.375		0.303		0.275		0.272		0.291	
E	0.358		0.467		0.475		0.504		0.482		0.453	
SE	0.055		0.072		0.041		0.300		0.221		0.035	
S	0.157		0.250		0.207		0.257		0.255		0.189	
SW	0.050		0.120		0.128		0.140		0.131		0.121	
W	0.235		0.316		0.323		0.329		0.321		0.293	
NW	0.153		0.232		0.194		0.329		0.224		0.208	
ALL	0.235		0.317		0.309		0.331		0.316		0.292	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 6B

TRAVEL DIRECTION	1979 BASE V/C	LOS	2006 NULL V/C	LOS	2006 BUILD ALTERNATIVES 1 V/C	LOS	2 V/C	LOS	3 V/C	LOS	1/2 V/C	LOS
ARTERIALS												
N	0.118	A	0.164	A	0.148	A	0.151	A	0.147	A	0.125	A
NE	0.146	A	0.202	A	0.133	A	0.227	A	0.236	A	0.143	A
E	0.338	A	0.470	A	0.382	A	0.459	A	0.455	A	0.312	A
SE	0.225	A	0.342	A	0.510	A	0.453	A	0.448	A	0.276	A
S	0.242	A	0.328	A	0.364	A	0.373	A	0.371	A	0.415	A
SW	0.173	A	0.167	A	0.128	A	0.135	A	0.155	A	0.168	A
W	0.114	A	0.135	A	0.088	A	0.086	A	0.098	A	0.086	A
NW	0.047	A	0.050	A	0.031	A	0.030	A	0.032	A	0.030	A
ALL	0.211	A	0.285	A	0.242	A	0.272	A	0.273	A	0.223	A
EXPRESSWAYS												
N	0.450	D	0.531	D	0.458	D	0.487	D	0.497	D	0.458	D
NE	-----		-----		0.973	E	0.713	D	-----		0.973	E
E	0.465	D	0.519	D	0.753	E	0.694	D	0.698	D	0.795	E
SE	-----		-----		0.346	C	0.381	B	0.829	E	0.397	C
S	0.500	D	0.708	D	0.629	D	0.697	D	0.654	D	0.232	B
SW	-----		-----		0.665	C	0.506	C	-----		0.489	B
W	0.449	D	0.504	D	0.614	D	0.600	C	0.665	C	0.644	D
NW	-----		-----		-----		-----		-----		-----	
ALL	0.454	D	0.514	D	0.703		0.621		0.665		0.696	
BOULEVARDS												
N											-----	
NE											1.044	F
E											-----	
SE											-----	
S	NA		NA		NA		NA		NA		0.347	A
SW											0.584	A
W											-----	
NW											-----	
ALL											0.765	C
ALL FACILITY TYPES												
N	0.200		0.254		0.224		0.233		0.233		0.206	
NE	0.146		0.202		0.767		0.500		0.236		0.756	
E	0.365		0.480		0.500		0.530		0.518		0.472	
SE	0.225		0.342		0.476		0.436		0.668		0.299	
S	0.244		0.331		0.390		0.376		0.374		0.409	
SW	0.173		0.167		0.457		0.259		0.155		0.375	
W	0.242		0.276		0.303		0.296		0.316		0.314	
NW	0.047		0.050		0.031		0.030		0.032		0.030	
ALL	0.266		0.336		0.403		0.375		0.374		0.186	

† AMS = 70 MPH for 2-lane design

‡ can not be evaluated because of mixed design speed evaluation criteria

NA evaluated on Arterial criteria T. 10-13 (HCM)

* ooo alt 1
ooo alt 2
ooo
ooo alt 1/2

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 6C

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.294	A	0.377	A	0.368	A	0.429	A	0.487	A	0.463	A
NE	0.441	A	0.513	A	0.540	A	0.521	A	0.480	A	0.565	A
E	0.414	A	0.515	A	0.531	A	0.505	A	0.501	A	0.558	A
SE	0.605	B	0.844	D	0.877	D	0.868	D	0.887	D	0.971	E
S	0.559	A	0.667	B	0.696	B	0.668	B	0.677	B	0.730	C
SW	0.439	A	0.473	A	0.285	A	0.464	A	0.471	A	0.260	A
W	0.162	A	0.243	A	0.178	A	0.207	A	0.212	A	0.195	A
NW	0.289	A	0.332	A	0.222	A	0.283	A	0.295	A	0.241	A
ALL	0.360	A	0.447	A	0.415	A	0.444	A	0.451	A	0.446	A
EXPRESSWAYS												
N	0.558	D	0.610	D	0.591	D	0.434	D	0.577	D	0.458	D
NE	0.543	D	0.491	D	0.504	D	0.899	E	0.046	B	0.859	E
E	0.574	D	0.675	D	0.788	E	0.367	C	0.371	C	0.316	C
SE	-----		-----		-----		-----		0.823	E	-----	
S	0.550	D	0.708	D	0.660	D	0.657	D	0.674	D	0.731	E
SW	-----		-----		-----		0.537	D	-----	AHS = C 70 MPH	0.484	B
W	0.396	C	0.399	C	0.361	C	0.344	C	0.364	C	0.344	C
NW	-----		-----		-----		-----		0.500	B	-----	
ALL	0.545	D	0.643	D	0.610		0.586		0.617	for 2-level design	0.607	
BOULEVARDS												
N											-----	
NE											-----	
E											-----	
SE											-----	
S											-----	
SW	NA		NA		NA		NA		NA		-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES												
N	0.503		0.562		0.544		0.433		0.560		0.459	
NE	0.447		0.512		0.538		0.763		0.457		0.753	
E	0.424		0.525		0.545		0.496		0.493		0.543	
SE	0.605		0.844		0.877		0.868		0.839		0.971	
S	0.552		0.700		0.667		0.659		0.674		0.731	
SW	0.439		0.473		0.285		0.507		0.471		0.393	
W	0.213		0.278		0.218		0.237		0.246		0.228	
NW	0.289		0.332		0.222		0.283		0.433		0.241	
ALL	0.461		0.555		0.521		0.529		0.551		0.542	

* ooo alt 1
ooo alt 2
ooo "
ooo alt 1/2

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7A-A

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N												
NE												
E	0.571	A	0.996	E	1.140	F	0.984	E	0.929	E	0.654	B
SE												
S												
SW												
W	0.209	A	0.322	A	0.508	A	0.345	A	0.340	A	0.349	A
NW												
ALL	0.315	A	0.519	A	0.692	B	0.531	A	0.512	A	0.438	A
EXPRESSWAYS												
N	0.792	E	0.865	E	0.906	E	1.011	F	0.993	E	0.951	E
NE												
E	0.553	D	0.737	E	0.863	E	0.776	E	0.735	E	0.860	E
SE												
S	0.398	C	0.548	D	0.747	E	0.691	D	0.658	D	0.736	E
SW												
W	0.285	C	0.370	C	0.404	C	0.438	D	0.400	C	0.384	C
NW												
ALL	0.573	D	0.700	D	0.812	E	0.813	E	0.783	E	0.823	E
BOULEVARDS												
N												
NE												
E												
SE												
S	N A		N A		N A		N A		N A			
SW												
W												
NW												
ALL												
ALL FACILITY TYPES												
N	0.792		0.865		0.906		1.011		0.993		0.951	
NE												
E	0.560		0.839		0.971		0.857		0.811		0.779	
SE												
S	0.398		0.548		0.747		0.691		0.658		0.736	
SW												
W	0.220		0.329		0.493		0.358		0.349		0.353	
NW												
ALL	0.462		0.636		0.770		0.714		0.688		0.608	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7B

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.179	A	0.193	A	0.252	A	0.190	A	0.170	A	0.206	A
NE	0.757	C	0.902	E	0.931	E	0.931	E	0.936	E	0.989	E
E	0.300	A	0.359	A	0.384	A	0.376	A	0.408	A	0.359	A
SE	0.398	A	0.456	A	0.462	A	0.445	A	0.439	A	0.430	A
S												
SW												
W												
NW												
ALL	0.393	A	0.460	A	0.491	A	0.469	A	0.473	A	0.478	A
EXPRESSWAYS												
N												
NE												
E												
SE												
S												
SW												
W												
NW												
ALL												
BOULEVARDS												
N												
NE												
E												
SE	N A		N A		N A		N A		N A			
S												
SW												
W												
NW												
ALL												
ALL FACILITY TYPES												
N	0.179		0.193		0.252		0.190		0.170		0.206	
NE	0.757		0.902		0.931		0.931		0.936		0.989	
E	0.300		0.359		0.384		0.376		0.408		0.359	
SE	0.398		0.456		0.462		0.445		0.439		0.430	
S												
SW												
W												
NW												
ALL	0.393		0.460		0.491		0.469		0.473		0.478	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7D

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS												
N	0.229	A	0.313	A	0.483	A	0.427	A	0.366	A	0.361	A
NE	0.362	A	0.525	A	0.778	C	0.732	C	0.622	B	0.582	A
E	1.215	F	1.579	F	1.691	F	1.585	F	1.548	F	1.766	F
SE	-----		-----		-----		-----		-----		-----	
S	0.427	A	0.407	A	0.290	A	0.397	A	0.402	A	0.235	A
SW	0.521	A	0.573	A	0.597	A	0.614	B	0.633	B	0.518	A
W	0.295	A	0.407	A	0.455	A	0.485	A	0.432	A	0.425	A
NW	-----		-----		-----		-----		-----		-----	
ALL	0.439	A	0.548	A	0.661	B	0.650	B	0.605	B	0.554	A
EXPRESSWAYS												
N	-----		-----		-----		-----		-----		-----	
NE	-----		-----		-----		-----		-----		-----	
E	0.408	C	0.921	E	1.053	F	1.077	F	0.989	E	0.744	E
SE	-----		-----		-----		-----		-----		-----	
S	-----		-----		-----		-----		-----		-----	
SW	-----		-----		-----		-----		-----		-----	
W	0.158	B	0.254	B	0.460	D	0.325	C	0.307	C	0.417	D
NW	-----		-----		-----		-----		-----		-----	
ALL	0.283	C	0.588	D	0.757	E	0.701	D	0.648	D	0.580	D
BOULEVARDS											-----	
N											-----	
NE											-----	
E											-----	
SE											-----	
S	N A		N A		N A		N A		N A		-----	
SW											-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES	0.229		0.313		0.483		0.427		0.366		0.361	
N	0.362		0.525		0.778		0.732		0.622		0.582	
NE	0.480		0.979		1.110		1.122		1.038		0.834	
E	-----		-----		-----		-----		-----		-----	
SE	0.427		0.407		0.290		0.397		0.402		0.235	
S	0.521		0.573		0.597		0.614		0.633		0.518	
SW	0.178		0.277		0.459		0.349		0.325		0.418	
W	-----		-----		-----		-----		-----		-----	
NW												
ALL	0.156		0.569		0.712		0.677		0.628		0.568	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 7F

TRAVEL DIRECTION	1979 BASE V/C	LOS	2006 NULL V/C	LOS	2006 BUILD ALTERNATIVES 1 V/C	LOS	2 V/C	LOS	3 V/C	LOS	1/2 V/C	LOS
ARTERIALS												
N												
NE												
E												
SE												
S												
SW	0.315	A	0.254	A	0.276	A	0.188	A	0.185	A	0.243	A
W												
NW												
ALL	0.315	A	0.254	A	0.276	A	0.188	A	0.185	A	0.243	A
EXPRESSWAYS												
N												
NE												
E												
SE												
S												
SW												
W												
NW												
ALL												
BOULEVARDS												
N												
NE												
E												
SE	N A		N A		N A		N A		N A			
S												
SW												
W												
NW												
ALL												
ALL FACILITY TYPES												
N												
NE												
E												
SE												
S												
SW												
W	0.315		0.254		0.276		0.188		0.185		0.243	
NW												
ALL	0.315		0.254		0.276		0.188		0.185		0.243	

PM: VOLUME TO CAPACITY RATIO - (LEVEL OF SERVICE)

ANC 8A

TRAVEL DIRECTION	1979 BASE		2006 NULL		2006 BUILD ALTERNATIVES							
					1		2		3		1/2	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
ARTERIALS	0.192	A	0.250	A	0.181	A	0.175	A	0.163	A	0.189	A
N	0.024	A	0.021	A	0.015	A	0.013	A	0.015	A	0.022	A
NE	0.204	A	0.349	A	0.243	A	0.262	A	0.267	A	0.380	A
E	0.420	A	0.550	A	0.551	A	0.493	A	0.470	A	0.533	A
SE	0.508	A	0.699	B	0.666	B	0.675	B	0.639	B	0.723	C
S	0.087	A	0.103	A	0.081	A	0.088	A	0.126	A	0.131	A
SW	0.074	A	0.335	A	0.079	A	0.094	A	0.084	A	0.101	A
W	0.020	A	0.245	A	0.034	A	0.049	A	0.042	A	0.090	A
NW												
ALL	0.261	A	0.393	A	0.312	A	0.311	A	0.295	A	0.345	A
EXPRESSWAYS	0.620	D	0.639	D	0.600	D	0.522	D	0.551	D	0.522	D
N	-----		-----		-----		-----		-----		-----	
NE	-----		-----		-----		-----		-----		-----	
E	-----		-----		-----		-----		-----		-----	
SE	0.789	E	1.024	F	0.949	E	0.853	E	0.894	E	0.916	E
S	-----		-----		-----		-----		-----		-----	
SW	-----		-----		-----		-----		-----		-----	
W	-----		-----		-----		-----		-----		-----	
NW												
ALL	0.739	E	0.909	E	0.845	E	0.754	E	0.792	E	0.798	E
BOULEVARDS											-----	
N											-----	
NE											-----	
E											-----	
SE											-----	
S	N A		N A		N A		N A		N A		-----	
SW											-----	
W											-----	
NW											-----	
ALL											-----	
ALL FACILITY TYPES	0.367		0.409		0.353		0.317		0.322		0.325	
N	0.024		0.021		0.015		0.013		0.015		0.022	
NE	0.204		0.349		0.243		0.262		0.267		0.380	
E	0.420		0.550		0.551		0.493		0.470		0.533	
SE	0.705		0.927		0.864		0.800		0.818		0.858	
S	0.087		0.103		0.081		0.088		0.126		0.131	
SW	0.074		0.335		0.079		0.094		0.084		0.101	
W	0.028		0.245		0.034		0.049		0.042		0.090	
NW												
ALL	0.490		0.620		0.556		0.514		0.522		0.552	

APPENDIX H
1979 BASE YEAR
LEVEL OF SERVICE FOR SELECTED ROADWAYS

APPENDIX H
1979 BASE YEAR
LEVEL OF SERVICE FOR SELECTED ROADWAYS

TABLE ____
CUTLINE A
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES		LINK CAPACITY		VOLUME-TO-CAPACITY (V/C) RATIO		LEVEL OF SERVICE	
					AM	PM	AM	PM	AM	PM	AM	PM
5340	BENNING RD. BR.	OKLAHOMA AV.- KENILWORTH AVE N.E.	EAST	FWY	738	2459	4819	4819	0.15	0.51	C	D
5341	BENNING RD. BR.	KENILWORTH AV.- OKLAHOMA AVE N.E.	WEST	FWY	2299*	772*	4968	4968	0.46	0.11	D	C
5304	YOUNG BR.	R.F.K. STADIUM RD.- ANACOSTIA FWY.	EAST	FWY	671	3614	5301	5301	0.16	0.69	B	D
5305	YOUNG BR.	ANACOSTIA FWY- R.F.K. STAD. RD.	WEST	FWY	4012	992	5465	5465	0.73	0.18	D	B
2232	SOUSA BR	SOUTHEAST FWY- ANACOSTIA FWY	EAST	FWY	1423	3291	3353	3353	0.42	0.98	C	E
2233	SOUSA BR	ANACOSTIA FWY- SOUTHEAST FWY	WEST	FWY	3974	1635	3726	3726	1.07	0.44	F	C
5006	11TH ST BR.	N ST SE RAMP- ANACOSTIA FWY	EAST	FWY	1924	4952	7052	7052	0.27	0.71	B	D
0	11TH ST. BR	ANACOSTIA FWY- M ST SE RAMP	WEST	FWY	5041	1374*	[illegible]	7052	0.85	0.19	D-E	E
6208	DOUGLASS BR.	M ST. SE TO I-295	EAST	FWY	765	2909	3300	3300	0.26	0.88	C	D-E
6209	DOUGLASS BR.	ANACOSTIA FK. RAMP- M ST. SE	WEST	FWY	2442*	1350*	3300	3300	0.74	0.41	D	C

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* [illegible]

TABLE _____
CUTLINE 8
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES AM	MICRO-ASSIGN. VOLUMES PM	LINK CAPACITY AM	LINK CAPACITY PM	VOLUME-TO-CAPACITY (V/C) RATIO AM	VOLUME-TO-CAPACITY (V/C) RATIO PM	LEVEL OF SERVICE AM	LEVEL OF SERVICE PM
2162	ANACOSTIA FWY.	BENNING RD-E. CAPITOL ST.	SOUTH	FWY	4300	1447*	5301	5301	0.81	0.27	E	C
2163	ANACOSTIA FWY.	E. CAPITOL ST.- BENNING RD	NORTH	FWY	2622	4418	5405	5405	0.49	0.81	C-D	E
1968	OKLAHOMA AV. NE	BENNING RD.-25TH PL. NE	SOUTH	COL	584	67	2335	2335	0.25	0.03	A	A
1969	OKLAHOMA AV. NE	25TH PL.NE- BENNING RD	NORTH	COL	15	223	924	626	0.02	0.36	A	A
1938	21ST ST. NE	BENNING RD - E ST. NE	SOUTH	COL	30	10	1242	1242	0.02	0.01	A	A
1939	21ST ST. NE	E ST. NE - BENNING RD.	NORTH	COL	7	41	400	400	0.02	0.12	A	A
498	19TH ST. NE	GALES PL- BENNING RD.	NORTH	MA	8	18	600	1200	0.01	0.02	A	A
3090	17TH ST. NE	BENNING RD- GALES PL.	SOUTH	MA	600	1042*	3014	3014	0.17	0.29	A	A
18	15TH ST. NE	G ST NE - BENNING RD	NORTH	COL	400*	400*	400	400	1.00	1.00	E	E
5	MARYLAND AVE. NE	BENNING RD.-G ST NE	SOUTH	MA	405*	452	1242	1292	0.33	0.35	A	A
4	MARYLAND AVE. NE	G ST. NE- BENNING RD.	NORTH	MA	324	754	422	736	0.77	1.02	C	E

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TABLE ____
CUTLINE C
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES		LINK CAPACITY		VOLUME-TO-CAPACITY (V/C) RATIO		LEVEL OF SERVICE	
					AM	PM	AM	PM	AM	PM	AM	PM
5346	RFK STADIUM RD (C ST NE)	YOUNG BR. SB PERIPHERAL RD	SOUTH	FWY	4177*	1390*	4819	4819	0.87	0.29	E	C
5094	21st ST NE (SB PERIPHERAL RD.)	C ST. NE & CAPITOL ST	SOUTH	MA	1162*	1697*	3726	3726	0.85	0.45	C	A
462	17TH ST NE	CONSTITUTION- A ST. NE	NORTH	MA	101	86	2195	2195	0.05	0.04	A	A
364	15TH ST. NE	CONSTITUTION- A ST NE	NORTH	COL	230	395	835	835	0.28	0.47	A	A
395	19TH ST. NE	A ST NE CONSTITUTION	SOUTH	COL	271*	340*	2335	2335	0.12	0.15	A	A
4035	N. CAROLINA AVE.	14TH ST. NE 13TH ST. NE	SOUTHWEST	COL	176*	106*	2211	2211	0.08	0.05	A	A
4021	N. CAROLINA AVE	13TH ST. NE 11TH ST NE	NORTHEAST	COL	7	55	623	623	0.01	0.09	A	A
242	11TH ST NE	CONSTITUTION- A ST NE	SOUTH	MA	105	599	522	911	0.18	0.66	A	B
679	MASSACHUSETTS AVE	8TH ST NE 9TH ST NE	SOUTHEAST	MA	260*	170*	2078	2078	0.13	0.08	A	A
677	MASSACHUSETTS AVE	9TH ST NE 8TH ST NE	NORTHWEST	MA	190*	580*	648	648	0.29	0.90	A	D-E
[illegible]	8TH ST NE	MASS AVE - A ST. NE	SOUTH	COL	190	36	754	754	0.25	0.05	A	A
82	6TH ST. NE	A ST NE - CONSTITUTION	NORTH	MA	410	549	456	550	0.90	1.00	D	E
60	4TH ST NE	CONSTITUTION - A ST. NE	SOUTH	MA	753	932	2195	2335	0.34	0.40	A	A
34	2ND ST NE	CONSTITUTION- A ST. NE	SOUTH	MA	72	281	919	919	0.08	0.31	A	A
35	2ND ST. NE	A ST NE - CONSTITUTION	NORTH	MA	359	251	400	400	0.29	0.63	D	B
423	17TH ST NE	A ST NE E. CAPITOL ST.	SOUTH	MA	810	1214	3506	3506	0.23	0.35	A	A

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TABLE ____
CUTLINE D
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES		LINK CAPACITY		VOLUME-TO-CAPACITY (V/C) RATIO		LEVEL OF SERVICE	
					AM	PM	AM	PM	AM	PM	AM	PM
2006	MINNESOTA AVE.	B ST. SE - ELY PL	SOUTH	MA	291 *	6-9 *	633	633	0.46	1.06	A	E
2007	MINNESOTA AVE.	ELY PL. - B ST. SE	NORTH	MA	504	456	1579	1579	0.32	0.29	A	A
2254	ANACOSTIA FWY.	YOUNG BR - BR. SOS	SOUTH	FWY	2243	2082	3643	3643	0.62	0.57	D	D
2255	ANACOSTIA FWY.	BR. SOS - YOUNG BR.	NORTH	FWY	2167	2324	3643	3643	0.59	0.64	D	D
1418	19TH ST SE	BAY ST - INDEPENDENCE	NORTH	MA	223	291 *	2320	1344	0.10	0.66	A	D
1380	17TH ST. SE	INDEPENDENCE - BAY ST.	SOUTH	MA	900	699	2335	2335	0.38	0.30	A	A
1706	MASSACHUSETTS AVE.	15TH ST. SE - 16TH ST. SE	SOUTHEAST	COL	163	8	535	714	0.30	0.01	A	A
1707	MASSACHUSETTS AVE.	16TH ST SE - 15TH ST. SE	NORTHWEST	COL	29	13	1927	1746	0.02	0.01	A	A
1678	KENTUCKY AVE.	13TH ST SE - S. CAROLINA	SOUTHEAST	COL	126	12	576	529	0.21	0.02	A	A
1671	KENTUCKY AVE	S. CAROLINA - 13TH ST. SE	NORTHWEST	COL	11	13	1242	1242	0.01	0.01	A	A
1304	11TH ST SE	INDEPENDENCE - C ST. SE	SOUTH	MA	297 *	371 *	618	629	0.46	0.59	A	A
1225	11TH ST SE	C ST. SE - INDEPENDENCE	NORTH	MA	114	202 *	501	501	0.23	0.40	A	A
790	8TH ST. SE	INDEPENDENCE - C ST. SE	SOUTH	COL	292	183	919	919	0.32	0.20	A	A
791	8TH ST. SE	C ST. SE - INDEPENDENCE	NORTH	COL	121	36	400	400	0.30	0.09	A	A
1885	S. CAROLINA AVE	7TH ST. SE - 6TH ST. SE	SOUTHWEST	COL	199	261	600	600	0.33	0.43	A	A
1884	S. CAROLINA AVE.	6TH ST. SE - 7TH ST. SE	NORTHEAST	COL	63	350 *	198	1074	0.08	0.33	A	A
946	6TH ST SE	S. CAROLINA - INDEPENDENCE	NORTH	MA	351	[illegible]	577	456	0.61	0.70	B	D
906	4TH ST. SE	INDEPENDENCE - PENN. AVE.	SOUTH	MA	[illegible] *	792	693	776	0.71	0.90	C	D
1010	PENNSYLVANIA AVE.	INDEPENDENCE - 3RD ST. SE	SOUTHEAST	PA	1375 *	1525	1620	1646	0.85	0.93	A	D-E
1011	PENNSYLVANIA AVE.	3RD ST SE - INDEPENDENCE	NORTHWEST	PA	1334 *	[illegible] *	2812	1583	0.57	0.33	A	A
858	2ND ST. SE	INDEPENDENCE - C ST SE	SOUTH	MA	[illegible] *	[illegible] *	[illegible]	403	0.21	0.26	A	A
859	2ND ST. SE	C ST. SE - INDEPENDENCE	NORTH	MA	[illegible] *	140 *	[illegible]	400	0.15	0.35	A	A
1338	15TH ST. SE	C ST. SE - MASS. AVE	NORTH	COL	0	221	40	400	0.24	0.55	A	A
882	3RD ST SE	IND. - PENN	SOUTH	LOCAL	[illegible] *	[illegible] *	400	502	-	-	-	-
883	3RD ST SE	PENN - IND.	NORTH	LOCAL	[illegible] *	157	402	562	0.27	0.30	A	A

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TABLE ____
CUTLINE E
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES		LINK CAPACITY		VOLUME-TO-CAPACITY (V/C) RATIO		LEVEL OF SERVICE	
					AM	PM	AM	PM	AM	PM	AM	PM
2028	MINNESOTA AVE.	28TH ST. SE - L'ENFANT SQ	SOUTHWEST	MA	503	511	2000	2000	0.25	0.25	A	A
2029	MINNESOTA AVE.	L'ENFANT SQ - 28TH ST SE	NORTHEAST	MA	693	751	1242	1242	0.56	0.60	A	B
5058	ANACOSTIA FWY.	BR. 505 - PENN. AVE	SOUTHWEST	FWY	2082	2072	3343	3343	0.62	0.57	D	D
5059	ANACOSTIA FWY.	PENN. AVE - BR 505	NORTHEAST	FWY	2167	2327	3343	3643	0.59	0.64	D	D
1669	POTOMAC AVE.	19TH ST. - 18TH ST. SE	SOUTHWEST	MA	37	105	456	420	0.08	0.26	A	A
1669	POTOMAC AVE	18TH ST - 19TH ST SE	NORTHEAST	MA	-	412	2211	2211	0.14	0.19	A	A
1719	MASSACHUSETTS AVE	19TH ST. - 18TH ST. SE	NORTHWEST	COL	57	216	2078	2078	0.03	0.10	A	A
1718	MASSACHUSETTS AVE	18TH ST - 19TH ST SE	SOUTHEAST	COL	444	164	507	1125	0.21	0.39	B	A
1969	INDEPENDENCE AVE	18TH ST - 19TH ST. SE	EAST	PA	914	1400	769	1499	0.48	1.27	A	F
625	C ST. NE	19TH ST - 18TH ST. NE	WEST	PA	2772	490	3614	3614	0.77	0.14	C	A
624	C ST NE	18TH ST. - 19TH ST. NE	EAST	PA	343	1189	1652	1452	0.21	0.82	A	D
3075	BENNING RD.	19TH ST. - 18TH ST NE	WEST	PA	2420	271	3217	3217	0.77	0.27	C	A
1	BENNING RD.	18TH ST. - 19TH ST NE	EAST	PA	545	1908	2858	3340	0.19	0.63	A	B
735	E. CAPITOL ST	19TH ST. - 18TH ST. NE	WEST	COL	1743	552	3316	3316	0.54	0.17	A	A
732	E. CAPITOL ST.	18TH ST. - 19TH ST. NE	EAST	COL	352	379	3316	33-	0.11	0.11	A	A

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TABLE ____
CUTLINE F
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES AM	MICRO-ASSIGN. VOLUMES PM	LINK CAPACITY AM	LINK CAPACITY PM	VOLUME-TO-CAPACITY (V/C) RATIO AM	VOLUME-TO-CAPACITY (V/C) RATIO PM	LEVEL OF SERVICE AM	LEVEL OF SERVICE PM
1908	MINNESOTA AVE.	NAYLOR - S ST. SE	SOUTHWEST	MA	162	272	410	410	0.40	0.73	A	C
1909	MINNESOTA AVE.	S ST. SE - NAYLOR	NORTHEAST	MA	[illegible]	495	554	554	0.49	0.89	A	D
2204	ANACOSTIA FWY.	PENN. AVE - 11TH ST BR	SOUTHWEST	FWY	[illegible]	1876	3043	3043	0.73	0.51	C	A
2205	ANACOSTIA FWY.	11TH ST. BR. - PENN AVE.	NORTHEAST	FWY	5[illegible]	[illegible]	3425	3425	0.60	0.69	A	B
5172	SOUTHEAST FWY	PENN. AVE - 11TH ST BR	SOUTHWEST	FWY	[illegible]	670	5465	5465	0.49	0.12	A	A
2270	SOUTHEAST FWY	11TH ST BR - PENN AVE	NORTHEAST	FWY	53	1455	3403	3403	0.32	0.43	A	A
1697	POTOMAC AVE.	13TH ST. - IVES PL SE	SOUTHWEST	MA	[illegible]	244	419	997	0.63	0.25	B	A
1696	POTOMAC AVE.	IVES PL. - 13TH ST SE	NORTHEAST	MA	[illegible]	[illegible]	1003	[illegible]	0.20	0.47	A	A
1678	PENNSYLVANIA AVE	11TH ST - 12TH ST. SE	EAST	PA	[illegible]	1490	1121	2509	0.22	0.58	A	A
1679	PENNSYLVANIA AVE	12TH ST. - 11TH ST. SE	WEST	PA	[illegible]	431	3329	3044	0.42	0.15	A	A
1999	INDEPENDENCE AVE.	11TH ST - 12TH ST. SE	EAST	PA	[illegible]	1132	2195	2195	0.10	0.52	A	A
739	LINCOLN SQ. SO.	11TH ST - 12TH ST. SE	EAST	COL	401	271	2335	2335	0.20	0.12	A	A
706	LINCOLN SQ. NO.	12TH ST. - 11TH ST. NE	WEST	COL	391	177	623	904	0.62	0.20	B	A
698	CONSTITUTION AVE.	11TH ST. - 12TH ST NE	EAST	PA	[illegible]	337	[illegible]	3217	-	0.42	A	A
697	CONSTITUTION AVE.	12TH ST. - 11TH ST. NE	WEST	PA	[illegible]	0	3049	0	0.72	-	C	A
598	C ST NE	12TH ST. - 11TH ST NE	WEST	MA	[illegible]	[illegible]	1613	1613	0.60	0.21	A	A
780	MARYLAND AVE.	11TH ST - 12TH ST NE	NORTHEAST	MA	252	672	1459	1247	0.17	0.54	A	A
781	MARYLAND AVE.	12TH ST. - 11TH ST. NE	SOUTHWEST	MA	930	415	1341	1427	0.69	0.29	B	A

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TABLE ____
CUTLINE G
ALTERNATIVE BASE

LINK NO.	ROADWAY SEGMENT	FROM - TO	DIRECTION	ROADWAY CLASS	MICRO-ASSIGN. VOLUMES AM	MICRO-ASSIGN. VOLUMES PM	LINK CAPACITY AM	LINK CAPACITY PM	VOLUME-TO-CAPACITY (V/C) RATIO AM	VOLUME-TO-CAPACITY (V/C) RATIO PM	LEVEL OF SERVICE AM	LEVEL OF SERVICE PM
5181	ANACOSTIA FWY.	DOUGLASS BR. - 11TH ST. BR	NORTH	FWY	1612*	4434*	5465	5465	0.48	0.81	D	D-E
5180	ANACOSTIA FWY.	11TH ST BR. - DOUGLASS BR.	SOUTH	FWY	3174*	4391*	5465	5465	0.58	0.25	D	D-E
1769	M ST. SE	N.J. AVE - 2ND ST. SE	EAST	MA	902*	1563*	3217	3217	0.28	0.49	A	A
1768	M ST. SE	2ND ST. SE - N.J. AVE.	WEST	MA	1672*	796*	2165	2165	0.50	0.41	A	A
2109	SOUTHEAST FWY.	I-395 - VIRGINIA AV. (RAMP)	NORTHEAST	FWY	2370*	4879	5465	5465	0.43	0.89	C	D-E
2176	SOUTHEAST FWY.	3RD ST. RAMP - I-395	SOUTHWEST	FWY	6462	2105*	7236	7286	0.89	0.29	D-E	C
1075	NORTH CAROLINA AVE	1ST ST. - 2ND ST. SE	SOUTHWEST	COL	1	4	693	693	0.01	0.01	A	A
1073	NORTH CAROLINA AVE.	2ND ST. - 1ST ST SE	NORTHEAST	COL	6	57	403	403	0.01	0.14	A	A
994	INDEPENDENCE AVE.	1ST ST - 2ND ST. SE	EAST	PA	455*	2011	2566	2840	0.18	0.71	A	A
~~995~~	~~INDEPENDENCE AVE.~~	~~2ND ST. - 1ST ST SE~~	~~WEST~~	~~PA~~								
156	EAST CAPITOL ST.	1ST ST - 2ND ST. SE	EAST	COL	105	430	1015	1247	0.10	0.34	A	A
157	EAST CAPITOL ST.	2ND ST. - 1ST ST. NE	WEST	COL	1273	394	2078	2078	0.61	0.19	B	A
28	CONSTITUTION AVE.	1ST ST. - 2ND ST. NE	EAST	PA	367	1399	1534	1576	0.24	0.89	A	A
29	CONSTITUTION AVE	2ND ST. - 1ST ST. NE	WEST	PA	1979	270	1605	1506	1.23	0.18	F	A

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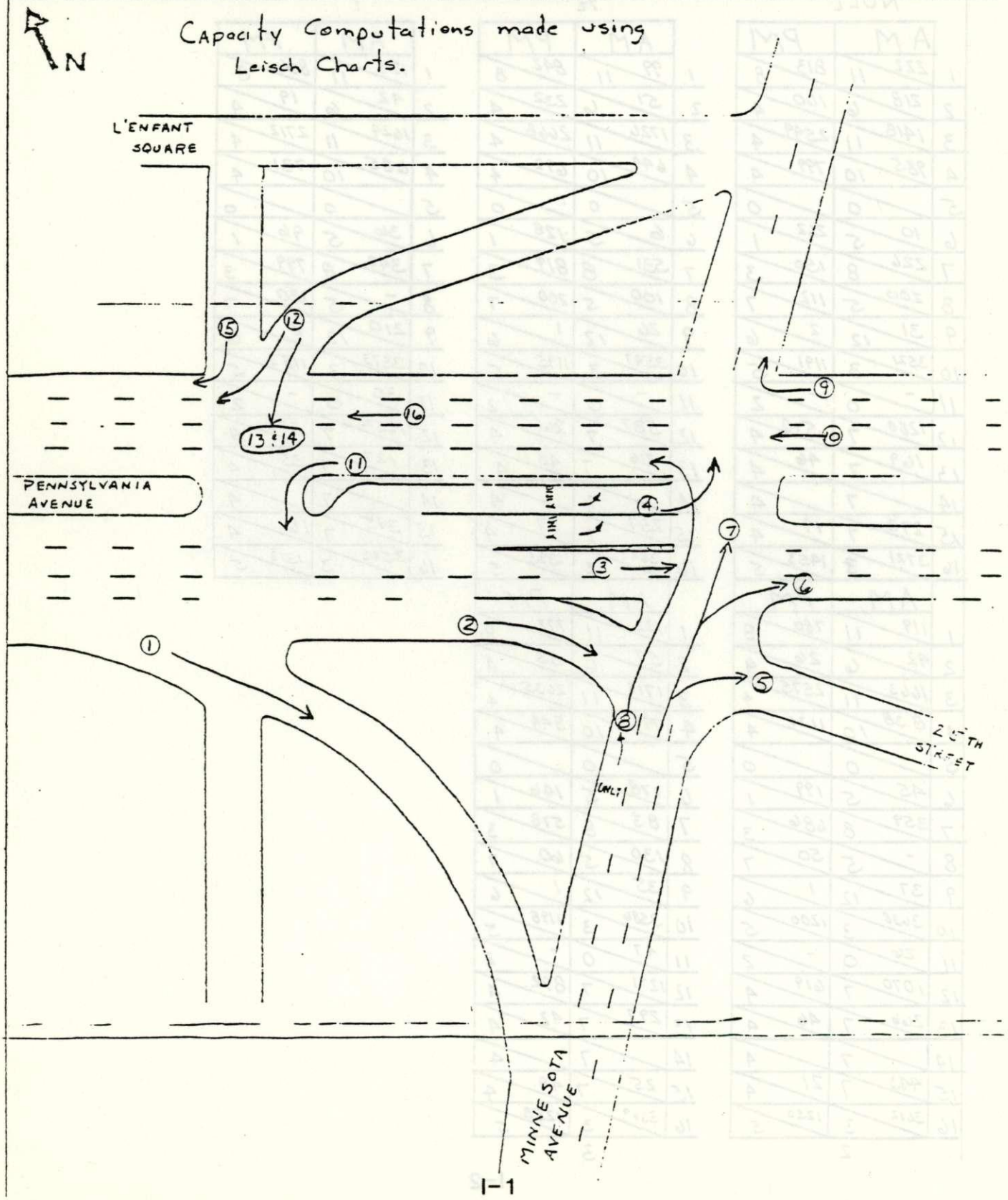
APPENDIX I
DETAILED CAPACITY ANALYSES
ALL FOUR - IDENTIFIED TYPE PROBLEM LOCATIONS

PARSONS, BRINCKERHOFF, QUADE & DOUGLAS, Inc.
COMPUTATION SHEET

Page ... of ... 16[illegible]
Made by P.A. Carris
Date 1/18/83
Checked by ...
Date ...

Subject Barney Circle
Intersection Capacity Computations



Parsons Brinckerhoff **Computation Sheet**

Subject: BARNEY CIRCLE
TRAFFIC VOLUMES by Alternative

Page ____ of ____
Made by: P. Carris
Date: 1/17/93
Checked by: ____
Date: ____

NULL

	AM		PM	
1	222	11	813	8
2	218	6	160	4
3	1418	11	2549	4
4	985	10	799	4
5		0		0
6	10	5	262	1
7	226	8	150	3
8	200	5	112	7
9	31	12	2	6
10	3521	3	1191	5
11	-	0	-	2
12	1280	7	510	4
13	169	7	46	4
14		7		4
15	272	7	19	4
16	3721	3	1453	5

	AM		PM	
1	119	11	780	8
2	42	6	26	4
3	1663	11	2575	4
4	838	10	1131	4
5		0		0
6	45	5	199	1
7	359	8	686	3
8	-	5	50	7
9	37	12	1	6
10	3638	3	1200	5
11	26	0	-	2
12	1070	7	619	4
13	266	7	46	4
14		7		4
15	443	7	21	4
16	3612	3	1250	5

2

½

	AM		PM	
1	99	11	842	8
2	51	6	232	4
3	1726	11	2668	4
4	644	10	692	4
5		0		0
6	6	5	128	1
7	531	8	819	3
8	100	5	200	7
9	26	12	1	6
10	3547	3	1195	5
11	-	0	-	2
12	587	7	261	4
13	216	7	40	4
14		7		4
15	257	7	17	4
16	3647	3	1395	5

	AM		PM	
1	122	11	778	8
2	57	6	38	4
3	1712	11	2635	4
4	799	10	849	4
5		0		0
6	178	5	146	1
7	83	8	578	3
8	130	5	60	7
9	35	12	1	6
10	3586	3	1198	5
11	47	0	-	2
12	1271	7	892	4
13	297	7	42	4
14		7		4
15	25	7	49	4
16	3667	3	1258	5

3

1

	AM		PM	
1	123	11	806	8
2	42	6	19	4
3	1624	11	2712	4
4	685	10	731	4
5		0		0
6	36	5	96	1
7	342	8	799	3
8	-	5	130	7
9	210	12	2	6
10	3573	3	1183	5
11	30	0	-	2
12	1252	7	372	4
13	127	7	35	4
14		7		4
15	375	7	16	4
16	3543	3	1313	5

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COMPUTATION SHEET

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Subject Barney Circle

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Date 2/25/82

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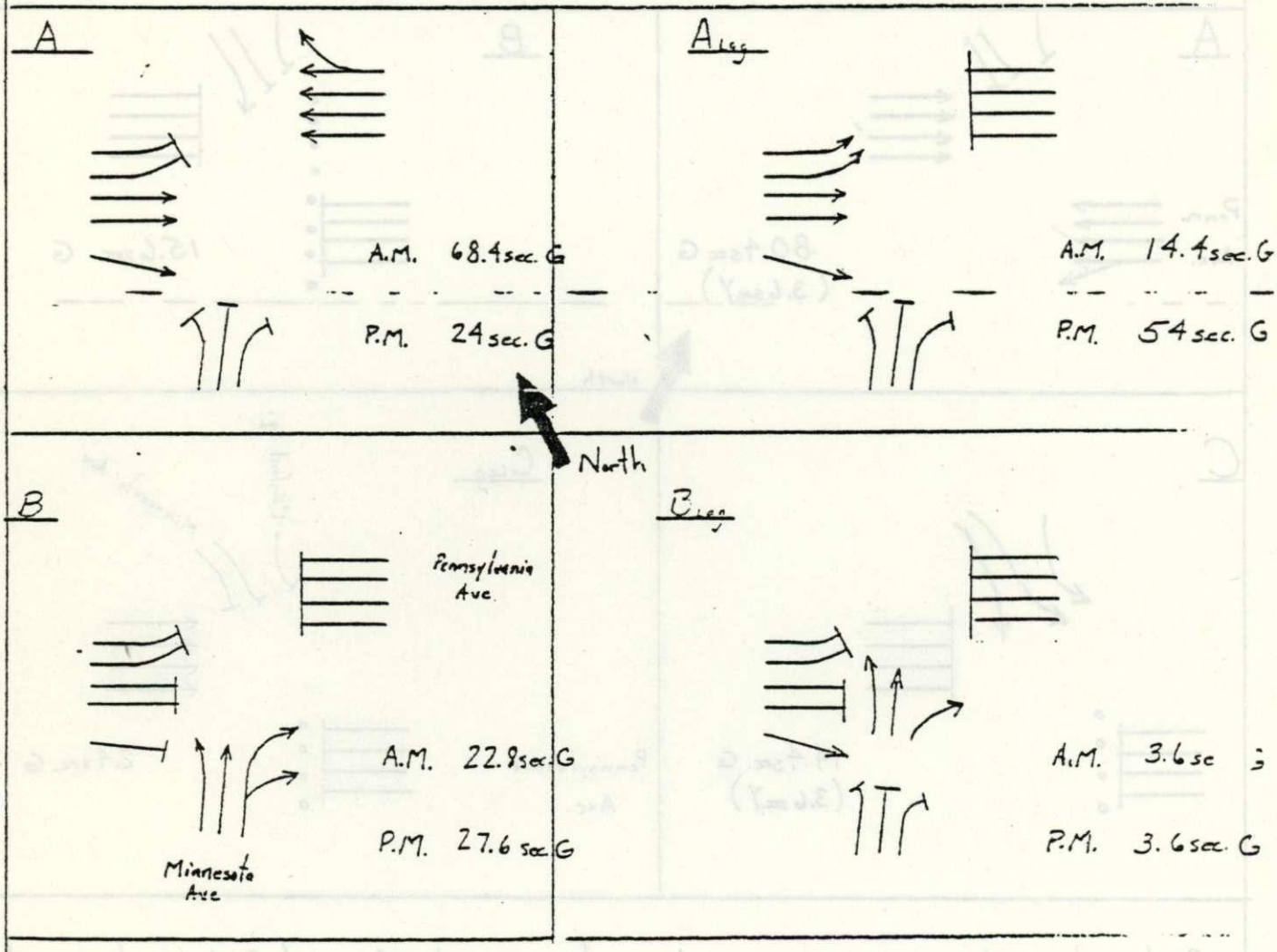
Date 2/25/82

Pennsylvania Avenue & Minnesota Ave. S.E



Cycle length = 120 seconds during A.M. & P.M. peak periods

Y = amber time

G = Green time

PARSONS, BRINCKERHOFF, QUADE & DOUGLAS, Inc.
COMPUTATION SHEET

Subject Barney Circle

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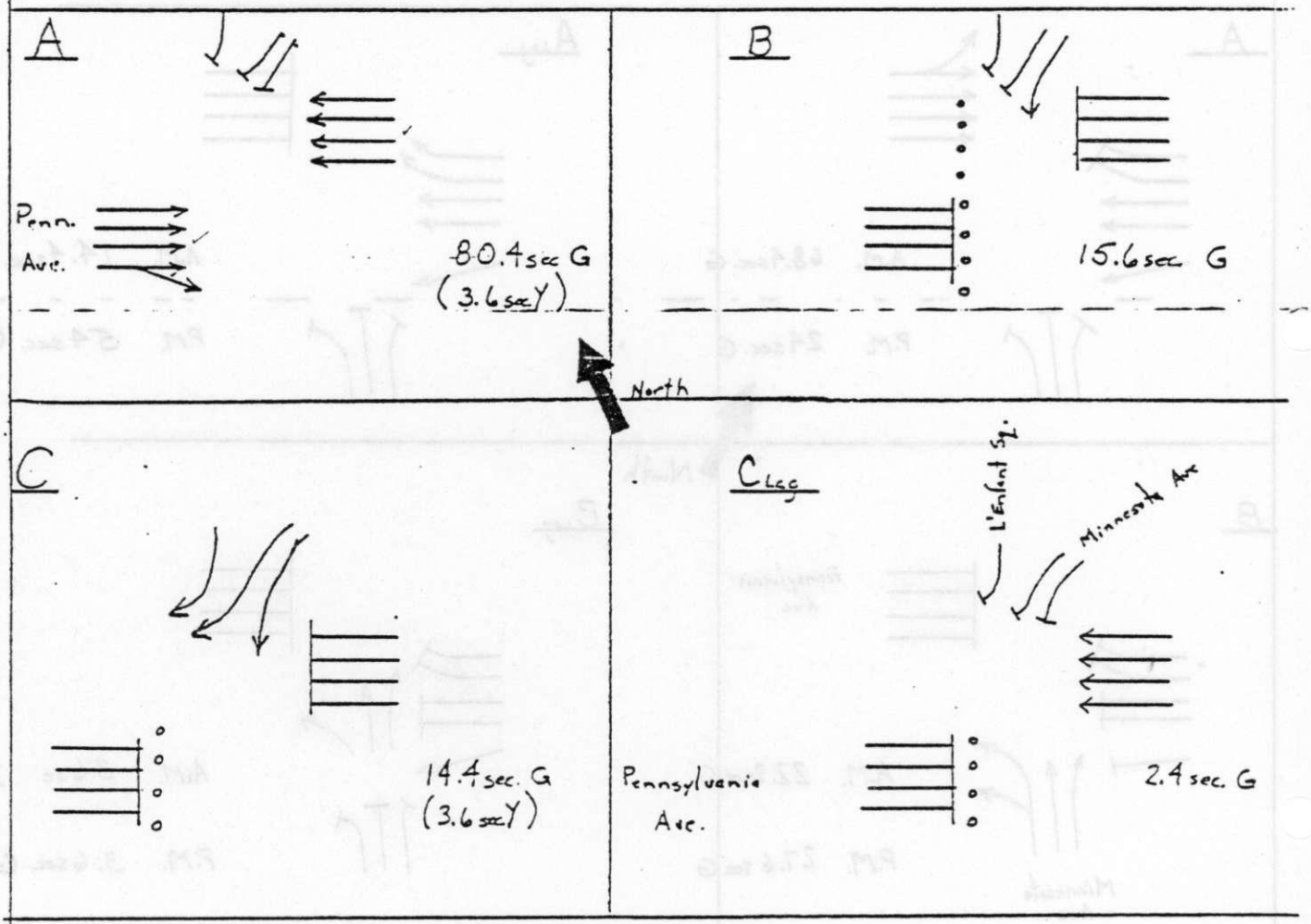
Date 2/25/82
Checked by _____
Date _____

Pennsylvania Ave, S.E. @ L'Enfant Square A.M.



Cycle length = 120 seconds during A.M and PM peak periods

Y: Amber time

G: Green time

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COMPUTATION SHEET

Subject Barney Circle

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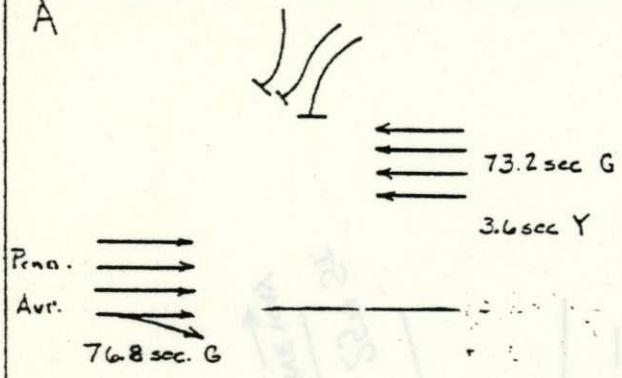
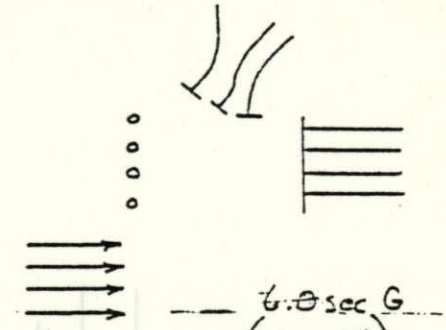
Pennsylvania Ave., S.E. @ L'Enfant Square P.M.

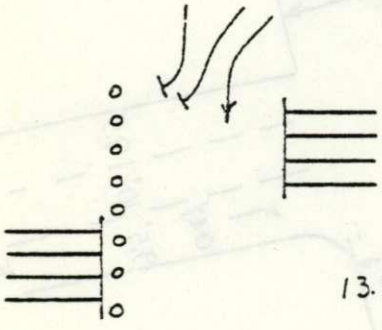
A



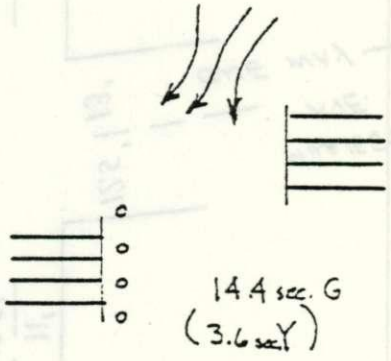
A Lag



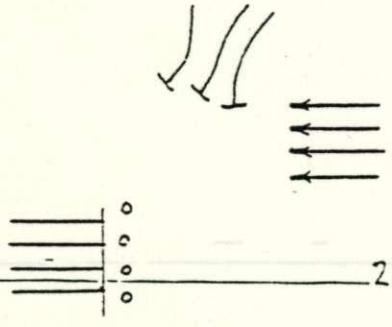
B



B Lag



C



Y = amber time
G = green time

Cycle Length = 120 seconds during A.M. & P.M. peak periods

Parsons Brinckerhoff Computation Sheet

Subject FOR PAUL CARRIS – TRANSPORTATION

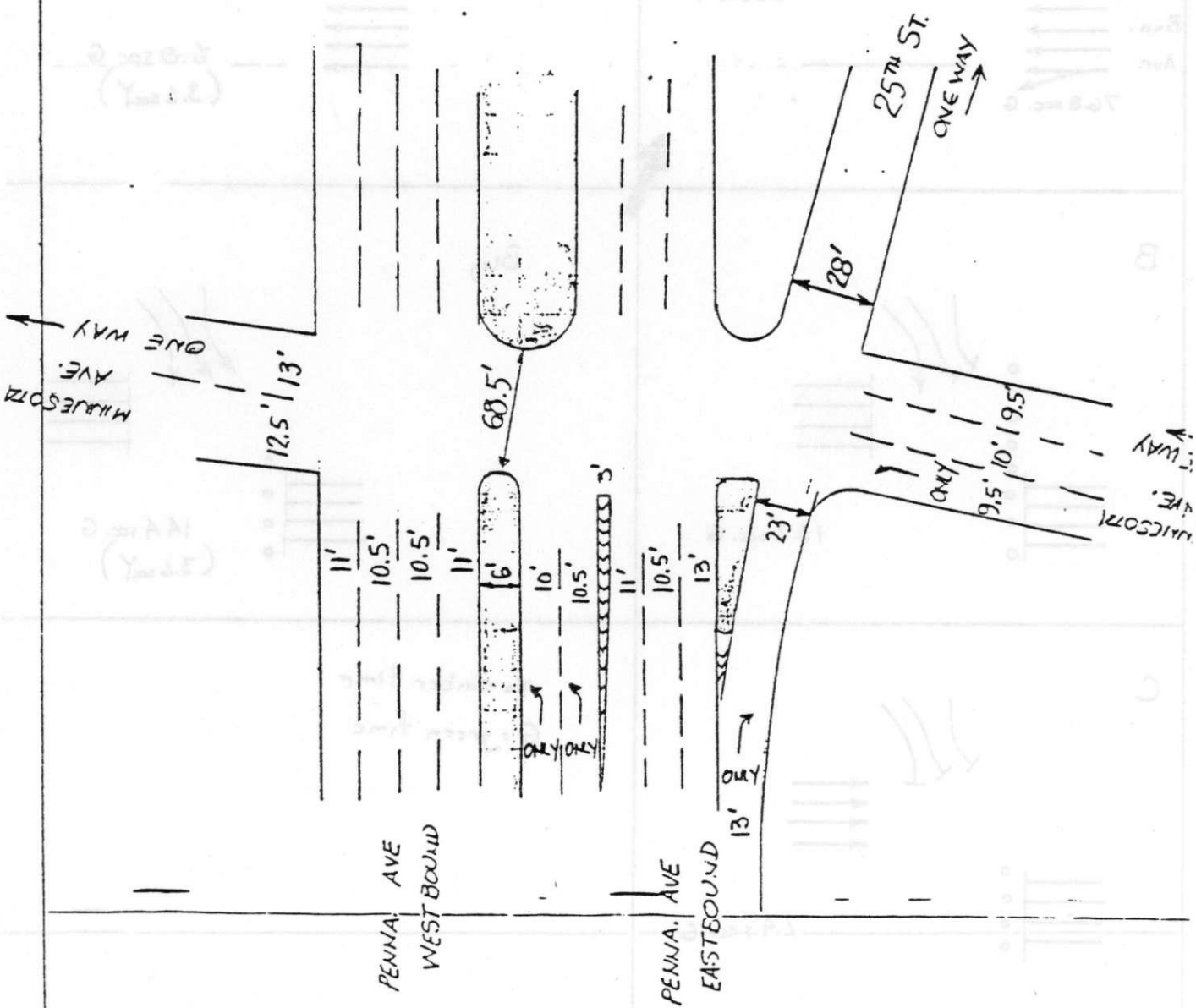
Page 1 of

Made by M. WOLFF

Date 9/16/81

Checked by

Date



PENN. AVE and MINN., S.E.

Penn. Ave. E/B Right Turn Movement ② Chart 17D
Width = 23'
T_r = 6(4)
Ped Int = between I & II
G/C = 0.72 (0.68)

LOS	S.V.
A	640 (620)
B	690 (620)
C	710 (690)
D	850 (830)
E (Capacity)	920 (900)
F	

	Null	Alt ½	Alt 1	Alt 2	Alt. 3
Proj. Vol.	218 (160)	51 (232)	42 (19)	42 (26)	57 (38)
V/C	.24 (.18)	.06 (.26)	.05 (.02)	.05 (.03)	.06 (.04)
LOS	A (A)	A (A)	A (A)	A (A)	A (A)

Parsons Brinckerhoff **Computation Sheet**

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Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

PENN. AVE and MINN. AVE, S.E.

Penn. Ave E/B Thru Chart 7 AM (PM)
Movement ③

Width = 34.5'
T_r = 11% (4)
L_T & R_T = 0 (0)
PHF = .97 (.96)
MP = 1.27 (1.26)
G/C = 0.69 (0.65)

LOS	Service Vol. (SV)	
A	2360	(2390)
B	2410	(2440)
C	2510	(2540)
D	2690	(2720)
E (Capacity)	2810	(2840)
F	—	—

	Null	Alt 1/2	Alt 1	Alt 2	Alt 3
Proj. Vol.	1418 (2549)	1726 (2668)	1624 (2712)	1663 (2575)	1712 (2635)
V/C	.50 (.90)	.61 (.94)	.58 (.95)	.59 (.91)	.61 (.93)
LOS	A (D)	A (D)	A (D)	A (D)	A (D)

Parsons Brinckerhoff **Computation Sheet**

Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

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PENN AVE and MINN AVE, S.E.

Penn Ave E/B Left Turn - Movement ④ Charts 18A & 22

18A Width = 20.5'
T_r = 10 (4)
G/C = 0.12 (0.45)
Design Capacity (LOS-C) = 100 (380)

22 Δ Turning $\measuredangle$ = < 90°
W_E - entrance width = 25.5'

Design Capacity of double left

	LOS
180 (540)	A
180 (540)	B
200 (600)	C
240 (720)	D
260 (780)	E (Capacity)
	F

	Null	Alt. 1/2	Alt. 1	Alt. 2	Alt. 3
Proj. Vol	985 (799)	644 (692)	685 (731)	838 (1131)	799 (844)
v/c	3.79 (1.02)	2.48 (0.89)	2.63 (0.94)	3.22 (1.45)	3.07 (1.08)
LOS	F (E-F)	F (C)	F (D)	F (F)	F (F)

Parsons Brinckerhoff **Computation Sheet**

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Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

PENN AVE and MINN AVE, S.E.

Minnesota Ave N/B - Thru + Right Movements (5,6 & 7) Chart 7
AM (PM)

Width = 19.5'
T_r = 8 (3)
R_T = Null 4 (64) L_T = 0 (0)
Alt. 1/2 1 (14)
Alt. 1 10 (11)
Alt. 2 11 (22)
Alt. 3 68 (20)
MP = 1.26 (1.25)
G/C = 0.22 (0.26)

LOS	SV				
	Null	Alt 1/2	Alt. 1	Alt 2	Alt. 3
A	456 (494)	456 (532)	437 (537)	437 (523)	390 (523)
B	466 (504)	466 (543)	446 (548)	446 (534)	398 (534)
C	480 (520)	480 (560)	460 (565)	460 (550)	410 (550)
D	538 (582)	538 (627)	515 (633)	515 (616)	459 (616)
(Capacity) E	552 (598)	552 (644)	529 (650)	529 (633)	472 (633)
F					

	Null	Alt 1/2	Alt. 1	Alt 2	Alt 3
Proj Vol	236 (412)	537 (947)	378 (895)	404 (885)	261 (724)
V/C	.43 (.69)	.97 (1.47)	.71 (1.38)	.76 (1.40)	.55 (1.14)
LOS	A (A)	C-D (F)	A (F)	A (F)	A (F)

Parsons Brinckerhoff **Computation Sheet**

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Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

PENN. AVE. and MINN. AVE., S.E.

Minn. Ave. N/B Left Turn - Movement ⑧ Chart 18A AM(PM)

Width = 10'
T_r = 5(7)
G/C = 0.22 (0.26)

LOS	S.V.
A	145 (170)
B	145 (170)
C	160 (190)
D	190 (230)
E (Capacity)	210 (245)
F	

	Null	Alt 1/2	Alt 1	Alt 2	Alt 3
Proj. Vol.	200 (112)	100 (200)	- (130)	- (50)	130 (60)
v/c	.95 (.46)	.48 (.82)	- (0.53)	- (.20)	.62 (.24)
LOS.	E (A)	A (D)	A (A)	A (A)	A (A)

Parsons Brinckerhoff **Computation Sheet**

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Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

PENN AVE and MINN AVE, S.E.

Penn Ave. w/b Thru + Rt Movements (9) & (10) Chart 7

AM (PM)

Width = 43'
T_T = 3 (5)
L_T = 0 (0)
R_T = Null 1 (0)
Alt 1/2 1 (0)
Alt 1 6 (0)
Alt 2 1 (0)
Alt 3 1 (0)
PHF = 0.97 (0.96)
MP = 1.27 (1.26)
G/C = 0.57 (0.20)

LOS	SV (Null, 1/2, 2, 3)	SV (Alt. 1)
A	2440 (850)	↑
B	2500 (865)	
C	2600 (900)	same
D	2830 (980)	
E (Capacity)	2950 (1030)	↓
F		

	Null	Alt. 1/2	Alt 1	Alt. 2	Alt. 3
Proj. Vol.	3552 (1193)	3573 (1196)	3783 (1185)	3675 (1201)	3621 (1199)
V/C	1.2 (1.16)	1.21 (1.16)	1.28 (1.15)	1.25 (1.17)	1.23 (1.16)
LOS	F (F)	F (F)	F (F)	F (F)	F (F)

Parsons Brinckerhoff **Computation Sheet**

Subject BARNEY CIRCLE TRAFFIC CAPACITY ANALYSIS

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PENN. AVE. and MINN. AVE, S.E

Minn Ave S/B (turn off towards Penn) Chart 18 AM (PM)
Movement (12)
Width: 12' (estimated from photos)
T_r = 7 (4)
q = 12'
G/C = 0.12 (0.12)

LOS	SV.		
A	126 (135)	increase by 10% due to ease of r.t. maneuver	139 (149)
B	126 (135)		139 (149)
C	140 (150)		154 (165)
D	168 (180)		185 (198)
E (Capacity)	182 (195)		200 (215)
F			

	Null	Alt 1/2	Alt 1	Alt 2	Alt 3
Proj. Vol.	1280 (510)	587 (261)	1252 (372)	1070 (619)	1271 (892)
v/c	6.4 (2.37)	2.94 (1.21)	6.26 (1.73)	5.35 (2.88)	6.36 (4.15)
LOS	F (F)	F (F)	F (F)	F (F)	F (F)

	BASE (Exist)
Actual Vol.	454 (252)
v/c	2.27 (1.17)
LOS	F (F)

Parsons Brinckerhoff **Computation Sheet**

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Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

PENN AVE. and MINN AVE. S.E.

MINN AVE S/B (across Penn Ave.) Chart 18B AM (PM)
Movement (13:14)
Width = 12'
T_r = 7 (4)
G/c = 0.25 (0.23)

LOS	SV
A	261 (279)
B	261 (279)
C	290 (310)
D	348 (372)
E (Capacity)	377 (403)
F	

	Base (Exist)	Null	Alt. 1/2	Alt 1	Alt 2	Alt 3
Proj. Vol.	163 (326)	169 (46)	216 (40)	127 (35)	266 (96)	297 (42)
v/c	043 (.81)	.45 (.11)	.57 (.10)	.34 (.10)	.71 (.11)	.79 (.10)
LOS	A (D)	A (A)	A (A)	A (A)	C (A)	D (A)

Parsons Brinckerhoff **Computation Sheet**

Subject BARNEY CIRCLE TRAFFIC CAPACITY ANALYSIS

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PENN AVE & MINN. AVE, S.E.

L'ENFANT S/B (Right turn only) Chart 18A Movement (15)
AM (PM)

Width = 12'
T_c = 7 (4)
G/c = 0.12 (0.12)

LOS	S.V.
A	108 (113)
B	108 (113)
C	120 (125)
D	144 (150)
E (Capacity)	156 (163)
F	

	Base (Exist.)	Null	Alt 1/2	Alt. 1	Alt 2	Alt 3
Proj. Vol.	219 (31)	272 (19)	257 (17)	375 (16)	443 (21)	25 (49)
v/c	1.40 (.19)	1.74 (.12)	1.65 (.10)	2.40 (.10)	284 (.13)	.16 (.30)
LOS	F (A)	F (A)	F (A)	F (A)	F (A)	A (A)

Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

PENN AVE and MINN. AVE., S.E.

PENN AVE W/B Movement (16) AM (PM) Chart 7

Width = 43'
T_T = 3 (5)
R_T = 0 (0)
L_T = Null, Alt 1/2 = 0 (0)
Alt 3, Alt. 1, Alt 2 = 1 (0)
G/C = 0.69 (0.61)

L.O.S.	S.V.
A	2961 (2632)
B	3024 (2688)
C	3150 (2800)
D	3434 (3052)
E (Capacity)	3569 (3172)

	Base	Null	Alt 1/2	Alt 1	Alt. 2	Alt. 3
Proj. Vol (or Exist.)	3583 (1446)	3721 (1453)	3647 (1395)	3543 (1313)	3612 (1250)	3669 (1258)
V/C	1.00 (.46)	1.04 (.46)	1.02 (.44)	0.99 (.41)	1.01 (.39)	1.03 (.40)
LOS	E-f (A)	F (A)	F (A)	E (A)	F (A)	F (A)

Parsons Brinckerhoff **Computation Sheet**

Subject BARNEY CIRCLE
TRAFFIC CAPACITY ANALYSIS

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MOVEMENT	Null		Alt. 1/2		Alt. 1		Alt. 2		Alt. 3	
PENN. @ MINN. and L'ENFANT SQ.	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Penn. Ave. E/B - Right Turn to 25th Street	A	A	A	A	A	A	A	A	A	A
Penn Ave. E/B - Through	A	D	A	D	A	D	A	D	A	D
Penn Ave E/B - Left Turn to Minnesota Ave	F	E-F	F	C	F	D	F	F	F	
Minn. Ave. N/B - Through + Right Turn Traffic	A	A	C-D	F	A	F	A	F	A	F
Minn. Ave. N/B - Left Turn to Penn W/B	E	A	A +	D	A +	A	A +	A	A +	A
Penn. Ave. W/B - Through + Right Turn Traffic	F	F	F	F	F	F	F	F	F	F
Minn. Ave. S/B (X off to meet L'ENFANT @ Penn)	F	F	F	F	F	F	F	F	F	F
Minn. Ave. S/B - across Penn west of Minnesota N/B	A	A	A	A	A	A	C	A	D	A
L'Enfant Sq. S/B to Penn Ave. W/B.	F	A	F	A	F	A	F	A	A	
Penn Ave. W/B @ L'Enfant Square. (west of Minn.)	F	A	F	A	E	A	F	A	F	A

Parsons Brinckerhoff **Computation Sheet**

Subject: Bladensburg Rd / Md. Ave Intersection Analysis

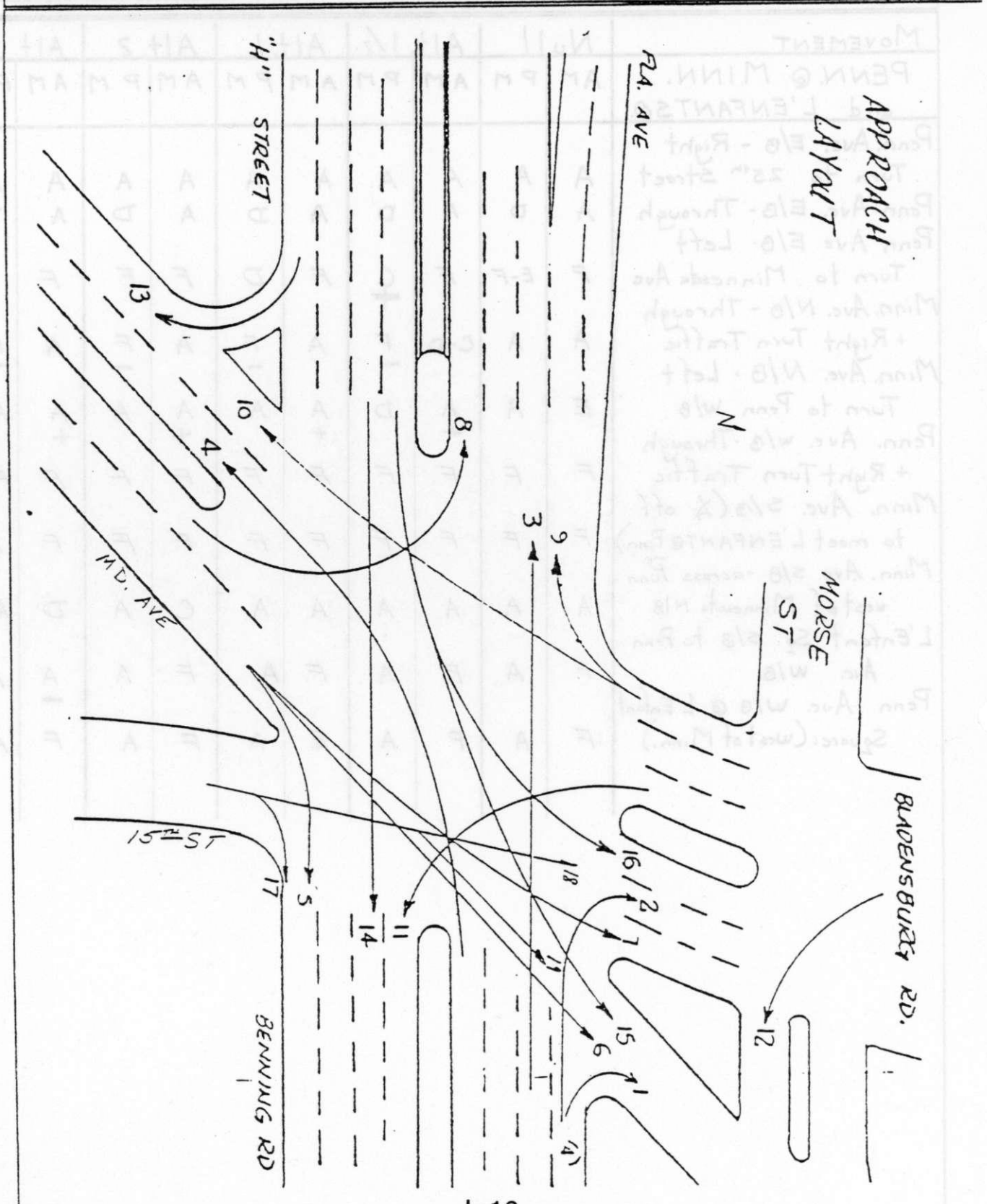
Page 1 of 2

Made by: S. Scalici

Date: 1-17-83

Checked by:

Date:



Parsons Brinckerhoff **Computation Sheet**

Subject _____

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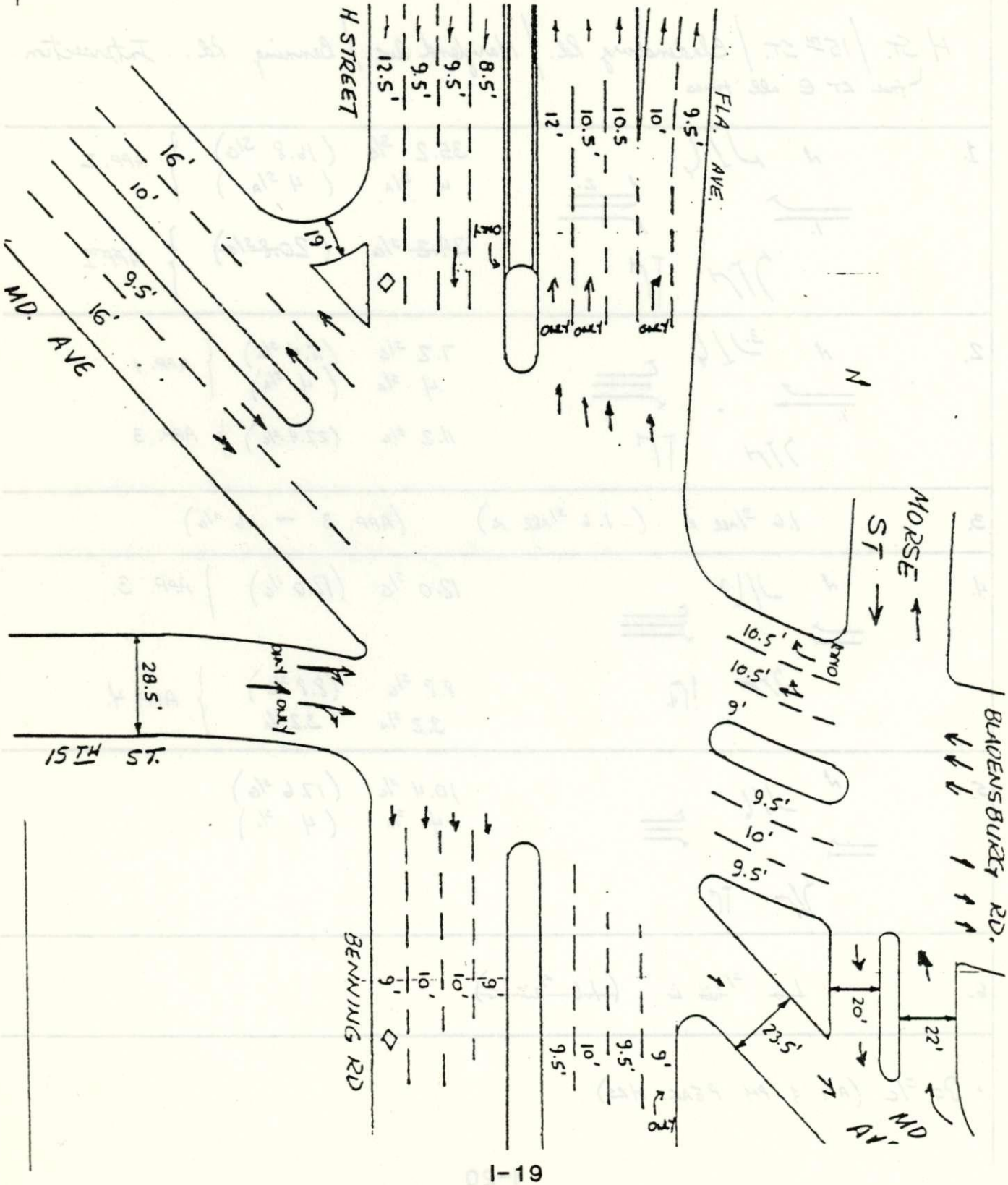
Made by S. Scalia

Date 1-17-83

Checked by _____

Date _____



Parsons Brinckerhoff Computation Sheet

Page 1 of 1

Made by S. Sabri

Date 3-4-92

Checked by P. Carris

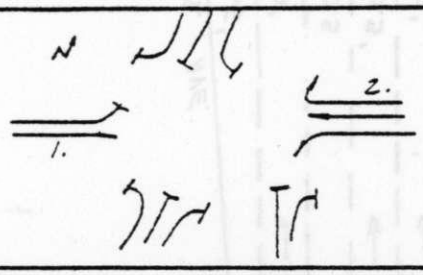
Date 3/5/92

Subject – Intersection Phasing & Signal Timing

H St. / 15th St. / Bladensburg Rd. / Maryland Ave. / Benning Rd. Intersection

└ free LT @ all times

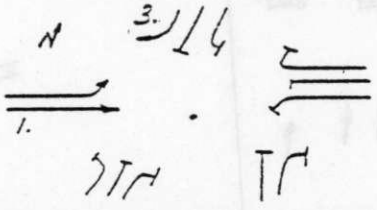
1.



35.2 S/G (16.8 S/G) } APP. 2
4 S/A (4 S/A)

39.2 S/G (20.8 S/G) } APP. 1

2.

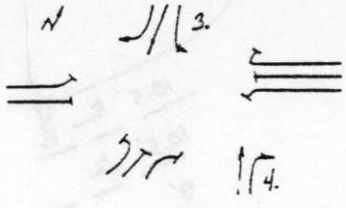


7.2 S/G (12.4 S/G) } APP. 1
4 S/A (4 S/A)

11.2 S/G (22.4 S/G) } APP. 3

3. 1.6 S/ALL R (1.6 S/ALL R) (APP. 3 – 1.6 S/G)

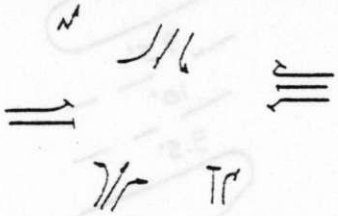
4.



12.0 S/G (12.0 S/G) } APP. 3.

8.8 S/G (8.8 S/G) } APP. 4.
3.2 S/A 3.2 S/A

5.



10.4 S/G (17.6 S/G)
4 S/A (4 S/A)

6. ~~1.6 S/ALL R (1.6 S/ALL R)~~

• 80 S/C (AM & PM PEAK HRS)

Parsons Brinckerhoff Computation Sheet

Page 1 of 1

Subject Research Volumes

Made by S. Calvin

Date 1-17-83

Checked by

Date

ALT.	PK. PERIOD \ HVHT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NULL	AM	56	566	1941	717	0	111	259	351	198	1206	618	NA	0	564	0	0
	PM	40	223	950	88	0	116	497	346	336	455	794	NA	0	2116	0	0
1/2	AM	57	578	1825	736	0	93	217	475	239	1145	634	NA	0	541	0	0
	PM	50	282	1002	5	0	170	726	140	325	392	877	NA	0	596	0	0
1	AM	62	622	1926	581	0	125	293	346	221	1076	609	NA	0	632	0	0
	PM	42	236	1092	6	0	167	710	126	320	391	930	NA	0	2124	0	0
2	AM	57	581	1935	557	0	103	240	437	195	1121	742	NA	0	701	0	0
	PM	113	243	1143	27	0	158	675	206	341	346	922	NA	0	2183	0	0
3	AM	46	464	1971	719	0	100	234	468	219	1177	619	NA	0	567	0	0
	PM	52	292	1019	5	0	157	668	176	323	301	971	NA	0	2119	0	0
% TR	AM	0	6.7	5.4	10.0*	8.0	16.3	3.5	0	9.3	6.5	0	NA	0	6.4	0	0
	PM	0	13.9	3.2	0	0	6.7	1.8	0	4.8	7.5	0	NA	16.7	2.4	0	0

		17	18	19
NULL	AM	175	497	—
	PM	226	313	—
1/2	AM	212	399	—
	PM	234	311	—
1	AM	151	485	—
	PM	241	321	—
2	AM	150	494	—
	PM	239	319	—
3	AM	194	403	—
	PM	131	409	—
% TR	AM	6.8	6.8	—
	PM	2.1	2.1	—

Parsons Brinckerhoff **Computation Sheet**

Subject _____

Page 1 of 7

Made by S. Scalia

Date 1-17-83

Checked by _____

Date _____

• Benning Rd. / H St. and Maryland Ave. / Bladensburg Rd. and 15th St.

Movement 1 & 2 (RT from WB Benning Rd) – Chart 18A*
↳ AM (PM) ↳ separate lane

Width = 9'
T_R = 5.9 % (11.8 %)
PHF = 0.93 (0.95)
G/C = 0.44 (0.21)

LOS	Service Volume (SV)
A	315 (145)
B	315 (145)
C	350 (160)
D	420 (195)
E (CAP)	455 (210)

Alternative		Null	1/2	1	2	3
Actual Volume	AM	622	635	684	638	510
	PM	263	332	278	286	344
V/C	AM	1.37	1.40	1.50	1.40	1.12
	PM	1.25	1.58	1.32	1.36	1.64
LOS	AM	F	F	F	F	F
	PM	F	F	F	F	F

* Capacity Analysis Techniques for Design of Signalized Intersections – Bureau of Public Roads (8/67)

• Movements 3 & 4 (WB Thru & LT Movements from WB Banning Rd.) – Chart 3
↳ AM (PM)

Width = 29'
PHF = 0.93 (0.95)
G/C = 0.44 (0.21)
Metro Size Factor = 1.20 (1.21)

Alt	Null	1/2	1	2	3
TL	6.7 (3.0)	6.8 (3.2)	6.5 (3.2)	6.5 (3.2)	6.7 (3.2)
LT	27 (8)	29 (.5)	23 (.5)	22 (2)	27 (.5)
RT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
LOS A	845 (490)	825 (510)	845 (510)	845 (510)	845 (510)
B	875 (505)	850 (530)	875 (530)	875 (530)	875 (530)
C	950 (550)	925 (575)	950 (575)	950 (575)	950 (575)
D	1095 (635)	1065 (660)	1095 (660)	1095 (660)	1095 (660)
E (Cap.)	1150 (665)	1120 (695)	1150 (695)	1150 (695)	1150 (695)
Actual Volume	2658 (1038)	2561 (1007)	2507 (1098)	2492 (1170)	2.690 (1024)
V/C	2.3 (1.6)	2.3 (1.5)	2.2 (1.6)	2.2 (1.7)	2.3 (1.5)
LOS	F (F)	F (F)	F (F)	F (F)	F (F)

• Left Turn Check Chart 17 A & B

V_o	564 (2116)	541 (596)	632 (2124)	701 (2183)	567 (2119)
T_o	6.4 (2.4)	→			
T_3	Same	as	above		
G/C	Same	as	above		

Using Charts 17c/e, a LOS F is also obtained for the turn movements

• Movements 5-8 (LT, Thru, LT from NB Maryland Ave.) – Chart 3

Width = 25.5'
PHF = 0.93 (0.95)
G/C = 0.13 (0.22)
Metro Size Factor = 1.20 (1.21)

Alt	Null	1/2	1	2	3
TR	5(2)	3(2)	4(3)	3(2)	3(2)
LT	49(36)	61(14)	45(13)	56(20)	58(18)
RT	0(0)	0(0)	0(0)	0(0)	0(0)
LOS A	220(375)	220(440)	220(440)	220(400)	220(400)
B	230(330)	230(460)	230(460)	230(415)	230(415)
C	250(425)	250(500)	250(500)	250(450)	250(450)
D	285(485)	285(570)	285(570)	285(515)	285(515)
E	300(510)	300(600)	300(600)	300(540)	300(540)
Actual Volumes	721(959)	785(1036)	764(1003)	780(1039)	802(1001)
V/C	2.4 (1.9)	2.6 (1.7)	2.5 (1.7)	2.6 (1.9)	2.7 (1.9)
LOS	F (F)	F (F)	F (F)	F (F)	F (F)

• Movement 9 (RT from SB Bladensburg Rd.) - Use Chart 17C
↳ AM (PM)

Width = 10.5'
G/C = 0.44 (0.67)
TR = 9.3% (4.8%)

LOS	SERVICE VOLUME (SV)
A	245 (360)
B	245 (360)
C	270 (400)
D	325 (480)
E	350 (520)

Alternative	Nill	1/2	1	2	3
Actual Volume	198(336)	239(325)	221(320)	195(341)	219(323)
V/C	.57(.65)	.68(.63)	.63(.62)	.56(.66)	63(.62)
LOS	A (A)	A (A)	A (A)	A (A)	A (A)

↳ although right & center lanes are available to vehicles, assume all RT veh. will complete their maneuver from the right lane.

Parsons Brinckerhoff **Computation Sheet**

Subject _____

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Made by S. Scalici

Date 1-17-23

Checked by _____

Date _____

- Movements 10 & 11 (SB Thru and Left-Turn Movements from SB Gladesboro Rd.)
  - AM (PM)
  - Use Chart 3

Width = 19.5'
PHF = 0.93 (0.95)
G/C = 0.28 (0.37)
Metro Size Factor = 1.20 (1.21)

Alt	Null	1/2	1	2	3
TL	4(3)	4(2)	4(2)	4(2)	4(2)
LT	34(60)	36(69)	36(72)	40(72)	35(76)
RT	0(0)	0(0)	0(0)	0(0)	0(0)
LOS A	370(500)	370(500)	370(500)	370(500)	370(500)
B	385(525)	385(525)	385(525)	385(525)	385(525)
C	425(575)	425(575)	425(575)	425(575)	425(575)
D	485(655)	485(655)	425(655)	485(655)	485(655)
E	510(690)	510(690)	510(690)	510(690)	50(690)
Actual Volumes	1824(1249)	1779(1269)	1685(1301)	1863(1262)	1796(1272)
V/C	3.6 (1.8)	3.5(1.8)	3.3(1.9)	3.7(1.8)	3.5(1.8)
LOS	F (F)	F (F)	F (F)	F (F)	F (F)

Movement 12 (LT from SB Bladensburg Rd. to Horse St.) does not occur in this intersection

Movement 13 (RT from EB H Street to Maryland Ave.) is a free right-turn movement that actually does not approach this intersection.

Movement 15 & 16 (LT from EB H Street) - There is 0 volume on th intersection approach.

Movement 14 (EB Through movements H Street) - Use Chart 3

%Tr = 6.4 (2.4)
Width = 31.5'
LT/LT = 0
PHF = 0.93 (0.95)
G/C = 0.58 (0.49)
Metro Size Factor = 1.23 (1.25)

LOS	Service Volume (SV)
A	1855 (1690)
B	1895 (1725)
C	1950 (1775)
D	2090 (1900)
E	2185 (1990)

Alt	Null	½	1	2	3
Actual Volume	564(2116)	541(596)	632(2124)	701(2183)	567(2119)
V/C	0.3(1.06)	0.25(0.30)	0.29(1.07)	0.32(1.10)	0.26(1.06)
LOS	A (F)	A (A)	A (F)	A (F)	A (F)

Parsons Brinckerhoff **Computation Sheet**

Subject _____

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Made by S. Scalise

Date 1-17-83

Checked by _____

Date _____

Movements 17-19 (RT & Thru Movements from 15th St.) - Use Chart 3, treat as 2-way Street

Width = 29.5'
PHF = 0.93 (0.95)
G/C = 0.11 (0.11)
% Tr = 6.8% (2.1%)
Metro Size Factor = 1.20 (1.21)

Alt	Null	1/2	1	2	3
LT	0(0)	0(0)	0(0)	0(0)	0(0)
RT	26(42)	35(43)	24(43)	23(43)	32(25)
LOS A	225(270)	225(270)	225(270)	225(270)	225(245)
B	230(275)	230(275)	230(275)	230(275)	230(255)
C	250(300)	250(300)	250(300)	250(300)	250(275)
D	290(345)	290(345)	290(345)	290(345)	290(315)
E (Cap)	300(365)	300(365)	300(365)	300(365)	300(335)
Actual Volume	672(539)	611(545)	636(562)	644(558)	597(547)
V/C	2.3(1.5)	2.0(1.5)	2.1(1.5)	2.2(1.5)	2.0(1.6)
LOS	F(F)	F(F)	F(F)	F(F)	F(F)

Parsons Brinckerhoff **Computation Sheet**

Subject: Level of Service Summary

Page 1 of 1

Made by: S. Scalici

Date: 1-17-83

Checked by:

Date:

Intersection Approach	Level of Service									
	Null		½		1		2		3	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1-2 RT from WB Benning Rd.	F	F	F	F	F	F	F	F	F	F
3-4 WB Thru & LT from WB Benning Rd.	F	F	F	F	F	F	F	F	F	F
5-8 NB Maryland Ave.	F	F	F	F	F	F	F	F	F	F
9 RT from SB Bladensburg Rd.	A	A	A	A	A	A	A	A	A	A
10-11 SB Thru & LT from SB Blad. Rd	F	F	F	F	F	F	F	F	F	F
14 EB H St.	A	F	A	F	A	F	A	F	A	F
17-19 NB Thru & RT from 15th St.	F	F	F	F	F	F	F	F	F	F

Parsons Brinckerhoff **Computation Sheet**

Subject: Weave Section Analysis* - SE Freeway

Page 1 of 4

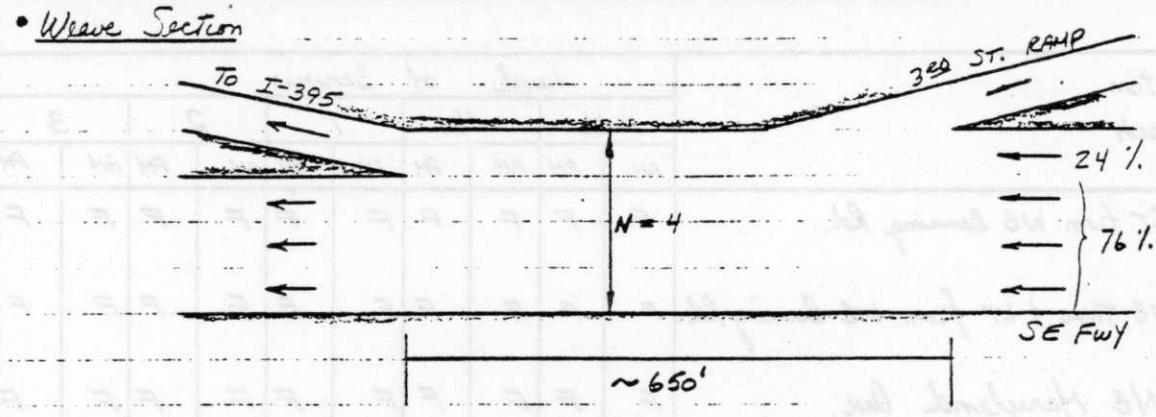
Made by S. Scalici

Date 1-19-83

Checked by A.E. Shaufler

Date 1-28-83

• Weave Section

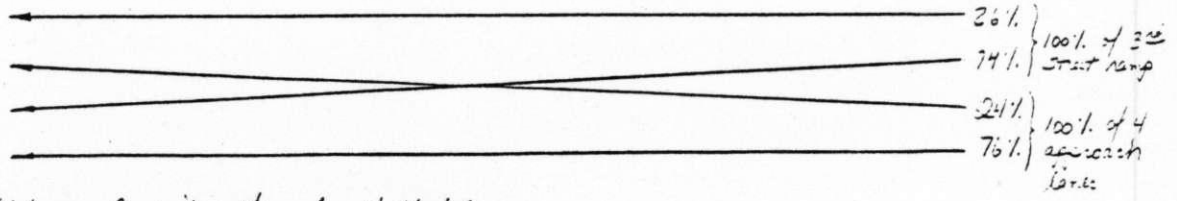


These figures represent an assumed lane distribution based on DC DOT field observations and future traffic projections

$$N = \frac{V + (K-1)W'}{SV}$$

N = # of lanes (4 lanes in all cases)
V = Total Volume, VPH
K = Weaving (Intensity) Factor
W' = Smaller weaving volume, VPH
SV = Service volume or capacity per lane on approach and exit roadways, VPH

Alternative		N	K	K-1	W'	V	SV	Level of Service
Null	AM	4	3	2	474	7639	2145	F
	PM	4	3	2	816	4998	1658	D-E
1/2	AM	4	3	2	256	8279	2198	F
	PM	4	3	2	626	6145	1850	E
1	AM	4	3	2	296	8237	2207	F
	PM	4	3	2	758	6088	1901	E
2	AM	4	3	2	185	8316	2172	F
	PM	4	3	2	691	5878	1815	E
3	AM	4	3	2	388	7968	2186	F
	PM	4	3	2	761	6034	1889	E



* 1965 Highway Capacity Manual Methodology

Parsons Brinckerhoff **Computation Sheet**

Subject _____

Page 2 of 4

Made by S. Scalici

Date 1-19-83

Checked by A.E. SCHAUFLER

Date 1-19-83

• Merge Section 3rd St. Ramp with WB Southeast Fwy

Alternative		Ramp Volume	SE (lane 1) Volume	Total Merge Volume	Level of Service *
Null	AM	638	1680	2318	F
	PM	1105	934	2039	F
1/2	AM	345	1904	2249	F
	PM	842	1273	2115	F
1	AM	398	1881	2279	F
	PM	1020	1216	2236	F
2	AM	249	1936	2185	F
	PM	930	1188	2118	F
3	AM	522	1787	2309	F
	PM	1024	1202	2226	F

• Service Volume Check across all through freeway lanes between the ramp-freeway termini.

Alternative		freeway volume	Level of service *
Null	AM	7639	E
	PM	4998	B
1/2	AM	8279	F
	PM	6145	C
1	AM	8237	F
	PM	6088	C
2	AM	8316	F
	PM	5878	C
3	AM	7968	E-F
	PM	6034	C

* Table 8.1 (1965 HCM) offers the limiting data for level of service determination.

Parsons Brinckerhoff **Computation Sheet**

Subject _____

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Made by S. Scalise
Date 1-19-83
Checked by A.E. Schaffer
Date 1-20-83

• Diverge Section I-395 Off Ramp with WB Southeast Fwy

Alternate		Total Diverge Volume	Level of * Service
Null	AM	2750	F
	PM	2049	F
1/2	AM	2980	F
	PM	2520	F
1	AM	2965	F
	PM	2496	F
2	AM	2994	F
	PM	2410	F
3	AM	2869	F
	PM	2474	F

* Table 3.1 (1965 HCM) offers the limiting data for level of service determination.

Parsons Brinckerhoff **Computation Sheet**

Subject _____

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Made by S. Scalia

Date 1-19-83

Checked by A.E. Schaufler

Date 1-20-83

ROADWAY SECTION		TRAFFIC VOLUMES BY ALTERNATIVE				
		Null	1/2	1	2	3
• 3rd St. ON-RAMP	AM	638	345	398	249	522
	PM	1105	842	1020	930	1024
• SE FWY (EAST of 3 ST. RAMP)	AM	7001	7934	7839	8067	7446
	PM	3893	5303	5068	4948	5011
• I-395 Off-RAMP	AM	2750	2980	2965	2994	2869
	PM	2049	2520	2496	2410	2474
• SE FWY (WEST of I-395 RAMP)	AM	4889	5299	5272	5322	5099
	PM	2949	3625	3592	3468	3560

Page A of 1

Computation Sheet

Made by S. Scalici

Date 1-18-83

Subject PARAMETERS OF INTEREST

Checked by

SE Fwy @ Penn Ave.

Date

V_m - merge volume

V_d - diverge volume

V_w - weave volume

V_f - total freeway volume taken at a point just downstream of an on-ramp and just upstream of an off-ramp

V_1 - volume in lane 1 (i.e., lane adjacent to ramp)

V_r - ramp volume

Page 1 of 3

Computation Sheet

Made by S. Scalici

Date 1-18-83

Subject FREEWAY CAPACITY - RAMPS

Checked by

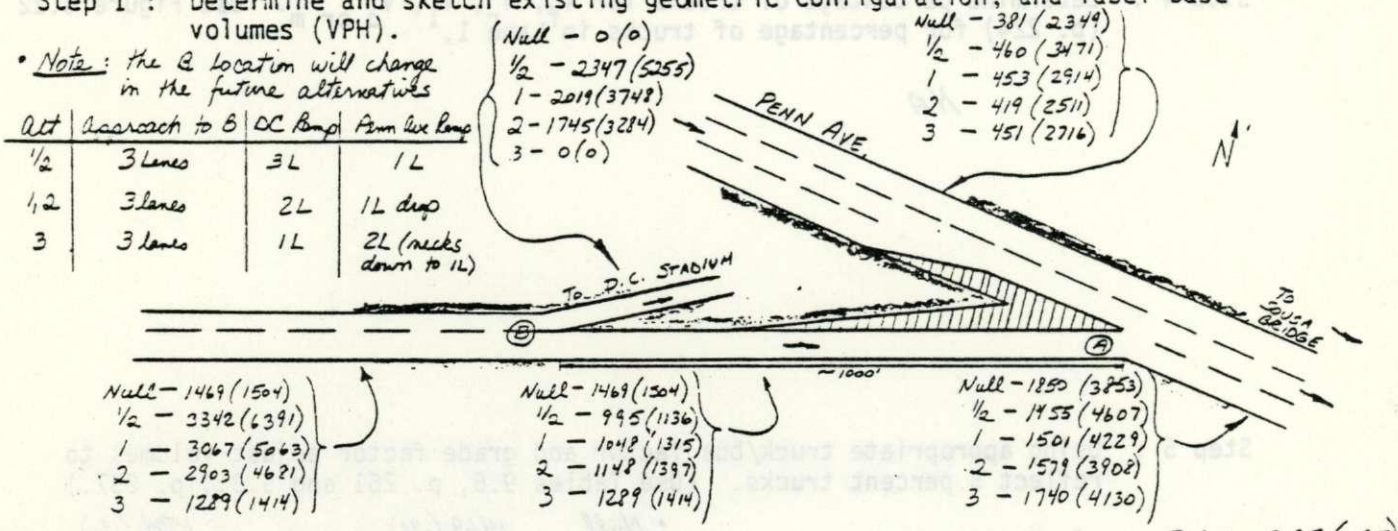
SE Fwy @ Penn Ave.

Date

Step 1 : Determine and sketch existing geometric configuration, and label base volumes (VPH).

• Note: the @ location will change in the future alternatives

Alt	Approach to B	DC Ramp	Penn Ave Ramp
1/2	3 Lanes	3L	1L
1/2	3 lanes	2L	1L drop
3	3 lanes	1L	2L (necks down to 1L)



• PHF = 0.95 (0.95)

Step 2 : Using Table 8.2 (p. 203), select appropriate nomograph to compute volume in labe 1 (V_1).

@ A: For a lane added to the freeway at a 1-lane on-ramp entrance, the basic merge volume in Table 2.1 (P.196) may be interpreted as limiting ramp volumes.

@ B: For a lane dropped from the freeway at a 1-lane off-ramp exit, the basic diverge volume in T. 2.1 (P.196) may be interpreted as limiting ramp volumes.

Step 3 : Compute checkpoint volumes and, if necessary, sketch configuration.

		Null	1/2	1	2	3
@ A :	V_M =	1469 (1504)	995 (1136)	1048 (1315)	1148 (1397)	1289 (1414)
@ B :	V_D =	1469 (1504)	995 (1136)	1048 (1315)	1148 (1397)	1289 (1414)

Page 2 of 3

Computation Sheet

Made by S. Scalici

Date 1-18-83

Subject FREEWAY CAPACITY - RAMPS

Checked by

SE Fwy @ Penn Ave.

Date

Step 4 : Determine percentage of trucks for V_f, V_r, V_l, V_d or m. Use Figure 8.22 (p. 224) for percentage of trucks in Lane 1.

NA

Step 5 : Using appropriate truck/bus factor and grade factor adjust volumes to reflect 5 percent trucks. (Use Tables 9.6, p. 261 and 9.3b, p. 257.)

- level terrain
- % T = 2 (4)

- Note: because the volumes are the same for both analysis areas, only 1 set of truck adjustment computations will be shown.

• Null	$\frac{1469\ (.91)}{0.98} = 1364$	$\frac{1504\ (.91)}{0.96} = 1426$
• 1/2	$\frac{995\ (.91)}{0.98} = 924$	$\frac{1136\ (.91)}{0.96} = 1077$
• 1	$\frac{1048\ (.91)}{0.98} = 973$	$\frac{1315\ (.91)}{0.96} = 1247$
• 2	$\frac{1148\ (.91)}{0.98} = 1066$	$\frac{1397\ (.91)}{0.96} = 1324$
• 3	$\frac{1289\ (.91)}{0.98} = 1197$	$\frac{1414\ (.91)}{0.96} = 1340$

Step 6 : Level-of-Service determination table 8.1 (p. 196).

The level-of-service summary is shown at right.

Alt	PENN AVE./SE FWY. MERGE	NEW OFF-RAMP/SE FWY. DIVERGE
• Null	C (C)	C (C)
• 1/2	A (A)	A (A)
• 1	A (C)	A (B)
• 2	B (C)	A (C)
• 3	B-C (C)	B (C)

@ A, a free flow condition is assumed in this analysis See attached for degree analysis

- EB Southeast Fwy @ the Sousa Bridge

A pedestrian-actuated signal exists at this location. When activated, the signal gives a minimum of 16.1 seconds of green time (based on DCDOT on-record information). For this analysis, assume the signal is activated for only one interval every cycle (70 sec). Use Chart 7.*

Width = 15'
G/C = 0.77
TR = 2 (4)

Alternative	Null	1/2	1	2	3
LT / RT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
LOS A	1615 (1570)	→	→	→	→
B	1650 (1600)	→	→	→	→
C	1700 (1650)	→	→	→	→
D	1900 (1850)	→	→	→	→
E	1955 (1900)	→	→	→	→
Actual Volume	1469 (1504)	995 (1136)	1148 (1315)	1148 (1397)	1289 (1414)
V/C	.75 (.79)	.51 (.60)	.54 (.69)	.59 (.74)	.66 (.74)
LOS	C (D)	A (A)	A (B)	A (C)	A (C)

* Capacity Analysis Techniques for Design of Signalized Intersections - Bureau of Public Roads (3/67)

APPENDIX J

TRANMIC PROGRAM
METHODOLOGY/SAMPLE OUTPUT REPORT

APPENDIX J

TRANMIC PROGRAM
METHODOLOGY/SAMPLE OUTPUT REPORT

ENVIRONMENTAL TRAFFIC INPUTS

Development of Input Requirements

An integral part of the air and noise anlayses is the volume and make-up of traffic on segments of the roadway network adjacent to the selected environmental monitoring sites. The traffic input required to assess the environmental impact of the various project alternatives at these sensitive sites include:

- the peak 1 hour traffic for an average weekday used in both air and noise assessments.

- the average peak consecutive 8 hour traffic for an average week day used in the air quality analysis.

In addition to the assessments of site specific environmental impact, regional impacts in terms of air and water quality and energy consumption were made. These assessments require general traffic inputs including vehicle-miles of travel (VMT) and vehicle-hours of travel. The traffic inputs were required for the Base Year 1979, the anticipated first year of operation 1989 and the Design Year 2006.

In order to develop the traffic data necessary for these assessments, both available and surveyed traffic data were used in conjunction with the Micro Assignment model traffic outputs. These parameters were factored into a program entitled TRANMIC to interpret and compute the required traffic inputs for the air/noise assessments. A brief synopsis of this interpretive program is presented in the next section. The detailed program write up may be found beginning on page J-5. The regional traffic inputs, VMT and VHT were estimated directly from the Micro traffic assignments. It should be noted that the Region as defined for the latter analyses in this study was limited to the roadway network selected for and lying within the Study Area. (Refer to Figure 1-2 and 1-3)

As described briefly in the next section, input for the TRANSMIT program not only included the Micro-Assignment traffic forecasts, capacity, posted speeds and roadway type but also requires a breakdown of hourly traffic volumes and vehicle classification. These latter inputs were developed for the base year and subsequent design year analyses as a series of curves. These curves are derived from available long term counts and the field surveys. They are applied to specific roadway segments and sites at which the counts were taken and to similar adjacent areas. Since the classification surveys could not provide the refinement in terms of vehicle class by weight or fuel categories a separate derivation was made of these factors using vehicle manufacturer and registration statistics. This statistical determination also provided as basis for comparison of the breakdowns developed from the surveys and provided a typical vehicle classification which was applied to new roadways in the design year.

For the base year, the vehicle classification breakdown generally followed the estimate developed from the field surveys. These results though were adjusted to account for fuel type i.e., gasoline or diesel. This adjustment was based on motor vehicle manufacturer's statistics of factory installed engine types and the normal age of passenger cars in use.[10] The results

of this estimate showed that even allowing for a doubling of the number of diesel equipped cars over the base condition 1979, less than 2 percent of the private cars on the road are diesel powered. Similar statistics relative to the sales of diesel powered trunks by gross vehicle weight (GVW) between 1974 and 1979 as compared to actual vehicle sales during the same period were used to determine a reasonable breakdown in fuel type.[11] The weight categories used in establishing this breakdown followed accepted noise model parameters

- Light Duty Truck 10,000 pounds GVW
- Medium Duty Truck 10,000 pounds 26,000 pounds GVW
- Heavy Duty Truck 26,000 pounds GVW

In order to further refine the vehicle classification breakdown, an estimate of the number of motorcycles in the traffic stream was also made. This estimate was based on vehicle registration statistics and national characteristics of vehicle use.[12,13] According to the data, motorcycles represent 2.8 percent of the registered vehicles but account for less than 1 percent of the travel for work related trips.

A general vehicle classification breakdown was developed for the Study Area. This estimate was derived using the statistics generated for fuel breakdown and use of motor cycles in conjunction with 1978 vehicle registrations for the State of Maryland, Virginia and the District of Columbia.[14] The commercial statistics were then refined to account for vehicle weight categories using national statistics on our trucks.[15] Table J-1 shows the derivation and final adjusted distribution of vehicles according to the required analysis classifications.

TRANMIC Program Methodology/Summary

In order to simulate one-hour and average eight-hour traffic condition for the micro scale air quality and noise effect models, hourly traffic statistics for the period 6 AM to 6 PM were generated. The program TRANMIC was developed to simulate these detail traffic conditions for each of the air and noise analysis sites.

Basic input requirements include peak A.M. and P.M. traffic volumes fromthe micro-assignment model and observed traffic characteristics form the traffic process.

Within the analysis period the TRANMIC program selects the worst aggregate peak hour and consecutive 8-hour traffic condition for each air and noise evaluation site. Specific traffic statistics produced by TRANMIC includes:

- hourly vehicle type distribution including passenger vehicles, medium truck, heavy truck, bus and motorcycle.
- percentile breakdown between gasoline vehicles and diesel vehicles.
- capacity for each roadway section.
- average travel speed for each roadway section.

TABLE J-1 AVERAGE VEHICLE CLASSIFICATION (ESTIMATE) FOR STUDY AREA

Air/Noise Vehicle Classification	Fuel	Registered Vehicles[3]	Percent Diesel Fueled[5,6]	Percent Dist. of Trucks by GVW[7]
Motorcycle		184,000[4]	-	
Auto[1]	Gas	-	-	
	Diesel	-	1.5	
Sub-Total		5,418,694		
Light Duty Truck (_ 10,000 # GVW)[2]	Gas	-	-	
	Diesel		0.5	85.4
Medium Duty Truck (10,000 _ 26,000 #GVW)	Gas		-	
	Diesel		5.2	9.1
Heavy Duty Truck/Bus (26,000 #GVW)	Gas		-	
	Diesel		94.7	5.5
Subtotal		976,761		
Total		6,579,655	100.0	100.0

1. Auto includes pickups, vans 2 axle, 4 tire less than 6500 #GVW.
2. GVW Gross Vehicle Weight
3. Total motor vehicles registered in 1978 - Virginia, Maryland and the District of Colombia. Source: MVMA Motor Vehicle Facts and Figures '80, Motor Vehicle Manufacturers Association. Detroit, Michigan.
4. Estimated figure based on National Registration statistics for Motorcycles at 2.8 percent of vehicles and vehicle registrations compiled from "State Air Pollution Control Board Statistics" - Region 7 Northern Virginia 8/26/80.
5. Op. Cit. MVMA Motor Vehicle Facts and Figures '80, "Passenger Cars in Use by Age and Factory Installation of Motor Vehicle Engines" pg. 5 Assumes diesel car production equals 5 percent of sales in 1982.
6. Op. Cit. U.S. Factory Sales of Diesel Trucks by GVW and U.S. Retail Sales by Domestic Manufacturers of New Trucks by GVW and Type.
7. "Characteristics of Trucks Owned". Op. Cit. MVMA.

The TRANMIC program computes average 24 hour volume by multiplying the combined A.M. and P.M. peak hour volume by an appropriate average daily traffic (ADT) conversion factor. The ADT is then distributed to its respective hour by the corresponding hourly distribution percentage and vehicle classification curves. Within each vehicle type further breakdown is computed between gasoline vehicles and diesel vehicles. Computation of average speed for each hour is processed in two steps.

First, the total time to traverse the link is derived by summing the run plus zero volume delay time (R + ZVD time) and the congestion delay time. The congestion delay time is computed in the program utilizing the following equations.

- Arterial Links: Link delay time in seconds = $0.06\ e^{5.8\ (V/C)}$

- Expressway Links: Delay time in seconds per mile = $1.15\ e^{4.9\ (V/C)}$
  - V = volume on the link in passenger car units (passenger car + light trucks + 2 x heavy duty gas plus diesel trucks)
  - C = Hourly capacity in passenger car units at level of service 'E'
  - e = 2.72 - the base of natural logrithms

In the next step the link speed is computed by dividing the link distance by the total time to traverse the link.

A detail discussion of the overall TRANMIC Program together will sample input and output are found beginning on page J-5.

Total Study Area Traffic Estimates

- Vehicle-Miles of Travel (VMT)

Daily VMT was estimated for the Base Year, No Build and Build Alternatives using the peak hour VMT statistics forecast from the micro assignments and the average combined A.M.-P.M. peak hour factors computed from the diurnal distributions. These distributions as noted previously are based on available and surveyed 24 hour counts within the Study Area for the major roadway types; Expressway, Non-Expressway and Boulevard, Table J-2 presents the summaries of Regional Daily VMT for the project alternatives according to roadway type.

- Vehicle-Hours of Travel (VHT)

Estimates of average daily VHT were made by examining the average speeds for the A.M. and P.M. peak hours and VMT by roadway type forecase by the Micro Assignment, shown in Table J-3. The values were compared to the VMT estimates shown in Table J-2 and the typical diurnal distribution of traffic on these roadways. An average value for off-peak travel speed was then assumed and factored with the peak hour speeds to approximate a weighted average speed for the network over a 24-hour period. This weighted average speed was divided into VMT to compute the estimated VHT value. A summary of the vehicles-miles of travel, approximate speeds and estimate of vehicle hours of travel are presented in Table J-3.

TABLE J-2 ESTIMATED REGIONAL DAILY VEHICLE MILES OF TRAVEL

Roadway Type	Base Year	2006 NoBuild	Build Alternatives 2006			
			1	2	3	1/2
Expressway	554,491	676,642	810,491	779,683	764,382	810,291
Non Expressway	1,219,007	1,549,717	1,648,116	1,647,190	1,629,522	1,660,725
Boulevard	-	-	-	-	-	34,335
All Facility Types	1,219,007	1,549,717	1,648,116	1,647,190	1,629,522	1,660,725

*Region-Defined as the Primary Study Area.

TABLE J-3 ESTIMATED REGIONAL DAILY VEHICLE HOURS OF TRAVEL

Roadway Type	Base Year	No Build	Alternatives 1	2	3	1/2
Vehicle Miles of Travel	1,219,007	1,549,717	1,648,116	1,647,190	1,629,522	1,660,725
Average Speed (mph)	23.9	21.0	21.6	21.1	21.4	20.6
Vehicle-Hours of Travel	50,957	73,624	76,394	78,062	76,229	80,650

*Region-Defined as the Primary Study Area.

TECHNICAL MEMORANDUM

SUBJECT: Procedure for Developing Traffic Data for Air Quality and Noise Effect Analysis

T R A N M I C

The acronym TRANMIC stands for Traffic Data for Air and Noise Analysis from Micro-assignment.

TRANMIC was developed to generate the detail traffic data requirements for both Air and Noise Analysis Program models. Basic inputs are AM and PM peak hours assignments from the micro-assignment process developed by Sterling Systems Inc., plus average daily traffic characteristics collected during the supplemented traffic surveys.

Based on the AM and PM peak hour link volume, hourly distribution with average classification of vehicle types i.e., passenger vehicles, light trucks, medium trucks, heavy duty trucks and motorcycles are disaggregated for the period from 6 AM to 6 PM. Bus volumes are also appended to the hourly breakdown based on the average peak and off-peak volumes. In addition, separation of gasoline and diesel fuel vehiclers under each class type is made.

For each hour, travel speeds are computed using of volume to capacity ratio and delay equations described in the program description.

INPUT

The input to the program is derived from two sources.

1. Micro-traffic assignment results containing peak hour volumes and
2. Prevailing traffic characteristics from the supplementala traffic surveys results.

This information is disaggregated into four data input files as described below:

1. Link data file

2. Diurnal distribution file
3. Vehicle classification file
4. Gasoline/diesel vehicle percentage file

OUTPUT

The program produces a printed record and a computer data file containing the hourly passenger vehicles, light trucks, medium trucks, heavy trucks, buses and motorcycles for each link within the analysis site. The files also include total passenger car equivalence units (auto + light truck + 2 x heavy duty trucks + 2 x buses), speed and capacity for each hour during the period from 6 AM to 6PM.

In addition, Air Quality and Noise Analysis, the highest aggregate volumes for the peak hour and the average hour of the highest consecutive 8 hours as identified by the analysis site including the corresponding speed are computed. A sample output is attached.

PROGRAM OPERATION

After reading in the link file, diurnal distribution file, the classification file and gasoline/diesel file, the program computes the average daily traffic (ADT) volume using the combined AM and PM peak hours from the micro-assignment and a computed ADT conversion factor. This factor is merely the reverse of the combined AM and PM peak hour factors determined from the long term traffic counts. The ADT volume is distributed to its respective hourly volumes by multipling the 24 hour volume by the corresponding hourly distribution factor. The resulting hourly volume is then split further into the various vehicle classification and finally fuel types.

Computation of the average link speed for each hour during the 12 hour period 6 AM to 6 PM is done by the program in two steps.

1. First, the total time to traverse the link is derived by summing the run plus zero volume delay time (R + ZVD time) and the congestion delay time. The congestion delay time is computed in the program utilizing the following equations.

- Arterial Links: Link delay time in seconds = $0.06\, e^{5.8\,(V/C)}$
- Expressway Links: Delay time in seconds per mile = $1.15\, e^{4.9\,(V/C)}$.

V = volume on the link in passenger car units
(passenger car + light trucks + 2 x heavy duty gas plus diesel trucks)
C = Hourly capacity in passenger car units - level of service 'E'
e = 2.72 - the base of natural logrithms

2. In the next step the link speed is computed by dividing the link distance given in hundredths of a mile by the total time to traverse the link.

The R + ZVD time, the arterial and expressway designations, the AM and PM volume/capacity ratios, and the link distances are inputted on a link volume card for direct read in to the Air and Noise Models.

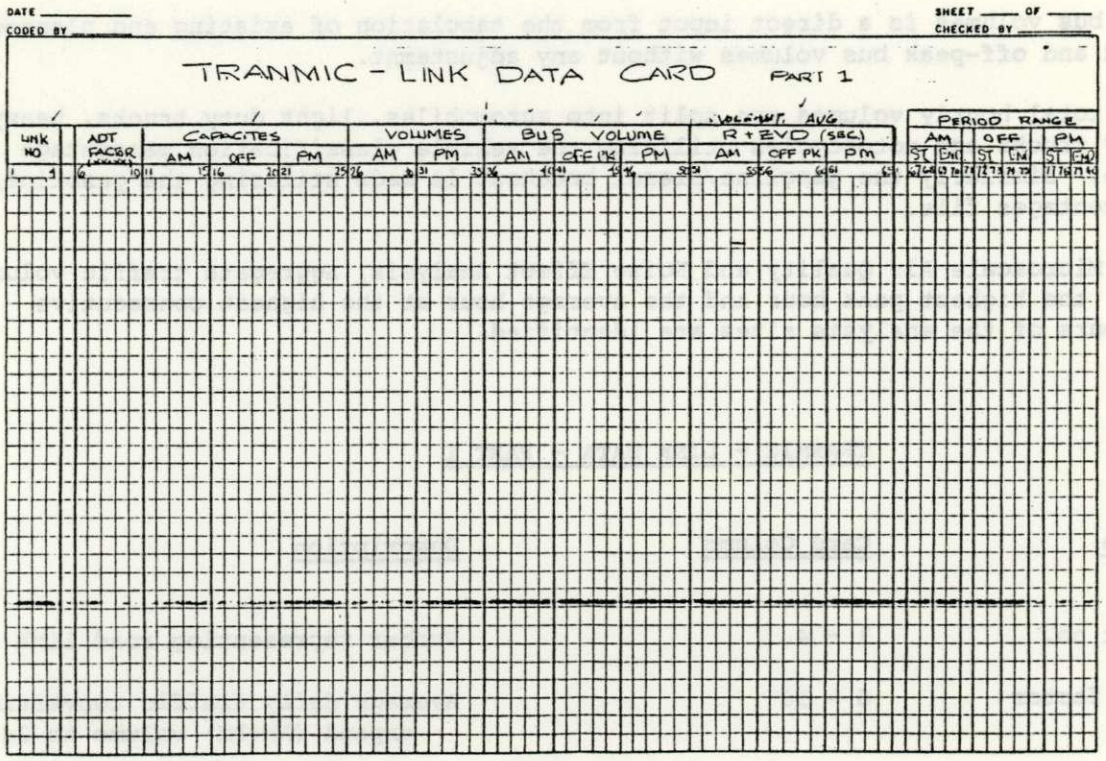
The bus volumes is a direct input from the tabulation of existing and planned peak and off-peak bus volumes without any adjustemnt.

The total hourly volumes are split into automobiles, light duty trucks, heavy duty trucks and motorcycles utilizing the vehicle classification percentage file. Similarly the gasoline/diesel breakout is made utilizing the gasoline/diesel percentages file.

For Microscale Air Quality and Noise Effect Analysis, aggregate traffic volume for the highest peak hour and the average hour at the highest consecutive 8 hours of the analysis sites are identified.

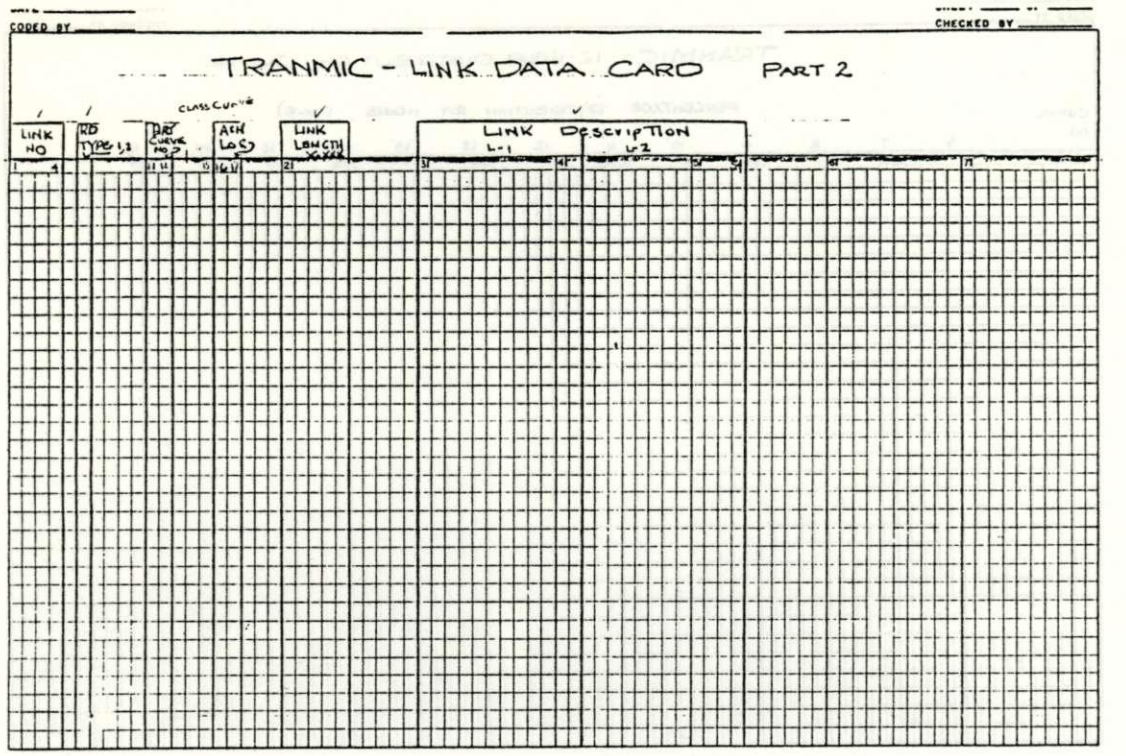
TRANMIC - LINK DATA - PART 1

Name	Card Column	Description
Link no.	1 - 4	Number representing road link section
ADT factor	6 - 10	Average daily traffic conversion factc expand (AM+PM) volume to 24 hr. vol
Capacities		
AM	11 - 15	Maximum acceptable volume (capacity) during AM peak hour
OFF	16 - 20	Maximum acceptable volume (capacity) during off peak hour
PM	21 - 25	Maximum acceptable volume (capacity) during PM peak hour
Volume		
AM	26 - 30	AM traffic volume from micro assignment
PM	31 - 35	PM traffic volume from micro assignment
Bus volume		
AM	36 - 40	Average hourly bus volume in the AM peri
OFF-PK	41 - 45	Average hourly bus volume in the OFF PEA period
PM	46 - 50	Average hourly bus volume in the PM peri
R + ZVD		
AM	51 - 55	Run plus zero volume delay time in secon from micro assignment output AM
OFF-PK	56 - 60	Run plus zero volume delay time in secon from micro assignment output OFF PEAK
PM	61 - 65	Run plus zero volume delay time in s nd from micro assignment output PM
Period Range		
AM	67 - 70	Beginning and end of AM period
OFF PEAK	72 - 75	Beginning and end of OFF PEAK period
PM	77 - 80	Beginning and end of PM period



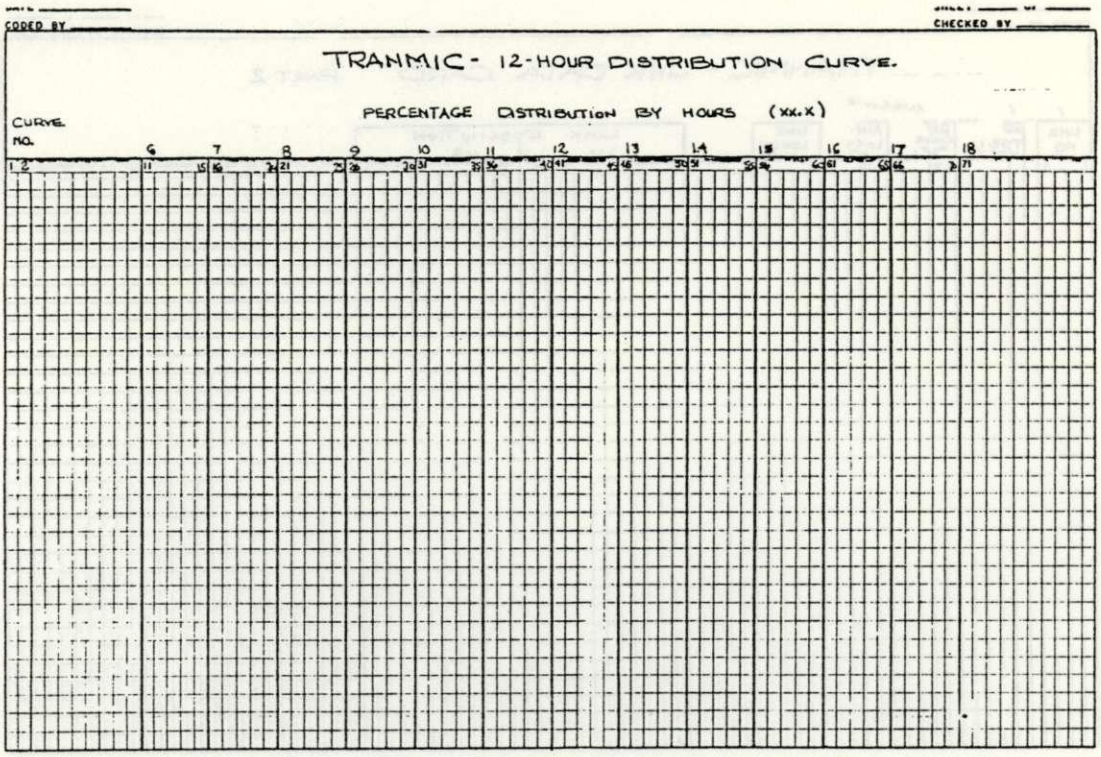
TRANMIC - LINK DATA - PART 2

Name	Card Column	Description
Link no.	1 - 4	Number representing roadway link section
Road type	6	Facility type designation 0- Expressway 1- Expressway 2- Arterial
Dist. curve no.	11 - 12	Number designating the 12 distribution percentile to be used
Class curve no.	14 - 15	Number designating the classification percentile to be used
AN LOC	16 - 17	Air and Noise site location number
Link description	31 - 54	Name describing link number



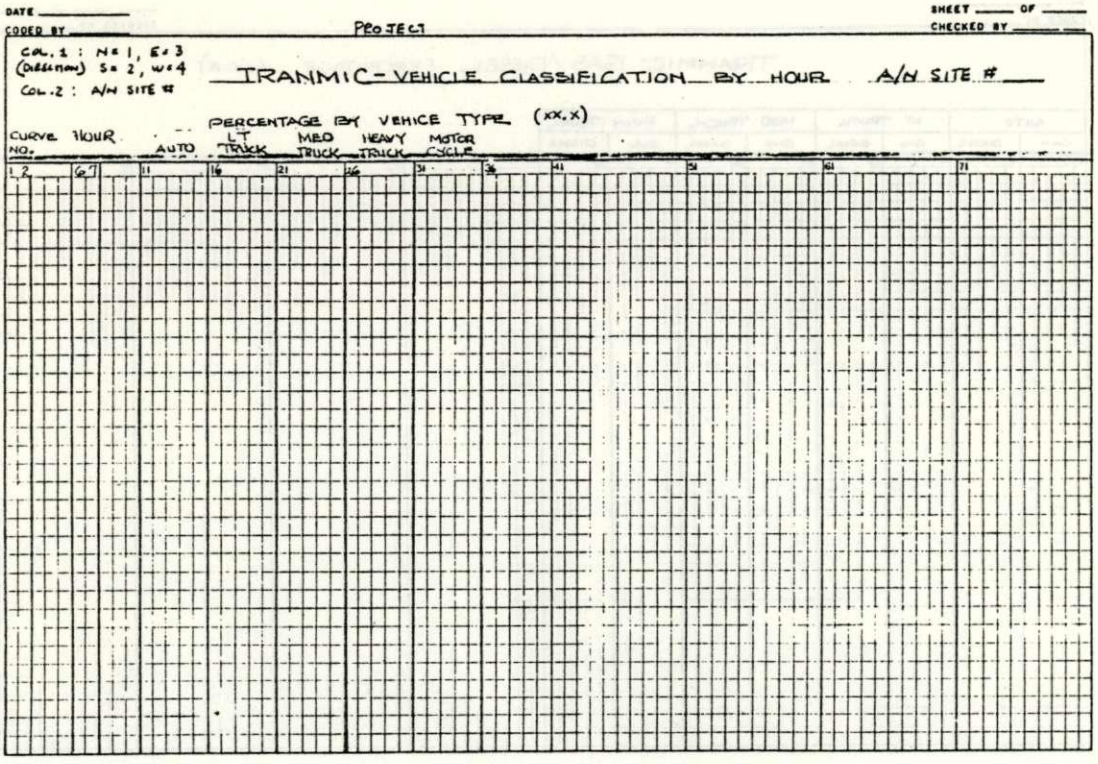
TRANMIC - 12 HOUR DISTRIBUTION CURVE

Name	Card Column	Description
Curve No.	1 - 2	Distribution curve no. designated to be used by link
Percentage distribution by hour		Percentage of 24 hr. traffic during
	11 - 15	6 - 7 AM
	16 - 20	7 - 8 AM
	21 - 25	8 - 9 AM
	etc.	etc.



TRANMIC - VEHICLE CLASSIFICATION BY HOUR

Name	Card Column	Explanation
Curve no.	1 - 2	Classification curve to be by link no.
Hour	6 - 7	Hour designated for curve
Auto	11 - 15	Percentage of passenger autos during above hour
Light truck	16 - 20	Percentage of light duty trucks during above hour
Medium truck	21 - 25	Percentage of medium duty trucks during above hour
Heavy truck	26 - 30	Percentage of heavy duty trucks during above hour
Motorcycle	31 - 35	Percentage of motorcycles during above hour



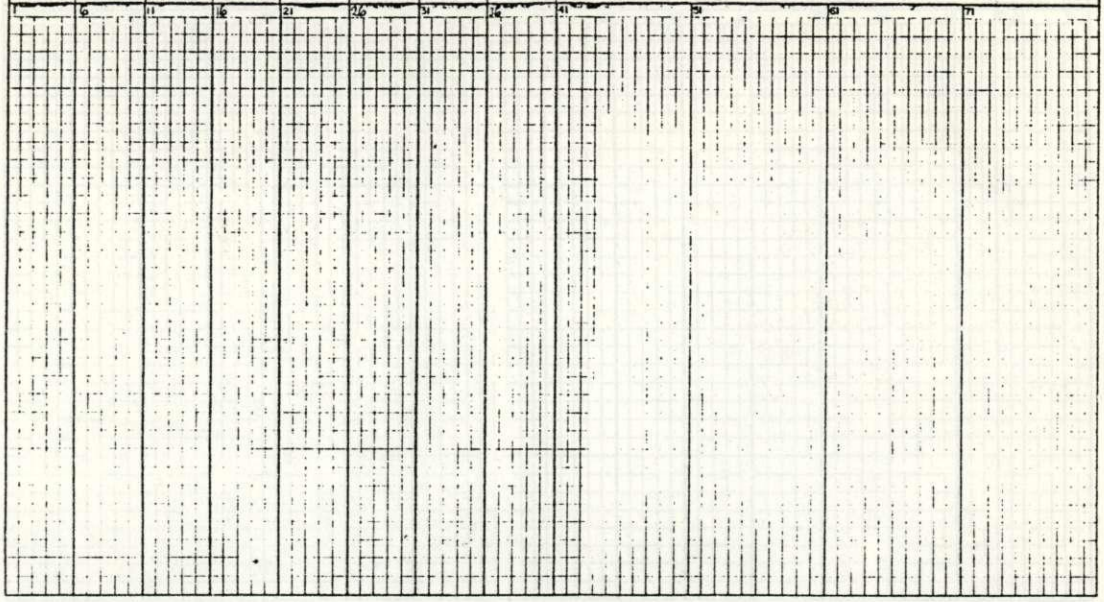
TRANMIC - GAS/DIESEL PERCENTAGE

Name	Card Column	Explanation
Auto		
Gas	1 - 5	Percentage of gasoline passenger auto
Diesel	6 - 10	Percentage of diesel passenger auto
Lt. Truck		
Gas	11 - 15	Percentage of gas light truck
Diesel	16 - 20	Percentage of diesel light truck
Med. Truck		
Gas	21 - 25	Percentage of gas medium duty truck
Diesel	26 - 30	Percentage of diesel medium duty truck
Heavy Truck		
Gas	31 - 35	Percentage of gas heavy duty truck
Diesel	36 - 40	Percentage of diesel heavy duty truck

CODED BY _____ CHECKED BY _____

TRANMIC GAS/DIESEL PERCENTAGE (XX.X)

AUTO		LT TRUCK		MED TRUCK		HEAVY TRUCK	
GAS	DIESEL	GAS	DIESEL	GAS	DIESEL	GAS	DIESEL
1	6	11	16	21	26	31	36



TRANMIC - TRAFFIC AIR & NOISE MICRO-ASSIGNMENT PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC. PAGE 12
BARNEY CIRCLE HEIS AIR & NOISE MICRO ASSIGNMENT DATA BASE NO BUILD

LINK NO. & NUM. LOCATION OF NO. A/N STATION	VEHICLE TYPE	NO. OF TRIPS A.M. 6-7	7-8	8-9	9-10	10-11	11-12	P.M. 12-1	1-2	2-3	3-4	4-5	5-6	12-HR. TOTAL	SITE VOLUME PEAK HR 4- 5	AVG8HR 10- 6
2254 AFWY SWB	AUTO -GAS	1641	1927	1820	1354	1114	1114	1165	1216	1284	1488	1969	1859	17963	1969	1388
(1) E CAP-PENN	AUTO -DIESEL	25	30	29	21	17	17	18	17	20	23	30	28	275	30	21
	LIGHT TRUCK-GAS	126	125	146	120	119	101	95	154	107	226	118	112	1549	118	129
	LIGHT TRUCK-DIESEL	1	1	1	1	1	1	0	1	1	1	1	1	11	1	1
	MEDIUM TRUCK-GAS	41	42	75	86	69	56	54	48	46	24	23	21	603	23	43
	MEDIUM TRUCK-DIESEL	2	3	4	5	4	3	3	3	2	1	1	1	32	1	2
	HEAVY TRUCK-GAS	2	2	2	6	2	2	2	1	1	1	1	1	23	1	2
	HEAVY TRUCK-DIESEL	42	39	44	84	48	48	38	59	32	28	21	20	503	21	37
	MOTORCYCLE	9	11	11	8	7	7	7	7	8	9	11	10	105	11	8
	BUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL VEHICLES	1889	2250	2191	1681	1381	1351	1381	1510	1501	1801	2175	2053	21044	2175	1632
	TOTAL PCU'S	1976	2356	2316	1858	1504	1460	1478	1523	1582	1855	2221	2096	22225	2221	1715
	CAPACITY	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643			
	SPEED	36.9	33.2	33.6	37.8	40.1	40.3	40.2	40.0	39.6	37.9	34.6	35.8		34.6	38.6
2255 AFWY NEB	AUTO -GAS	1460	1724	1594	1131	1074	1211	1303	1280	1493	2200	2316	1795	18581	2316	1584
(1) PENN-E. CAP	AUTO -DIESEL	22	26	24	17	16	18	20	19	23	34	35	27	281	35	25
	LIGHT TRUCK-GAS	241	263	243	247	258	209	195	178	283	305	230	179	2851	230	230
	LIGHT TRUCK-DIESEL	1	1	1	1	1	1	1	1	1	2	1	1	13	1	1
	MEDIUM TRUCK-GAS	26	36	40	51	42	52	40	68	41	66	38	29	549	38	47
	MEDIUM TRUCK-DIESEL	1	2	3	3	2	3	2	4	2	4	2	2	30	2	3
	HEAVY TRUCK-GAS	2	3	3	3	2	3	3	3	2	2	1	1	28	1	2
	HEAVY TRUCK-DIESEL	35	67	72	70	52	61	59	49	42	38	25	20	609	25	56
	MOTORCYCLE	9	11	10	8	7	8	8	8	9	13	13	10	114	13	10
	BUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL VEHICLES	1796	2133	2030	1531	1454	1564	1631	1630	1896	2664	2661	2064	23056	2661	1944
	TOTAL PCU'S	1859	2241	2168	1658	1552	1685	1735	1774	1983	2774	2727	2116	24272	2727	2043
	CAPACITY	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643			
	SPEED	37.8	34.4	35.2	39.2	39.8	39.0	38.7	38.4	36.8	27.9	28.5	35.7		28.5	33.6
5270 AFWY SWB	AUTO -GAS	1641	1927	1879	1354	1114	1114	1165	1216	1284	1488	1969	1859	17963	1969	1389
(1) E CAP-PENN	AUTO -DIESEL	25	30	29	21	17	17	18	17	20	23	30	28	275	30	21
	LIGHT TRUCK-GAS	126	125	146	120	119	101	95	154	107	226	118	112	1549	118	129
	LIGHT TRUCK-DIESEL	1	1	1	1	1	1	0	1	1	1	1	1	11	1	1
	MEDIUM TRUCK-GAS	41	42	75	86	69	56	54	48	46	24	23	21	603	23	43
	MEDIUM TRUCK-DIESEL	2	3	4	5	4	3	3	3	2	1	1	1	32	1	2
	HEAVY TRUCK-GAS	2	2	2	6	2	2	2	1	1	1	1	1	23	1	2
	HEAVY TRUCK-DIESEL	42	39	44	84	48	48	38	59	32	28	21	20	503	21	37
	MOTORCYCLE	9	11	11	8	7	7	7	7	8	9	11	10	105	11	8
	BUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL VEHICLES	1889	2250	2191	1681	1381	1351	1381	1510	1501	1801	2175	2053	21044	2175	1632
	TOTAL PCU'S	1976	2356	2316	1858	1504	1460	1478	1523	1582	1855	2221	2096	22225	2221	1715
	CAPACITY	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643	3643			
	SPEED	37.7	33.4	34.2	38.4	41.0	41.2	41.1	40.2	40.5	38.1	35.1	36.0		35.1	39.1

Sample TRANMIC output