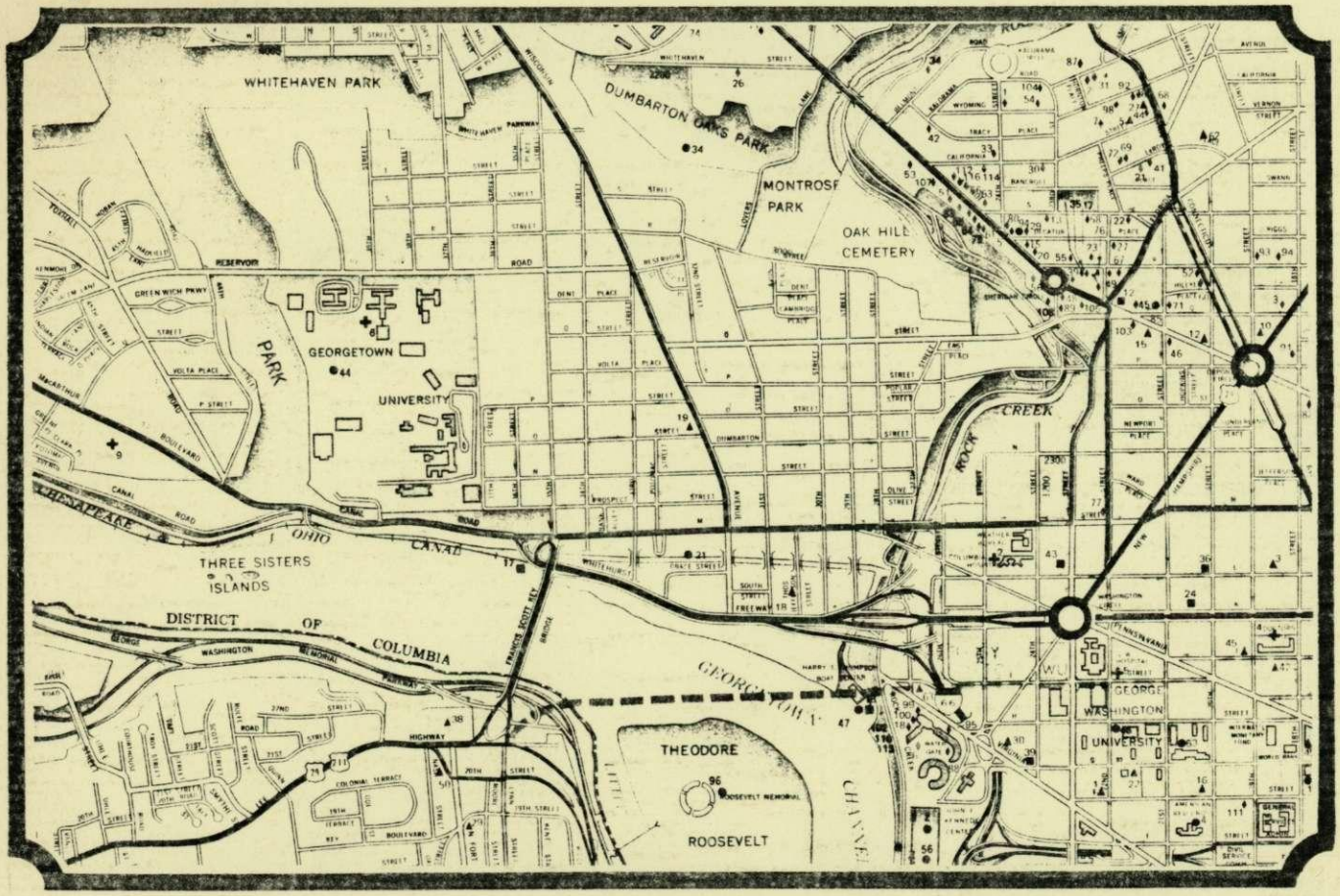
june, 1980

GEORGETOWN AREA ACCESS IMPROVEMENTS

an analysis of alternatives

for:
District of Columbia
Department of Transportation

by:
jhk & associates



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AN ANALYSIS OF ALTERNATIVES

Prepared for

District of Columbia Department of Transportation

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GEORGETOWN AREA ACCESS ALTERNATIVES STUDY

Technical Memoranda

Technical Memorandum No. 1: Georgetown Area Potential Access Improvements, JHK and Associates, February 1979

Technical Memorandum No. 2: The Reinstitution of Georgetown Trolley Service: An Overview, JHK and Associates, March 1979

Technical Memorandum No. 3: Existing Transportation Conditions in Georgetown, JHK and Associates, March 1979

Technical Memorandum No. 4: Georgetown University Transportation Survey, Rivkin Associates Inc., August 1979

Technical Memorandum No. 5: Packaging Alternatives, JHK and Associates, March 1979

Technical Memorandum No. 6: Criteria for the Evaluation of Alternatives, JHK and Associates, March 1979

Technical Memorandum No. 7: Existing Weekend Transportation Conditions in Georgetown, JHK and Associates, July 1979

Technical Memorandum No. 8: Implementation Considerations for the Recommended Georgetown Area Access Alternatives, JHK and Associates, August 1980

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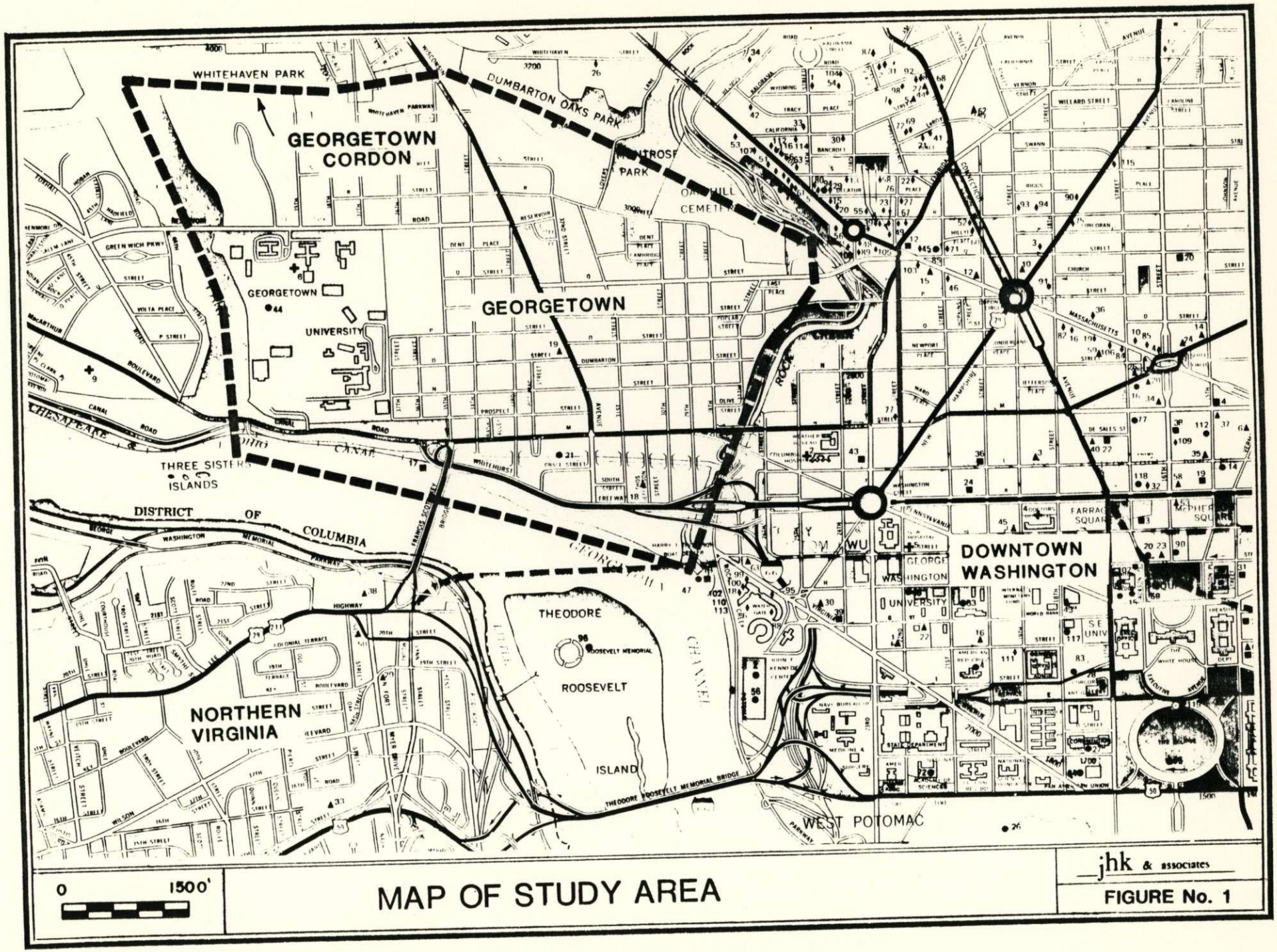
CHAPTER 1. INTRODUCTION

This report presents the findings of the analysis of a series of candidate access improvement alternatives for the Georgetown area of Washington, D.C., and presents a list of recommended changes designed to improve transportation in Georgetown. The analyses presented in this report were performed as part of the Georgetown Area Access Alternatives Study by JHK and Associates under contract to the D.C. Department of Transportation. Throughout both the development and analysis of alternatives, technical and policy guidance was provided to the study by a steering committee which consisted of representatives of government agencies involved with transportation in Georgetown, citizen representatives from the Georgetown area, and representatives of the Georgetown Businessmen's Association.

Georgetown presently experiences a number of access related problems which are likely to worsen over the next several years if the growth projected for the area occurs. Solutions to Georgetown's transportation problems must be developed within the constraints of a number of physical, environmental, institutional, budgetary, and historical preservation factors which limit what actions are feasible in the area.

Many of Georgetown's access problems are related to its location (see Figure 1). It is situated just to the west of the Central Business District of Washington, D.C., at the end of one of only five bridges which cross the Potomac River between Virginia and Washington, D.C. Georgetown is surrounded on three sides by parks and on the fourth by the Potomac River, resulting in a limited number of entry and exit points. Because it is situated between the second busiest Potomac River crossing into the District of Columbia and the Central Business District, a large amount of traffic passes through Georgetown which is destined to or coming from points other than Georgetown.


WHITEHAVEN PARK
GEORGETOWN CORDON
DUMBARTON OAKS PARK
GEORGETOWN
UNIVERSITY
GEORGETOWN
THREE SISTERS ISLANDS
DISTRICT OF COLUMBIA
NORTHERN VIRGINIA
THEODORE ROOSEVELT ISLAND
ROOSEVELT MEMORIAL
THEODORE ROOSEVELT MEMORIAL BRIDGE
DOWNTOWN WASHINGTON
WEST POTOMAC
0
1500'
MAP OF STUDY AREA
jhk & associates
FIGURE No. 1

Georgetown is an historical district, having been largely built up during the nineteenth century, prior to the advent of the automobile. Therefore many of its streets are quite narrow and there is relatively little off-street parking, despite the fact that the area is quite densely developed. Because Georgetown is so rich in history it has been entered in the Department of Interior's National Register of Historical Places and any changes to the transportation system should attempt to preserve or enhance Georgetown's historical features.

Georgetown is an area which is not directly served by Metrorail, and therefore transit passengers to or from Georgetown must travel by bus on congested streets for all or part of their trip. Because its streets are narrow and filled with traffic, it is difficult for full size buses to maneuver in Georgetown. As a result of this lack of maneuverability and a forced transfer for transit patrons using Metrorail, travel times by transit to and from Georgetown tend to be slow.

Georgetown is an area with an abundance of shops, restaurants, and entertainment spots, all of which attract a large number of trips, primarily by automobile. A high percentage of these trips are made during evenings and on weekends and result in congestion at all times of the day and high demand for the limited number of parking spaces available to residents, particularly in the blocks immediately adjacent to the M Street and Wisconsin Avenue commercial areas. Georgetown's residential streets also carry a significant amount of spillover traffic from its arterial streets, as well as a substantial proportion of the traffic destined to or coming from Georgetown University's Main Campus, which does not presently have full access to a major arterial street.

In addition to being a commercial and residential center, Georgetown is an office center, so a large number of daily commuters make their way to and from Georgetown, and they do so

primarily by auto. A residential parking permit program has been instituted in Georgetown in order to prevent commuters from filling the on-street spaces in Georgetown's residential areas.

Land use in Georgetown is undergoing a number of changes, most of which will add to the demands on its already strained transportation system. These changes for the most part are concentrated in the already congested area between M Street and the Waterfront. Major expansions are forecast in residential, commercial, and office land use in this area, resulting in forecast 1985 Georgetown trip generation being 40 percent higher than in 1979.

Solutions to Georgetown's transportation problems must be developed within the context of a set of citywide priorities, all of which compete for funds in a limited budget. Potential solutions must be evaluated with respect to the full range of their impacts both upon Georgetown and its surrounding area. Decisions regarding money to be spent in Georgetown will need to be weighed against needs in other parts of the city as well.

In order to develop and evaluate a set of candidate access improvement alternatives for the Georgetown area, it was felt that a set of objectives for improving transportation in Georgetown should first be developed. Although it was realized that no one set of objectives would accurately reflect the goals of every interest group concerned with transportation planning in Georgetown and that different objectives would be weighed differently in terms of importance by different interest groups, an attempt was made to develop an overall generalized set of objectives which could be used in developing and evaluating alternatives in this study. This set of objectives is as follows:

- Improve transit access within Georgetown and between Georgetown and Metrorail
- Reduce the impact of vehicular traffic passing through Georgetown
- Improve Georgetown University access

- Improve Georgetown parking characteristics
- Increase modal shares for transit and other high occupancy vehicles for trips to, from, and through Georgetown
- Reduce the detrimental socio-economic and environmental impacts on Georgetown's quality of life caused by transportation. Included within this objective are the following sub-objectives:
  - Improve air quality
  - Decrease overall energy consumption
  - Reduce noise levels
  - Reduce neighborhood disruption caused by transportation
  - Assist in Georgetown's efforts at historic preservation
- Keep to a minimum disruptive impacts of access changes on areas surrounding Georgetown
- Improve transportation access for the mobility-limited in Georgetown
- Spend monetary resources in the most cost-effective manner.

Based upon these objectives and input from the members of the Study Steering Committee, a preliminary list of candidate transportation access improvements for the Georgetown area was developed and presented in "Technical Memorandum No. 1: Georgetown Area Potential Access Improvements." Based upon input from Study Steering Committee members this list was revised and an analysis of the candidate improvements begun. As the analysis proceeded new alternatives became apparent and were added to the list. The final list of candidate access improvements which were analyzed in this study is presented in Table 1. In the following chapters each of these candidate improvements is analyzed in detail.

The analysis of alternatives was done in two phases. During the first phase each individual action was assessed with regard to traffic operation impacts, socio-economic impacts,

Table 1. Candidate Georgetown Area Access Improvements

CANDIDATE PHYSICAL ROADWAY IMPROVEMENT ACTIONS
(1) Tie the existing stub-end ramps at the east end of Whitehurst Freeway to M Street and Pennsylvania Avenue.
(2) Extend lower K Street to intersect with Canal Road opposite the Southern Entrance to Georgetown University.
(3) Repave lower K Street, moving the railroad tracks to either the north or south side of K Street.
(4) Depress K Street between Washington Circle and Whitehurst Freeway.
(5) Construct a double left turn lane at the Canal Road - Foxhall Road intersection for use by westbound Canal Road traffic during the PM peak.
(6) Upgrade Southern Entrance to Georgetown University.
(7) Provide pedestrian access along K Street between Georgetown and the West End.
CANDIDATE TRAFFIC OPERATION IMPROVEMENT ACTIONS
(1) One-way streets.
(a) South of M Street (29th, 30th, 31st, Thomas Jefferson Streets)
(b) North-south streets north of M Street (28th, 29th, 30th, 31st Streets)
(c) East-west streets north of M Street (N, P, Q Streets)
(2) Upgrade the traffic signal system.
(3) Reversible lanes on Key Bridge.
(4) Remove reversible lanes on M Street.
(5) Extend bus lanes on M Street from Wisconsin Avenue to Key Bridge.
(6) Make right lane of Key Bridge northbound right turn only at Whitehurst Freeway ramp.
(7) High occupancy vehicle lanes on Key Bridge.
(8) High occupancy vehicle lanes on Whitehurst Freeway.
(9) High occupancy vehicle lanes on Canal Road and Whitehurst Freeway from Chain Bridge to Washington Circle.
(10) High occupancy vehicle lanes on P and Q Streets.
(11) Reduce the number of lanes on Key Bridge to four.
(12) Reduce the number of lanes on Chain Bridge to two.

Table 1. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE PARKING MANAGEMENT ACTIONS
(1) Extend residential parking permit program to evenings and weekends.
(2) Extend peak hour on-street parking restrictions along M Street and Wisconsin Avenue to midday, evenings, and weekends.
(3) Convert a percentage of parking spaces along M Street and Wisconsin Avenue to loading zones.
(4) Build a parking garage in the Wisconsin Avenue commercial area north of M Street.
(5) Park-and-ride lots.
(a) Glen Echo Amusement Park
(b) McLean, Virginia area
(c) Georgetown University
(6) Remove peak hour on-street parking spaces south of M Street.
(7) Convert a percentage of on-street parking spaces south of M Street to loading zones.
(8) Marketing of private garage spaces, particularly on weekends and evenings.
(a) expand parking validation programs
(b) post parking information
(c) signing for parking
(9) Increase parking meter rates and extend hours.
(10) Increase the number of on-street parking spaces which are metered.
CANDIDATE TRANSIT IMPROVEMENT ACTIONS
(1) New or modified large bus routes.
(a) Glen Echo park and ride express service
(b) Chevy Chase Circle - Tenley Circle - American University - Georgetown University - Farragut Square
(2) Reinstitution of Georgetown trolley service.

Table 1. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE TRANSIT IMPROVEMENT ACTIONS (CONTINUED)
(3) Small bus routes. (a) K Street - Pennsylvania Avenue loop (b) K Street - Georgetown University loop (c) K Street - Georgetown University Medical Center (d) Foggy Bottom - Georgetown University loop (e) Rosslyn - Georgetown University Medical Center (f) Rosslyn - Wisconsin/Massachusetts Avenues (g) Rosslyn - Dupont Circle (h) Rosslyn - Foggy Bottom (i) Foggy Bottom - Dupont Circle via Wisconsin Avenue (j) Extension of above routes to Kennedy Center and other points in Foggy Bottom, or to Farragut Square (4) Transit marketing. (a) Transit information centers (b) Transit information package for Georgetown employees (c) Employer subsidy of transit fares (d) Transit fare validation scheme (e) Transit information brochure for patrons of Georgetown shops, restaurants, and entertainment spots
CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ALTERNATIVES
Physical Intersection Alternatives (1) Null alternative: the intersection would be left as it is today with no left turns from the University to eastbound Canal Road or from eastbound Canal Road to the University allowed.

Table 1. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ALTERNATIVES (CONTINUED)
Physical Intersection Alternatives (continued) (2) At grade signalized intersection at present access location with no widening or change in Canal Road alignment. Under this alternative an opening would be made in the existing median strip through which left turns could be made, but no turn bays would be installed. (3) At grade signalized intersection at present access location with provision of a 200 foot left turn bay from eastbound Canal Road into the University and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment. (4) At grade signalized intersection 200 feet to the east of the existing University entrance with provision of a 200 foot left turn bay from eastbound Canal Road and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment. (5) Grade separated interchange with flyover ramps carrying left turning movements into and out of Georgetown University. (6) A third roadway with three lanes would be built along the crest of the Potomac Palisades. This roadway would be used by westbound Canal Road traffic, with perhaps a reversible lane to accommodate AM peak loads. The existing westbound lanes would become an access road to serve University traffic. Operational Alternatives (1) Allow all turning movements into and out of Georgetown University at all times. (2) Prohibit left turns into and out of Georgetown University by all vehicles during peak periods, allowing full access during the remainder of the day. (3) Prohibit left turns into and out of Georgetown University by all vehicles, except buses and emergency vehicles, during peak periods, allowing full access during the remainder of the day. (4) Prohibit left turns into and out of Georgetown University at all times, except to buses and emergency vehicles. (5) Prohibit left turns into and out of Georgetown University during the AM peak only. (6) Prohibit left turns out of Georgetown University during the AM peak.

Table 1. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ALTERNATIVES (CONTINUED)
Alternatives to Overcome Grade Differential Between Canal Road and Main Campus (1) Use the existing roadway. (2) At the midpoint of the existing roadway reverse the roadway direction to make a U-shaped roadway. (3) Build a structure containing ramps to overcome the grade differential. Complementary Alternatives (1) Incorporate a double left turn at the intersection of Canal and Foxhall Roads for westbound Canal Road traffic during the PM peak. (2) Maintain the Prospect Street Entrance to the University as a major entrance for vehicles accessing the campus from the north and east and to provide a relief valve to the Canal Road Entrance during periods of peak traffic flow. (3) Build an entrance to the proposed Main Campus parking structure from Reservoir Road.
OTHER CANDIDATE GEORGETOWN UNIVERSITY ACTIONS
(1) Reorient GUTS Virginia routes to avoid duplication with Ballston Metrorail line. Provide frequent shuttle service between Rosslyn station and Georgetown University at lower fare than for longer trips. (2) Accept Metrorail or Metrobus transfers in lieu of payment or as a discount toward payment of fare. (3) Allow for fare payment on GUTS buses, instead of present ticket system. (4) Revise GUTS schedules to better coordinate with the start of classes and actual running times. (5) Change Virginia and Law School GUTS routes so as to access the University at the Southern Entrance. (6) Establish a transit and carpool information center on campus. (7) Create a transit information package to be distributed to students at registration and faculty and staff through the campus mail.

Table 1. Candidate Georgetown Area Access Improvements (CONTINUED)

OTHER CANDIDATE GEORGETOWN UNIVERSITY ACTIONS (CONTINUED)
(8) Increase parking costs and use additional revenues to subsidize GUTS service.
(9) Reduce the discount for monthly or yearly parking to encourage parkers to pay daily and use transit when feasible.
(10) Reserve most convenient parking spaces for carpools with three or more persons.
(11) Expand GUTS service.
(12) Vanpooling program.

environmental impacts, neighborhood impacts, costs, community acceptance, and institutional considerations. Detailed travel demand analyses were not performed for each individual alternative, but instead a generalized assessment of impacts on travel demand was made. During the analysis of individual alternatives, serious flaws were identified for a number of candidate actions which warranted their being dropped from the second phase of the analysis. The alternatives which remained following the initial phase of the analysis were grouped into one of four packages of candidate improvements, and each of these packages was then tested using a computerized travel demand modeling process. Based upon the results of the first and second phases of the analysis, a set of recommended transportation improvements for the Georgetown area was developed and presented to the D.C. Department of Transportation and the Study Steering Committee.

The remainder of this report is divided into eight chapters. The first six chapters following this introduction present the findings of the analysis of individual access

improvement alternatives. These chapters are divided by general categories of candidate access improvements as follows:

- Candidate Physical Roadway Improvement Actions
- Candidate Traffic Operation Improvement Actions
- Candidate Parking Management Actions
- Candidate Transit Improvement Actions
- Candidate Georgetown University Southern Entrance Actions
- Other Candidate Georgetown University Actions

Following the assessment of individual access alternatives, the travel demand analyses performed for each of the four packages of alternatives are discussed. The final chapter presents JHK and Associates' recommendations for improving access in the Georgetown area.

CHAPTER 2. CANDIDATE PHYSICAL ROADWAY IMPROVEMENT ACTIONS

Over the course of the past thirty years a large number of physical roadway improvement alternatives have been proposed and analyzed in the Georgetown area. Included among these were the Three Sisters Bridge, which would have crossed the Potomac River northwest, of Georgetown, and the Potomac River Freeway, which would have connected the Three Sisters Bridge and Upper Northwest Washington with Downtown and would have passed through Georgetown underground. For a variety of reasons these proposals have been dropped from further consideration and were not included in this study.

There are, however, two major roadway construction projects that will occur in the near future that will have a definite impact on travel within Georgetown. These are the opening of Interstate 66 in Northern Virginia between the Capital Beltway and the Theodore Roosevelt Bridge and the rehabilitation of the Whitehurst Freeway between Canal Road and Rock Creek Park. Because both of these projects are committed and either under construction or nearing the construction stage, they were not directly considered as alternatives in this study. However, their effects on travel patterns in Georgetown will be significant, and therefore have been considered throughout the analysis of Georgetown access alternatives.

Because of Georgetown's intense development and because of its abundance of historical sites and environmentally sensitive parklands, there are only a limited number of opportunities for physical roadway improvements in the area. JHK and Associates, together with Study Steering Committee members, identified seven physical roadway improvement alternatives which warranted analysis in this study. These alternatives are as follows:

(1) Tie the existing stub-end ramps at the east end of Whitehurst Freeway to M Street and Pennsylvania Avenue.

(2) Extend lower K Street to intersect with Canal Road opposite the Southern Entrance to Georgetown University.

(3) Repave lower K Street, moving the railroad tracks to either the north or south side of K Street.

(4) Depress K Street between Washington Circle and Whitehurst Freeway.

(5) Construct a double left turn lane at the Canal Road - Foxhall Road intersection for use by westbound Canal Road traffic during the PM peak.

(6) Upgrade Southern Entrance to Georgetown University.

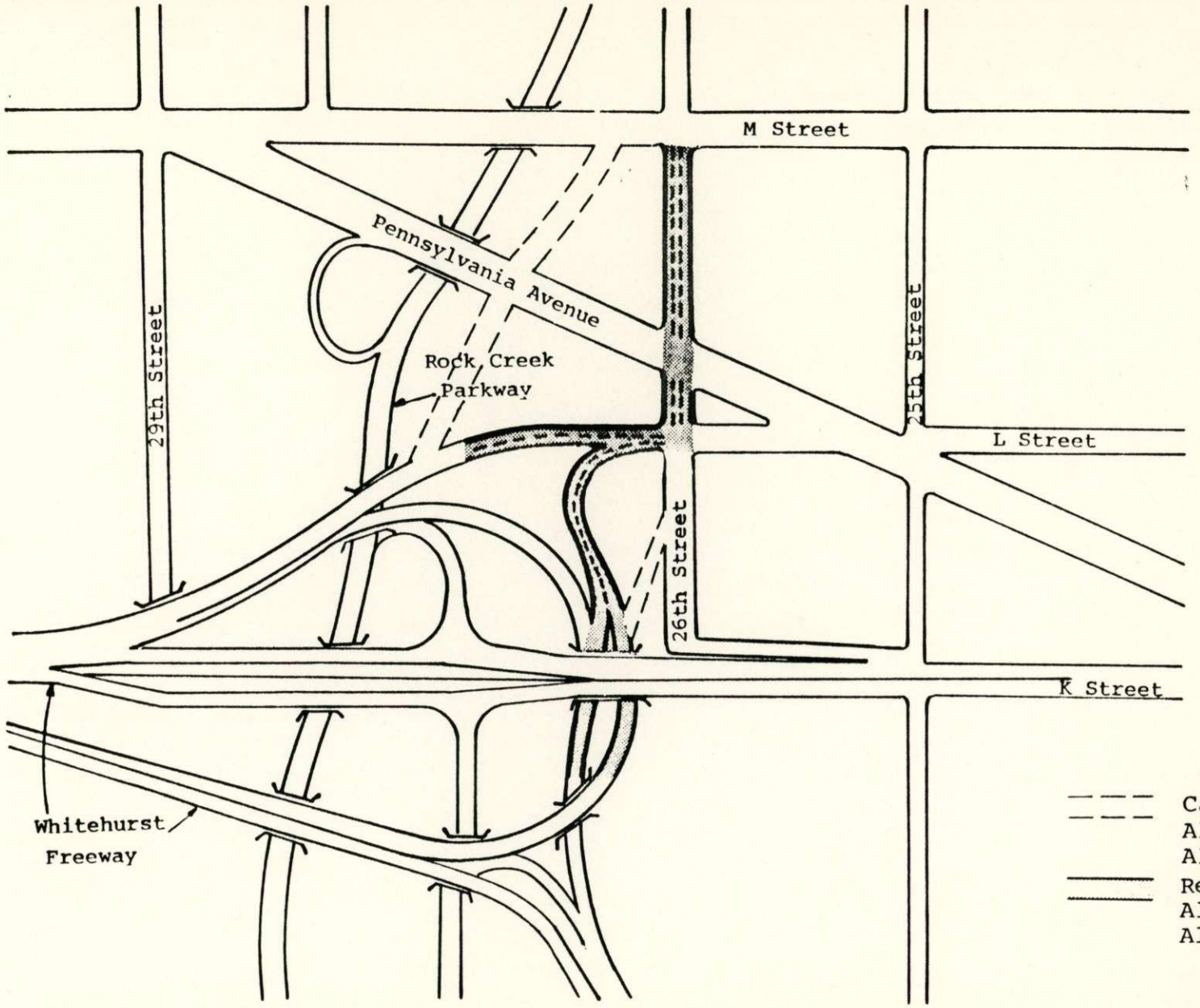
(7) Provide pedestrian access along K Street between Georgetown and the West End.

The first four of these alternatives are analyzed in this chapter. The last two are discussed in Chapter 6, the chapter dealing with the Southern Entrance to Georgetown University.

(1) Tie the existing stub-end ramps at the east end of Whitehurst Freeway to M Street and Pennsylvania Avenue. At the present time stub-end ramps exist at the east end of Whitehurst Freeway which were originally designed to connect to a freeway which would have followed Rock Creek to the north. Following the decision to drop the freeway from the regional transportation plan, consideration was given to the connection of these ramps to Pennsylvania Avenue and/or M Street just to the east of Rock Creek Park. The eastbound ramp was never built because insufficient travel demand was forecast along the ramp to justify its existence. The westbound ramp was never constructed because existing capacity constraints at the west end of Whitehurst Freeway effectively limited the amount of additional westbound traffic which could be added to the freeway during the PM peak period. Because of the different issues and impacts involved with the construction of the two separate ramps they are discussed separately.

Until recently there has been little justification for the construction of the eastbound ramp from Whitehurst Freeway connecting to Pennsylvania Avenue because the vast majority of traffic which could potentially use such a ramp (that which is destined to Downtown D.C.) has a more direct route to its final destination by staying on the Whitehurst Freeway and passing under Washington Circle. However, in the past few years there has been intensive development in the West End area between Pennsylvania Avenue and M Street and in the east end of Georgetown which would be directly served by a ramp from the Whitehurst Freeway to Pennsylvania Avenue. The alternative routes for vehicles destined to either of these areas is to exit from K Street at 24th Street and travel to either Pennsylvania Avenue or M Street, or to travel through Georgetown along M Street. Thus the construction of the eastbound ramp from the Whitehurst Freeway to Pennsylvania Avenue could offer the potential to reduce vehicle miles of travel both in Georgetown and the West End from the levels which would exist without the ramps.

The number of ways in which an eastbound ramp from Whitehurst Freeway could be linked to Pennsylvania Avenue are limited by physical constraints in the area. The existing stub end ramp and K street are presently constructed in such a manner that it should be feasible to construct a ramp under K Street (see Figure 2) without substantial reconstruction of either the existing stub end ramp or K Street. From the point at which the ramp would pass under K Street it appears that it would be most logical for the ramp to connect into the ramp from Interstate 66 which terminates at the intersection of 26th Street and L Street. The only other alternative would be to bring the ramp up to a merge with 26th Street at a point south of L Street. However, this alternative would involve bisecting and taking much of the land in the West End Park along 26th Street and would greatly increase traffic volumes along 26th Street, which is presently a quiet residential street with little through traffic.



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PROPOSED WHITEHURST FREEWAY RAMPS

jhk & associates

FIGURE No. 2

Connecting the eastbound Whitehurst Freeway ramp with the Interstate 66 ramp also poses problems because the Interstate 66 ramp is already severely congested during the AM peak period and would likely need to be widened to two lanes. In that case L Street would also need to be widened to two eastbound lanes during the AM peak period.

The design of a westbound ramp from M Street and/or Pennsylvania Avenue to Whitehurst Freeway also presents a number of problems which may be difficult to resolve. The primary purpose of such a ramp would be to divert through traffic from M Street onto the Whitehurst Freeway, and thus off of Georgetown streets. Therefore it is necessary that M Street traffic be given easy access to this ramp. Several alternatives were analyzed to connect M Street to the Whitehurst Freeway.

One alternative would involve the construction of a ramp which would begin just to the west of the corner of 26th and M Streets, pass under Pennsylvania Avenue and connect to the existing stub end of the Whitehurst Freeway ramp. A critical problem with this alternative is that it would pass under Pennsylvania Avenue at the point where the Pennsylvania Avenue bridge over Rock Creek Park ends, thus requiring reconstruction of that bridge. This alternative would also require the installation of large retaining walls and would pass through an existing park west of 26th Street between M Street and Pennsylvania Avenue.

Another option would be to construct the ramp along a similar alignment to the above option, but to cross Pennsylvania Avenue with an at grade intersection. Such an option could probably be designed so as to eliminate the need for complete reconstruction of the Pennsylvania Avenue bridge. However, it would result in three very close signalized intersections on Pennsylvania Avenue between 26th and 28th Streets. This option also has the disadvantage of cutting through the existing park west of 26th Street.

A third option would be to convert 26th Street to two-way operation, have vehicles turn south on 26th Street from M Street, west on L Street, and link into the westbound Whitehurst Freeway ramp from L Street. This alternative would require some realignment of the existing stub end of the Whitehurst Freeway ramp but would involve much less impact on parkland and would not increase the number of intersecting streets with Pennsylvania Avenue. However, in order to convert 26th Street to two-way operation and to connect L Street to the Whitehurst Freeway, parking would have to be removed from 26th Street between L and M Streets and from L Street west of 26th Street.

The ramp from westbound Whitehurst Freeway to southbound Key Bridge could be redesigned so it could carry a higher number of vehicles per hour. A barrier could be extended at the point where the ramp meets Key Bridge to reduce conflicts between ramp traffic and vehicles already on the bridge. The signal at the intersection of the westbound Whitehurst Freeway ramp with Canal Road could be retimed to favor Whitehurst Freeway traffic to a greater degree than at the present time. Even if a significant increase in capacity at this point proves to be impossible, it would be desirable to attempt to divert as much M Street traffic to Whitehurst Freeway as possible during all other parts of the day other than the PM peak and on weekends, in order to reduce traffic through Georgetown proper as much as possible.

It is estimated that a total of 2,000 to 3,000 vehicles would use the eastbound ramp per day and 3,000 to 4,000 vehicles would use the westbound ramp per day. The total cost of tying the existing stub-end ramps into L Street is estimated to be between $1,000,000 and $1,400,000 in 1979 dollars.

If tied with capacity restraint actions within Georgetown, the Whitehurst Freeway ramps could serve to provide an effective

bypass of Georgetown proper for a number of through trips which presently use M Street and Pennsylvania Avenue. However, the ramps raise a number of concerns among West End residents with regard to negative impacts, which should be studied in detail before a decision is made whether to build the ramps. Concerns have been raised regarding the reduction in on-street parking spaces on 26th Street, N.W.; changed traffic patterns within the West End; and possible environmental impacts. Although it is felt the net effect of the revised traffic patterns would be to shift some traffic from streets which run through the middle of the West End to streets which run along the north and west edges of that community, the traffic patterns resulting from the opening of the ramps should also be studied in more detail.

The primary justification for building the ramps would be to reduce through traffic volumes on M Street in Georgetown which detracts from the historic and commercial values of this area. The need for this shift is greater if trolley service is reinstituted or other capacity restaint measures are applied along M Street within Georgetown. If these actions are implemented and the ramps are not constructed, the net effect will be that through traffic will, to a greater extent than it even does today, use local residential streets to get through the West End.

The construction of the proposed ramps at the Whitehurst Freeway, if tied with capacity restraint measures within Georgetown, would result in significant benefits in terms of traffic operations and the impacts of through traffic upon Georgetown. However, there are a number of legitimate concerns regarding the impacts of the proposed ramps on the West End which need to be addressed in detail. If the ramps were to be constructed, it would be necessary that all impacts of the proposed action, both positive and negative, be studied

in detail. It is recommended that the D. C. Department of Transportation enter the environmental review process for an alternative which would contain the following elements:

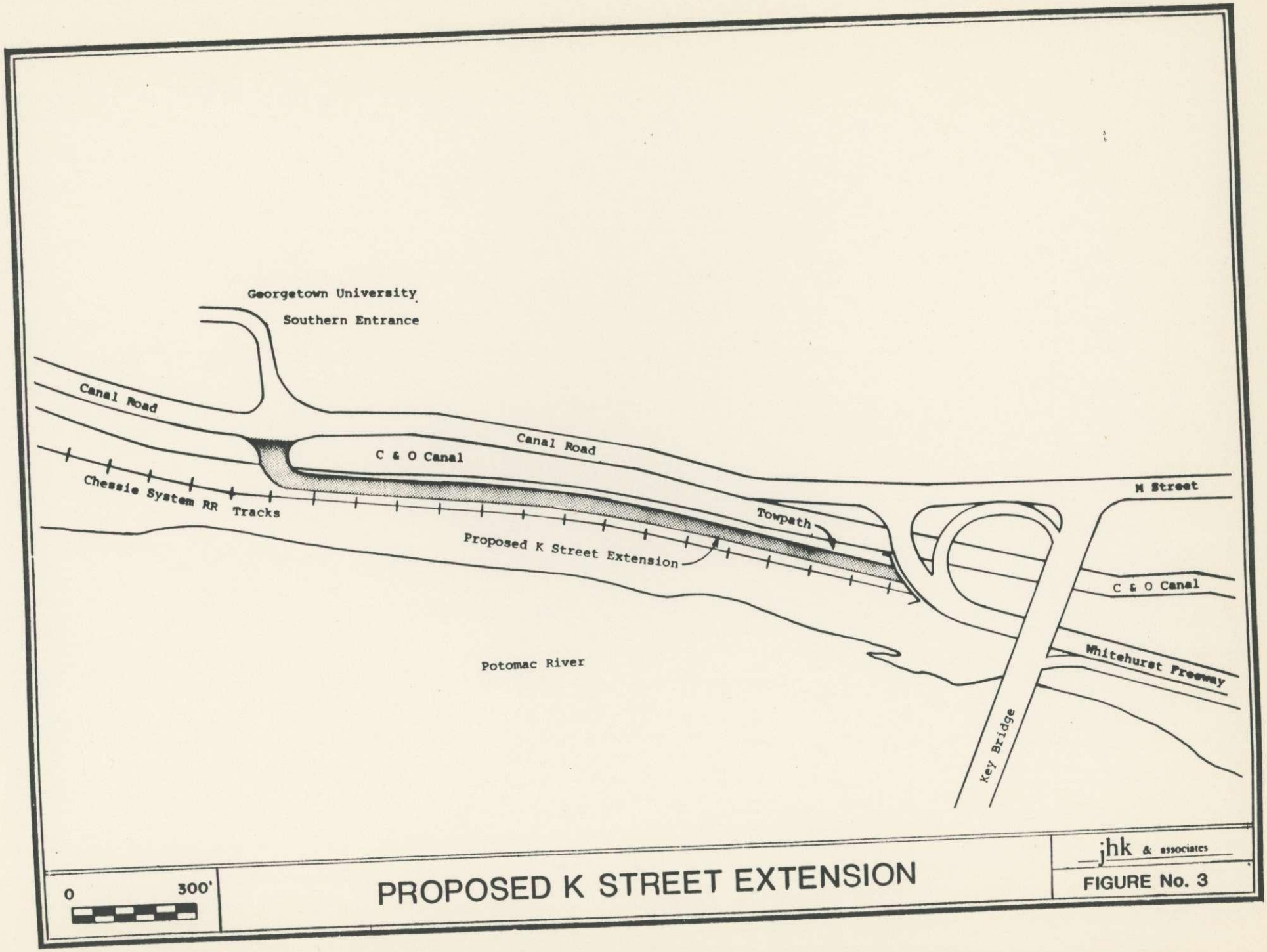
- Tie existing ramps at the east end of Whitehurst Freeway to termini on L Street.
- Convert 26th Street between L and M Streets to two-way operation, removing parking in this section of 26th Street, and making the center lane reversible.
- Remove parking on L Street between the Whitehurst Freeway ramps and 26th Street, redesigning the intersection of 26th and L Streets to accommodate double left turns. Make L Street one-way eastbound between 26th Street and Pennsylvania Avenue.

In addition, as part of the design for the reconstruction of the Whitehurst Freeway, it is recommended that both the eastbound and westbound ramps at the west end of Whitehurst Freeway be redesigned in order to improve traffic flow. This entire proposal, however, should only be considered within the context of an overall management plan which does not permit increased traffic volumes to enter downtown Wahington.

(2) Extend lower K Street to intersect with Canal Road opposite the Southern Entrance to Georgetown University. The primary purpose of this alternative would be to provide improved access to the rapidly growing area of Georgetown south of M Street, thereby diverting much of the traffic oriented to this area from M Street and the center of Georgetown. The extension of K Street to Canal Road could also serve as an alternate route to M Street and the Whitehurst Freeway for through traffic.

However, there are a number of serious problems with this alternative which make its feasibility unlikely. The most serious impacts would be upon the C&O Canal which would have to be crossed if lower K Street is to be connected to Canal Road (see Figure 3). The C&O Canal is a national historic landmark administered by the National Park Service. Except for a small piece of land just to the west of Key Bridge, the entire area between Canal Road and the Potomac River to the west of Key Bridge is National Park Service land. The elevation of K Street as it passes under Key Bridge is approximately 20 feet above sea level. At the point where K Street extended would intersect with Canal Road the elevation is 50 feet above sea level, thus the construction of a roadway which would enable vehicles to overcome this grade differential would require a barrier between the C&O Canal and the Potomac River. This barrier would be much more obtrusive than the existing Chessie System railroad tracks. Piers would have to be constructed for a bridge across the C&O Canal which would protude into the canal's right of way along the wall separating the canal from Canal Road.

The traffic impacts of extending K Street to intersect with Canal Road would be mixed. The area south of M Street in Georgetown is undergoing rapid redevelopment with significant increases in traffic generation being experienced. Traffic generated by this new development which is oriented to the west must presently use the narrow north-south streets connecting K Street to M Street. Much of this traffic would benefit from the opening of a connection to Canal Road, and the present overburdening of M Street would be relieved to a certain extent. However, this traffic would be dumped onto Canal Road at a point where it could not handle the additional traffic loads. In addition, lower K Street would become a third major east-west route through the southern part of Georgetown. The additional capacity provided by such a roadway would be contrary to this study's objective of reducing


Georgetown University
Southern Entrance
Canal Road
Canal Road
C & O Canal
Canal Road
Chessie System RR Tracks
Towpath
M Street
Proposed K Street Extension
C & O Canal
Potomac River
Whitehurst Freeway
Key Bridge
0
300'
PROPOSED K STREET EXTENSION
jhk & associates
FIGURE No. 3

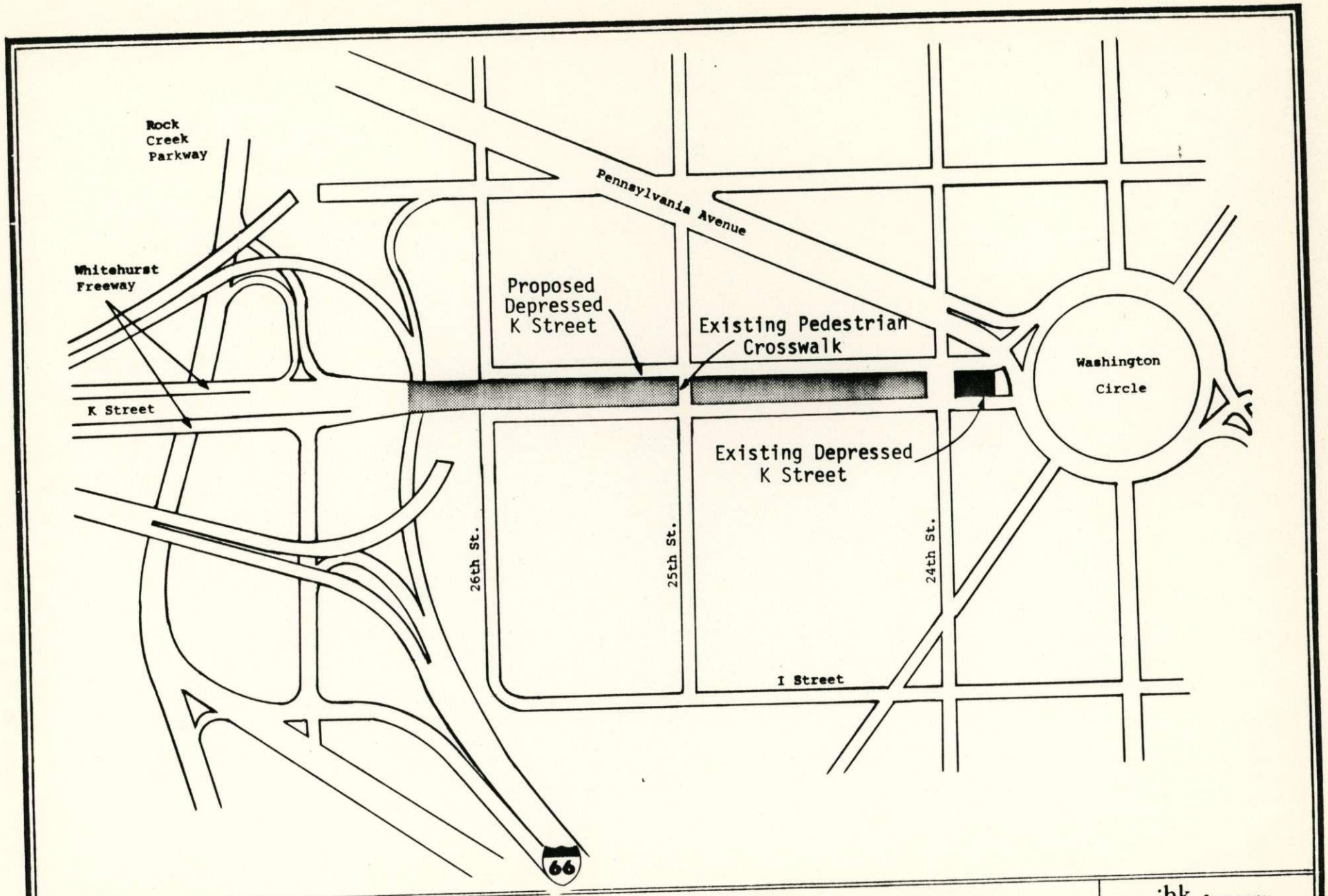
through traffic in Georgetown as well as D.C. DOT's larger objective of reducing automobile traffic to downtown Wahington. Because of the large number of problems associated with this alternative, it is recommended that it be dropped from further consideration in this study.

(3) Repave lower K Street, moving the railroad tracks to either the north or south side of K Street. On the north side of lower K Street many new buildings have recently been constructed, are being built, or are planned. On the south side of lower K Street the Waterfront Park and the proposed Georgetown Waterfront development is planned. With the massive redevelopment of the area of Georgetown south of M Street travel demand on K Street is steadily increasing. However, lower K Street at the present time has railroad tracks down its center and very poor pavement conditions.

It is necessary that the railroad tracks remain along lower K Street because the General Services Administration power plant at the east end of lower K Street receives coal shipments along the Chessie System line that runs down the center of lower K Street. However, if the tracks could be moved to either the north or south side of the street and the street repaved, its traffic handling capabilities would be improved considerably. With a new pavement it would be possible to run buses along K Street without fear of damage resulting from the poor pavement conditions. Putting the tracks along the south side would require that the tracks cross lower K Street at its east end in order to access the GSA power plant. However, placing them on the north side would require railroad crossings at every intersection and the tracks would interfere with unloading operations at the buildings along the north side of the street.

The D.C. Department of Transportation is presently planning to incorporate the repaving of lower K Street into its project to rehabilitate the Whitehurst Freeway. It is important that this be done, and if the Whitehurst Freeway project is delayed for any reason, serious consideration should be given to repaving lower K Street sooner. It is now impossible for buses to operate over this street because of its poor condition. If new bus routes cannot begin operating in this area as new developments open, an important opportunity to develop a transit habit among the residents and employees of these new developments may be lost. The cost of repaving lower K Street and moving the railroad tracks to the south side of the street for its entire length is estimated to be on the order of $300,000 to $400,000 in 1979 dollars. This is an expenditure that will be well worth the cost because it will allow K Street to provide some relief to M Street for traffic in South Georgetown and will permit the institution of bus service to the rapidly and densely developing area south of M Street.

(4) Depress K Street between Washington Circle and Whitehurst Freeway. At the present time K Street passes through a tunnel under Washington Circle, returns to the level of the surface streets at 25th Street, and again becomes depressed where it splits from the Whitehurst Freeway. At 25th Street vehicular traffic cannot cross K Street; however, there is a pedestrian signal and crosswalk which is used by a large number of pedestrians throughout the day (see Figure 4). The pedestrian signal is the first signal encountered by traffic coming off the Whitehurst Freeway. There are a significant number of pedestrian accidents at this location each year, which has led to the suggestion by residents of the West End that K Street be depressed through this section. Because such a project would obviously involve significant engineering



PROPOSED DEPRESSED K STREET

jhk & associates

FIGURE No. 4

analysis and considerable cost, JHK requested D. C. Department of Transportation engineers to develop a cost estimate for this project. If K Street were depressed through this entire section and a vehicular/pedestrian bridge were built across K Street at 25th Street, D.C. DOT engineers estimate the entire project would cost $6,600,000. If the bridge were designed to carry trolley loadings (25th Street is one of the streets being considered for a trolley routing), another $600,000 would have to be added to the cost of the project. A project of this order of magnitude would have to be incorporated into longer term capital projects planning and would have to be weighed against other large scale capital projects throughout the city.

A possible alternative to dealing with the pedestrian crossing problem would be to build a pedestrian bridge across K Street. Depending upon the type of structure built such a bridge would cost between $100,000 and $200,000. Although this alternative would not solve the problem of traffic noise for residents living along K Street, it would offer a safe crossing of K Street for pedestrians at a considerably lower cost. It is recommended that a pedestrian bridge at 25th Street be prioritized in relation to other locations where pedestrian bridges are presently being considered throughout the city and if it determined to be among the most needing locations, that such a bridge be built.

(7) Provide pedestrian access along K Street between Georgetown and the West End. With the rapid redevelopment of the area of Georgetown south of M Street, it is important that good access to Metrorail be provided in order that as high a percentage of trips will use Metrorail as possible. The straight line distance between most of this development and the Foggy Bottom Metrorail station is between 1/2 and 3/4 mile, which is within the range of distances commuters are observed to walk to Metrorail stations. However, at present there is no direct pedestrian

connection between lower K Street in Georgetown and the Foggy Bottom station. Pedestrians desiring to make this movement must walk north to M Street and Pennsylvania Avenue before proceeding east to the West End. It is important that transit usage to the new developments south of M Street be as high as possible if transportation levels of service are to be maintained at an acceptable level in South Georgetown. Because a direct pedestrian connection between Georgetown and the West End along K Street would significantly improve access to the Foggy Bottom Metrorail station from South Georgetown, it is recommended that attempts be made to incorporate a sidewalk along K Street across Rock Creek Park during the design and reconstruction of Whitehurst Freeway.

CHAPTER 3. CANDIDATE TRAFFIC OPERATION IMPROVEMENT ACTIONS

Because there are unlikely to be many major physical changes to the street system in Georgetown in the foreseeable future, improvements in access in the study area will have to come to a large degree from management of the existing street system. Although a great deal of effort has been spent in the past trying to tailor traffic operations to demand in order to maximize traffic throughput, the rapid redevelopment of the area south of M Street is going to introduce a whole new set of traffic patterns and traffic operation issues which must be dealt with in Georgetown.

Traffic operations alternatives cover a wide range of means for improving traffic flow. They also can be used to try to achieve objectives other than strictly maximizing vehicle throughput, however. For example certain lanes on roadways could be set aside for use by high occupancy vehicles only, or certain turning movements could be controlled either through signal timing or turn restrictions to reduce through traffic volumes. However, in investigating alternative traffic operation options, one must be careful not to propose actions which may solve one problem and create a more serious one elsewhere.

A total of twelve candidate traffic operation actions were generated for inclusion in this alternatives analysis. These actions are as follows:

(1) One-way streets
   (a) South of M Street (29th, 30th, 31st, Thomas Jefferson Streets)
   (b) North-south streets north of M Street (28th, 29th, 30th, 31st Streets)
   (c) East-west streets north of M Street (N, P, Q Streets)

(2) Upgrade the traffic signal system.

(3) Reversible lanes on Key Bridge.

(4) Remove reversible lanes on M Street.

(5) Extend bus lanes on M Street from Wisconsin Avenue to Key Bridge.

(6) Make right lane of Key Bridge northbound right turn only at Whitehurst Freeway ramp.

(7) High occupancy vehicle lanes on Key Bridge.

(8) High occupancy vehicle lanes on Whitehurst Freeway.

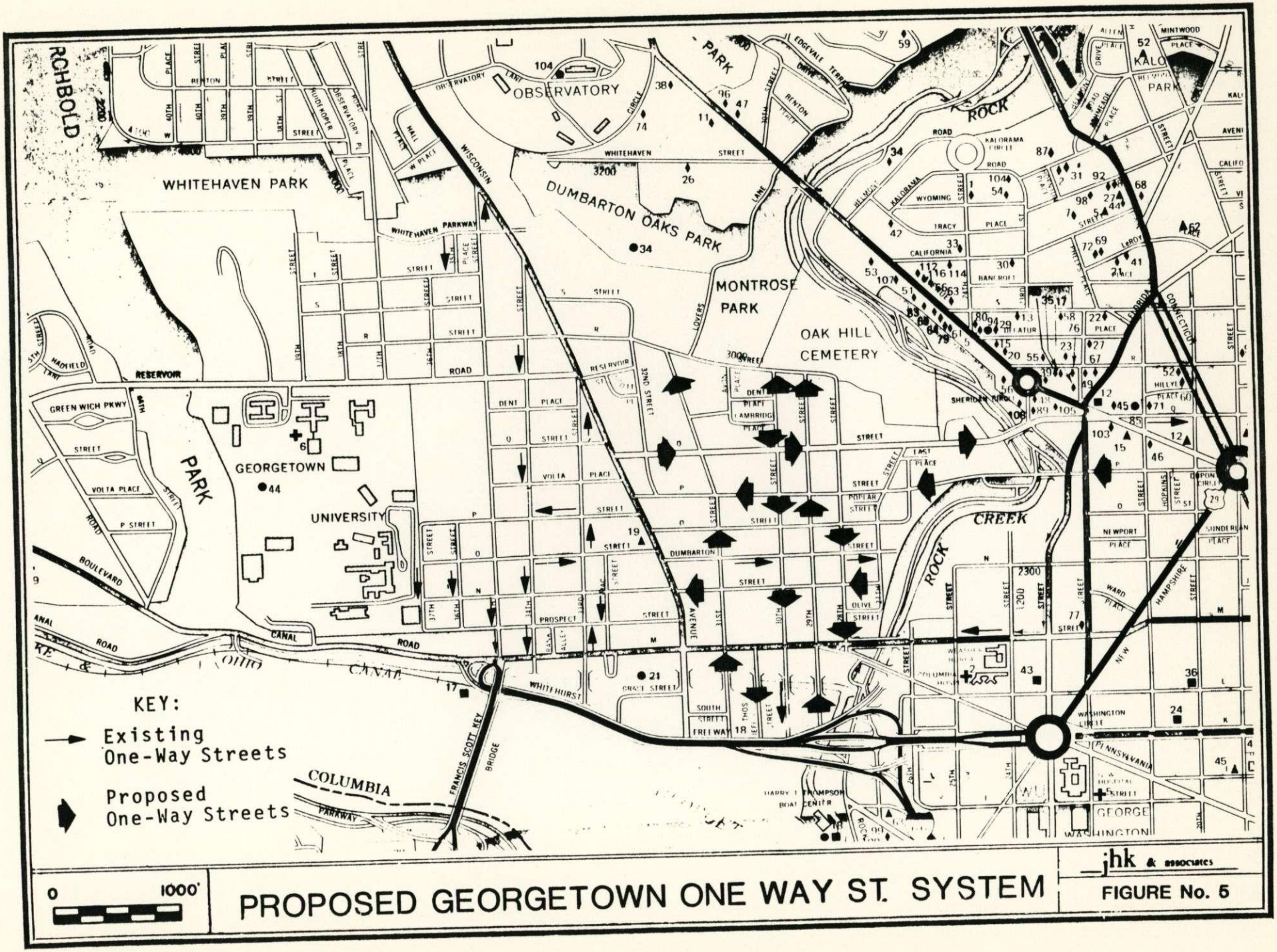
(9) High occupancy vehicle lanes on Canal Road and Whitehurst Freeway from Chain Bridge to Washington Circle.

(10) High occupancy vehicle lanes on P and Q Streets.

(11) Reduce the number of lanes on Key Bridge to four.

(12) Reduce the number of lanes on Chain Bridge to two.

(1) One-way streets. One way streets are normally implemented in densely developed areas where inadequate capacity exists on existing two-way streets. One-way streets can increase the traffic carrying capacity of the street system because they eliminate turning conflicts with on-coming traffic and normally reduce delays resulting from stopping or parking vehicles by allowing for an extra lane(s) in which to get by stopping or parking vehicles. Pedestrian safety is normally improved with one-way streets because pedestrians only need to be concerned with vehicles approaching from one direction. However, with the improvements which result in traffic flow, vehicular speeds normally increase as do traffic volumes carried. The discussion of potential one-way street patterns in Georgetown will be divided into three sections: one-way streets south of M Street, north-south one-way streets north of M Street, and east-west one-way streets north of M Street. A one-way street pattern already exists west of Wisconsin Avenue in Georgetown. A map showing both existing and potential one-way streets in the Georgetown area is shown in Figure 5.



PROPOSED GEORGETOWN ONE WAY ST. SYSTEM

jhk & associates

FIGURE No. 5

(a) South of M Street. The area of Georgetown south of M Street is rapidly redeveloping with many new buildings being constructed. This redevelopment is resulting in significantly more traffic being added to the north-south streets which run between K and M Streets. Except for Wisconsin Avenue these streets are quite narrow. With parking allowed on both sides, at it is now, it is impossible for two vehicles travelling in opposite directions to pass without one pulling over to the side while the other passes. To exacerbate the situation drivers of delivery trucks often cannot find space along the curb when making deliveries, so they stop their trucks in the middle of the street, unload or load their cargo, and block traffic, often for periods as long as 5 minutes or more. In order to stop these trucks from blocking the street, more loading and unloading zones are needed along these streets (see discussion in the chapter on parking alternatives). In order to facilitate traffic flow along these streets, it is proposed that one-way street operations be instituted on 29th, 30th, Thomas Jefferson, and 31st Streets between K and M Streets as shown in Figure 5. Because of serious sight distance problems encountered by southbound traffic on 29th Street at K Street, it is recommended that if a one-way street pattern is adopted that 29th Street be one-way northbound. The direction of each of the other streets would depend to a certain extent upon what is done in terms of one-way operations north of M Street. Recently 30th Street between M and K Streets was converted to one-way southbound operation at the request of residents living in the area. The new directional pattern was well received by most residents and businessmen, except one hotel operator who must now have guests' cars driven around the block after they are retrieved from the hotel's garage. One-way streets will result in some additional vehicle miles of travel because most trips to points along the one-way streets will have to circle a block, either in coming to or leaving their destination. However, travel time delays should be reduced considerably on the one-way

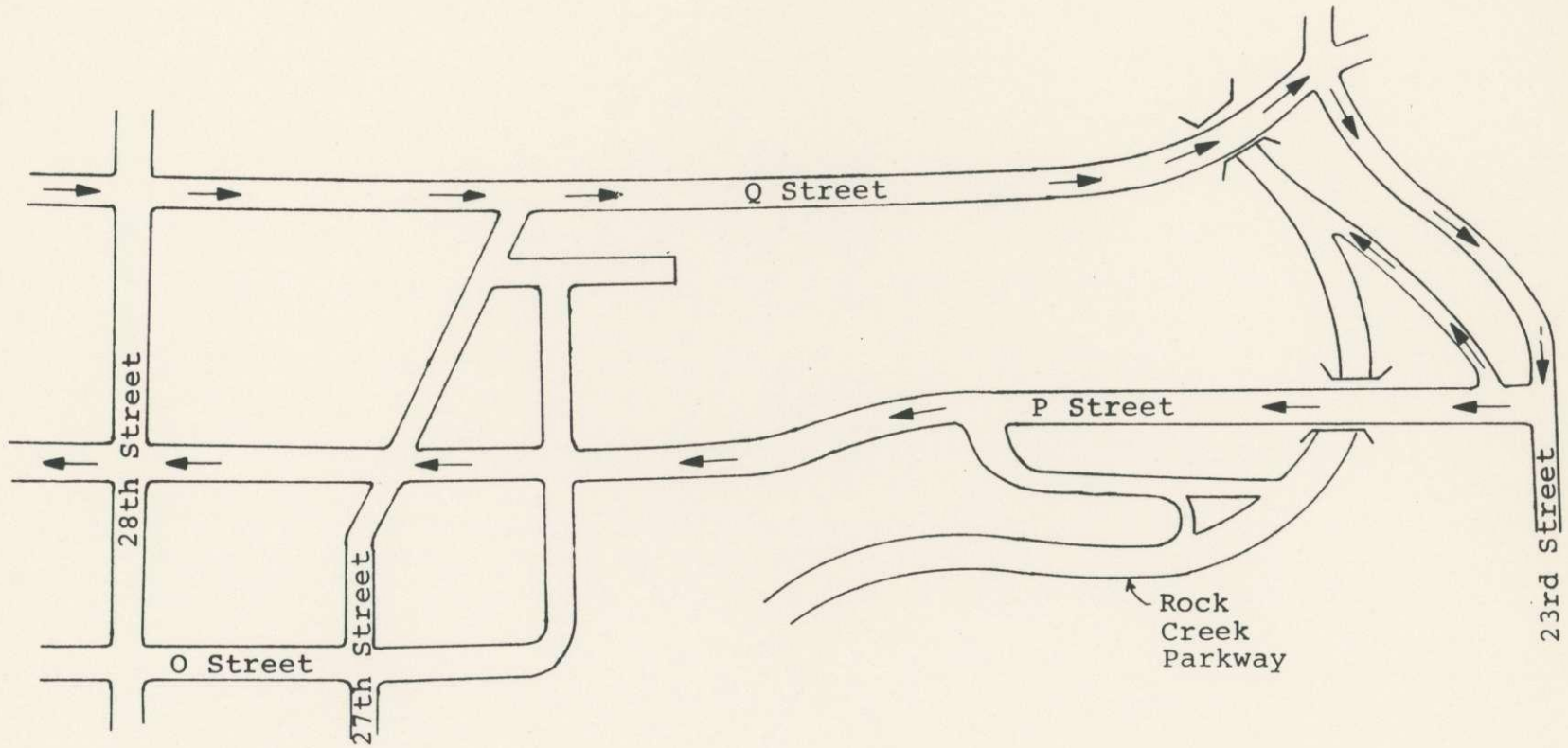
streets. The capacities of the intersections of these streets with M Street will be increased because of the reduction in the number of turning movements allowed. Because of the large increases in trip generation and its resultant impacts on traffic flow in this area, it is recommended that 29th and Thomas Jefferson Streets be made one-way northbound, 31st Street be made one-way southbound, and 30th Street be retained as a one-way southbound street.

(b) North-south streets north of M Street. As shown in Figure 5, 28th, 29th, 30th, and 31st Streets have all been proposed for one-way operation between M and R Streets. Whereas the north-south streets south of M Street suffer from inadequate capacity and poor traffic flow to the entrances of the many new and large office and commercial buildings going up in the area, the area north of M Street is primarily residential in nature, and the streets in the area provide adequate access to the residences. The traffic problems along these streets are somewhat the opposite of the streets south of M Street in that through traffic from the congested arterial streets spills over onto these streets which are intended for local access only. The residents in this area have successfully lobbied to get four-way stops installed at most intersections throughout this area in an effort to slow down traffic and discourage through traffic from using these streets. It is doubtful that these residents would be amenable to a proposal which would facilitate traffic flow and increase the number of through vehicles using their streets. On the other hand one-way streets do make parking easier and improve pedestrian safety. Because the primary impact of converting these streets to one-way operation would be upon the local residents and because converting these streets to one-way operation would likely increase through traffic on them, this proposed action should only be considered if supported by those persons living in the area.

(c) East-west streets north of M Street. Proposals have been made to create two one-way pairs out of N, Dumbarton, P, and Q Streets between Wisconsin Avenue and the eastern boundary of Georgetown (see Figure 5). Dumbarton Street presently is one-way eastbound. N Street would be made one-way westbound to balance the one-way flow on Dumbarton Street. Q Street would be made one-way eastbound and P Street one-way westbound. This is the reverse of a normal one-way pairing and is proposed this way because Q Street east of Rock Creek Park is one-way eastbound. P and Q Streets at the present time carry relatively large traffic loads primarily because they are the only Georgetown streets north of M Street which cross Rock Creek Park. A majority of the peak period traffic on these streets is through traffic and any actions which would facilitate traffic flow on these streets would likely increase the amount of through traffic on these streets, particularly during peak periods. In addition there are two problems, one at each end of the proposed two-way pair which make the desirability of implementing this one-way pair questionable. The vast majority of eastbound traffic on P and Q Streets makes a left turn from Wisconsin Avenue in order to get on one or the other of these streets. At the present time these left turning vehicles are split between the two intersections, and although they contribute to congestion at both intersections their impact is lessened by the fact that they are split between the intersections. If a one-way pair were implemented and all eastbound vehicles had to turn at Q Street, the congestion would become more serious merely because all these left turning vehicles would be concentrated at one intersection. Although no green time would have to be given to westbound Q Street vehicles, these vehicles would still be coming through the intersection from P Street. Another problem with the P/Q Street one-way pair occurs at the east end of Georgetown where it crosses Rock Creek Park. P Street presently intersects with Rock Creek Parkway in both directions. The Rock Creek Parkway/ P Street ramps carry substantial traffic volumes oriented both

toward downtown Washington and toward Georgetown. If P Street is made one-way westbound, traffic coming from Rock Creek Parkway and desiring to go eastbound would first have to travel westbound to 27th Street and then north to Q Street before proceeding eastbound (see Figure 6). Traffic wishing to access Rock Creek Parkway from Georgetown would have to cross Rock Creek Park on Q Street and proceed southbound on 23rd Street and westbound on P Street before being able to get on Rock Creek Parkway from P Street. The net effect of the one-way pair would be to facilitate through traffic while making conditions more difficult for traffic coming from Georgetown and wishing to get on Rock Creek Parkway. Therefore this one-way pair is not recommended. Although it does not appear that converting N Street to one-way westbound operation would have serious negative impacts, it also does not appear that there is much to be gained by the action, except perhaps increased ease of parking and increased pedestrian safety. Therefore this action is recommended only if there is strong citizen support for it.

(2) Upgrade the traffic signal system. The traffic signal system in Georgetown has received a great deal of attention during the past twenty years. Timing plans have been carefully conceived which are based upon measured traffic volume turning counts. Several years ago M Street through Georgetown was connected into the D.C. Department of Transportation's computerized traffic signal system. However, timing patterns were not properly updated to account for the increased traffic volumes which the system was capable of handling and traffic backed up from Key Bridge, resulting in serious congestion through Georgetown. Except for isolated cases where intersections do not have adequate capacity to handle the traffic volumes passing through them, the overall traffic signal system in Georgetown does a fairly good job of moving traffic when properly maintained. The critical element that determines how well the signal system moves traffic is proper maintenance and constant updating of phasing and timing plans as traffic patterns change.



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PROPOSED P AND Q STR ONE WAY OPERATIONS

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FIGURE No. 6

The need for new traffic signals in Georgetown will depend to a certain extent upon what other candidate actions are implemented. If the Southern Entrance to Georgetown University is upgraded so all turning movements are allowed, a traffic signal will have to be installed at that location. This signal will have to interconnect with the signals at the intersection of Canal and Foxhall Roads and with the signals at the intersection of Canal Road and the Whitehurst Freeway. If buses and emergency vehicles only are permitted to make certain movements during certain time periods, a bus priority signal will have to be installed.

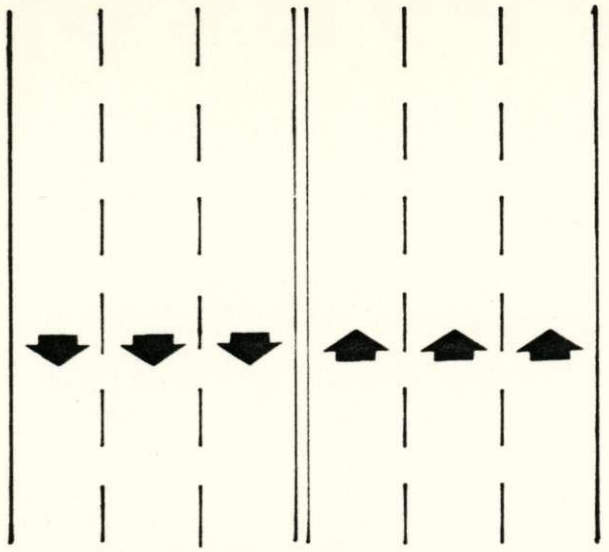
If one-way streets are implemented south of M Street, a new signal will be necessary at the intersection of Thomas Jefferson Street and M Street. In addition phasing and timing plans along M Street would have to be updated to respond to the resultant changes in traffic patterns. Regardless of whether or not one-way street operations are implemented in South Georgetown, a signal will be warranted in the very near future at the intersection of Wisconsin Avenue and K Street. If changes in traffic operations on Key Bridge are implemented, their impact on traffic patterns will have to be taken into account in signal timing. To as great an extent as is practical, signal timing at the west end of Whitehurst Freeway should be designed to favor Whitehurst Freeway traffic, thereby making Whitehurst Freeway a preferable route to M Street for through traffic.

Changes in traffic patterns will occur, even over and above those changes directly resulting from the implementation of certain traffic operation actions, because of the rapid development occurring south of M Street. Therefore, it is essential that traffic volumes and turning movements along M Street and K Street be carefully monitored over the course of the next several years to determine if changes in signal phasing or timing are warranted or if new signals are necessary at intersections not presently having them.

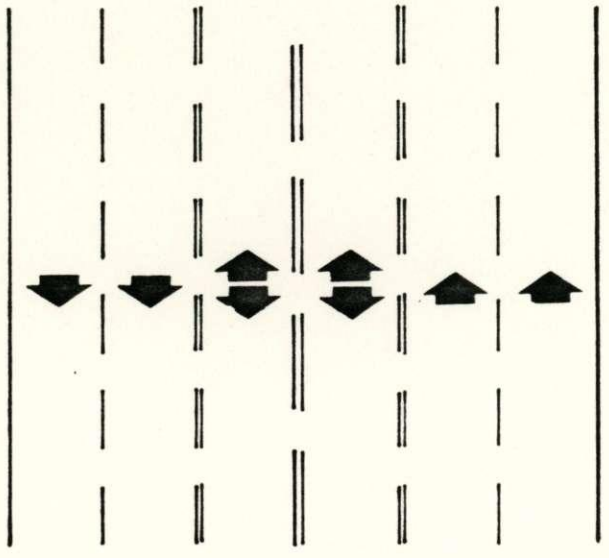
(3) Reversible lanes on Key Bridge. This is the first of several candidate traffic operations actions for Key Bridge. It should be noted that a separate management study is presently being conducted for Interstate 66 and the Roosevelt Bridge. It is important that any management actions taken for Key Bridge be fully coordinated with the actions which will be taken to manage Interstate 66.

Key Bridge is presently the second busiest river crossing between Virginia and the District of Columbia, the Interstate 395 bridges being the only busier crossing. January 1979 traffic counts showed a weekday average of 61,200 vehicles crossing Key Bridge, with the AM and PM peak hours representing 7.6 and 7.5 percent of total daily traffic. Both peak hours have highly unbalanced flows with the AM split being 66/34 and the PM split 37/63, inbound versus outbound; so considering the bridge by itself, the traffic flows are unbalanced enough to permit reversible lanes. In addition, if the Southern Entrance to Georgetown University becomes the main entrance to the campus, left turns off Key Bridge will increase to the point that two left turn lanes off Key Bridge onto M Street during the AM peak period would improve traffic operations at the Georgetown end of the bridge during that time period.

There are, however, some serious problems with the reversible lane concept on Key Bridge. A primary objective of this study is to reduce through traffic in Georgetown, but the net effect of increasing capacity on Key Bridge would be to increase through traffic volumes. During the PM peak period the constraining factor on Key Bridge traffic capacity is not the bridge itself, but the capacity of Rosslyn Circle, and little would be gained by attempting to merge four lanes of traffic into a traffic circle which is already at capacity with three lanes of traffic entering from the bridge. Reversible lanes on the bridge would require some rather complex signing including overhead signs. The bridge



EXISTING KEY BRIDGE LANE CONFIGURATION



PROPOSED REVERSIBLE LANE CONFIGURATION

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KEY BRIDGE REVERSIBLE LANES

jhk & associates

FIGURE No. 7

structure at the present time is not capable of supporting overhead signs. In addition, such signs would detract from the appearance of this architecturally significant structure.

Because of the problems cited above it is felt that reversible lanes during the PM peak should be dropped from further consideration. Although there are serious problems with the concept of reversible lanes on Key Bridge during the AM peak period, this concept should at least be considered in the Key Bridge management study, but only if the two left lanes are utilized for left turns onto Canal Road, and only within the context of a total management plan which does not permit increased through traffic to enter Georgetown proper.

(4) Remove reversible lanes on M Street. Since the Metrorail Blue Line opened between Rosslyn and downtown Washington in July 1977 and the vast majority of Virginia bus routes which used to operate along M Street in Georgetown were cut back at the Rosslyn station in September 1977, traffic congestion along M Street has subsided considerably during peak periods. The net result has been that M Street has become a more attractive alternative route for through traffic entering Georgetown. A suggested means of reducing M Street through traffic is the removal of the reversible lanes along M Street.

Although such a measure may effectively reduce M Street through traffic volumes, this measure by itself would be counterproductive to certain other transportation objectives in Georgetown. Unless capacity is also reduced at the major entry points to M Street, i.e., Key Bridge, Canal Road, and M Street and Pennsylvania Avenue over Rock Creek Park, the net effect of removing the reversible lanes would be a spillover of through traffic onto parallel residential streets within Georgetown, as a result of the slower travel times along M Street. In addition the increased congestion would result in increased air pollution emissions and gasoline consumption. Therefore, removal of the reversible lanes without tying this action to certain other measures is not recommended at this time.

However, if the ramps at the east end of Whitehurst Freeway are linked to M Street and Pennsylvania Avenue, and the Key Bridge traffic management scheme is able to effectively limit the amount of traffic which can enter M Street, traffic flows along M Street could be reduced from present levels and permit removal of the reversible lanes without the resultant spillover and congestion effects cited above.

If trolley service is reinstituted on M Street and operated on exclusive right-of-way in the center lanes of M Street, reversible lanes would have to be removed from M Street through Georgetown. In this case it would be important that alternate capacity be provided to prevent traffic which presently uses the center lanes of M Street from spilling over onto local residential streets. The proposed Whitehurst Freeway ramps would be one means to provide this alternate capacity.

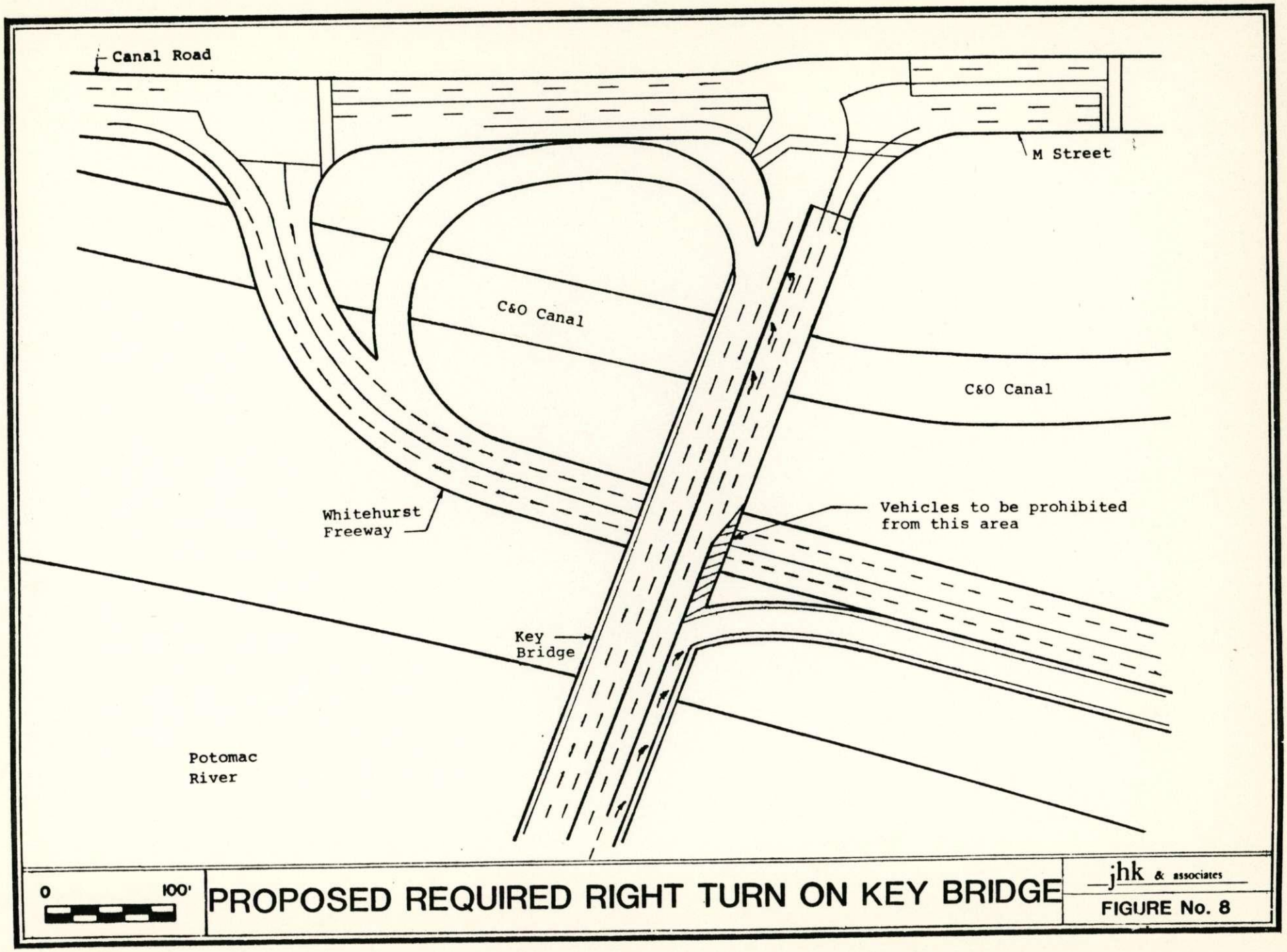
Traffic projections for 1985 show the percentage of through traffic decreasing from present levels as new developments south of M Street open up. This local access traffic is likely to have much less of a directional bias than existing peak hour traffic, which has a 64/36 directional split during the PM peak hour on M Street just east of Wisconsin Avenue. Therefore, traffic volumes along M Street should be carefully monitored over the course of the next five to six years, and if the directional distribution becomes less pronounced, serious consideration should be given to removing the reversible lanes along M Street.

(5) Extend bus lanes on M Street from Wisconsin Avenue to Key Bridge. Bus lanes presently exist on M Street between 28th Street and Wisconsin Avenue during the AM and PM peak periods in the peak direction. A total of 28 buses were counted during both the AM and PM peak hours in the peak direction in this section. Even with this number of buses, an average of one every two minutes, the bus lane carries a high number of autos, some of which are legitimately using the lane to make right turns. In the section of M Street between Wisconsin Avenue and Key Bridge only 12 buses pass

by in the peak direction during the peak hour, or one every five minutes. With bus volumes this low, there would be a high number of bus lane violations. Significant savings in bus travel times could not be realistically expected. It is unwise policy to install bus lanes where they are not warranted because they tend to be frequently violated and tend to breed general disrespect for bus lanes elsewhere in the city. Therefore extending the bus lanes on M Street from Wisconsin Avenue to Key Bridge is not recommended.

(6) Make right lane of Key Bridge northbound right turn only at Whitehurst Freeway ramp. One of the key objectives of this study is to attempt to find means for reducing the amount of through traffic using Georgetown's local streets. One means for doing this is to try to divert some of this through traffic to the Whitehurst Freeway and thereby effectively bypass Georgetown's street system. One proposed means designed to divert a higher percentage of Key Bridge traffic to the Whitehurst Freeway is to make the northbound right lane a right turn only lane at the Whitehurst Freeway ramp (see Figure 8). In this way right turning traffic would not have to compete with through traffic for use of the right lane. Capacity for through traffic would be reduced, thereby making the Key Bridge - M Street route a less attractive alternative for through traffic.

Making the right lane, right turn only becomes an even more attractive alternative if during the rehabilitation of Whitehurst Freeway the ramp from Key Bridge could be reconstructed so it has more curvature. Then cars would not have to come almost to a complete stop before turning onto the ramp from the bridge. This alternative also becomes more attractive if the eastbound ramp at the east end of Whitehurst Freeway is built to tie into L Street because the Whitehurst Freeway would become a more attractive alternative route for traffic destined to points in the West End and eastern Georgetown, as well as for traffic passing through Georgetown.



PROPOSED REQUIRED RIGHT TURN ON KEY BRIDGE

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FIGURE No. 8

A final recommendation on making the right lane of Key Bridge northbound right turn only at the Whitehurst Freeway ramp should wait until the completion of the ongoing Interstate 66 management study. However, at this time it appears to be an alternative which has merit, particularly if linked with the ramps at the east end of Whitehurst Freeway. If this alternative is implemented some physical means should be employed to prevent through vehicles from continuing to use the right lane. Raised pavement in the area just north of the ramp would discourage through traffic from using this lane, but would still allow for through vehicles to bypass a disabled vehicle in the center lane when such an incident occurs.

(7) High occupancy vehicle lanes on Key Bridge. Under existing conditions, the conversion of a peak period, peak direction lane to high occupancy vehicle usage would not be warranted because the time savings afforded HOV's would be so minimal that little modal diversion would occur and enforcement of the HOV lane would be almost impossible. However, once Intersate 66 opens in 1983 or 1984, the percentage of vehicles using Key Bridge during peak periods which will be high occupancy vehicles will increase significantly, due to the occupancy restrictions which will be in effect on Interstate 66. High occupancy vehicles will be assured a high level of service for their trip between the Capital Beltway and Rosslyn along Interstate 66. It would also be desirable if they could be assured a high level of service into the District of Columbia, in order to ensure the attractiveness of the high occupancy modes when persons are choosing among modes for their trips into downtown Washington.

Unfortunately there are several serious operational problems which make high occupancy vehicle lanes on Key Bridge impractical. An HOV lane on Key Bridge would have to be designed to carry both buses and carpools to ensure that neither high occupancy vehicle mode suffers increased time delays imposed

upon mixed traffic. The right lanes of Key Bridge are not supposed to be used by buses because the bridge cannot structurally support bus loadings in these lanes. In addition, free access to and from Whitehurst Freeway should be given to autos in order to encourage through traffic to use Whitehurst Freeway instead of streets in Georgetown proper. If the center lanes are used it will not be possible for traffic to move into position to make turns at either end of Key Bridge. If the northbound left lane is used for HOV's it will interfere with traffic turning left from Key Bridge onto Canal Road. Going southbound it will be difficult for buses to move from the right lane at their last stop on M Street into the left lane in a short enough time period to benefit from a lefthand HOV lane on Key Bridge. Carpools destined for Interstate 66 will exit from the right lane in Rosslyn Circle and therefore would not want to use the left lane of Key Bridge.

In addition to the operational problems cited above, enforcement of an HOV lane for both buses and carpools which is not physically separated from mixed traffic is extremely difficult, so there would likely be little if any time savings afforded HOV's by exclusive lanes on the bridge. For all the reasons given above it is recommended that the Key Bridge high occupancy vehicle lane alternative be dropped from further consideration in this study.

(8) High occupancy vehicle lanes on Whitehurst Freeway. HOV lanes on Whitehurst Freeway are a concept that has been proposed for a number of years but which has never been implemented. HOV lanes would be designed to afford a bypass of congestion at the west end of Whitehurst Freeway during peak periods. However, there are a number of convincing arguments against the implementation of high occupancy vehicle lanes on the Whitehurst Freeway. The first and most important is that implementation of these lanes would be counterproductive to meeting the objective of reducing the impact of vehicular through traffic in Georgetown. Reducing the capacity

of Whitehurst Freeway for low occupancy vehicles to one lane would divert significant numbers of these vehicles to alternative routes which use local Georgetown streets. Time savings afforded high occupancy vehicles would be so small that there would be almost no modal diversion to HOV's. Overall delay, air pollution emissions, and energy consumption would increase, particularly on Georgetown's local streets. An HOV lane on Whitehurst Freeway would carry only a small number of buses (14 were counted during the AM peak hour in the peak direction) and a correspondingly small number of carpools (only 164 three-or-more person carpools were counted during the AM peak hour in the peak direction). Even if the number of three-or-more person carpools increases by 50 percent, an optimistic estimate at best, only 246 carpools and 14 buses would use this lane, while an estimated 1,000 to 1,300 low occupancy vehicles would be diverted to local Georgetown streets. Based upon the above arguments it is recommended that this alternative be dropped from further consideration.

(9) High occupancy vehicle lane on Canal Road and Whitehurst Freeway from Chain Bridge to Washington Circle. During the gasoline shortage of the summer of 1979, the U.S. Department of Interior and the D.C. Department of Transportation asked JHK and Associates to analyze the feasibility of implementing a high occupancy vehicle lane along Canal Road and the Whitehurst Freeway as a potential energy saving action which could be quickly implemented. JHK and Associates prepared a memorandum for D.C. DOT.[1/] The HOV lane was not implemented, primarily because it was not feasible to put in place in a rapid enough manner that it could respond to the summer of 1979 shortage.

The HOV lane was to have operated between 7 and 9 AM in the right lane of eastbound George Washington Parkway, Canal Road, and Whitehurst Freeway, from a point two miles north of Chain Bridge

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1/ JHK and Associates, "Canal Road Bus/Carpool Lane," prepared for D.C. Department of Transportation, May 1979.

to the eastern terminus of the Whitehurst Freeway. It was estimated that buses and carpools could achieve a 7 to 12 minute time savings over low occupant vehicles traversing the entire length of the facility.

The memorandum addressed a number implementation issues including signing, marking, enforcement, and public relation issues. It also identified some serious problems. Significant diversion of low occupancy vehicles to MacArthur Boulevard could be expected. Some of this increased traffic will undoubtedly find its way onto Reservoir Road, P Street, Q Street, and other residential streets in Georgetown. Unless a third eastbound lane is added to Canal Road between Chain Bridge and Arizona Avenue, this area will become a major bottleneck. Unless carefully planned, significant delays could result not only to low occupant vehicles but also to buses and carpools.

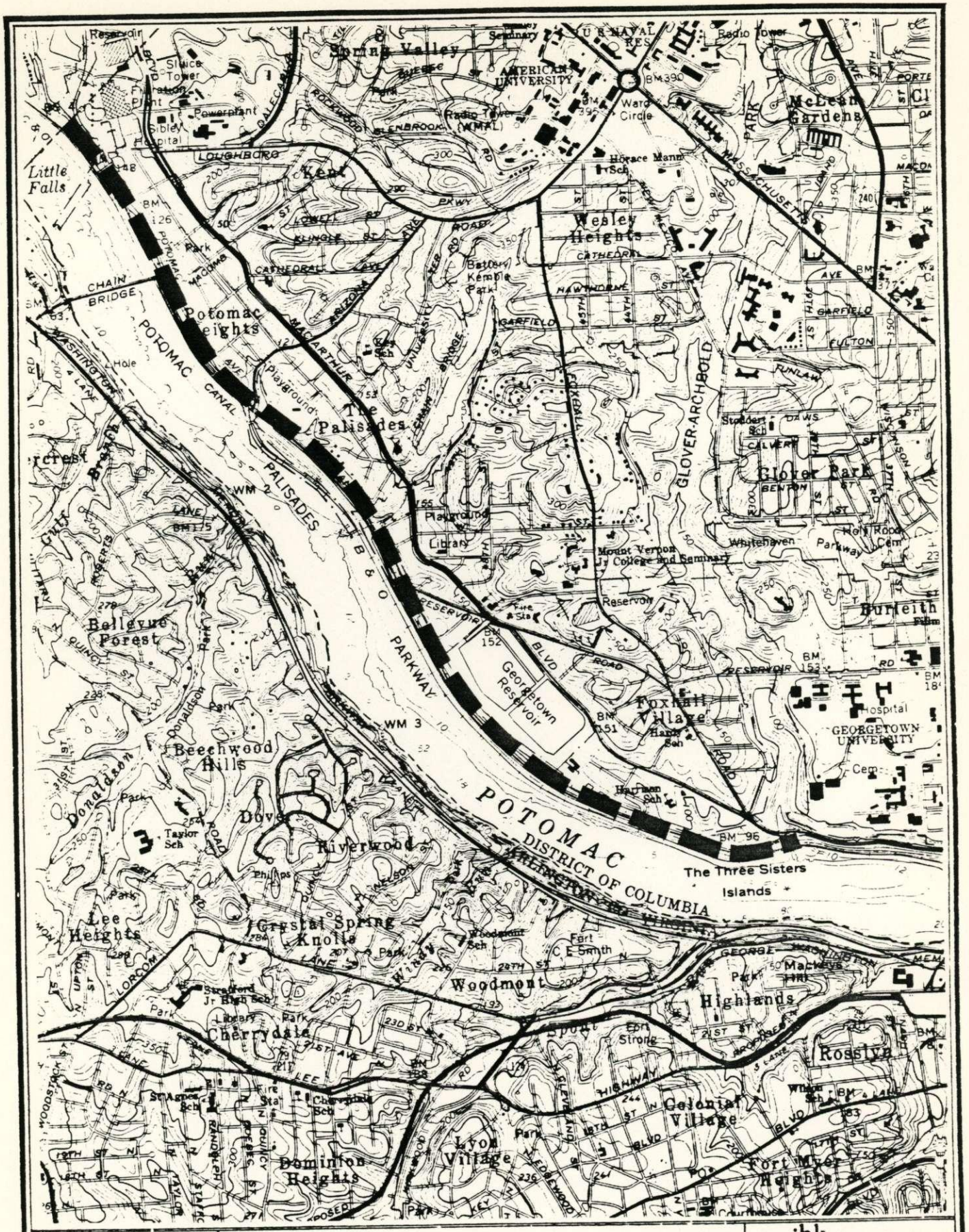
As identified in the analysis of Whitehurst Freeway HOV lanes, a reduction in capacity for low occupancy vehicles, not only on the Whitehurst Freeway but also on Canal Road between Foxhall Road and the Whitehurst Freeway is likely to result in significantly higher traffic volumes making their way onto Georgetown streets and would be counterproductive to the goal of reducing through traffic impacts within Georgetown. The justification for an HOV lane on these sections becomes especially questionable when one considers the very small time savings which could be afforded high occupancy vehicles over present travel times between the intersection of Foxhall and Canal Roads and the eastern terminus of Whitehurst Freeway.

The principal time savings a Canal Road HOV lane could afford these vehicles are on Canal Road at the existing bottlenecks at Chain Bridge, Arizona Avenue, and Foxhall Road, and it is in these sections that an HOV lane affords the most potential for causing modal diversion and energy savings. Therefore, it is recommended that further consideration be given to an HOV lane

only in the section of the George Washington Parkway and Canal Road between the Maryland State Line and Foxhall Road. (see Figure 9).

Even in this section implementation of an HOV lane could be expected to be a sensitive issue. Implementation would have to occur at an appropriate time, and should occur only after careful planning and preparation. However, an HOV lane on Canal Road does offer an opportunity for significant diversion to high occupancy vehicles in a corridor which presently experiences some of the lowest vehicle occupancies entering downtown Washington. It is a project which deserves careful study and should have implementation plans fully developed, so when an appropriate time for implementation becomes available, such as the next gasoline shortage, it could be rapidly put in place. An additional attractive feature of this project is the fact that it is easily retractable. If after implementaion the expected modal diversion does not occur and congestion becomes even more severe in the corridor, the project could easily be dropped. It is also important to note that HOV lanes on Canal Road have significantly greater potential if a park-and-ride lot at the Glen Echo Amusement Park is implemented. Past efforts to establish a park and ride lot at this site have failed and future prospects for this site are not good. However, it is important that the search for potential sites for park and ride lots on both sides of the Potomac River continue.

(10) High occupancy vehicle lanes on P and Q Streets. As discussed earlier in the analysis of potential one-way traffic operations on P and Q Streets, these streets presently carry relatively high traffic volumes, particularly for streets which are primarily residential in nature. P and Q Streets are the only streets in the northern half of Georgetown which cross Rock Creek Park, and as a result they carry a relatively high proportion of through traffic (48 and 60 percent, respectively in the PM peak period entering Georgetown). Implementation of HOV lanes on


Spring Valley
AMERICAN UNIVERSITY
U.S. NAVAL RES.
Radio Tower
McLean Gardens
Ward Circle
Horace Mann Sch
Wesley Heights
Little Falls
Kent
Potomac Heights
CHAIN BRIDGE
POTOMAC CANAL
MACARTHUR BLVD
The Palisades
PALISADES
GLOVER-ARCHBOLD
Glover Park
Stoddert Sch
Whitehaven Parkway
Holy Rood Cem
Mount Vernon Jr College and Seminary
Library
Playground
Reservoir
Georgetown Reservoir
Foxhall Village
GEORGETOWN UNIVERSITY Hospital
Burleith
Bellevue Forest
Beechwood Hills
Donaldson Park
Dover
Riverwood
Taylor Sch
Harrison Sch
POTOMAC
DISTRICT OF COLUMBIA
The Three Sisters Islands
Lee Heights
Crystal Spring Knolls
Woodmont
Woodmont Sch
Fort C.E. Smith
Macarthur Park
Highlands
Cherrydale
Stratford Jr High Sch
Fort Strong
Rosslyn
Colonial Village
Lyon Village
Dominion Heights
Fort Myer Heights
Courthouse
WM 2
WM 3
B & O PARKWAY
0
5000'
PROP. CANAL RD. HOV LANE
jhk & associates
FIGURE No. 9

these streets has been proposed as a means to reduce the capacity for low occupant autos (through low occupant autos in particular), while improving travel times for buses and carpools and thereby inducing modal diversion to these higher occupancy modes.

Probably the only way HOV lanes on these streets could be at all enforceable, and hence effective, would be if they were operated as contra-flow lanes. However, contra-flow lanes on P and Q Streets between Wisconsin Avenue and 23rd Streets present several serious problems. Traffic operations for low occupancy autos would in effect be the same as those of the proposed one-way street discussed earlier in this chapter and would have somewhat similar problems. In particular traffic accessing Rock Creek Parkway from Georgetown or egressing from Rock Creek Parkway to go into downtown Washington will have to take a long circuitous route.

In addition in those portions of P and Q Street where there is presently parking on both sides of the street, vehicles desiring to find a parking space would have to be allowed to use the contra-flow HOV lane to search for a parking space. This would increase the difficulties of enforcing the HOV lanes. The reduced capacity for low occupancy vehicles on P and Q Streets will induce some of these vehicles to divert to other residential streets which are not intended to be used for trips other than local access.

Because of the above cited reasons it is recommended that high occupancy vehicle lanes on P and Q Streets no longer be considered. With-flow HOV lanes would be almost impossible to enforce and therefore ineffective. Contra-flow lanes not only would have the problems associated with one-way street operations, but would also present problems for parkers along P and Q Streets.

(11) Reduce the number of lanes on Key Bridge to four. This rather drastic measure has been proposed as a means to reduce the amount of Virginia traffic passing through Georgetown from Key Bridge. The capacity of this main artery into Georgetown from Virginia would be cut by a third. Because of the

resultant difficulty for vehicles to make their way through Georgetown, persons in through vehicles would in theory either change their travel paths to other Potomac River bridges or would divert to transit.

There are, however, several serious problems with the proposed action which in total make it an undesirable alternative. The District of Columbia's present policies are to attempt to divert as many trips to high occupancy modes as possible and thus reduce vehicular travel demand, particularly on streets in downtown and in residential areas. However, at the same time, it is realized that a well functioning arterial street system is necessary if the District's attempts to attract a larger business base are to be successful. Therefore, measures will not be adopted which attempt to divert persons to transit by making the arterial system become so congested that travel by low occupancy auto becomes extremely difficult. The long term implications of such actions would be to drive new development from the center city to suburban locations where even more travel will be generated. Reducing Key Bridge to four lanes would be such an action.

This action would cause untold congestion both in Georgetown and Rosslyn, not only for through trips, but also for trips to and from points within Georgetown. Trips diverted to other bridges would have longer travel paths, resulting in increased vehicle miles of travel, air pollution emissions, and energy consumption. The negative effects of the resultant congestion would impact not only low occupant autos, but also the buses and carpools to which the District is attempting to get people to switch. The congestion caused by backups from Key Bridge into Georgetown would result not only in decreased accessibility within Georgetown, but in more air pollution emissions and energy consumption by idling cars standing in the congestion. Increased difficulty of getting to Georgetown would drive away some retail trips presently being made to Georgetown. It is unlikely Georgetown residents or businesses desire to significantly

decrease their own accessibility in order to make it more difficult for through trips to use Georgetown streets for their travel paths. There are more effective means to decrease the impacts of through traffic on Georgetown than by completely taking away two lanes from Key Bridge. For all these reasons, it is recommended that this candidate action be dropped from further consideration at this time.

(12) Reduce the number of lanes on Chain Bridge to two. As noted in Technical Memorandum No. 3 a significant portion of the Virginia traffic crossing Chain Bridge eventually moves its way onto Georgetown Streets, either via Canal Road or Reservoir Road. The majority of this traffic is vehicles passing through Georgetown, and thereby contributing to Georgetown's through traffic problem. It has been suggested that if the number of lanes on Chain Bridge were reduced to one in each direction at all times of day, traffic would be discouraged from using this bridge and would be less apt to make its way into and through Georgetown.

Although in concept there is some merit to the suggestion, there are also some significant problems. Although a significant portion of the traffic crossing Chain Bridge is oriented toward downtown Washington, a large portion is also oriented to points other than the CBD. For the vast majority of non-CBD oriented trips in this corridor there is very poor transit service, so the real alternatives to Chain Bridge are route alternatives, rather than mode alternatives. For a number of these trips the most attractive alternative route is to cross the Cabin John Bridge and make the entire trip in the corridor on the Maryland side of the river. For these trips the impact on Georgetown does not change. However, total VMT, air pollution emissions, and energy consumption would increase. The other principal route alternative would be to use the George Washington Parkway on the Virginia side of the river through Spout Run and then to use one of the central area Potomac River Bridges, thus aggravating the already severely congested

conditions at Spout Run and on the other Potomac River Bridges. For many of the trips presently crossing Chain Bridge, however, neither of these route alternatives is a realistic option and these trips would continue to use Chain Bridge, even if long backups had to be endured. Removal of a lane on the bridge would result in significant increases in delay without offsetting benefits.

An alternative to the absolute removal of a lane from the bridge would be the conversion of one of the peak period, peak direction lanes to an HOV lane. Such an action could be tied to the implementation of an HOV lane along Canal Road during peak periods. The problem with this alternative is that the approaches on the Virginia side of Chain Bridge have only two lanes so there would be no effective means for high occupancy vehicles to bypass the backup and delays caused by the reduction in capacity on the bridge. Although this option should be considered during the development of detailed implementation plans for the Canal Road HOV lane, it appears to be an inadvisable alternative at this time, as does the absolute removal of an entire lane from the bridge at all times.

CHAPTER 4. CANDIDATE PARKING MANAGEMENT ACTIONS

One of the most critical access problems in the Georgetown area at the present time is parking, and this problem is bound to be exacerbated as new development takes place in the area. Competition between Georgetown's residents and patrons of its commercial establishments for the limited supply of free on-street parking spaces is keen. This problem is particularly acute during evenings and on weekends in the areas within three to four blocks of M Street and Wisconsin Avenue. The implementation of the residential parking permit program in Georgetown has eased short term parking supply problems during midday on weekdays, but has had little effect on evening and weekend parking problems.

Other problems related to parking in Georgetown include the lack of effective marketing of off-street spaces, a severe shortage of off-street parking spaces in the Wisconsin Avenue commercial area north of M Street, delivery vehicles double and triple parking throughout the midday period, and the lack of adequate park and ride facilities in the traffic corridors which converge upon Georgetown. A number of candidate parking management measures for the Georgetown area designed to help solve some of the above-cited problems are analyzed in this chapter. These candidate actions are as follows:

(1) Extend residential parking permit program to evenings and weekends.

(2) Extend peak hour on-street parking restrictions along M Street and Wisconsin Avenue to midday, evenings, and weekends.

(3) Convert a percentage of parking spaces along M Street and Wisconsin Avenue to loading zones.

(4) Build a parking garage in the Wisconsin Avenue commercial area north of M Street.

(5) Park-and-ride lots.

(a) Glen Echo Amusement Park

(b) McLean, Virginia area

(c) Georgetown University

(6) Remove peak hour on-street parking spaces south of M Street

(7) Convert a percentage of on-street parking spaces south of M Street to loading zones.

(8) Marketing of private garage spaces, particularly on weekends and evenings

(a) expand parking validation programs

(b) post parking information

(c) signing for parking

(9) Increase parking meter rates and extend hours.

(10) Increase the number of on-street parking spaces which are metered.

(1) Extend residential parking permit program to evenings and weekends. The institution of a residential parking permit program between 7:00 AM and 6:00 PM on weekdays has been quite effective in increasing the availability of on-street parking in Georgetown for residents and short-term parkers. As reported in Technical Memorandum No. 3 the average occupancy rate of on-street spaces on weekdays has dropped from 115 percent to 86 percent making it much easier for both residents and shoppers to find on-street parking. The persons who have been most impacted by the program are Georgetown employees who drive to work and other commuters who formerly drove to Georgetown to park their cars and who then took transit or walked to their final destination.

Because the weekday residential parking permit program has been quite successful, a proposal to extend the hours of Georgetown's parking permit program to evenings and weekends is being studied by the D.C. Department of Transportation. The primary justification for such an extension is the difficulty residents have in

finding on-street spaces near their homes during these time periods because tourists, shoppers, and patrons of restaurants and entertainment spots utilize the spaces. The results of the weekend and evening on-street parking inventory show this to be a particularly acute problem within 3 to 4 blocks of M Street and Wisconsin Avenue.

However, there are a number of significant differences between the nature of on-street parking during evenings and weekends from on-street parking during the day on weekdays which need to be weighed in making a decision on extending the hours of the residential parking permit program. The average length of stay of evening and weekend visitors to Georgetown tends to be longer than for midday weekday visitors, so while the weekday permit program acts to make parking more convenient for visitors (both to residences and businesses) an evening or weekend program would make parking considerably less convenient. This could have a serious negative impact, particularly on businesses such as restaurants and entertainment spots which cater to customers who tend to stay longer than two hours in Georgetown. It would also prove an inconvenience for residents who entertain guests for longer than two hours. The weekday program is designed primarily to discourage commuters from parking all day on Georgetown streets. During evenings and weekends there are few commuters parking on-street in Georgetown. An additional requirement for a residential parking permit to be successful is the existence of good transit alternatives or a good supply of off-street parking. During evenings and on weekends transit levels of service drop off considerably, particularly at the home end of many trips attracted to Georgetown, and therefore transit in many cases is not a realistic alternative. Many of the off-street parking facilities close on evenings and weekends, making off-street parking, at least for the present, inconvenient for many evening and weekend travelers to Georgetown.

It has been suggested that perhaps a 3 or 4 hour permit program could be implemented during evening and weekend hours to overcome some of the problems cited above. However, it is doubtful whether such a program would have any impact on parking space availability since such a program would not affect existing users of the scarce spaces.

A recommendation regarding the extension of the hours of the residential parking permit program will not be made since this alternative is being further studied by D.C. DOT. However, some of the problems cited above need to be seriously considered in any decision which is made regarding the extension of the hours of the parking permit program.

(2) Extend peak hour parking restrictions along M Street and Wisconsin Avenue to midday, evenings, and weekends. Often the most serious congestion problems along M Street and Wisconsin Avenue occur during non-peak periods when the capacity of both roadways is reduced because parking is allowed along both sides. Therefore, it has been suggested that removal of on-street spaces along both streets could reduce off-peak congestion levels on these streets. Although this may be true, a more effective way of dealing with off-peak congestion would be to reduce the amount of double parking, particularly by delivery trucks, occurring on both streets by converting a percentage of on-street spaces on both streets to loading zones. This alternative is discussed below. In addition, increasing the capacity of M Street and Wisconsin Avenue during off-peak periods would tend to encourage through traffic, which is presently discouraged from using these streets, to return to Georgetown's streets. The number of spaces involved would be 101 along Wisconsin Avenue and 97 along M Street. These represent a significant proportion of the on-street spaces within three blocks of the Georgetown commercial area. These spaces are already in short supply, particularly during evenings

and weekends and their removal would likely result in more cruising by autos searching for on-street parking spaces.

Of course if trolley service is reinstituted in Georgetown along M Street and Wisconsin Avenue and the trolley operates on dedicated right-of-way, it is likely that parking will have to be removed along these streets at all times. However, unless trolley service is implemented, it is recommended that on-street parking along M Street and Wisconsin Avenue remain during off-peak periods and that efforts along these streets concentrate on reducing double parking, particularly by pickup and delivery vehicles.

(3) Convert a percentage of parking spaces along M Street and Wisconsin Avenue to loading zones. Access for pickups and deliveries to most of the businesses along M Street and Wisconsin Avenue is from the street in front of the business. Because parking is permitted along most of the length of both streets in front of the businesses and these parking spaces are well utilized, trucks often find it necessary to double park in front of a business when making a pickup or delivery. The presence of double parked trucks substantially reduces the capacity of these streets and contributes significantly to midday congestion. In order to alleviate this problem it has been suggested that a number of the on-street parking spaces along both streets be reserved as truck loading and unloading zones. In order to be effective three parking spaces would have to be removed from midblock along each block face if one large or two medium sized trucks are to be expected to be able to use the loading zone. Strict enforcement of the loading zones would also be necessary in order to keep automobiles from using the loading zones as parking spaces. This enforcement could be performed by the same persons who presently check parking meters along these streets. Thirteen block faces along Wisconsin Avenue north of M Street and twelve block faces along M Street inside the Georgetown corridor presently have parking spaces which could be converted to loading zones. If three spaces were converted

to loading zones along each of these block faces, approximately one-third of the on-street parking spaces along these streets would be removed during the midday period. This would result in substantially less impact on parking supply than the complete removal of on-street parking spaces along these two streets, yet could result in significant alleviation of existing midday congestion problems along M Street and Wisconsin Avenue.

(4) Build a parking garage in the Wisconsin Avenue commercial area north of M Street. Little off-street parking presently exists in the Wisconsin Avenue corridor north of M Street, and as a result parking supply in this area is tight, particularly during evenings and on weekends when this area attracts a large number of visitors. With the institution of the residential parking permit program, parking is very difficult for non-transit commuting employees who work in this area.

An investigation of existing land uses in this area does not reveal any locations which could be easily converted to a parking facility either by private interests or by the District of Columbia government. Therefore, it is recommended that the D.C. Department of Transportation support a long term goal of increasing off-street parking in the Wisconsin Avenue commercial area north of M Street. This can be done by ensuring that at least adequate and if possible extra off-street parking is provided with any new development which is proposed in this area. In the meantime it is imperative that a high level of transit service be maintained and improved upon in this corridor in order that employees have an attractive alternative to commuting by auto.

(5) Park-and-ride lots. The Potomac River corridor to the northwest of Georgetown is generally a low density, high income area,much of which is not well served by transit. Because of the low density of development in the corridor, general increases in transit service will not prove to be cost-effective.

However, if park-and-ride lots could be established in the corridor which could be served by a high level of transit service to the central employment area, particularly during peak commuting periods, significant modal diversion could be expected.

An examination of the Potomac River corridor reveals several potential locations for park-and-ride service. The first is the existing parking lot at the Glen Echo Amusement Park in the Glen Echo area of Montgomery County. The parking lot is for the most part unused during weekdays at the present time. It is located along MacArthur Boulevard just to the north of a convenient access road between MacArthur Boulevard and Canal Road. Its location is such that a large number of auto commuters to downtown Washington who presently commute along the Canal Road - MacArthur Boulevard Corridor could be expected to be intercepted.

There are, however, several issues which should be considered in making the decision as to whether the Glen Echo Amusement Park lot could be used as a park-and-ride lot. The first is the opposition of local residents to a park-and-ride facility at the Glen Echo Amusement Park. The residents of the community of Glen Echo have effectively blocked all past attempts to implement a park-and-ride lot at this location because they did not want the additional auto and bus traffic in their neighborhood. Additional opposition in the past has come from the National Park Service. The other problem which has impeded past efforts is the fact that MacArthur Boulevard is posted with a six ton weight limitation in the area near the Glen Echo Amusement Park and an exception to this weight limitation would have to be granted buses in the short section of MacArthur Boulevard between the amusement park and the cutoff to Canal Road. However, there appear to be no structural deficiencies which require the prohibition of buses in this section of MacArthur Boulevard.

Discussions with officials of the Montgomery County Department of Transportation indicate that it is unlikely that the opposition of the residents of Glen Echo to a park-and-ride lot at the amusement park could be overcome. Because Glen Echo is incorporated the town can deny access to the parking lot, thus effectively blocking the implementation of the park-and-ride facility.

The data collection phase of this study indicated that a substantial number of Virginia cars cross Chain Bridge and ultimately make their way into Georgetown via Canal Road and Resevoir Road. Park-and-ride lots in the McLean area of Virginia, to the west of Chain Bridge could be expected to intercept some of this traffic which presently passes through Georgetown. The Virginia Department of Highways and Transportation (VDH&T) is presently investigating potential locations for such park-and-ride lots. The D.C. Department of Transportation should support VDH&T's efforts to establish park-and-ride lots in this area.

The third potential location for a park and ride lot is at Georgetown University. The university has limited the number of parking spaces it makes available for commuters to the university, and as a result it suffers a severe parking shortage during certain special events such as basketball games and commencement exercises. Provided insurance details could be worked out, the university has expressed interest in exploring the possibility of constructing extra parking spaces which would be reserved for short term park-and-riders at most times but could be used by the university for special events parking. These spaces would be convenient to the proposed transportation terminal at the Southern Entrance to the university and could be used by shoppers and other short term parkers destined to points within Georgetown or downtown Washington. If the university expresses interest in supplying such spaces and a guarantee could be supplied that the spaces would be for short-term use only, it is recommended that the D.C. Department of Transportation act favorably on such as proposal.

(6) Remove peak hour on-street parking spaces south of M Street. The area of Georgetown south of M Street is undergoing rapid and intense redevelopment. Existing plans call for a doubling of both trip generation and the number of parking spaces in this area in the next six years. Traffic in and out of this area is served primarily by a series of narrow north-south streets between K and M Streets and by lower K Street as it runs under the Whitehurst Freeway. At the present time parking is allowed on both sides of all these streets, except 30th Street where it is allowed on one side. It is difficult for cars to pass each other going in the opposite direction and existing capacity is limited. As new development continues to be built in this area traffic operations will deteriorate, particularly during peak periods. As discussed in the traffic operations improvements chapter, it is recommended that these streets be converted to one-way operation. In addition it will become necessary to remove some or all parking from these streets during certain periods if the traffic volumes being generated by all the new development is to be served. However, because total parking supply in this area is extremely tight, particulary for residents, it is recommended that on-street restrictions be applied only when off-street spaces become available to replace the on-street spaces being removed, and only when removal of these spaces becomes necessary to maintain adequate traffic operations. Removal of spaces should occur in a gradual manner. Within the next year or two it will probably become necessary to restrict parking on one or both sides of these streets during peak periods. Then as full development occurs it may become necessary to also restrict parking during the middle of the day on one or both sides of the street. It should not be necessary however to implement all restrictions on all streets at one time. The restrictions should be implemented instead as traffic operations warrant their being put in place, and priority should be given to reserving spaces which remain for residents of this area.

(7) Convert a percentage of on-street parking spaces south of M Street to loading zones. The streets south of M Street are quite narrow with parking on both sides of the street in most sections and virtually no room to pass oncoming or stopped traffic. Because in the past these streets carried little traffic and parking spaces for the most part were filled, trucks making pickups or deliveries to buildings along these streets would double park in the middle of the street and effectively block all traffic, often for as much as five minutes or more. With the intense development which is occurring in this area and the resultant increase in traffic, this practice of double parking and blocking these streets must be stopped. However, as development goes in, there will be even higher demand for making pickups and deliveries along these streets.

At the present time there are a limited number of on-street loading zones on the north-south streets south of M Street. However, there is not nearly enough space dedicated to loading zones, nor are the existing loading zones adequately enforced. Therefore, it is recommended that two or three parking spaces along each block face in which there is significant office or retail land use be dedicated to use as a loading zone only during the hours of 7 AM to 7 PM. If parking is to be restricted during peak periods along a block face then the hours of the loading zones should be shortened to midday hours only. Furthermore, it is recommended that D.C. Department of Transportation parking enforcement personnel rigorously enforce loading zone restrictions and no longer tolerate double parking by trucks on these streets. In addition, it is recommended that the adequacy of curb space dedicated to loading zones be reviewed, particularly as new developments are completed. In converting parking spaces to loading zones, care should be taken not to reduce the number of on-street spaces available for use by residents living along these streets.

(8) Marketing of private garage spaces, particularly on weekends and evenings. At the present time there is a perception by most persons travelling to Georgetown that parking spaces are difficult to find and once a space is found it is often several blocks from the trip's final destination. Because of this perception some persons will travel to alternative destinations other than Georgetown where parking is not perceived to be as great a problem. The reason for this perception is that persons travelling to Georgetown think in terms of the availability of on-street parking spaces in Georgetown, which are difficult to find, particularly during evenings and weekends. However, at the present time off-street parking spaces are not fully utilized, partially because drivers to Georgetown would rather spend the extra effort required to find an on-street space. In other cases travellers to Georgetown are not aware that off-street parking is available. In addition, a number of the off-street parking garages are closed during evenings and on weekends. If off-street parking was more effectively marketed during these periods perhaps more garages would stay open during these periods of parking space shortage. Three specific measures have been proposed as a means to more effectively market off-street spaces: the expansion of parking validation programs, the posting of parking information in Georgetown business establishments, and better signing of where off-street parking is available.

Parking validation programs are an effective means for commercial establishments in densely developed areas to attract customers who might otherwise balk at coming to their establishment because they have to pay for parking. Usually a commercial establishment makes an arrangement with a parking garage owner so that if a customer presents a parking ticket that has been validated (stamped) by the commercial establishment, the customer either does not pay or receives a discount on his parking fee. The owner of the commercial establishment then reimburses the garage owner for those parking tickets he has validated.

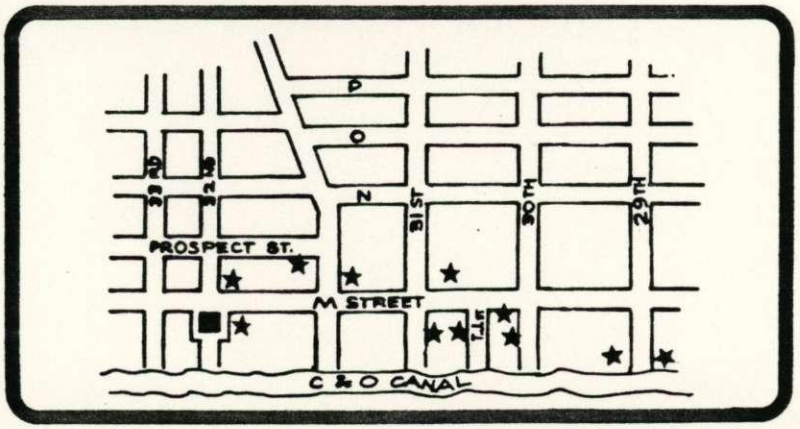
Parking validation programs in Georgetown are not as prevalent as in many commercial centers throughout the United States. Even where they do exist in Georgetown they tend to not be prominently posted or advertised. Parking validation programs could significantly ease the perception of parking difficulties in Georgetown by potential patrons of Georgetown's commercial establishments. They are an effective means of attracting customers who otherwise might not travel to Georgetown. It is recommended that the Georgetown Businessmen's Association actively work with parking garage owners to expand parking validation programs in Georgetown and simultaneously extend the hours which parking garages remain open during the evenings and on weekends. It is also recommended that parking validation programs, once in place, be effectively marketed through advertisements and prominently displayed signs.

As discussed earlier, one of the critical problems related to parking in Georgetown is general lack of knowledge regarding where parking is available, particularly off-street parking south of M Street. One means of addressing this problem would be for the owners of stores, restaurants, entertainment spots, and professional offices to post parking information. Figure 10 shows a page of an advertising supplement to the Thanksgiving 1979 edition of the Washington Post called "Christmas in Georgetown". In this single graphic, information regarding the location of off-street parking in Georgetown is effectively displayed. A similar graphic could be developed in poster form to be displayed in commercial establishments throughout Georgetown. In addition a flyer could be developed containing similar information which patrons of Georgetown commercial establishments could take home for future reference. The Georgetown Businessmen's Association would appear to be the most appropriate organization to take on the responsibility for developing and producing both the poster and flyer.

PARKING
WHILE
SHOPPING
IN
GEORGETOWN

*29th & C&O CANAL

★3030 M ST.
★3053 M ST.
★3268 M ST.
★3285 M ST.
★1229 WISC. AVE.
★1055 THOMAS JEFFERSON
★1058 31st ST.
★1070 30th ST.
★3220 PROSPECT ST.



SOURCE: ADVERTISING SUPPLEMENT TO NOVEMBER 22, 1979 WASHINGTON POST

GEORGETOWN PARKING INFORMATION

jhk & associates

FIGURE No. 10

Another method for increasing public awareness of the location of off-street parking is to post signs along M Street and K Street indicating parking is available along a certain street. These signs need not be large or obtrusive. They could merely say "PARKING" and have an arrow pointing in the appropriate direction. Responsibility for putting up such signs rests with the D.C. Department of Transportation, Bureau of Parking.

(9) Increase parking meter rates and extend hours. Increasing the cost of parking has traditionally been viewed as a possible means to divert some travellers to transit or higher occupancy autos. However, this strategy is more effective for work trips where there is less choice of trip destination than for shopping and social-recreation trips where an increase in parking costs will be more likely to divert trips to an alternative destination. The primary purpose of parking meters in the commercial areas of Georgetown is to ensure turnover in the most conveniently located parking spaces and thus guarantee their availability to short-term parkers. There is little to be gained by raising parking meter rates other than to increase revenues to the city government. However, potential losses to Georgetown retail establishments could far outstrip gains from raising meter rates, particularly if meter rates are not raised uniformly around the city. Therefore, unless meter rates increase throughout the city, raising their rates in Georgetown is not recommended.

For the most part, money must be put in parking meters in Georgetown on weekdays between the hours at 7:00 AM and 6:30 PM. Parking in metered spaces is restricted to either 30 minutes, 1 hour, or 2 hours. During evenings and on weekends there are no time restrictions or fees for using these spaces. Extending the hours that parkers are required to pay for the use of metered spaces has been suggested as a means to increase turnover of these spaces during evenings and on weekends when the parking supply is limited. However, doing so would decrease the supply of

spaces available to residents during these periods of tight parking supply. In addition, the nature of short-term parking during the evenings and on weekends is quite different than during midday on weekdays. During evenings and on weekends visitors to both businesses and residences tend to stay for periods longer than the midday time limits for the metered spaces. A much smaller proportion of the short-term parkers require the use of a parking space for the maximum time allowed on a meter. Therefore, extending the hours during which meter fees must be paid is not recommended at this time.

(10) Increase the number of on-street parking spaces which are metered. The D.C. Department of Transportation's present policy regarding the placement of parking meters is that they are to be placed in commercial areas where the on-street parking supply is limited and there is a need to ensure the turnover of vehicles utilizing on-street spaces. As a matter of policy, parking meters usually do not extend more than one block into the residential areas adjoining the commercial areas in which parking meters are warranted. This is to ensure that residents have free parking spaces available adjacent to their homes. Using the criteria outlined above virtually every on-street space in Georgetown which warrants a meter presently has one. Extending meters further into the residential areas would deprive Georgetown residents of even more parking spaces than they presently have available.

However, a possible solution exists which could ensure a higher turnover of vehicles in parking spaces in residential areas adjacent to M Street and Wisconsin Avenue while at the same time allowing residents to use spaces in front of their homes. Under the proposed scheme meters would be extended several blocks on either side of M Street and Wisconsin Avenue. In those spaces which do not presently have meters, cars displaying local residential parking permits would be allowed to park indefinitely

without paying the meter fee. Visitors to shops, restaurants, entertainment spots, or offices in Georgetown would have to pay meter fees. Visitors of Georgetown residents could obtain visitor passes similar to those which are presently used to exempt visitors from the two hour time limit imposed by the residential parking permit program. There are several attractive features to this proposal. It is a means of making spaces in the residential areas close to M Street and Wisconsin Avenue more accessible to the residents who live in the area. Enforcement would become much easier than under the present residential parking permit program where cars must be rechecked two hours later to determine if they have violated parking regulations. The hours during which meter fees are required could be extended without negatively impacting residents. In fact under this scheme such a proposal becomes an attractive way to overcome the problem of residents not being able to find parking spaces during evenings and on weekends. The reaction of residents is likely to be mixed. On the one hand they may not like the idea of parking meters in front of their homes and they may find the meters an imposition upon their visitors. However, if implementation of the proposal results in greater ease of parking during evenings and weekends in much the same manner the weekday residential parking permit program made parking much easier during those times, there would likely be strong support for such a measure. The strongest opposition could be expected from businessmen who would see the measure making parking more difficult for their patrons.

The proposed measure deserves serious study by the D.C. Department of Transportation's Bureau of Parking, particularly with regard to its legality. If it is found to have a good legal basis, or could with the proper enabling legislation, a pilot program could be tested to see if the intended results occur, to see what public reaction would be and to determine what type of problems would occur. Initial reaction by residents appears to be negative and an educational program about the benefits of such a program may prove necessary.

CHAPTER 5. CANDIDATE TRANSIT IMPROVEMENT ACTIONS

Transit is a critical element of Georgetown's transportation system and provides an important opportunity for helping to improve access to and within Georgetown. During the course of this study it became apparent that there are a number of problems with transit service within Georgetown, both actual and perceived. These problems have been identified through discussions with Georgetown citizens and businessmen, through discussions with WMATA and D. C. Department of Transportation staff members, by riding on buses through Georgetown, by standing on street corners in Georgetown and observing bus operations, by studying schedules and route maps, and through the survey of Georgetown University students, faculty, and staff. A number of these problems are discussed in Technical Memoranda 3 and 4 and are briefly summarized here:

- Georgetown is not directly served by Metrorail, and therefore transit trips to and from much of the Washington metropolitan area require a transfer between Metrorail and Metrobus.
- Although there are three Metrorail stations only one mile from the center of Georgetown, a high proportion of potential transit trips in Georgetown are not directly linked by bus to the most convenient Metrorail station for the individual trip. In particular, much of North Georgetown does not have convenient bus access to either Rosslyn or Foggy Bottom, and much of South Georgetown does not have convenient access to Dupont Circle so bus transfers or long walks are necessary for relatively short Metrorail access trips. It is desirable that direct bus access be provided to both the Metrorail Red Line and Metrorail Blue/Orange Line to minimize transfers both on buses and Metrorail.
- The rapidly developing area of Georgetown along lower K Street is not presently served by Metrobus. Providing service along this street would offer an important opportunity to develop a transit habit among both residents and employees of the area and thus reduce vehicular demand on the narrow, congested streets south of M Street.

- The bus routes which presently serve Georgetown run on long routes across the city. Often, by the time they have reached Georgetown, they are crowded making it necessary for Georgetown passengers to stand. In addition they are often off schedule and have started running in platoons of three to four buses, thus increasing effective headways and decreasing the perceived level of service.
- Fares on Metrobus are perceived to be quite high, particularly for short trips to Metrorail stations or the K Street business district of downtown Washington. Fares are especially disproportionately high for trips between Georgetown and the Rosslyn Metrorail station because of the state line crossing charge.
- Bus travel times in Georgetown are slow because buses get caught in the congestion on Georgetown's arterial streets, and because buses have difficulty in maneuvering on Georgetown's narrow streets. This maneuverability problem is exacerbated by illegally parked vehicles which block bus paths, the worst culprits being double-parked delivery trucks.
- There is not good transit service between Georgetown and the area of Northwest Washington west of Wisconsin Avenue. This problem is particularly acute for commuters to Georgetown University from this area because in most cases at least two transfers are required.
- In general transit service in the Potomac River corridor northwest of Georgetown is sparse, with no park and ride service provided in this heavy auto commuting corridor.
- Transit service in Georgetown is not effectively marketed. Although levels of service are quite high compared to most of the rest of the metropolitan area, many Georgetown residents, employees, and shoppers are not aware of what services are available and as a result perceive poor levels of service.

Although transit service in Georgetown is plagued by many problems, there are a number of opportunities for improving both service levels and the perception of transit service in the Georgetown area. A number of the above-cited problems could

be overcome through some judicious modification of transit routes, through the addition of several new routes, and through aggresive marketing of transit in the Georgetown area.

In response to the above-cited problems, as well as the objectives for improving transportation access in the Georgetown area outlined in Chapter 1, the following candidate transit improvement actions have been proposed and are analyzed in this chapter.

(1) New or modified large bus routes.
   (a) Glen Echo park and ride express service
   (b) Chevy Chase Circle - Tenley Circle - American University - Georgetown University - Farragut Square

(2) Reinstitution of Georgetown trolley service.

(3) Small bus routes.
   (a) K Street - Pennsylvania Avenue loop
   (b) K Street - Georgetown University loop
   (c) K Street - Georgetown University Medical Center
   (d) Foggy Bottom - Georgetown University loop
   (e) Rosslyn - Georgetown University Medical Center
   (f) Rosslyn - Wisconsin/Massachusetts Avenues
   (g) Rosslyn - Dupont Circle
   (h) Rosslyn - Foggy Bottom
   (i) Foggy Bottom - Dupont Circle via Wisconsin Avenue
   (j) Extension of above routes to Kennedy Center and other points in Foggy Bottom, or to Farragut Square

(4) Transit marketing.
   (a) Transit information centers
   (b) Transit information package for Georgetown employees
   (c) Employer subsidy of transit fares
   (d) Transit fare validation scheme
   (e) Transit information brochure for patrons of Georgetown shops, restaurants, and entertaiment spots.

(1) New or modified large bus routes. Metrobus routes presently operate on virtually every major arterial street in Georgetown. A number of problems with these routes were identified earlier, most of which are related to the fact that the Georgetown section of these routes is only a small portion of a much longer route structure. Most of the deficiencies identified earlier can be more effectively dealt with by implementing local, small bus routes within Georgetown than by implementing more or revised Metrobus line-haul routes. However, two problems which could potentially be addressed through the implementation of new bus routes are the lack of service between Georgetown and the area of Northwest Washington to the northwest of Georgetown and the general sparsity of service between the Potomac River corridor west of Georgetown and downtown Washington. Two new Metrobus routes have been proposed to deal with these deficiencies. These routes are shown in Figures 11 and 12.

The first route would provide express bus service between the proposed Glen Echo park-and-ride lot and Farragut Square via Canal Road, M Street, Pennsylvania Avenue, and K Street. If sufficient parking is provided at Glen Echo and the route is operated at a high level of service (15 minute headways or better during the peak), it is reasonable to expect that a significant number of commuters would be diverted from their autos to the express service. This service could fill an existing void in transit service in this corridor where the density of development is too low to justify broad transit route coverage. This service would be especially effective if combined with HOV lanes on Canal Road and could be expected to provide some relief to Georgetown traffic congestion caused by through autos between the Potomac River Corridor traffic shed and downtown Washington. As discussed in Chapter 4, however, it is unlikely that a park-and-ride lot can be implemented at the Glen Echo Amusement Park. Unless an alternative location

GLEN ECHO - FARRAGUT STA.

jhk & associates

FIGURE No. 11

CHEVY CHASE CIR.–FARRAGUT STA.

jhk & associates

FIGURE No. 12

could be found for a park and ride lot, this route will not prove feasible.

The second proposed Metrobus route would start at Chevy Chase Circle, and travel south on Connecticut Avenue, southwest on Nebraska Avenue past the proposed Tenley Circle Metrorail Station and American University, southeast on New Mexico Avenue and Tunlaw Road, south on 37th Street to the Georgetown University Medical Center, east on Reservoir Road, south on 35th Street passing two blocks from the main entrance to Georgetown University, east on Prospect Street, south on Wisconsin Avenue, and east on M Street, Pennsylvania Avenue, and K Street to Farragut Square. This route would directly connect downtown Washington and Georgetown with a number of locations in Northwest Washington which are not directly linked by transit at the present time. Routes similar to this one have been proposed in the past but have not been implemented because transit priorities were placed elsewhere in the city. However, it is a route that should receive serious consideration for implementation by WMATA.

Vehicle operating requirements and costs were estimated for each of the two candidate Metrobus routes analyzed. It was assumed that both routes would operate on 15 minute headways during peak periods, the Glen Echo-Farragut Square express service would operate on 60 minute headways during weekday off-peak periods, and the Chevy Chase-Farragut Square route would operate on 30 minute headways during midday with less frequent service during evenings and on weekends. Under these assumed conditions, operating requirements and costs would be as follows:

	Glen Echo - Farragut Square	Chevy Chase Circle - Farragut Square
Peak Period Headway	15	15
Base Period Headway	60	30
Vehicle Requirements	4	5
Annual VHT	6,300	14,500
Annual VMT	101,000	139,000
Annual Operating Costs (1979 dollars)	$250,000	$260,000

(2) Reinstitution of Georgetown trolley service. During an earlier phase of the Georgetown Area Access Alternatives Study a separate analysis of this alternative was performed, the results of which are presented in "Technical Memorandum No. 2: The Reinstitution of Georgetown Trolley Service: an Overview." In this memorandum a number of alternative alignments, operational considerations, and system impacts of trolley service in Georgetown were analyzed in terms of determining if the reinstitution of trolley service in Georgetown is a viable alternative which should be pursued in more depth through the conduct of a detailed Georgetown Trolley Study.

During the course of the analysis a number of issues were identified which it was felt must be addressed in detail before a decision regarding the reinstitution of trolley service is made. These issues included the following:

Function

- Is the primary function of the system to be historic preservation, transportation service, or a combination of the two?

System Location

- Is the system to be a local Georgetown system, or is it to extend beyond Georgetown and provide a major line-haul function?
- What is to be the alignment of the system?

Physical System

- To what degree can existing electrical conduit and track be used for trolley operations?
- Should the track be located in the center lane(s) or curb lane(s)?
- Should the system have single or double track operations?
- Should the system be located in reserved right of way or will it operate in mixed traffic?
- What type of vehicle should be used?
- What type of power source should be used?

- What should be the station spacing?
- Where will the maintenance facility be located?

System Operations

- What would be the hours of operation?
- What would be the system headways?
- How many vehicles would be required?
- What fares would be charged?
- What would be the roles for other transit systems in the Georgetown area?

System Impacts

- How would the trolley affect businesses in Georgetown?
- How would the trolley affect accessibility to and within Georgetown?
- How would the trolley affect traffic operations and parking? How would it affect traffic volumes on Georgetown streets?
- What safety problems does a trolley system introduce? To what degree are these solvable?
- What are the neighborhood impacts? What would the community acceptance of these impacts be?
- How much noise would the system create?
- How would the trolley affect air quality?
- What are the construction impacts?
- Is the system to be fully accessible to the elderly and handicapped? If so, how does this affect design and operations?

Institutional

- Who would operate the system?
- Who would fund the system? Where are moneys available? How would funding for a trolley affect funding for other transit in the region?

Patronage and Revenue

- What ridership would be attracted to the system? How would this demand be distributed over time of day, day of week, and season of year?
- How does demand affect system requirements?
- What portions of the demand would be former transit riders, former auto users, or induced trips?
- How much revenue would be collected from the system?

Costs

- How much would alternative systems cost to build?
- What would it cost to operate these systems at various levels of service?
- What would system deficits (or operating surpluses) be? If there were a deficit, who would pay the subsidy?

An overview analysis of each of these issues is provided in Technical Memorandum No. 2. Rather than repeating the discussion of that analysis, the reader is referred to that document. In that report, JHK concludes that based upon the information available at this time, none of the issues identified above forecloses trolley service as a possible transportation option in Georgetown. JHK further recommended in that report that an in-depth Georgetown Trolley Study be performed.

Since the issuance of that technical memorandum, preliminary travel demand estimates have been made for a base trolley alternative which operates between the Foggy Bottom Metrorail Station and the intersection of M Street and Wisconsin Avenue. These estimates are presented in Chapter 8.

In terms of the trolley's impacts on other proposed access improvement measures in Georgetown, it is felt that the primary impact of the trolley will be on traffic operations. It is likely that the trolley would have to operate on exclusive right-of-way in the center of M Street and Pennsylvania Avenue and that two traffic lanes will in effect be removed from these

major traffic carrying streets. If the trolley is implemented, there will be even more justification for tying the ramps at the east end of the Whitehurst Freeway into L Street, so traffic can effectively bypass that portion of M Street on which the trolley will be operating.

The trolley offers an opportunity to improve local transit service between the center of Georgetown and the Foggy Bottom Metrorail Station. However, the trolley should supplement bus service through Georgetown, rather than replace it because the bus routes which presently run along M Street and Pennsylvania Avenue in Georgetown are line-haul routes which primarily carry longer transit trips that pass through Georgetown or originate from points outside the proposed service area of the trolley. Institution of trolley service also will not decrease the need to provide transit service to lower K Street and between Rosslyn and Dupont Circle as recommended in the next section and therefore does not affect the conclusions reached in that section.

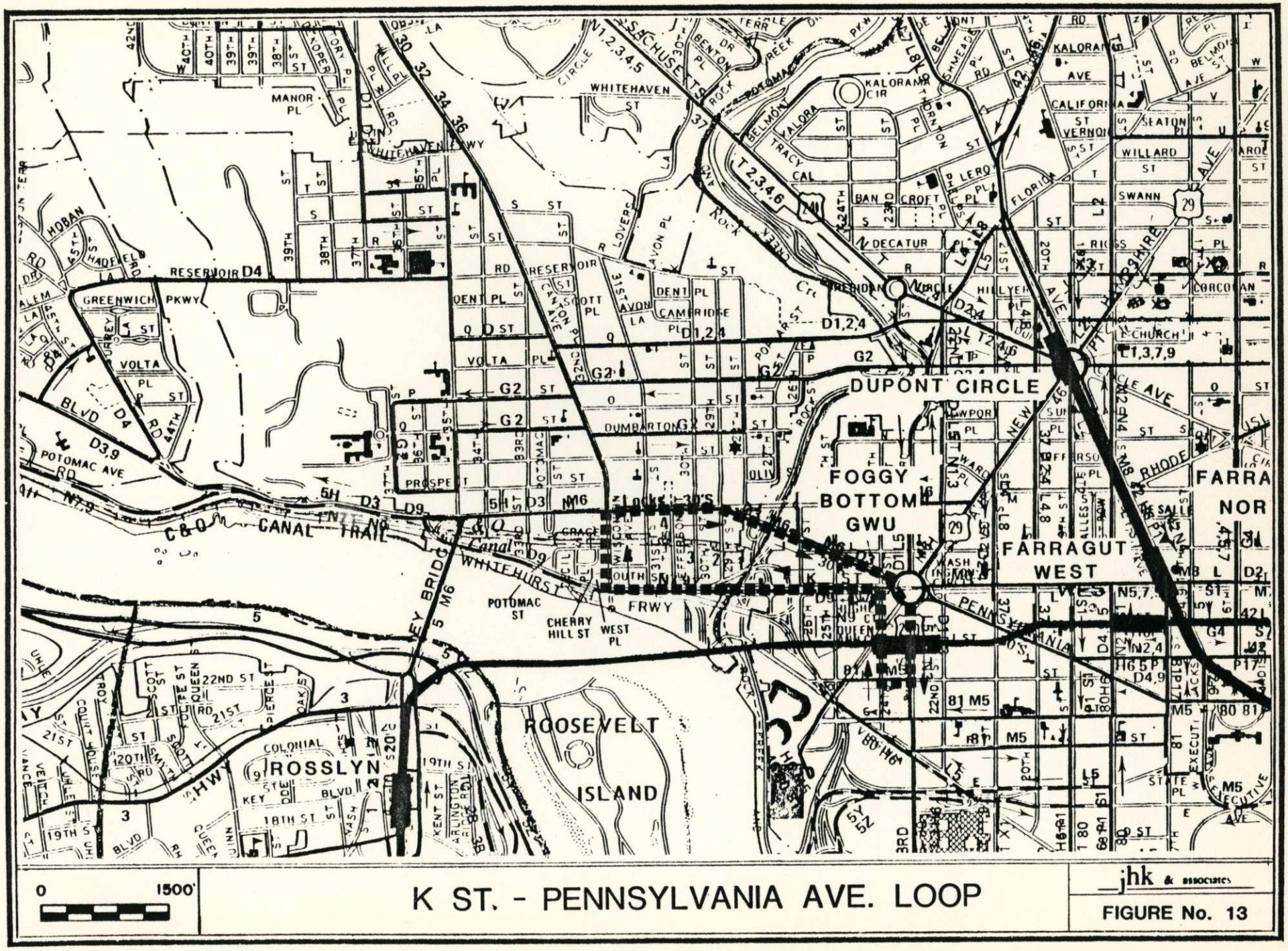
(3) Small bus routes. The D. C. Department of Transportation is presently conducting a study to investigate the feasibility of implementing a number of neighborhood bus routes which would operate using buses smaller than those used by WMATA. The system in principle would be similar to Montgomery County's Ride-On system in which small buses are routed through residential areas where passengers destined to or coming from nearby activity centers, Metrorail stations, or line-haul bus routes are picked up and dropped off. Georgetown is one of the areas within the District of Columbia being considered for such routes. It is a logical area for such service because larger WMATA buses running on line-haul routes do not adequately serve the transit needs of Georgetown at the present time. In order to better penetrate the potential transit market in Georgetown, local routes which provide service between Georgetown and its nearby Metrorail stations are needed. Metrobuses cannot effectively maneuver on many of Georgetown's

narrow and congested streets, whereas midsize buses such as the Greyhound Citycruisers presently used by Montgomery County could much more successfully maneuver on these streets. Short localized routes often prove to be very productive routes because there are a relatively large number of passengers boarding per vehicle mile traveled. With a separate system where buses operate on short, productive routes, it becomes feasible to consider lower fares for short local trips, particularly those which do not transfer to a longer line-haul bus route. Such a system could provide convenient, low-cost transit access to Metrorail stations and induce a significant number of travelers to divert to transit.

During the course of considering the possibilities for local small bus routes in Georgetown, a number of potential routes were identified, nine of which were chosen for analysis. These nine routes are shown in Figures 13 through 21.

The K Street-Pennsylvania Avenue Loop route (Figure 13) is designed to provide transit service to the rapidly developing area between K and M Streets and link this area directly to the Foggy Bottom Metrorail station. It would be operated as a loop route with buses traveling in both directions to ensure that the most direct route to the Foggy Bottom station is traversed. Although this route would meet its objective, routes which extend further into Georgetown and traverse K Street would provide service to a larger portion of Georgetown and therefore are rated higher.

The K Street - Georgetown University Loop route (Figure 14) would provide direct service between the Foggy Bottom Metrorail station and lower K Street and would also extend service to the area of Georgetown west of Wisconsin Avenue, including Georgetown University. Although it would be desirable to link this area to the Foggy Bottom station, the Georgetown University transportation survey showed significantly less demand for transit service to the Foggy Bottom station than either the Dupont Circle or Rosslyn stations. Transit service between this area and Foggy Bottom would


DUPONT CIRCLE
FOGGY BOTTOM GWU
FARRAGUT WEST
ROSSLYN
ROOSEVELT ISLAND
C&O CANAL TRAIL
Canal
WHITEHURST FRWY
KEY BRIDGE
HWY
RESERVOIR D4
GREENWICH PKWY
VOLTA PL
BLVD
D4
D3,9
POTOMAC AVE
RD
DUMBARTON
PROSPECT
CRACE
POTOMAC ST
CHERRY HILL ST
WEST PL
WHITEHAVEN ST
MANOR PL
CAMBRIDGE PL
D1,2,4
L1,3,7,9
L2
L5
L6
L8
M5
M6
M8
N5,7
N2,4
H6,5
P1
P17
D4,9
D2
G2
G4
D3
D9
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D6
D7
D8
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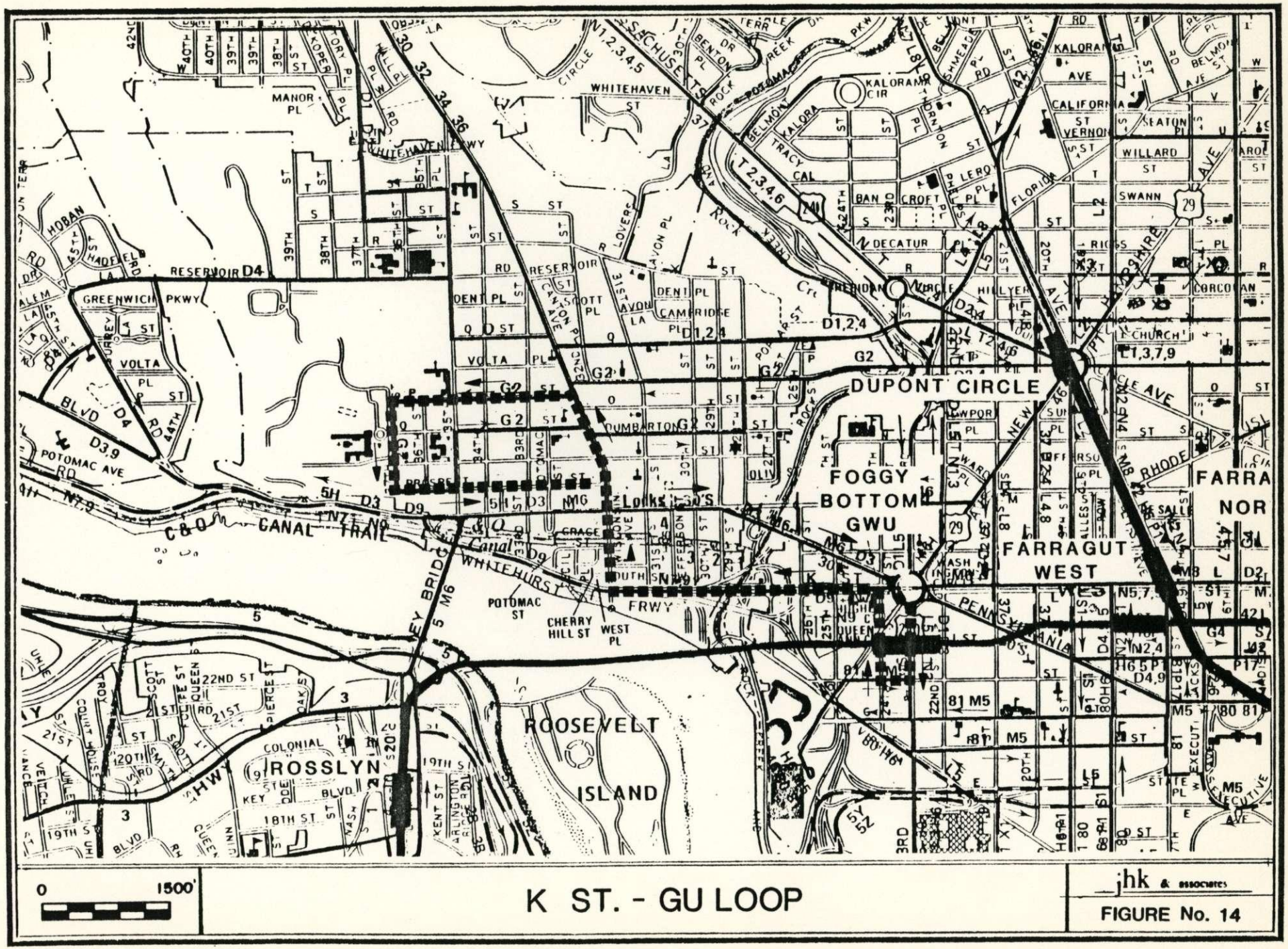
1500'
K ST. - PENNSYLVANIA AVE. LOOP
jhk & associates
FIGURE No. 13


DUPONT CIRCLE
FOGGY BOTTOM GWU
FARRAGUT WEST
ROOSEVELT ISLAND
ROSSLYN
K ST. - GU LOOP
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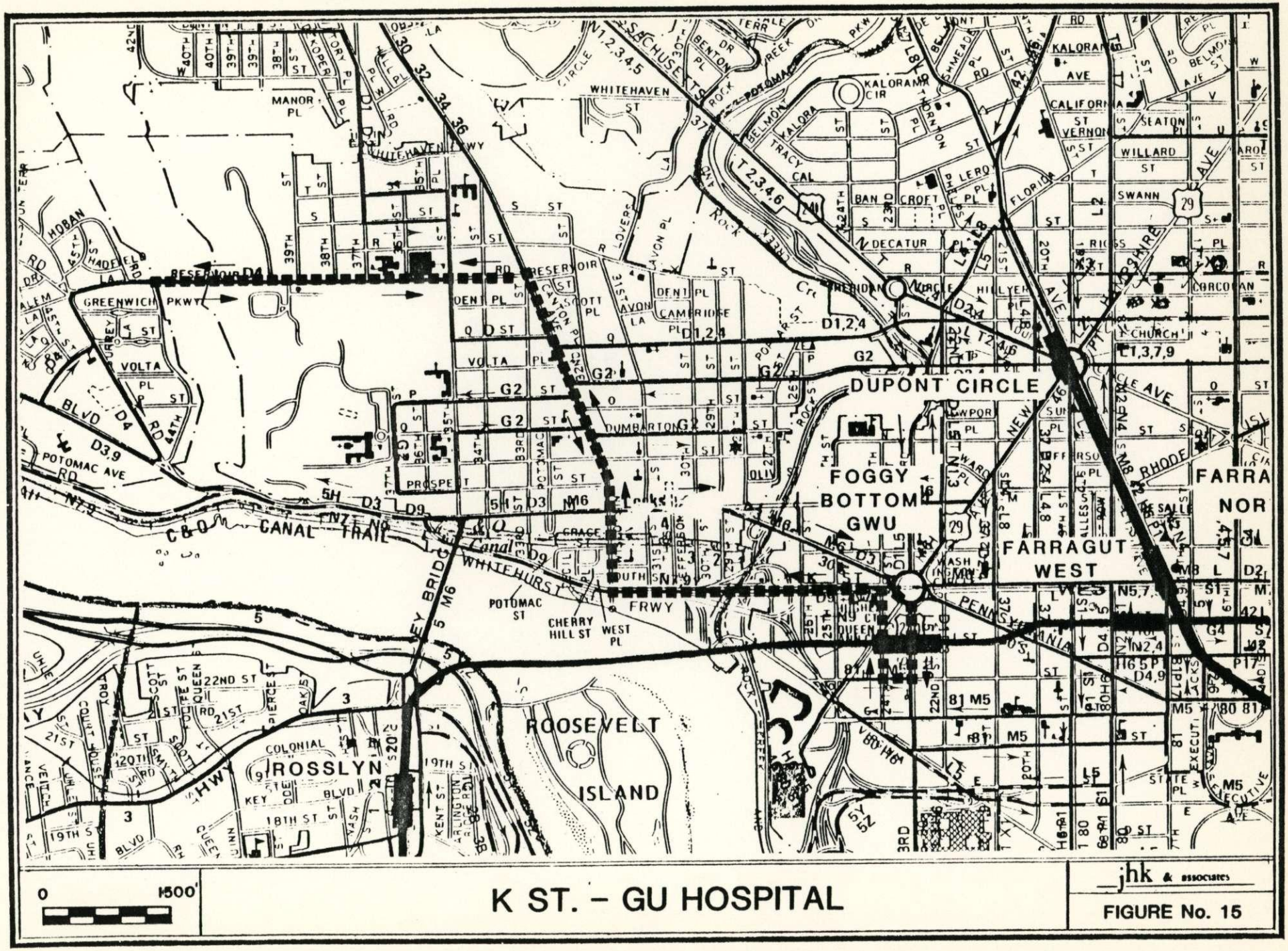
1500'
jhk & associates
FIGURE No. 14


DUPONT CIRCLE
FOGGY BOTTOM GWU
FARRAGUT WEST
ROOSEVELT ISLAND
ROSSLYN
WHITEHAVEN ST
MANOR PL
RESERVOIR RD
GREENWICH PKWY
VOLTA PL
DUMBARTON
PROSPECT
GRACE ST
POTOMAC ST
CHERRY HILL ST
WEST PL
WHITEHURST FRWY
K ST
M ST
L ST
K ST. - GU HOSPITAL
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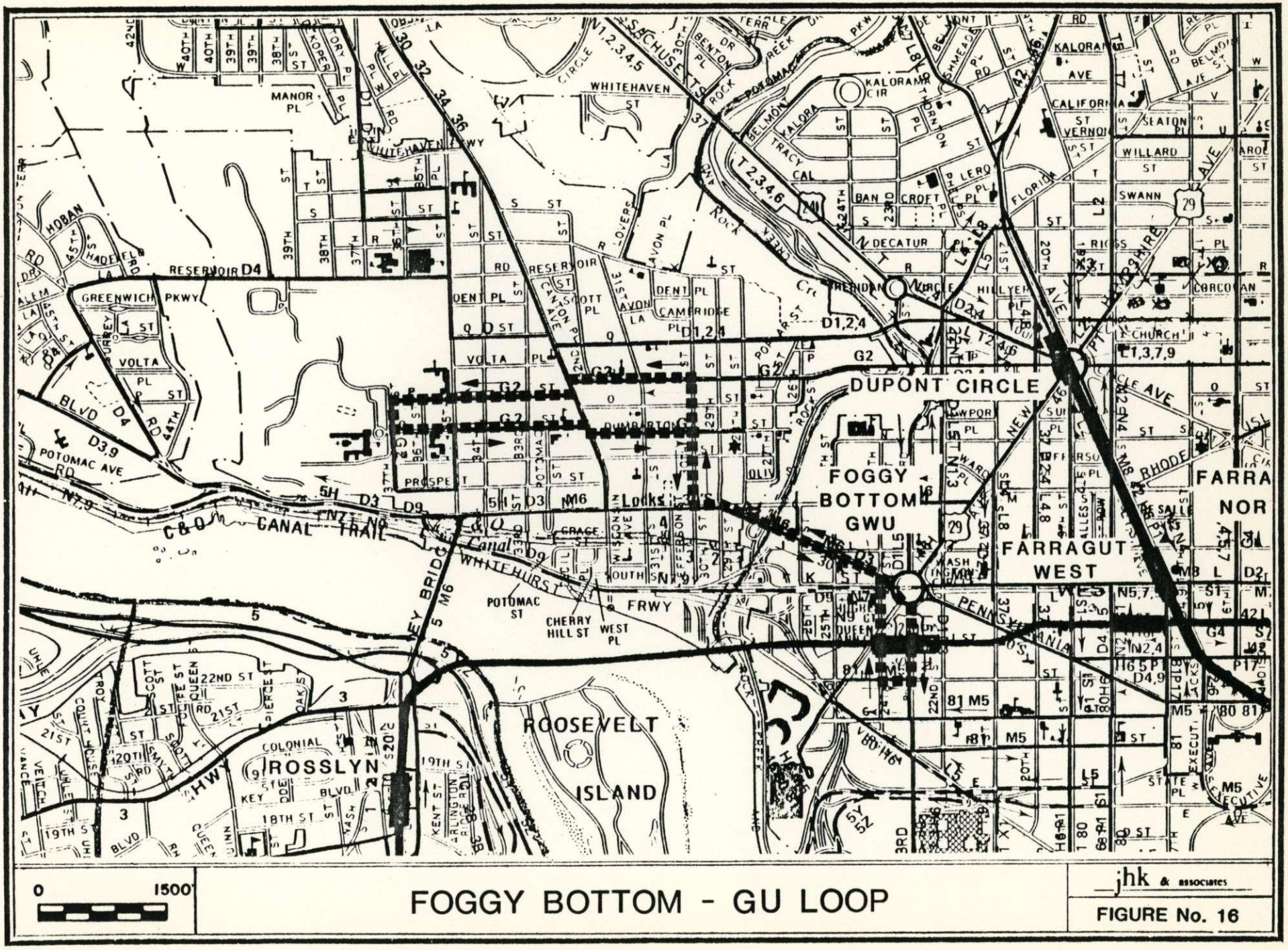
jhk & associates
FIGURE No. 15


DUPONT CIRCLE
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FARRAGUT WEST
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KALORAMA CIR
CHURCH
DECATUR
CAMBRIDGE PL
DUMBARTON
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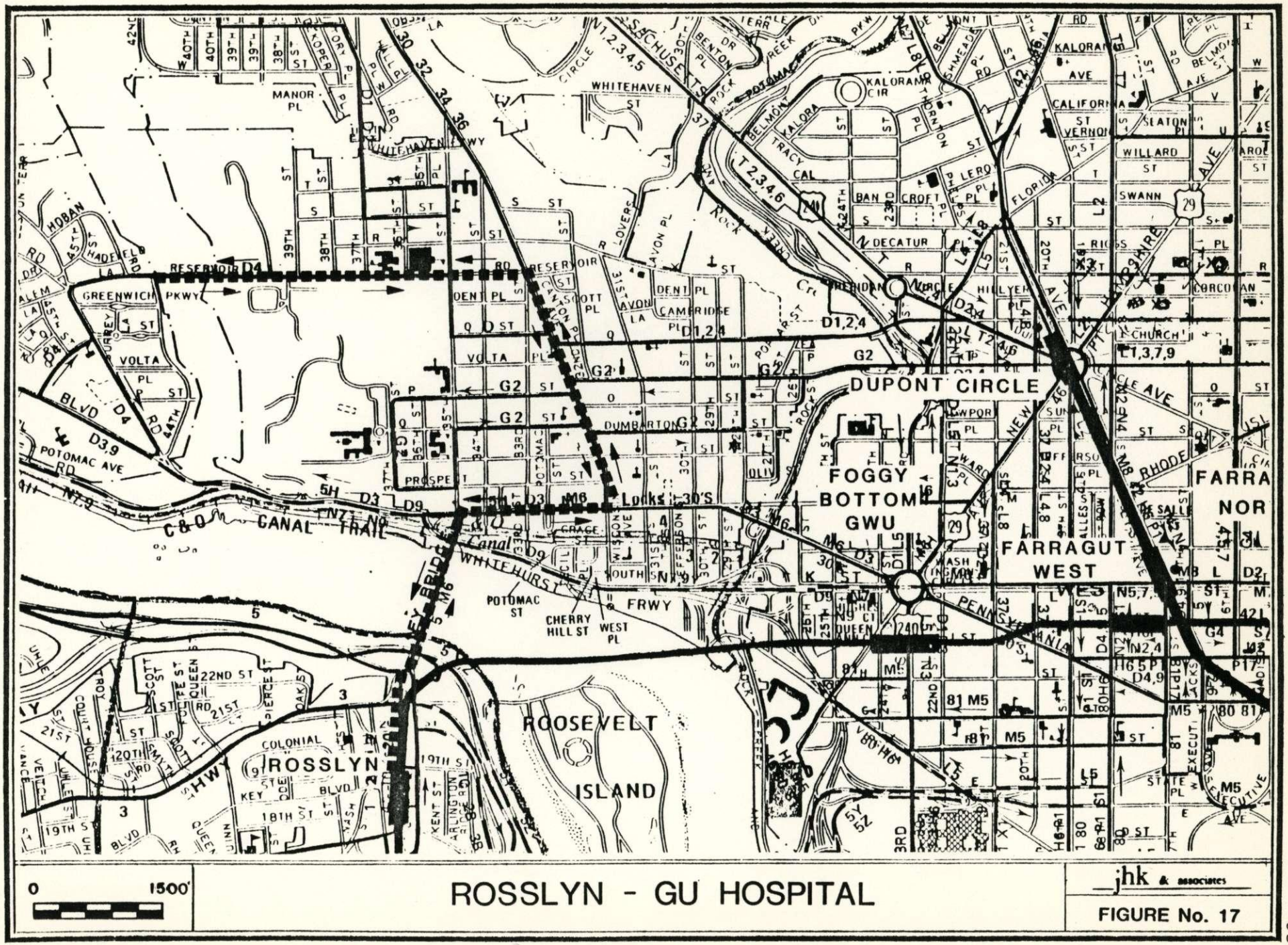
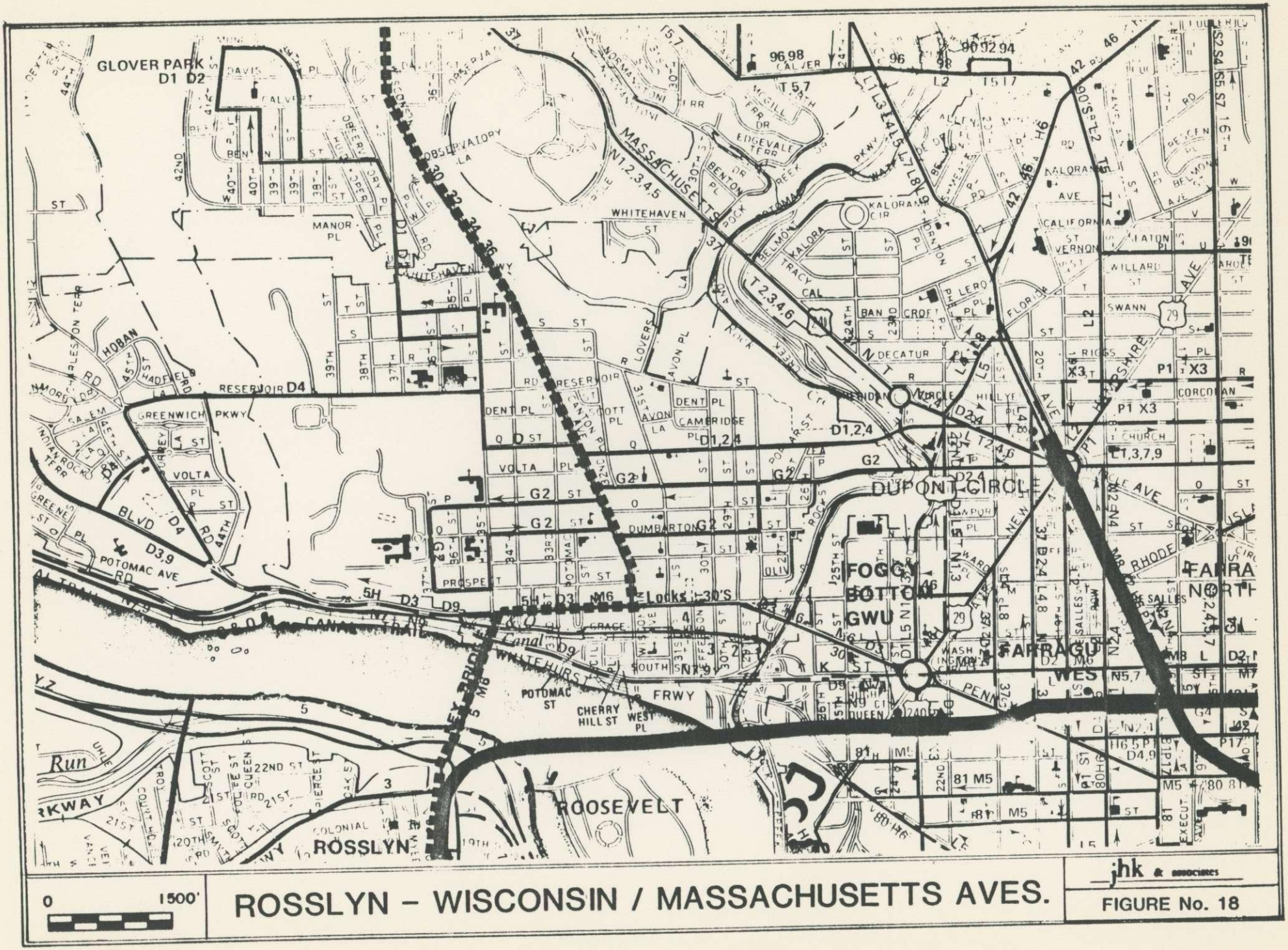
FIGURE No. 16



ROSSLYN - GU HOSPITAL

jhk & associates

FIGURE No. 17


GLOVER PARK
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N1,2,3,4,5
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RESERVOIR D4
GREENWICH PKWY
VOLTA PL
DENT PL
CAMBRIDGE PL
D1,2,4
G2
DUMBARTON
POTOMAC AVE
D3,9
5H D3 D9
M16
Locks 1-30'S
C & O CANAL
Canal
WHITEHURST FRWY
POTOMAC ST
CHERRY HILL ST
WEST PL
FOGGY BOTTOM
GWU
DUPONT CIRCLE
FARRAGUT WEST
FARRAGUT NORTH
T5,7
T2,3,4,6
D2,4
L1,3,7,9
P1 X3
CORCORAN
CHURCH
SWANN
DECATUR
KALORAMA CIR
BELMONT
WILLARD
CALIFORNIA AVE
MASSACHUSETTS AVE
RHODE ISLAND AVE
PENN
ROOSEVELT
ROSSLYN
HOBAN
BLVD
Run
PKWY
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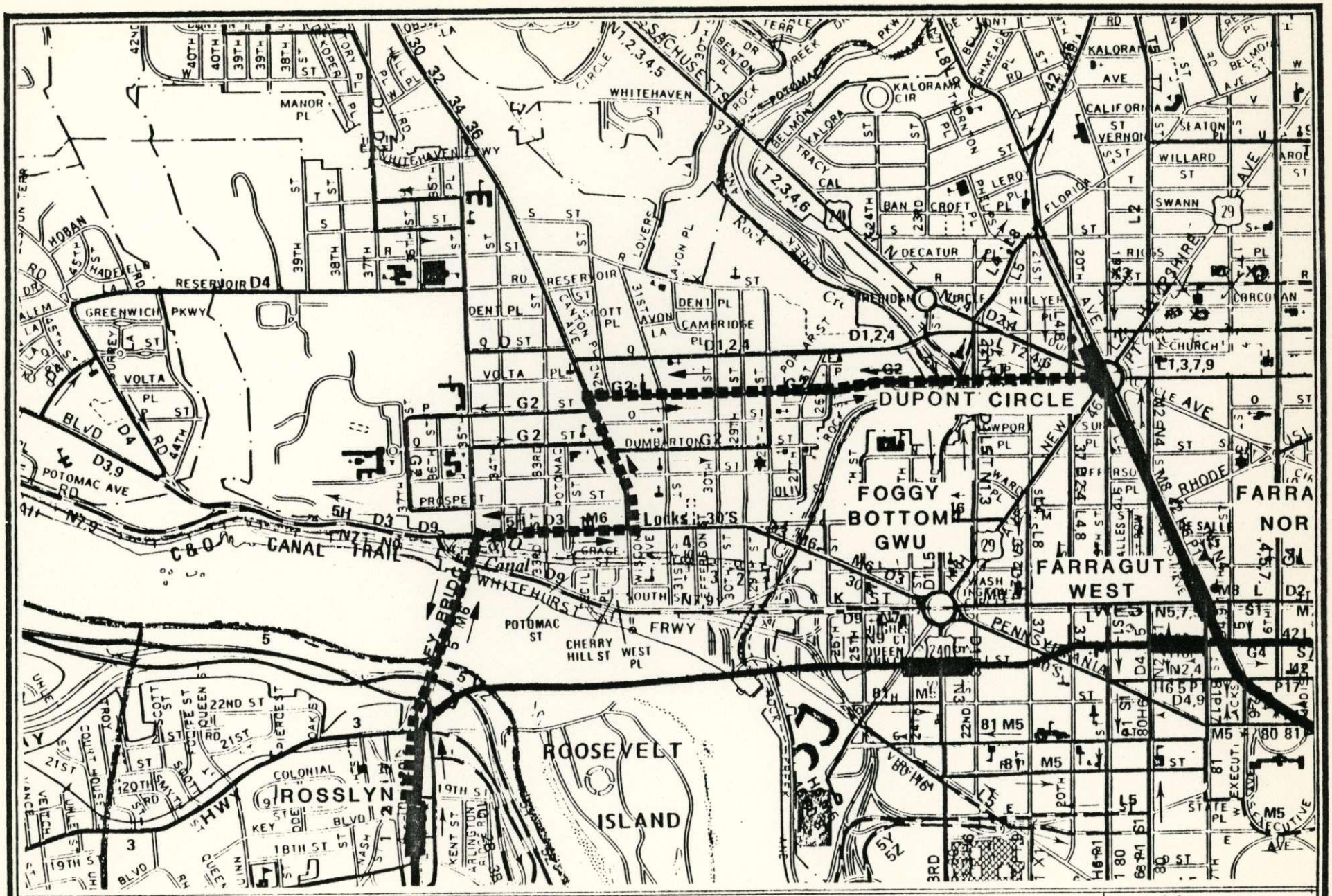
ROSSLYN – WISCONSIN / MASSACHUSETTS AVES.
jhk & associates
FIGURE No. 18


ROSSLYN - DUPONT CIRCLE
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jhk & associates
FIGURE No. 19
DUPONT CIRCLE
FOGGY BOTTOM GWU
FARRAGUT WEST
ROOSEVELT ISLAND
ROSSLYN
C&O CANAL TRAIL
Canal
Locks
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POTOMAC ST
CHERRY HILL ST
WEST PL
KALORAMA CIR
WHITEHAVEN ST
MANOR PL
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VOLTA PL
DENT PL
CAMBRIDGE PL
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POTOMAC AVE
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BLVD
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L8
M5
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M4
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T2,3,4,6
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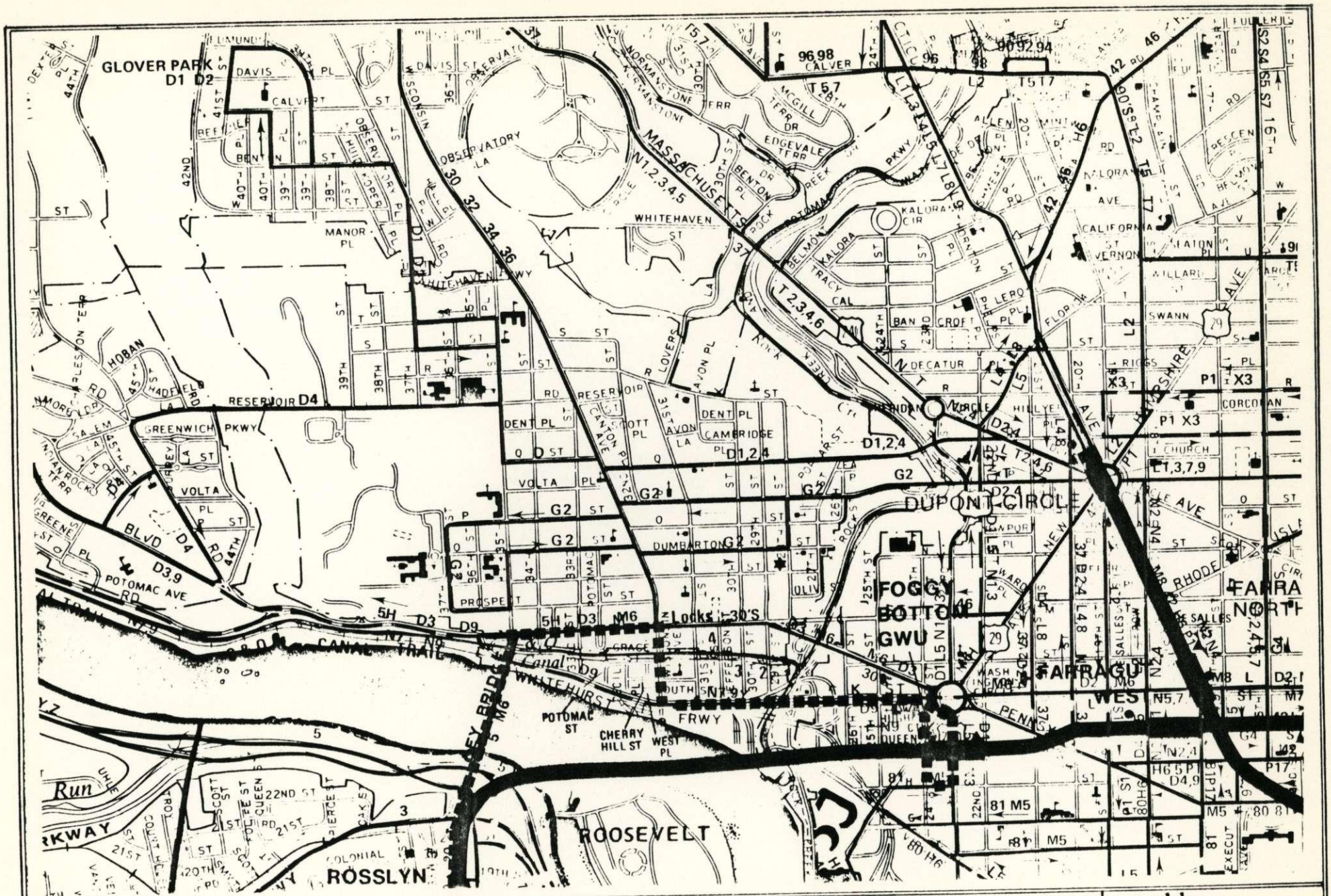
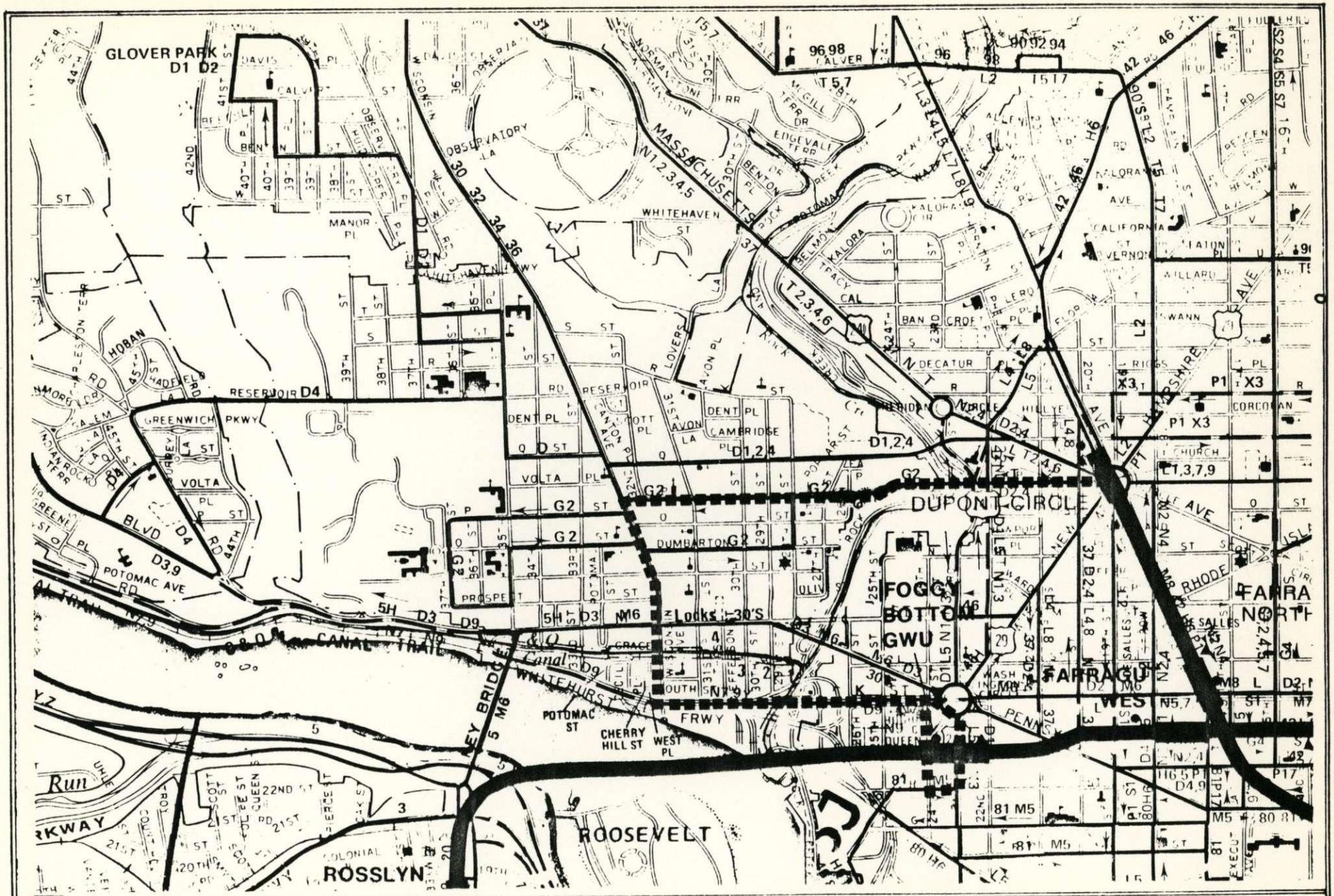


ROSSLYN – FOGGY BOTTOM

jhk & ASSOCIATES

FIGURE No. 20



FOGGY BOTTOM – DUPONT CIRCLE

jhk & associates

be provided by the proposed Metrobus route between Chevy Chase and Farragut Square which passes through Georgetown. Therefore for the sake of avoiding duplication of service in an area in which demand is unlikely to warrant it, this route is not recommended.

The third route analyzed would begin at the Georgetown University Medical Center and would traverse Reservoir Road, Wisconsin Avenue, and K Street, finally ending up at the Foggy Bottom Metrorail station (see Figure 15). This route would be similar to the previously analyzed one, but would link Burleith and the GU Medical Center with the Foggy Bottom station. Is is not recommended for essentially the same reasons the prior alternative was not.

The fourth alternative (Figure 16) would provide direct transit service between neighborhoods both east and west of Wisconsin Avenue and the Foggy Bottom station. Persons living in these neighborhoods who presently wish to access the Foggy Bottom station must walk to either Wisconsin Avenue or M Street. This alternative also would directly link Georgetown University with the Foggy Bottom station. Although this particular route would provide improved service to the residential areas it would directly serve, it could not be expected to be as productive as several of the later alternatives that are recommneded. Therefore, it does not receive as high a ranking as those alternatives.

The fifth alternative (Figure 17) would link the Rosslyn Metrorail Station with the Georgetown University Medical Center via Wisconsin Avenue. This route would directly connect both the center of Georgetown and North Georgetown with the Rosslyn Station on buses which could charge significantly lower fares than the existing Metrobuses which cross Key Bridge. Such a route could significantly improve Virginia transit passengers' perceptions of the level of bus service provided between Metrorail and Georgetown.

However, this alternative does not rate as high as one of its variants (Alternative 6) which instead of turning west on Reservoir Road from Wisconsin Avenue, continues north on

Wisconsin Avenue to Massachusetts Avenue (see Figure 18). This is because the Georgetown University Medical Center is effectively linked to the Rosslyn station via GUTS, but at present there is no direct connection between the Wisconsin Avenue corridor and Rosslyn, despite indications that demand for this movement is quite high. Alternative 6 is recommended for implementation as a Georgetown small bus route.

The seventh small bus route alternative is another variant of the two prior alternatives. It would go between Rosslyn and Dupont Circle (see Figure 19). This alternative also does not rate quite as highly as a route which extends up Wisconsin Avenue because the Metrorail Blue Line is directly connected to Dupont Circle by a number of routes which run between Dupont Circle and Farragut Square. Trips from Virginia to Dupont Circle can take Metrorail to the Farragut West station and ride a Metrobus for free with no backtracking required. On the other hand, trips between Virginia and the Wisconsin Avenue corridor on existing routes either involve double transfers if passengers alight from Metrorail at Rosslyn, or significant backtracking if they alight at Foggy Bottom. Demand between Rosslyn and the residential areas along P Street east of Wisconsin Avenue cannot be expected to be as great as between Rosslyn and the upper Wisconsin Avenue corridor.

The eighth small bus route alternative would be between Rosslyn and Foggy Bottom via lower K Street (see Figure 20). This route would directly link the rapidly developing lower K Street area with both the Foggy Bottom and Rosslyn Metrorail stations. In combination with the route between Rosslyn and Wisconsin/Massachusetts Avenue, it would provide an especially high level of service in the area between Rosslyn and the intersection of M Street and Wisconsin Avenue. This alternative is more attractive than the previously discussed alternatives for lower K Street. Travel demand would be higher than for the other alternatives

because this alternative would directly connect the dense, new development along K Street with the Metrorail station commuters to Georgetown from Virginia would be most likely to use, the Rosslyn station. Therefore this route is recommended for implementation as a small bus route in Georgetown.

The final proposed small bus route would be between Foggy Bottom and Dupont Circle via K Street, Wisconsin Avenue, and P Street (see Figure 21). This route would directly connect the center of Georgetown and the lower K Street area with Metrorail stations on both the Blue/Orange and Red lines. This service could be effectively marketed as a shopping and restaurant special with discount fares given to Georgetown shoppers or diners. When combined with the proposed Rosslyn-Foggy Bottom route, a high level of service would be ensured between lower K Street in Georgetown and the Foggy Bottom station. This route could be expected to be well used and therefore is recommended for implementation as a small bus route.

The D. C. Department of Transportation's small bus program is now in the initial stages of planning and is still several years from becoming operational. However, with new developments already opening south of M Street, it is critical that transit service begin along lower K Street as soon as possible, so a transit habit can be developed among travelers to and from this area. Because Georgetown has a need for small bus service now and because the recommended routes in Georgetown have a high probability for success, it is recommended that Georgetown be used as a pilot area for the small bus system. This would enable the D. C. Department of Transportation to work out many of the problems with the system before attempting to implement it on a large scale throughout the city. It also could enable Georgetown to benefit from the implementation of small bus routes much earlier than might otherwise be possible.

The routes which are shown in the alternatives to terminate at the Foggy Bottom Metrorail station could be extended to connect

with the Kennedy Center and other points in the Foggy Bottom area. This would enable Foggy Bottom to benefit from small bus service and would directly connect Georgetown with destinations in Foggy Bottom. An analysis of specific routings in Foggy Bottom is outside the scope of this study. However, connection of Georgetown small bus routes into Foggy Bottom is a concept which has merit and should receive serious consideration in the ongoing small bus study being conducted for the D. C. Department of Transportation.

Extension of alternative small bus routes to Farragut Square has also been proposed. This would directly connect Georgetown with this downtown business district. Although this option should also receive consideration in the small bus study, it may not have as much merit as extending these routes into Foggy Bottom. Doing so would increase bus operating requirements without significantly increasing bus patronage.

Small bus routings in the vicinity of the Foggy Bottom station would be via a loop in which buses would travel eastbound on K Street to Washington Circle, turn right from the circle onto 23rd Street with passengers being dropped off in front of the Foggy Bottom Metrorail Station. Buses would then continue south on 23rd Street, turn west on H Street and turn north on 24th Street, stopping opposite the Metrorail station to pick up passengers. Buses would turn west on the service road to K Street, rejoining K Street at 25th Street. It has been pointed out that the merge from the westbound K Street service road to K Street is a dangerous maneuver which buses may have difficulty negotiating. If this proves to be the case, serious consideration should be given to installing a bus priority signal at 25th and K Streets.

An analysis of vehicle operating requirements and costs was performed for the three recommended small bus routes in Georgetown. Each route is short enough that a round trip could

be completed in 30 minutes. Therefore, if routes are operated on ten minute headways, it would be necessary to have three buses in service on each route at any given time, or a total of nine buses for the three routes. If ten minute headways are maintained throughout the day and evening, annual vehicle hours of travel per route would be 17,800 and annual vehicle miles of travel would be 142,000 for the Rosslyn-Foggy Bottom route, 171,000 for the Foggy Bottom-Dupont Circle route, and 192,000 for the Rosslyn-Wisconsin/Massachusetts Avenues route. Annual operating costs in 1979 dollars would be approximately $480,000 per route, or $1.44 million for the three routes combined. Operating these routes at ten minute headways would give effective five minute headways along the portions of the routes which overlap. If demand proved to be high enough that additional buses would have to be added, operating costs would increase proportionately. The latest estimate for capital costs for mid-size buses is $95,000 per bus. To operate the service recommended, eleven buses would be required (nine in service at any one time, plus two spares), resulting in a total capital cost of $1.0 million.

(4) Transit Marketing. As stated in Chapter 1, one of the objectives for improving transportation access in the Georgetown area is to increase transit's modal share of trips to, from, and through Georgetown. An effective transit marketing strategy should be an integral part of any transit improvement package for the Georgetown area.

At the beginning of this chapter a number of observed deficiencies in Georgetown area transit service were listed. The majority of these dealt with shortcomings with the actual service that operates in Georgetown. However, lack of awareness of transit service that is available in the Georgetown area, by residents,

employees, and visitors is one reason transit's modal share is not higher than it is today. In addition many employers and commercial establishments tend to "subsidize" travel to and from Georgetown by auto without providing similar subsidies for employees or customers who travel by transit. For example the cost of providing parking for employees or customers is often underwritten either through the provision of free or low-cost spaces or through parking validation programs while similar schemes to underwrite employers' and customers' transit fares generally do not exist. Finally, transit's image in the Georgetown area needs to be improved. Through a concerted marketing effort, travelling to and from Georgetown by transit could be perceived as being "chic" or at least no longer perceived as being "unchic" by fellow employees, shoppers, or residents. In order that transit can be more effectivetly marketed in Georgetown a five element marketing strategy is outlined below.

(a) Transit information centers. As noted above many persons who live, work, or visit in Georgetown are not fully aware of what transit service is available for their travel to and from Georgetown. One method for better disseminating information about transit service is to set up transit information centers in banks, stores, and restaurants throughout Georgetown. The information centers would not have to be large, but should be attractive, and provide clear information about what transit service is available. A map showing routes in Georgetown could be displayed together with instructions on how to get between various points in Georgetown and key destinations such as Metrorail stations and downtown Washington. Each transit information center should also contain a supply of schedules for all bus routes serving Georgetown. In addition information about the advantages of travelling to Georgetown by transit should be displayed.

(b) Transit information package for Georgetown employees. Much of the information which would be displayed in the proposed transit information center could be combined into a package of materials about Georgetown transit service for use by employees. A brochure or short report could be developed which contains a transit route map of the Georgetown area, information on how to use Metrobus and Metrorail to get to and from Georgetown, and information on the advantages of travel by transit, particularly in terms of cost. The package of materials could also include schedules for bus routes in the Georgetown area and information on the Council of Governments' computerized carpool matching program. Sets of packages could be made available to Georgetown employers who could distribute them to current or newly-hired employees. The package could also be made available to Georgetown residents, perhaps through the Citizens Association of Georgetown.

(c) Employers subsidy of transit fares. Employers have long subsidized travel to work by auto for their employees through the provision of free or low-cost parking spaces. In the past few years the concept of subsidizing employee travel to work has been extended to transit travel through the issuance of transit passes to employees as a fringe benefit. Firms in Los Angeles, Dallas, Chicago, Seattle, Hartford, Kansas City, Minneapolis, and now Washington are presently paying part or all of their employee's transit fares for their trip to and from work. Congressional Quarterly, in January 1980, became the first Washington firm to subsidize transit work trips. Major employers who have subsidized transit travel to work have been able to claim credit for doing their part to conserve energy, reduce the number of cars on the roads, ease center city congestion, lower air pollution, and relieve parking problems. For employers who provide free parking to their employees as a fringe benefit, shifts of employees to transit often can mean savings in costs for subsidizing travel to work, or can mean greater availability of parking spaces for

customers. Employer subsidies for transit work trips by employees should be strongly encouraged in the Georgetown area.

(d) Transit fare validation scheme. Parking validation schemes have long been used as an effective marketing tool to attract patrons to commercial establishments by auto in areas with high parking costs. The concept can be logically extended to transit patrons as well. Under a transit fare validation program, commercial establishments buy tokens from the transit agency and give tokens to patrons who have made a minimum purchase and request a token. A number of stores in Silver Spring presently participate in such a program where a token is worth a full fare on any Montgomery County Ride-On bus or 25 cents off a fare on any Metrobus anytime, anywhere the buses run. The program in Montgomery County is marketed under the name "Fare Share" and has proven to be quite successful. A similar program in Georgetown could be an effective tool to attract transit patrons to Georgetown shops, restaurants, and entertainment spots.

(e) Transit information brochure for patrons of Georgetown shops, restaurants, and entertainment spots. This element of the proposed transit marketing strategy is an extension of the transit information center and transit information package element. However, this element would focus upon visitors to Georgetown's commercial establishments. A brochure could be developed which would contain information on transit routes in the Georgetown area and how to access Metrorail via these routes. The brochure could also contain information about the transit fare validation scheme if such a scheme were implemented. This brochure should be different from the brochure developed for employees because it would be necessary that a brochure aimed at Georgetown visitors be concise and eyecatching if it is to be noticed and picked up at cashier stands in commercial establishments.

CHAPTER 6. CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ACTIONS

One of the key issues to be addressed in the Georgetown Area Access Alternatives Study is the upgrading of the Canal Road entrance to Georgetown University so traffic movements in all directions into and out of the University can be made at this location. The adopted Georgetown University Master Plan calls for the Canal Road entrance to become the principal access point to the Main and East Campus of the University, thereby removing much of the existing University-generated commuter and truck traffic from local residential streets within Georgetown.

EXISTING TRANSPORTATION ACCESS TO GEORGETOWN UNIVERSITY

In April 1979, a survey was taken of Georgetown University students, faculty, and staff to determine the characteristics of existing access patterns to the University. The findings of this survey are presented in "Technical Memorandum No. 4: Georgetown University Transportation Survey." Some of the key findings of the survey as they affect the analysis of upgrading the Southern Entrance to the University are as follows:

- Georgetown University draws approximately 9,780 commuters to its campus each weekday. Of these, 59% are destined to the Main and East Campus and 41% to the Georgetown University Medical Center.
- Fifty percent of the University's commuters arrive by auto with that percentage split as follows: 36% drive and park in University lots or garages, 9% drive and park on-street, 5% ride as a passenger in an automobile.
- Arrivals at the University peak at 9:00 AM with 45% of all arrivals occurring between 8:00 and 9:00 AM. Departures are less peaked with the peak hour (5-6 PM) representing 28% of the total day's departures.

Auto access to the Georgetown University Medical Center is presently via Reservoir Road with access points at four locations along Reservoir Road. The East and Main Campus of the University

can be accessed at three major points: Healy Circle at 37th and O Streets, the Prospect Street Entrance at 37th and Prospect Streets, and the Southern Entrance off Canal Road. At the Southern Entrance left turns into and out of the campus cannot be made, thus limiting the amount of access which is made through this point. Vehicular traffic counts made in March and April of 1977 show that during the hours between 7 AM and 6 PM East and Main Campus arrivals and departures are split among the 3 entrances as follows:[1/]

	% Vehicular Arrivals	% Vehicular Departures
Healy Circle	44	44
Prospect Street Entrance	38	43
Southern Entrance	18	13
	100	100

The vast majority (over 80%) of vehicular traffic accessing the East and Main Campus does so by passing through the residential areas east of campus. Included in this traffic is a significant number of trucks which serve the University as well as all GUTS buses. Most of the traffic which comes from or is destined to Virginia must wind its way along M Street, 33rd or 34th Street, and Prospect Street to reach campus. Traffic approaching from the Canal Road-MacArthur Boulevard Corridor to the northwest must travel along Reservoir Road and 35th Street, thereby contributing to the already high levels of congestion along these streets. Traffic which leaves the University via the Southern Entrance and wishes to cross Key Bridge or travel eastbound toward downtown Washington must circle all the way around Georgetown University before continuing on its way.

IMPACTS OF GEORGETOWN UNIVERSITY MASTER PLAN ON ACCESS

Several portions of the Georgetown University Master Plan call for changes within the University which will significantly

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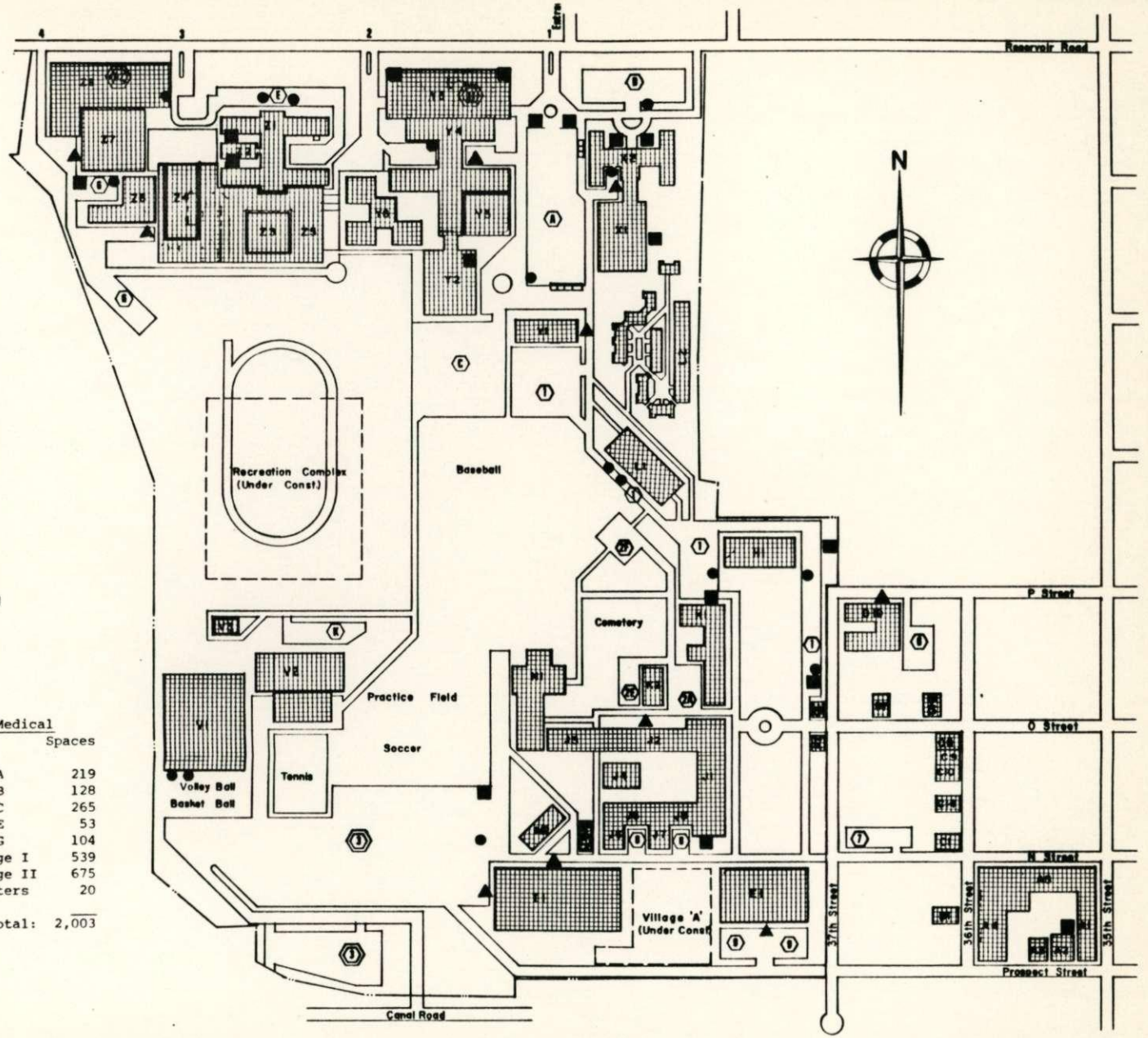
1/ Data derived from traffic counts provided by Stephen G. Petersen, P.E.

impact access and egress patterns to and from the University. Existing parking is provided on the Main and East Campus at a total of 10 locations as shown in Figure 22. Ultimate plans call for virtually all surface parking on the Main and East Campus to be eliminated with these spaces being replaced by a new parking garage which would be located just to the north of existing Surface Lot 3. This garage would be in a multiple use structure which would contain fluidized energy storage beds below the parking levels and recreation fields on the roof of the structure. With the elimination of the surface lots which are presently accessed via Healy Circle, the Healy Circle Entrance would become a ceremonial entrance and would no longer serve as a major vehicular access point to the University. With the shift in parking to the proposed parking garage and the closing of Healy Circle as an access point, the Master Plan calls for the Canal Road entrance to become the major entrance to the University. In order to be able to serve such a function, it would be necessary that all turning movements into and out of the University at this point be allowed.

JUSTIFICATION FOR PROVIDING FULL ACCESS AT THE CANAL ROAD ENTRANCE

At the present time, Georgetown University is the single largest traffic generator in the Georgetown area and represents approximately one-third of the total Georgetown population and employment. The 8,387 students, 3,834 staff members, and 828 faculty members represent a total University population of 13,049. The total number of non-University residents in Georgetown is estimated to be 12,700, and total non-University Georgetown employment is estimated to be 13,800. A traffic generator the size of Georgetown University should logically have its major access points along arterial streets which are designed to carry large volumes of traffic. Yet, at the present time, 82 percent of the traffic accessing the East and Main Campus of the University does so by traversing local neighborhood streets in Georgetown. Included in this traffic is a



PARKING SYMBOLS

- Main Campus Parking
- Public Parking Available
- Medical Center Parking
- Public Parking Available
- Metered Parking
- Loading Zones
- Motor Bike Areas
- Bicycle Areas
- Visitor Handicap Parking
- Handicap Parking

Campus	Spaces
Lot 1	251
2A 2E 2F	64
3	1,171
6, 7, 8, & 9	164
K	55
Total:	1,705

Medical	Spaces
Lot A	219
B	128
C	265
E	53
G	104
Garage I	539
Garage II	675
Meters	20
Total:	2,003

0 400'

GEORGETOWN UNIVERSITY PARKING

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FIGURE No. 22

a large number of delivery trucks and GUTS buses. It would be desirable to remove as much of this traffic as possible from local residential streets and put it instead on arterial streets, whose main purpose is to carry large volumes of traffic. Although present plans do not call for significant increases in traffic generated by the University, truck traffic will increase somewhat with the addition of 12 large coal trucks and 1 large lime truck making deliveries to the new Atmospheric Fluidized Bed (AFB) Power Plant. The most direct access point for these truck deliveries would be through the Canal Road entrance. However, at the present time, the trucks (as well as other traffic utilizing the Southern Entrance for both access and egress) must circle around the perimeter of the campus on local Georgetown streets to either enter or leave via the Southern Entrance.

GUTS buses (as well as other Key Bridge traffic) to and from Virginia presently use local Georgetown streets to the east of campus and contribute to the critical turning volumes at the intersection of M Street and Key Bridge. Significant delays are encountered both at this intersection and in making the circuitous route through the Georgetown streets east of campus. A primary objective of the University is to provide a high level of transit service between the University and Metrorail in order to induce more persons accessing the University to switch to transit. By permitting GUTS buses from Virginia to access the University via the Southern Entrance, substantial transit travel time savings to the Rosslyn Metrorail station and other points in Virginia would be experienced, thus significantly improving the efficiency of the GUTS system.

Upgrading the Canal Road entrance to the University could also offer the potential for significantly improving emergency vehicle access to the Georgetown University Medical Center. Ambulances responding to accidents along the Canal Road Corridor presently take victims to George Washington University Medical Center rather than the closer Georgetown University Medical Center because quick access cannot be made to the Georgetown University Medical Center.

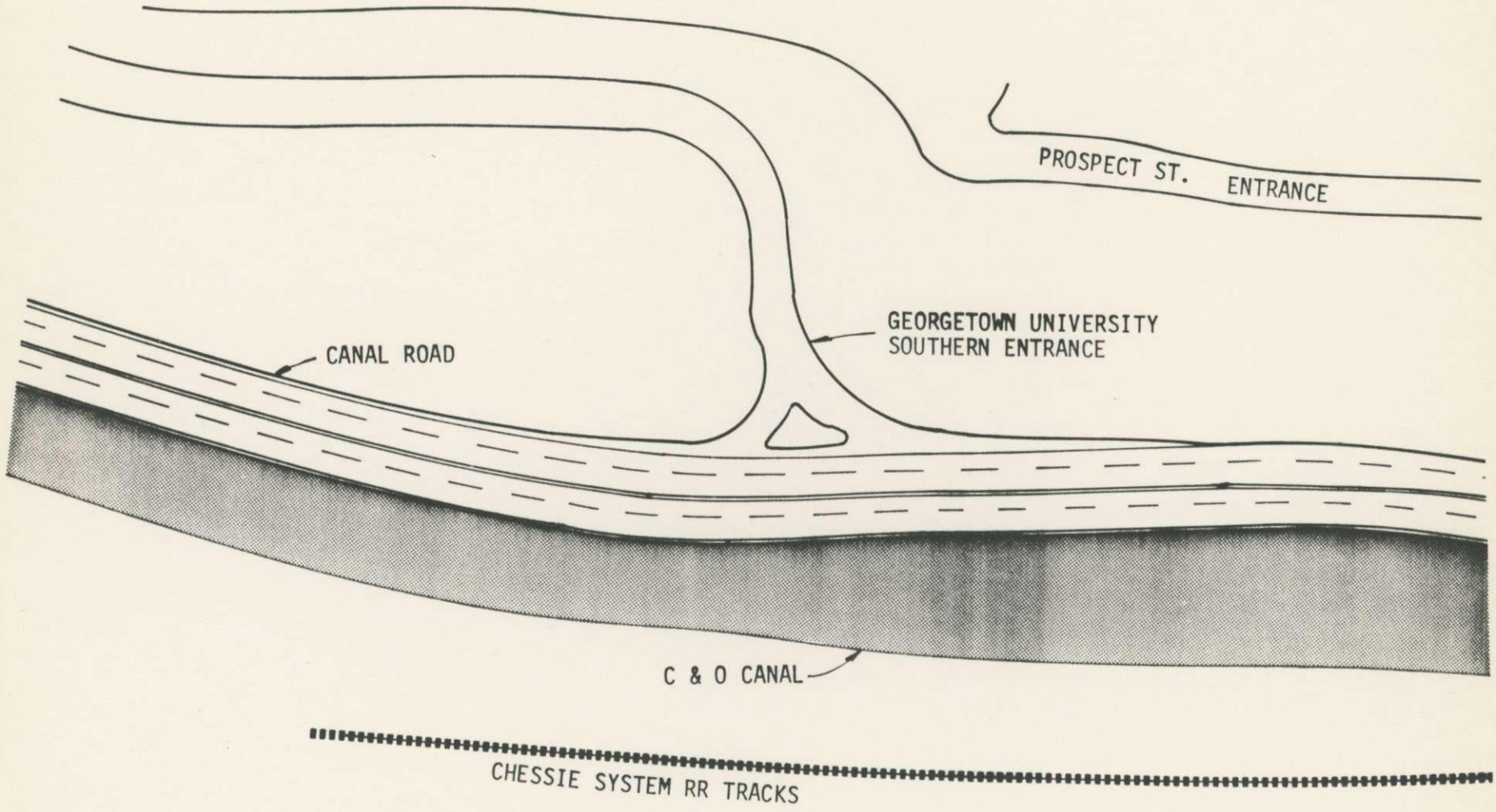
PHYSICAL SETTING

The number of alternatives for upgrading the Canal Road entrance to Georgetown University is limited by the physical setting in which the entrance is located. The C&O Canal parallels Canal Road on its south side (see Figure 23). The retaining wall on the north side of the Canal is only 2 feet from the curb of Canal Road. The C&O Canal is a registered historical landmark and is owned and maintained as a national park by the United States Government. Any change in alignment or widening of Canal Road to the south would encroach upon the canal and result in highly undesirable impacts.

Immediately to the north of Canal Road the Potomac Palisades rise approximately 50-55 feet to the plateau upon which Georgetown University's lower campus is situated. The Potomac Palisades are an outcropping of igneous rock which run along the Potomac River for a distance of nearly 200 miles. The eastern end of this outcropping is located just to the west of Key Bridge. Portions of the face of the Potomac Palisades are only four feet from the north curb of Canal Road in the area immediately to the west of the University's Southern Entrance. The National Park Service is in the midst of an active program to try to preserve the Potomac Palisades in its natural state to as great a degree as possible.

Any change of the alignment or widening of Canal Road to the north in the section in which the face of the Palisades is within only a few feet of Canal Road would encroach upon the face of the Palisades. It is worth noting that for a distance of approximately 200 feet to the east of the existing Southern Entrance to the University, there is no rock outcropping, the surface being dirt fill. Thus, movement of the entrance to the east could permit some realignment of Canal Road without encroaching upon the rock face of the Palisades.

The existing elevation of Canal Road at the Southern Entrance to Georgetown University is 50 feet above sea level. The plateau



0 100'

EXISTING GU CANAL ROAD ENTRANCE

jhk & ASSOCIATES

FIGURE No. 23

at the top of the cliff face averages 103 feet above sea level in elevation, resulting in the need for vehicles entering the campus to overcome a grade differential of 53 feet. The existing roadway into the University runs at a 6 percent grade for much of its length.

DESCRIPTION OF SOUTHERN ENTRANCE ALTERNATIVES

A number of alternatives have been developed for the Southern Entrance to Georgetown University based upon the physical constraints identified in the previous section, traffic operation considerations, and the desire of Georgetown University to make the Southern Entrance the main access point to the campus. For the purpose of alternatives analysis, the alternatives will be divided into physical alternatives for the intersection of Canal Road and the Southern Entrance, operational alternatives both for the Southern Entrance intersection and other intersections in the Georgetown University area, and alternatives for permitting vehicles to overcome the grade differential between Canal Road and the plateau on which the University is located. The final Southern Entrance alternative would consist of a package of one of each of the types of alternatives identified above.

PHYSICAL INTERSECTION ALTERNATIVES

Working within the physical constraints of the general location of the Southern Entrance to Georgetown University, six physical intersection alternatives were identified. These alternatives are as follows:

(1) Null alternative: the intersection would be left as it is today with no left turns from the University to eastbound Canal Road or from eastbound Canal Road to the University allowed.

(2) At grade signalized intersection at present access location with no widening or change in Canal Road alignment. Under this alternative an opening

would be made in the existing median stip through which left turns could be made, but no turn bays would be installed.

(3) At grade signalized intersection at present access location with provision of a 200 foot left turn bay from eastbound Canal Road into the University and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment.

(4) At grade signalized intersection 200 feet to the east of the existing University entrance with provision of a 200 foot left turn bay from eastbound Canal Road and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment.

(5) Grade separated interchange with flyover ramps carrying left turning movements into and out of Georgetown University.

(6) A third roadway with three lanes would be built along the crest of the Potomac Palisades. This roadway would be used by westbound Canal Road traffic, with perhaps a reversible lane to accommodate AM peak loads. The existing westbound lanes would become an access road to serve University traffic.

OPERATIONAL ALTERNATIVES

A number of operational alternatives are available, which when combined with certain physical alternatives, will prevent severe congestion from occuring on Canal Road and other nearby roadways. The operational alternatives considered in this analysis are as follows:

(1) Allow all turning movements into and out of Georgetown University at all times.

(2) Prohibit left turns into and out of Georgetown University by all vehicles during peak periods, allowing full access during the remainder of the day.

(3) Prohibit left turns into and out of Georgetown University by all vehicles, except buses and emergency vehicles, during peak periods, allowing full access during the remainder of the day.

(4) Prohibit left turns into and out of Georgetown University at all times, except to buses and emergency vehicles.

(5) Prohibit left turns into and out of Georgetown University during the AM peak only.

(6) Prohibit left turns out of Georgetown University during the AM peak.

ALTERNATIVES TO OVERCOME GRADE DIFFERENTIAL BETWEEN CANAL ROAD AND MAIN CAMPUS

(1) Use the existing roadway.

(2) At the midpoint of the existing roadway reverse the roadway direction to make a U-shaped roadway.

(3) Build a structure containing circular ramps to overcome the grade differential.

COMPLEMENTARY ALTERNATIVES

In addition to the alternatives listed above for upgrading the Southern Entrance into Georgetown University, several complementary alternatives were investigated which could mitigate some of the traffic impacts of the Southern Entrance. In addition to those listed, many of the transportation management schemes being investigated both for the University and the Georgetown community could result in improved traffic operations. The complementary alternatives which were directly investigated in relation to the Southern Entrance are as follows:

(1) Incorporate a double left turn at the intersection of Canal and Foxhall Roads for westbound Canal Road traffic during the PM peak.

(2) Maintain the Prospect Street Entrance to the University as a major entrance for vehicles accessing the campus from the north and east and to provide a relief valve to the Canal Road Entrance during periods of peak traffic flow.

(3) Build an entrance to the proposed Main Campus parking structure from Reservoir Road.

ANALYSIS OF TRAFFIC IMPACTS OF AN UPGRADED SOUTHERN ENTRANCE

As part of the transportation survey of Georgetown University students, faculty, and staff, respondents were asked to indicate their trip origins, destinations, arrival times, and departure times for all trips typically made during a week.[1/] The responses to these questions were expanded to derive estimates of the total number of vehicles arriving and departing campus both on weekdays and weekends. Figure 24 shows the percentage of campus weekday arrivals and departures by time of day. It is estimated that over the course of a typical weekday a total of 8,900 persons arrive at and leave campus, 53% of which are destined to the Main and East campus, with the remainder destined to the Medical Center. Survey responses indicate that the peak arrival hour on campus is between 8 and 9 AM when 45% of all arrivals take place. Departures take place over a more spread out period with the peak hour (5-6 PM) accounting for only 28% of the total daily departures. Of the persons who arrive on campus during the peak AM hour, 50%, or approximately 2,000, drive an auto which they park in a campus parking lot. Of these, 57% are destined to the Medical Center and would not use the proposed Southern Entrance. If the Prospect Street entrance to the Main and East Campus were left open, another 10% of the autos could be expected to use that entrance. The remaining 33% (660) are travellers which could be expected to use the Canal Road entrance if it were open to all travel movements at all times. Of these 660, approximately 37% (246) would come from the west and 67% (414) would come from the east (primarily across the Key Bridge from Virginia).

An analysis of existing traffic into and out of the University during peak periods[2/] shows that the peak hour for arrivals

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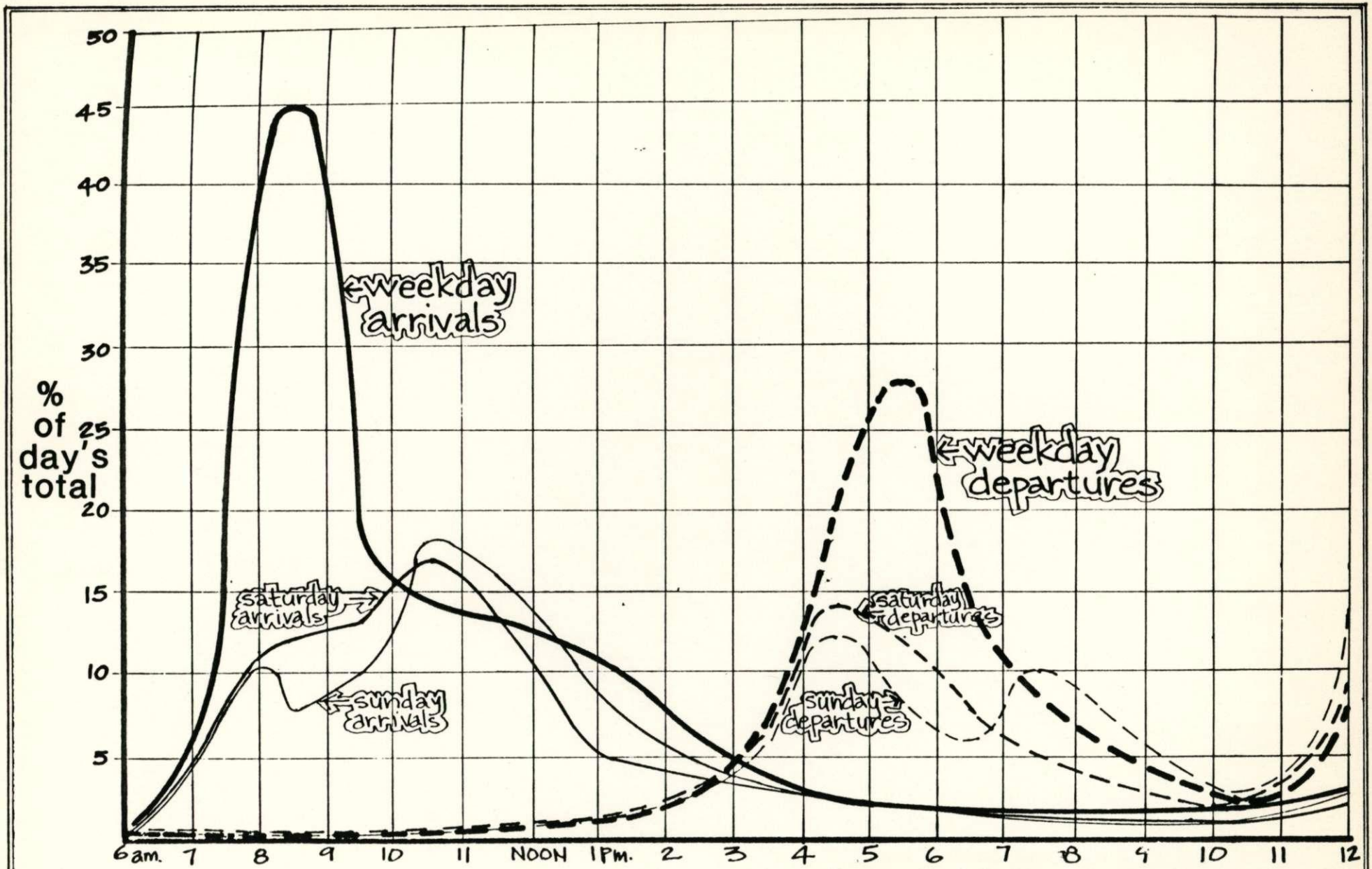
1/ Rivkin Associates Inc. "Technical Memorandum 4: Georgetown University Transportation Survey," August 1979.

2/ Traffic counts taken March-April 1977 by Stephen G. Petersen, P.E.



Source: Technical Memorandum No. 4
Georgetown University Transportation Survey

TIME OF DAY OF CAMPUS ARRIVALS AND DEPARTURES

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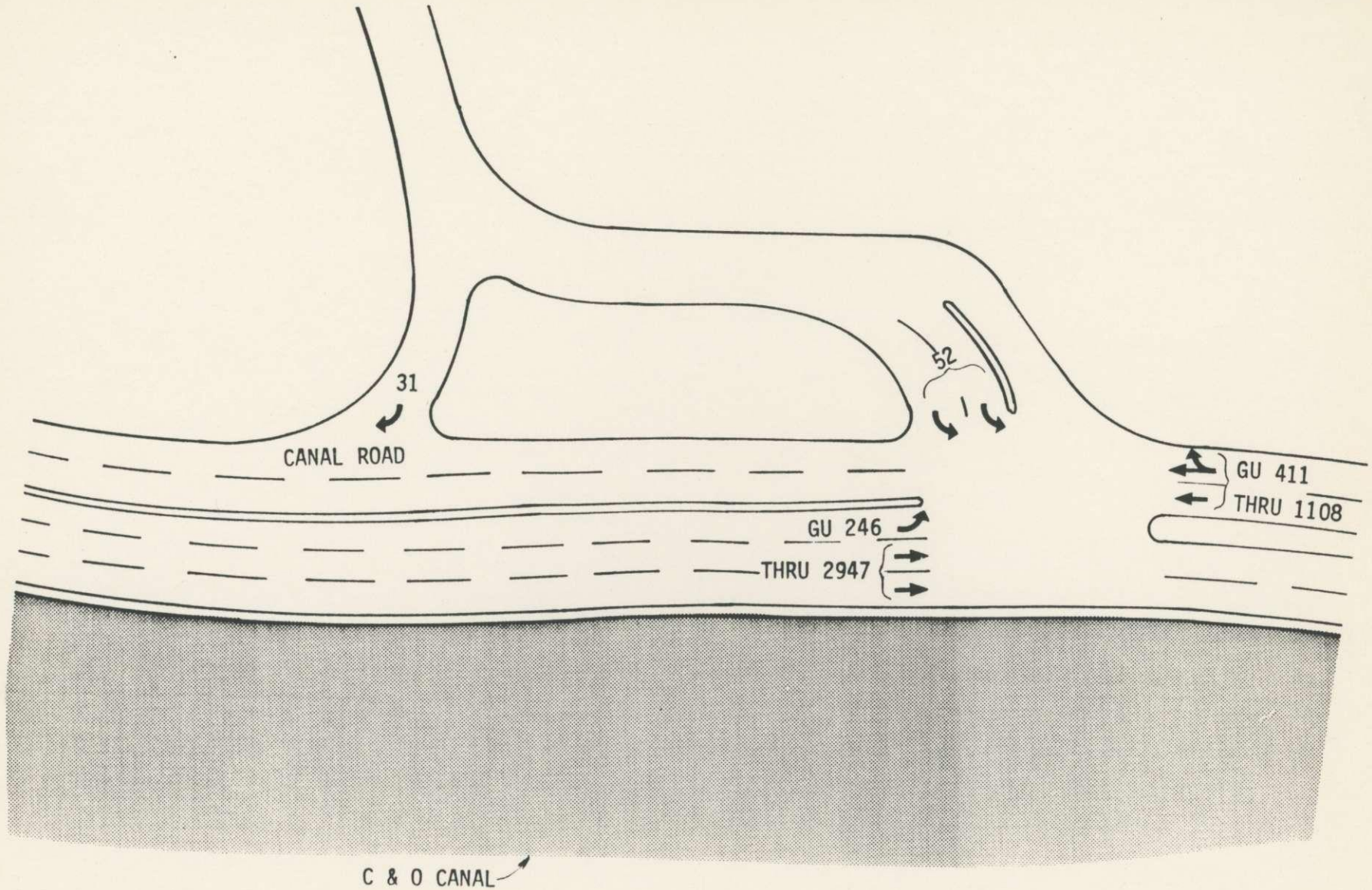
FIGURE No 24

is actually 8:30-9:30 AM and survey respondents tended to indicate earlier arrival times than actually occur. Therefore, by using AM peak hour demand numbers derived from the survey a conservative analysis was performed. Use of these numbers also tends to make the analysis conservative because modal shifts which can be expected to occur as a result of transit service improvements which will take place in the next several years were not taken into account. Although traffic into and out of the University is significantly less during the PM peak hour, capacity analyses were also performed for this time period because general commuter traffic on Canal Road is heavier at that time.

Figures 25 and 26 show traffic movements which could be expected to be made at the Canal Road entrance if all turning movements were allowed both under the condition in which the Prospect Street entrance is left open and the condition in which it is closed. During the AM peak period, Canal Road eastbound presently flows nearly at capacity. In order to accommodate the vehicles turning left into the University from Canal Road, it would be necessary that a left turn bay be provided which contains enough storage space for the left turning movement. Due to the physical constraints on either side of Canal Road, the left turn bay would be limited to 200 feet in length. This length should be adequate if a short cycle length is maintained, a long left arrow is maintained, or a permissive left on solid green is allowed. Because traffic on Canal Road eastbound is presently so heavy during the AM peak hour (2947), it might be necessary that left turns out of the University onto Canal Road eastbound be prohibited during the AM peak period.

During the PM peak hour westbound Canal Road traffic volumes are not as heavy as eastbound AM peak hour volumes, so left turns out of the University can be more easily accommodated. If a single lane is provided for left turns out of University, the Level of Service for the intersection would be "E." However, provision of a double left turn lane from the University would allow traffic to continue to move at Level of Service "D." Therefore, it is



0 50'

AM PEAK HOUR AT GU SOUTHERN ENTRANCE
IF PROSPECT STREET ENTRANCE REMAINS OPEN

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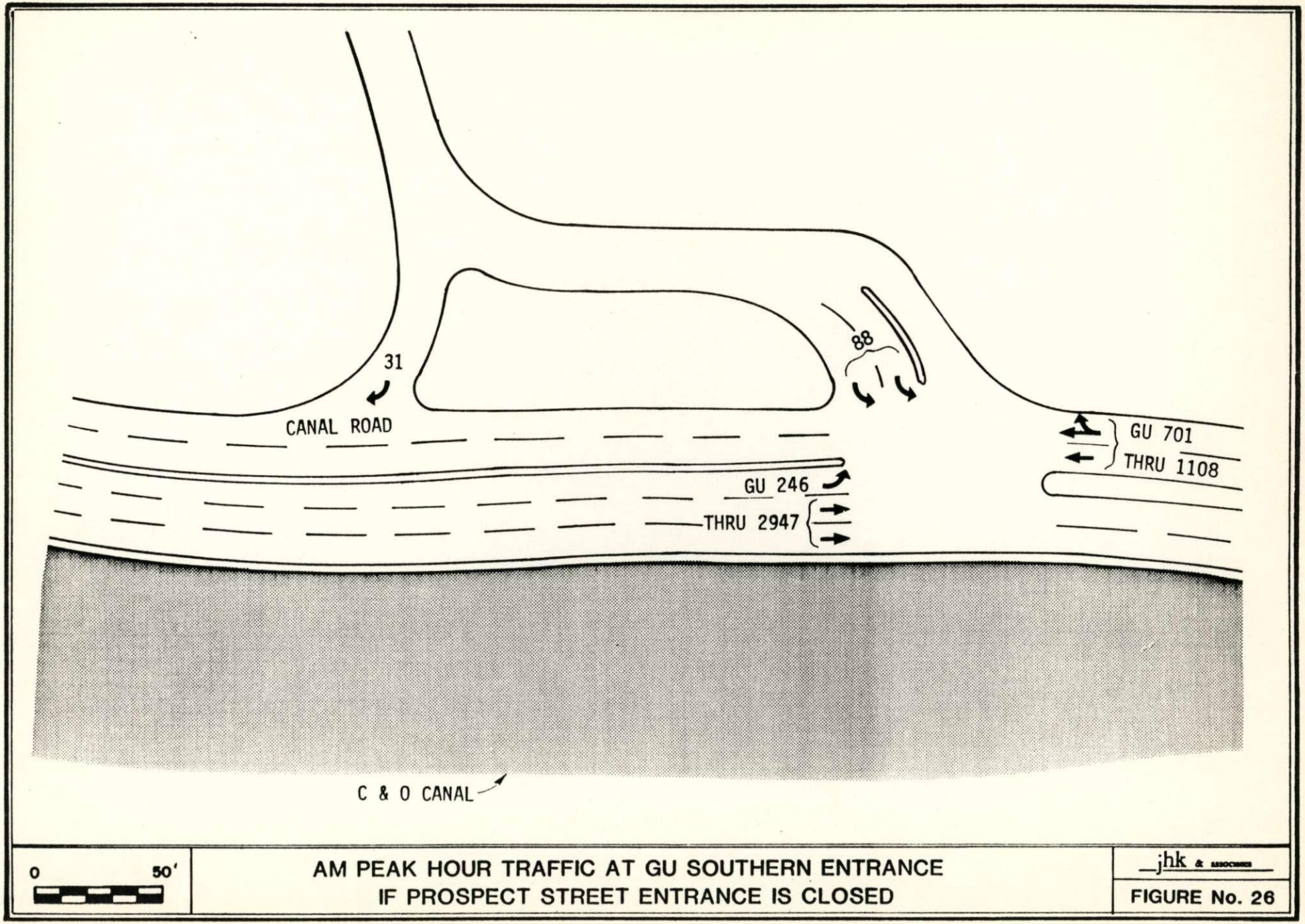
FIGURE No. 25



AM PEAK HOUR TRAFFIC AT GU SOUTHERN ENTRANCE
IF PROSPECT STREET ENTRANCE IS CLOSED

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FIGURE No. 26

recommended that the exit from the University be designed such that a double left turn is provided for.

Opening the Canal Road entrance to the University could be expected to impact two other signalized intersections in the immediate vicinity, the intersection of M Street and Key Bridge and the intersection of Canal and Foxhall Roads. The primary impact of the change in University approach patterns during the AM peak on the intersection of M Street and Key Bridge is to shift a number of right turning vehicles to making left turns. Because of the large reductions in Key Bridge traffic volumes since the opening of the Blue Line and since the right turn volumes off Key Bridge are the critical volumes at this time, it is felt that with minor signal timing changes the increased left turn volumes could be accommodated during the AM peak. During the PM peak, when more significant congestion occurs, the effect of the shift in University traffic would be to decrease the critical left turn volumes from westbound M Street to Key Bridge and increase the non-critical right turn volumes from eastbound M Street to Key Bridge, thereby improving level of service. It should be noted that level of service at the intersection of M Street and 33rd and 34th Streets should also be improved during both peak periods because significant reductions in University traffic will be made at both intersections.

The intersection which will be most negatively impacted by the upgrading of the Southern Entrance will be the intersection of Foxhall and Canal Roads. An analysis of existing traffic volumes at this intersection shows that it runs over capacity both during the AM and PM peaks with the PM peak experiencing the longest backups. It is not uncommon for westbound Canal Road traffic to back up beyond the Southern Entrance, a distance of over 1,000 feet. To alleviate some of this congestion and to permit the additional University traffic to exit onto Canal Road, it is recommended that the intersection of Canal Road and Foxhall Road be reconstructed to incorporate a double left turn lane onto Canal Road during the PM peak period. With existing traffic levels the intersection

operation would improve to Level of Service "C." The additional University traffic would result in a Level of Service on the borderline between "C" and "D" if a double left turn onto Canal Road is permitted. It should be noted that the D.C. Department of Transportation plans to implement a double left turn at this location during the Summer of 1980.

The additional University traffic through the intersection of Canal and Foxhall Roads during the AM peak will result in a further deterioration of traffic conditions during that time period. However, it should be noted that the large majority of University arrivals during the 8:00 to 9:00 AM period are concentrated during the latter part of the hour when the general commuter peak has begun to lessen somewhat.

One of the primary traffic impacts which would result from the opening of the Canal Road entrance and the elimination of access through Healy Circle would be a lessening of traffic volumes on Reservoir Road. It is estimated that over 200 vehicles which presently use Reservoir Road during the peak AM hour would no longer use Reservoir Road, thereby significantly improving traffic flow at several severely congested intersections, including the intersections of Foxhall and Reservoir Roads and 35th Street and Reservoir Road.

ANALYSIS OF IMPACTS OF SOUTHERN ENTRANCE ALTERNATIVES

The analysis of impacts of Southern Entrance alternatives is divided in the same manner the description of alternatives was earlier in the chapter, i.e., an analysis of the physical intersection alternatives, operational alternatives, and alternatives to overcome the grade differential between Canal Road and the Main Campus.

Physical Intersection Alternatives

(1) Null alternative. The disadvantages of maintaining the Southern Entrance as it is at present have been outlined earlier in this chapter. Significant delays are encountered by vehicles accessing and egressing Georgetown University by being forced to travel on local Georgetown streets. If the Southern Entrance is not upgraded and the Healy Circle Entrance is closed, the Prospect Street Entrance would become the only fully accessible entrance to the University, resulting in a traffic overload of Prospect Street. The higher number of vehicle miles of travel and higher levels of congestion on Reservoir Road, Prospect Street, and M Street under the null alternative will result in higher air pollution and energy consumption levels.

(2) At grade signalized intersection at present access location with no widening or change in Canal Road alignment. This alternative would result in unacceptable traffic congestion levels during peak periods and should only be considered if combined with turn restrictions during the peak periods. The major advantages of such an alternative would be its low cost, essentially the only costs being those associated with opening the median barrier, signalization, and signing; and the fact that there would be no construction impacts or encroachment on space which is not presently used as roadway.

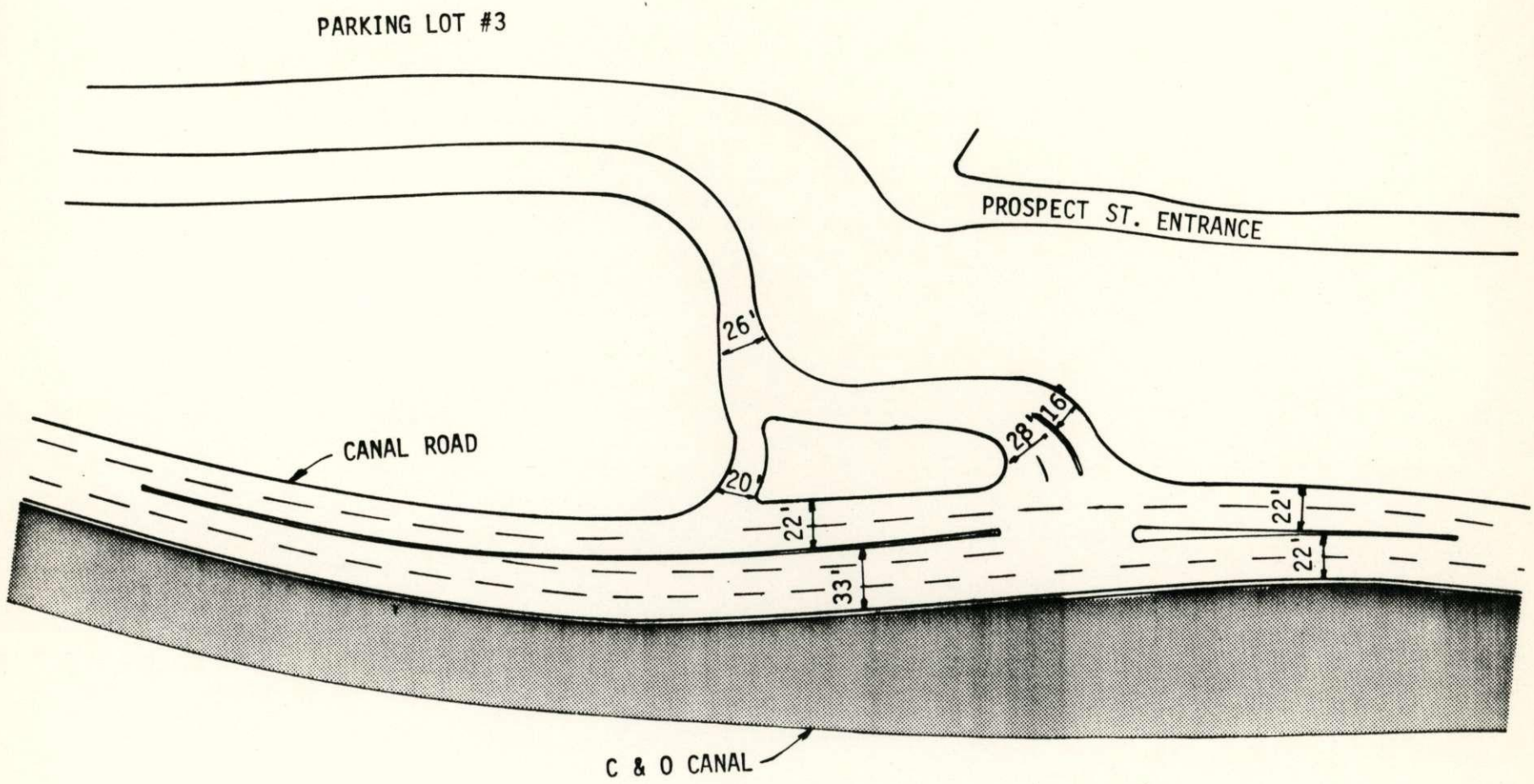
(3) At grade signalized intersection at present access location with provision of a 200 foot left turn bay from eastbound Canal Road into the University and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment. This alternative would allow for a storage lane for left turning vehicles and therefore would provide an acceptable Level of Service under the conditions outlined in the "Traffic Impacts" section. However, in order to construct this alternative, it would be necessary to remove a portion of the cliff face in the area immediately to the west of the existing entrance. This would

conflict with the National Park Service's efforts to preserve the Potomac Palisades in their natural state.

(4) At grade intersection 200 feet to the east of the existing University entrance with provision of a 200 foot left turn bay from eastbound Canal Road into the University and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment. (See Figure 27). This alternative operationally would be similar to the previous one but would not involve encroachment upon the face of the Potomac Palisades in the vicinity of the University entrance. The actual access point from Canal Road would be in an area which is presently dirt fill and as a result the presently exposed rock face would be undisturbed. The provision of a storage lane for left turn vehicles would allow for an acceptable level of service through the intersection.

(5) Grade separated interchange with flyover ramps carrying left turning movements into and out of Georgetown University. Operationally the entrance to the University would have significantly less impact on Canal Road if left turning movements into and out of the University did not have to cross oncoming traffic at grade. However, the provision of a grade separated interchange at the Southern Entrance would involve encroaching upon the C&O Canal, the Potomac Palisades, or both. Even an interchange configuration with tight curves and minimal vertical and lateral clearances would require a substantially wider right of way than is possible without encroaching upon the Canal or Palisades. Because of the historical and environmental sensitivity of the Canal and Palisades, this alternative is not judged acceptable.

(6) A third roadway with three lanes along the crest of the Potomac Palisades to carry westbound Canal Road traffic, with the existing westbound lanes becoming an access road to serve University traffic. This alternative would involve the construction of a grade separated interchange at the intersection of Canal and Foxhall Roads and could result in improved traffic flow both at the



0 100'

PROPOSED SOUTHERN ENTRANCE

jhk & associates

FIGURE No. 27

Southern Entrance and the Canal Road-Foxhall Road intersection. However, it would be built along the crest of the environmentally sensitive Potomac Palisades and would result in unacceptable environmental and visual impacts to the Palisades. It is therefore judged an unacceptable alternative.

Summary of Physical Alternatives

From a traffic operations standpoint, it is necessary that if the Southern Entrance is to be upgraded to handle all traffic movements at all times of day that at a minimum a left turn bay from eastbound Canal Road be constructed. Alternatives which would provide for a higher operational level of service than an at grade signalized intersection with left turn bay (grade-separated alternatives) are judged unacceptable because they would encroach upon the historically and environmentally sensitive C&O Canal and Potomac Palisades. Construction of an intersection with a left turn bay at the location of the present Southern Entrance to the University would also involve encroachment on the rock face of the Potomac Palisades and therefore is not judged as favorably as the alternative with an at grade intersection located approximately 200 feet to the east of the existing intersection as shown in Figure 27.

Operational Alternatives

(1) Allow all turning movements into and out of Georgetwon University at all times. This alternative would provide the highest level of service to Georgetown University and would result in the greatest diversion of University traffic from local Georgetown streets. However, such an alternative could result in severe congestion on eastbound Canal Road during the AM peak period if through traffic on these lanes are not given 100 percent green time. If very short and infrequent green times are given to left turning vehicles exiting from the University during the AM peak, full access might be feasible.

(2) Prohibit left turns into and out of Georgetown University by all vehicles during peak periods, allowing full access during the remainder of the day. This alternative would do little to change Georgetown University traffic characteristics during peak periods when the majority of such traffic accesses or egresses the University. However, it would provide improved access during off-peak periods, thus allowing a Southern Entrance alternative for trucks making off-peak deliveries and other University traffic arriving or leaving during off-peak periods. This operational alternative should be most seriously considered in combination with a physical alternative in which a left turn bay is not provided for eastbound Canal Road traffic turning into the University. Otherwise, it severely impinges upon University access through the Southern Entrance.

(3) Prohibit left turns into and out of Georgetown University by all vehicles, except buses and emergency vehicles,during peak periods, allowing full access during the remainder of the day. This alternative would overcome the disadvantages of the previous alternative for high priority vehicles, thus allowing for greatly improved GUTS service between Northern Virginia and the main campus and improved emergency vehicle access to the Medical Center but would do little to improve access for the majority of vehicles destined to or leaving Georgetown University during peak periods and would do little to lessen University traffic impacts on local Georgetown streets during peak periods, when these impacts are most severe.

(4) Prohibit left turns into and out of Georgetown University at all times, except to buses and emergency vehicles. Although access to the University would be significantly improved for priority vehicles, this alternative does nothing to improve access for all other vehicles going to and from the University. It is recommended that this alternative receive consideration only if a left turn bay is not constructed on Canal Road or as an interim measure until a new intersection can be constructed.

(5) Prohibit left turns into and out of Georgetown University during the AM peak only. This alternative would not grant Georgetown University full access at all times of day, but could overcome some of the most severe capacity problems which would result from the upgrading of the Southern Entrance, i.e., AM peak period volumes through the intersection of Foxhall and Canal Roads and through the Southern Entrance intersection. However, University-generated traffic volumes on Reservoir Road and other local Georgetown streets would continue to remain high during the AM peak. If this alternative is adopted, turn prohibition exceptions should be granted to GUTS buses and emergency vehicles, perhaps through a signal preempt system.

(6) Prohibit left turns out of Georgetown University during the AM peak. Eastbound traffic on Canal Road at the Southern Entrance during the AM peak period runs near capacity without a signal at the present time. Adding a signal at this location and decreasing the amount of time allotted to eastbound Canal Road traffic would likely result in severe congestion during the AM peak even with very low left turn volumes leaving the University. Although auto demand for this turning movement is forecast to be quite low, more severe impacts could be expected if buses were also prohibited from making this movement. Therefore, if the left turn prohibition out of the University is adopted during the AM peak, it is recommended that GUTS buses be given preemption.

Summary of Operational Alternatives

The choice of which operational alternative is implemented will to a certain degree depend upon the physical alternative which is chosen. If no left turn bay is provided for eastbound Canal Road traffic turning into the University, it is highly unlikely that left turning movements into and out of the University could be allowed during peak periods without causing severe congestion

problems. Even with the provision of a left turn bay, serious consideration should be given to prohibiting left turns out of the University onto eastbound Canal Road during the AM peak, unless operational experience shows that allowing this movement will not result in undue congestion. No matter which operational plan is chosen, it would be desirable if both GUTS buses and emergency vehicles were allowed to make all movements at all times, if necessary through the use of a preempt system.

Alternatives to Overcome Grade Differential Between Canal Road and Main Campus

(1) Use the existing roadway. The existing roadway between Canal Road and the main level of the University campus turns westward shortly after leaving Canal Road and climbs at a 5-6% grade to the west end of Georgetown University's Parking Lot 3. The roadway is quite steep for trucks and buses and is difficult to negotiate during snow or ice storms. It takes up a considerable amount of valuable land and terminates approximately 500 feet west of the location of the proposed parking garage which would be used by nearly all autos accessing the Main Campus. It also makes a cut along the Potomac Palisades and creates a visual intrusion in the middle of the Palisades. However, using the existing roadway would obviate the need for further construction in the vicinity of the Palisades and would be the lowest cost alternative for overcoming the grade differential. Using the existing roadway could also serve as an interim means of overcoming the grade differential, thereby allowing earlier implementation of Southern Entrance-Canal Road intersection.

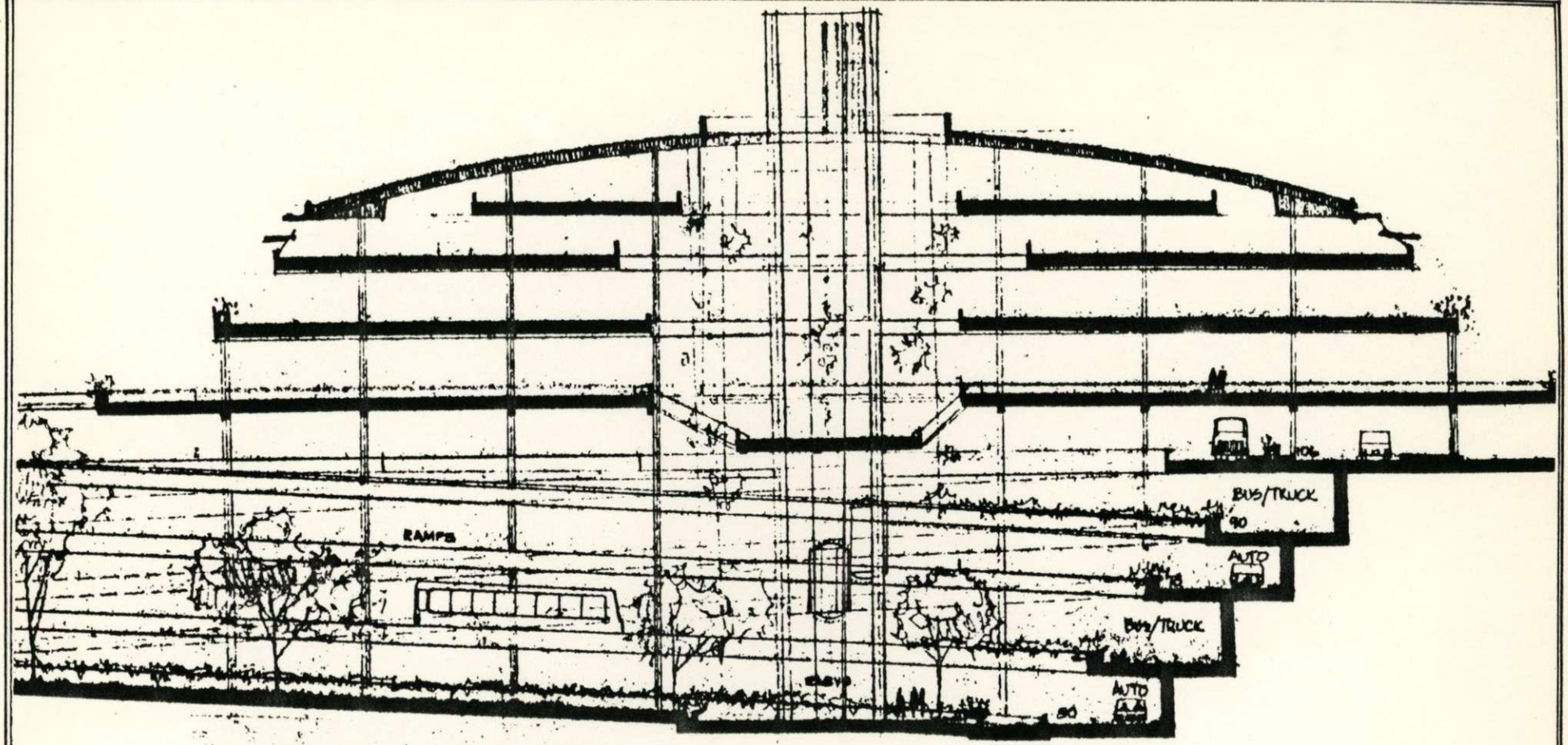
(2) At the midpoint of the existing roadway reverse the roadway direction to make a U-shaped roadway. This alternative would permit vehicles to arrive at the level of the Main Campus in the proposed parking garage. However, the problems caused by

steep grades would remain, valuable land would continue to be used, and a new cut into the face of the Palisades would be required.

(3) Build a structure containing circular ramps to overcome the grade differential. A helix structure as shown in Figures 28 and 29 has been proposed by Georgetown University which could serve both as a means to overcome the grade differential between Canal Road and the Main Campus and as a terminal facility for GUTS and other public transportation routes. The proposed structure would be designed to permit the passage of a light rail line through it if such a line is built along the Cabin John right of way. The structure would have earth berms placed on its south side in order to effectively shield it and help provide a continuous line across the crest of the Palisades. The entrance at the Canal Road level would be a monumental entrance to the University. Although the helix structure would be built into the Palisades, it offers potential to improve upon the impact the Southern Entrance presently has on the Palisades. The roadway which presently bisects the Palisades would be covered by earth and trees. With the construction of an earth berm across the crest of the Palisades the building would be effectively hidden and have less of a visual impact than the present roadway. The building could serve as an intermodal transfer point both for passengers transferring among WMATA and/or GUTS buses and passengers transferring to an intra-University transit system. Vehicles entering campus would arrive at the level of the University in the general vicintiy of the proposed Main Campus parking garage and University Center.

Summary of Alternatives to Overcome Grade Differential Between Canal Road and Main Campus.

Use of the existing roadway between Canal Road and the Main Campus, or a modified version of the existing roadway presents several problems which could potentially be overcome by a ramp



SCHEMATIC CONCEPT

SECTION E/W LOOKING NORTH 1"=20'

- BUS TERMINAL/METRO ACCESS
- TRUCK/SERVICE ACCESS
- AUTO/TAXI/VAN ACCESS
- AUTO LOWER LEVEL DROP OFF/ELEVATORS
- MAIN TRAFFIC ACCESS G.U.
- HIGH PEDESTRIAN TRAFFIC G.U. FUNCTIONS
- 200 GUEST ROOM/CONFERENCE CENTER/UNIV. CTR./ RESTAURANTS/SERVICES.

PROPOSED G.U. TRANSPORTATION TERMINAL

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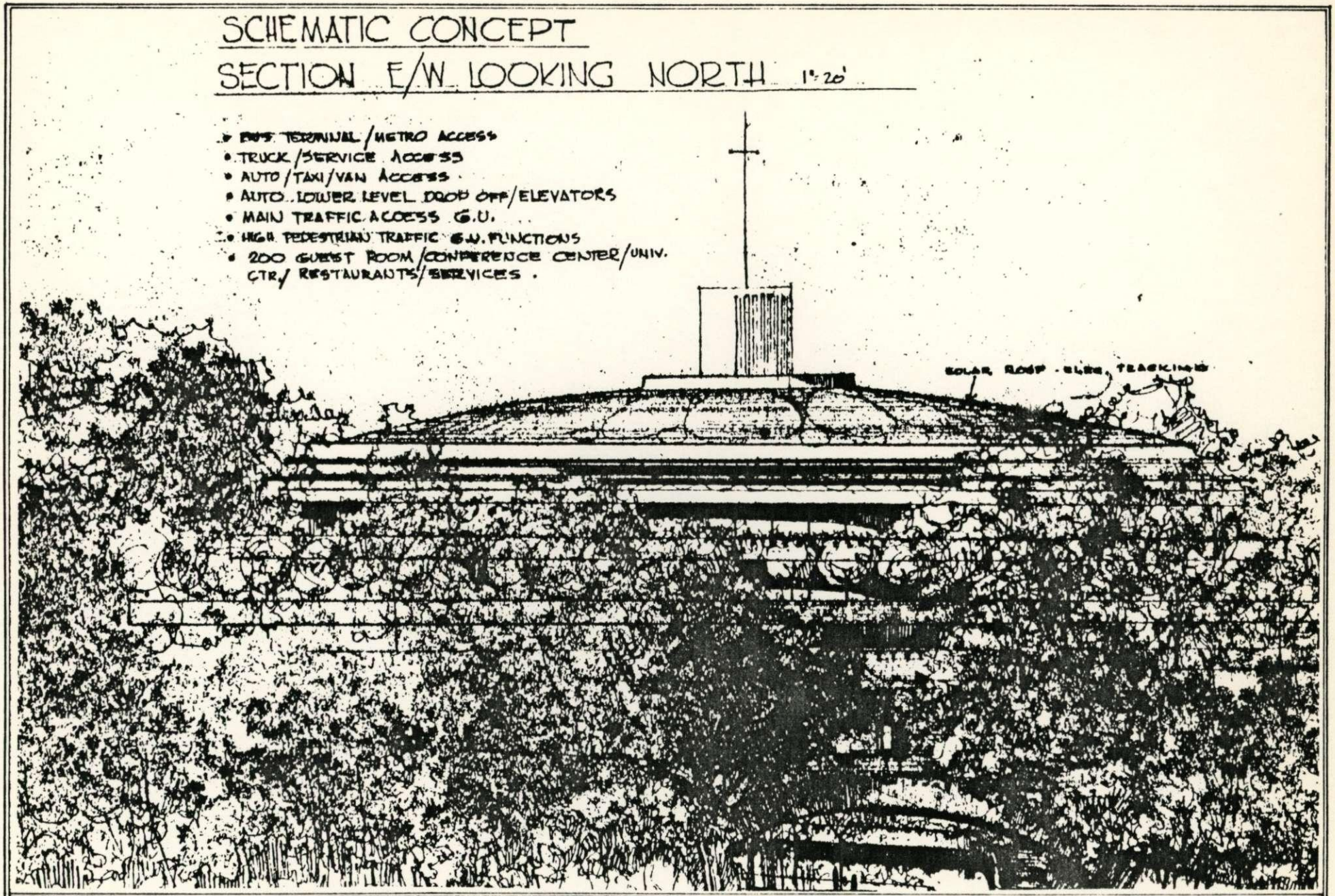
FIGURE No. 28



PROPOSED G.U. TRANSPORTATION TERMINAL

jhk & associates

FIGURE No. 29

structure which is designed to minimize the impact of the Southern Entrance on the Potomac Palisades. The design of such a structure must be such that it enhances the Palisades and should be such that it can serve as a terminal facility for transit lines accessing Georgetown University at the Southern Entrance. Becasue the implementation of such a structure would require environmental review, it is recommended that the environmental review process begin shortly.

Complementary Alternatives

(1) Incorporate a double left turn at the intersection of Canal and Foxhall Roads for westbound Canal Road traffic during the PM peak. At the present time traffic desiring to turn left onto Canal Road at its intersection with Foxhall Road often has to wait through several cycles of the signal and frequently backs up beyond the Southern Entrance. As was shown in the discussion of traffic impacts, provision of a double left turn lane during the PM peak would significantly improve the level of service of this intersection and allow for the increase in traffic expected as a result of the Canal Road entrance becoming the main entrance of the University. The D.C. Department of Transportation is scheduled to incorporate PM peak double left turn operations at the intersection of Canal and Foxhall Roads as part of its resurfacing project for Canal Road which is presently scheduled to be completed during the summer of 1980. However, in addition to the scheduled action, serious consideration should be given to the extension of the left turn bay several hundred feet to the east of its present terminus in order to increase the capacity of the intersection. This would require the widening of Canal Road and the taking of a narrow strip of land on the north side of Canal Road presently administered by the National Park Service.

(2) Maintain the Prospect Street Entrance as a major entrance to Georgetown University. It is estimated that approximately 20-25 percent of University traffic comes from or is destined to points to the north and east of campus which are more readily accesssible via the Prospect Street Entrance than would be via the Canal Road Entrance. From a capacity point of view on Canal Road, it would be desirable for this traffic to continue to access the University via the Prospect Street Entrance. In addition, it would be desirable that this entrance serve as a relief valve to the Southern Entrance during periods of highest traffic volumes. It also would serve as the alternate to the Southern Entrance for any traffic movements which are prohibited at that point during certain time periods.

(3) Build an entrance to the proposed Main Campus parking structure from Reservoir Road. With the closing of Healy Circle as a major access point to Georgetown University, traffic concentrations will become heavier at the two remaining access points, the Southern Entrance and the Prospect Street Entrance. A potential means to redistribute some of this traffic, and particularly to reduce its impact on the intersection of Foxhall and Canal Roads, would be to provide an access point to the Main Campus parking garage from Reservoir Road. Most of the traffic which would use this entrance would come from the west and is already on Reservoir Road because it cannot presently make a left turn into the University from Canal Road. Therefore the main traffic impacts of such an entrance would be to reduce traffic east of the Georgetown University Medical Center on Reservoir Road and other local Georgetown streets and to reduce the number of vehicles which would both pass through the intersection of Canal and Foxhall Roads and which would make a left turn from Canal Road into the University, if this were permitted.

Summary of Complementary Alternatives

It is recommended that in conjunction with the upgrading of the Southern Entrance that a double left turn lane during the PM peak be incorporated at the intersection of Canal and Foxhall Roads for westbound Canal Road traffic, and that the Prospect Street Entrance be maintained as a major entrance to the University. In addition, serious consideration should be given by Georgetown University to building an additional entrance to the Main Campus from Reservoir Road.

CHAPTER 7. OTHER CANDIDATE GEORGETOWN UNIVERSITY ACTIONS

In the previous chapter various alternatives for upgrading the Southern Entrance to Georgetown University were analyzed. In this chapter a number of other potential alternatives for improving transportation access to Georgetown University are evaluated. A number of the alternatives analyzed in this chapter and much of the information used in the analysis come directly from the Georgetown University Transportation Survey conducted in the Spring of 1979 by Rivkin Associates and Georgetown University. The results and analysis of this survey are reported in Technical Memorandum No. 4 of this study. Other alternatives and information used in the analysis were derived from discussions and correspondence with cognizant Georgetown University officials.

The Georgetown University Transportation Survey identified several deficiencies and opportunities for improving existing access to the University. Among these are the following:

- A high level of transit service between Georgetown University and Metrorail (and as a result much of the Washington metropolitan area) does not presently exist.
- Transfers between GUTS and Metrorail or Metrobus are inconvenient and expensive.
- GUTS buses travel circuitous routes and as a result do not offer competitive travel times to autos.
- GUTS does not offer service at the times desired by a number of potential passengers.
- The GUTS ticket system is inconvenient to use.
- There is general lack of knowledge about what transit services or carpool matching services are available to Georgetown University commuters.
- Carpooling and transit usage is not widespread because parking for low occupant vehicles on campus is convenient and cheap compared to other locations in Georgetown and downtown Washington.

- Little is done to encourage or facilitate the formation of carpools for travel to and from campus.

Based upon these concerns twelve candidate access improvement alternatives for Georgetown University were identified and analyzed. These twelve actions are as follows:

(1) Reorient GUTS Virginia routes to avoid duplication with Ballston Metrorail line. Provide frequent shuttle service between Rosslyn station and Georgetwon University at lower fare than for longer trips.

(2) Accept Metrorail or Metrobus transfers in lieu of payment or as a discount toward payment of fare.

(3) Allow for fare payment on GUTS buses, instead of present ticket system.

(4) Revise GUTS schedules to better coordinate with the start of classes and actual running times.

(5) Change Virginia and Law School GUTS routes so as to access the University at the Southern Entrance.

(6) Establish a transit and carpool information center on campus.

(7) Create a transit information package to be distributed to students at registration and faculty and staff through the campus mail.

(8) Increase parking costs and use additional revenues to subsidize GUTS service.

(9) Reduce the discount for monthly or yearly parking to encourage parkers to pay daily and use transit when feasible.

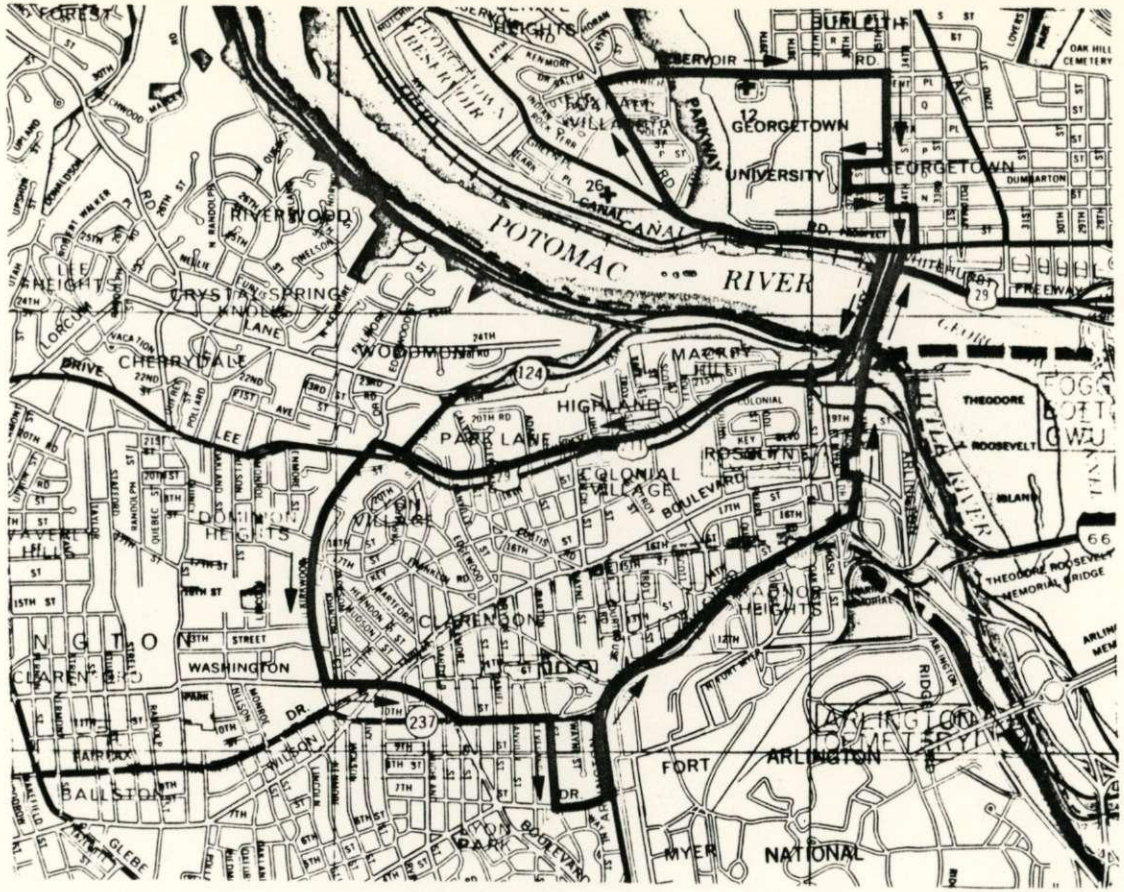
(10) Reserve most convenient parking spaces for carpools with three or more persons.

(11) Expand GUTS service.

(12) Vanpooling program.

(1) Reorient GUTS Virginia routes to avoid duplication with Ballston Metrorail line. Provide frequent shuttle service between Rosslyn station and Georgetown University at lower fare than for longer trips. At the present time GUTS operates three routes in Virginia, as shown in Figures 30 to 32. The Arlington Loop route provides all day service on weekdays and operates on one hour headways. It provides service to both the Lee Highway and Arlington Boulevard corridors for a distance of approximately 2½ miles from campus and is the backbone of GUTS service to Northern Virginia. However, the route operates on a loop and as a result users of the service must endure a long roundabout ride for either their trip to or their trip from campus. In addition to the base service provided by the Arlington Loop route, peak period service is provided along the Lee Highway corridor by the Lee Highway route and along the Arlington Boulevard corridor by the Route 50 route. Students, faculty, and staff who use these routes are able to get direct bus service to campus and pay only 40¢. Taking WMATA buses from either of these corridors would require a transfer at Rosslyn, would require a five block walk from the nearest bus stop on the D.C. side of Key Bridge and would cost 80 cents.

However WMATA service in both corridors to the Rosslyn Metrorail station is excellent with headways during the peak periods being less than 5 minutes. If a convenient, low cost transfer to a direct bus to campus could be guaranteed at the Rosslyn Metrorail station, the level of transit service not only to commuters from the Lee Highway and Arlington Boulevard corridors but to all points in Northern Virginia conveniently linked to a Metrorail station would be improved considerably. Many of the commuters served by the existing GUTS routes live within walking distance of one of the newly opened Metrorail stations along the Orange Line, so for these commuters GUTS provides duplicate transit service between their residences and Rosslyn



	WEEKDAYS																	Saturday and Sunday				Sunday PM Only	
	AM	AM	AM	AM	AM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	AM	AM	PM	PM	PM	PM
Healy	7:15	8:05	9:05	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20	9:20	10:20	11:20	10:30	11:05	4:20	5:20	10:08	11:08
St. Mary's	–	–	–	10:24	11:24	12:24	1:24	2:24	3:24	4:24	5:24	6:24	7:24	8:24	9:24	10:24	11:24	–	–	4:23	5:23	10:08	11:08
Lee Highway & Quinn St.	7:23	8:13	9:13	10:32	11:32	12:32	1:32	2:32	3:32	4:34	5:34	6:34	7:32	8:32	9:32	10:32	11:32	10:38	11:13	4:31	5:31	10:16	11:16
Lee Highway & Adams St.	7:24	8:14	9:14	10:33	11:33	12:33	1:33	2:33	3:33	4:36	5:36	6:36	7:33	8:33	9:33	10:33	11:33	10:39	11:14	4:32	5:32	10:17	11:17
Lee Highway & Cleveland	7:26	8:15	9:15	10:34	11:34	12:34	1:34	2:34	3:34	4:37	5:37	6:37	7:34	8:34	9:34	10:34	11:34	10:40	11:15	4:33	5:33	10:18	11:18
Lee Highway & Kirkwood	7:27	8:17	9:17	10:36	11:36	12:36	1:36	2:36	3:36	4:39	5:39	6:39	7:36	8:36	9:36	10:36	11:36	10:42	11:17	4:35	5:35	10:20	11:20
Kirkwood Rd. & 13th St.	7:29	8:18	9:18	10:37	11:37	12:37	1:37	2:37	3:37	4:40	5:40	6:40	7:37	8:37	9:37	10:37	11:37	10:43	11:18	4:36	5:36	10:21	11:21
Danville St. & 10th St.	7:31	8:20	9:20	10:39	11:39	12:39	1:39	2:39	3:39	4:43	5:43	6:43	7:39	8:39	9:39	10:39	11:39	10:46	11:20	4:38	5:38	10:23	11:23
Barton & 9th St.	7:32	8:21	9:21	10:40	11:40	12:40	1:40	2:40	3:40	4:44	5:44	6:44	7:40	8:40	9:40	10:40	11:40	10:46	11:21	4:39	5:39	10:24	11:24
Pershing Dr. & Wayne St.	7:33	8:22	9:22	10:41	11:41	12:41	1:41	2:41	3:41	4:45	5:45	6:45	7:41	8:41	9:41	10:41	11:41	10:47	11:22	4:40	5:40	10:25	11:25
Arlington Blvd. & Queen St.	7:36	8:25	9:25	10:43	11:43	12:43	1:43	2:43	3:43	4:47	5:47	6:47	7:43	8:43	9:43	10:43	11:43	10:49	11:24	4:42	5:42	10:27	11:27
14th & Rhodes St.	7:37	8:26	9:26	10:44	11:44	12:44	1:44	2:44	3:44	4:48	5:48	6:48	7:44	8:44	9:44	10:44	11:44	10:50	11:25	4:43	5:43	10:28	11:28
Arlington Towers (Lynn St.)	7:38	8:28	9:28	10:46	11:46	12:46	1:46	2:46	3:46	4:50	5:50	6:50	7:46	8:46	9:46	10:46	11:46	10:52	11:27	4:45	5:45	10:30	11:30
Metro Station (Bus Alley on Moore St.)	7:40	8:30	9:30	10:47	11:47	12:47	1:47	2:47	3:47	4:52	5:52	6:52	7:47	8:47	9:47	10:47	11:47	10:53	11:28	4:46	5:46	10:31	11:31
St. Mary's	7:50	8:45	9:45	10:57	11:57	12:57	1:57	2:57	3:57	5:05	6:05	7:05	7:57	8:55	9:55	10:55	11:55	11:01	11:36	4:54	5:54	10:39	11:39
Healy	7:55	8:50	9:50	11:00	12:00	1:00	2:00	3:00	4:00	5:08	6:08	7:08	8:00	8:58	9:58	10:58	11:58	11:05	11:40	4:58	5:58	10:42	11:42

0 3000'

GUTS ARLINGTON LOOP ROUTE

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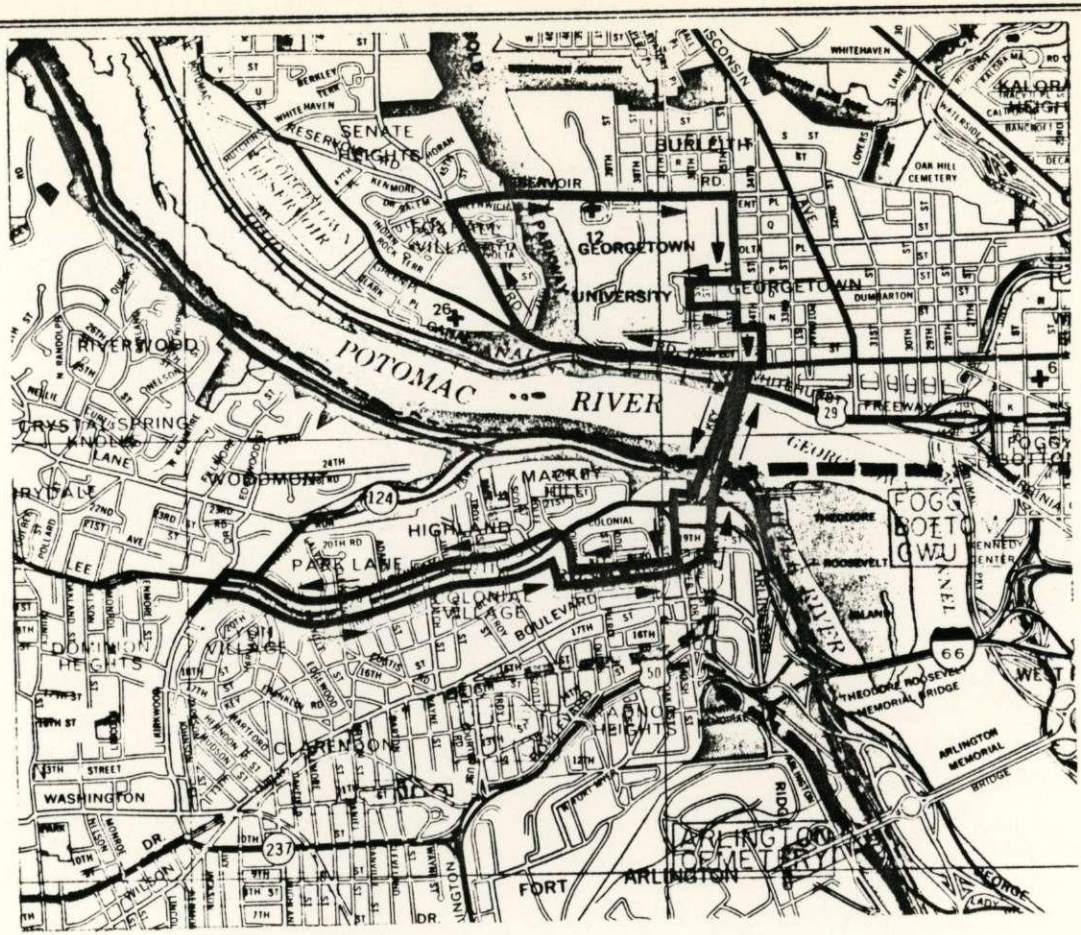
FIGURE No. 30



Lee Highway Schedule

LEE HIGHWAY	WEEKDAYS AM	AM	AM	PM	PM	PM
CCC	–	–	–	4:14	5:14	6:14
Healy	7:23	8:10	9:10	4:19	5:19	6:19
Key Blvd. & Ode St.	–	–	–	4:30	5:32	6:30
Lee Highway & Quinn St.	–	–	–	4:32	5:34	6:32
Lee Highway & Adams St.	–	–	–	4:34	5:36	6:34
Lee Highway & Cleveland St.	–	–	–	4:35	5:37	6:35
Lee Highway & Kirkwood St.	7:34	8:24	9:24	4:37	5:39	6:37
Lee Highway & Cleveland St.	7:36	8:26	9:26	4:39	5:40	6:39
Lee Highway & Adams St.	7:37	8:27	9:27	4:40	5:41	6:40
Lee Highway & Quinn St.	7:38	8:29	9:29	4:41	5:42	6:41
Key Blvd. & Ode St. (by drive ways)	7:40	8:30	9:30	4:42	5:43	6:42
CCC	7:50	8:45	9:45	4:52	5:54	6:52
Healy	7:55	8:50	9:50	4:56	5:58	6:56

0 3000'

GUTS LEE HIGHWAY ROUTE

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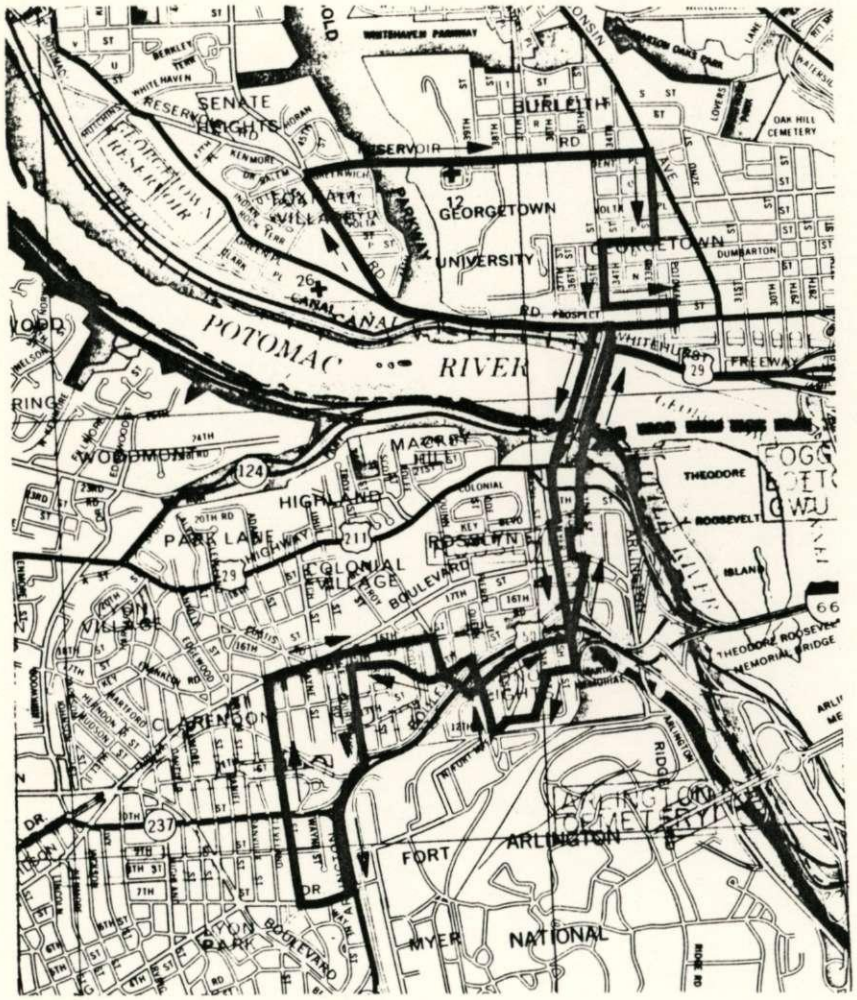
FIGURE No. 31



Rt. 50 Schedule

ROUTE 50	WEEKDAYS AM	AM	AM	PM	PM	PM
CCC	–	–	–	4:12	5:12	6:12
St. Mary's	–	–	–	4:14	5:14	6:14
Healy	7:15	8:05	9:05	4:19	5:19	6:19
Kennedy Institute (36th & Prospect)	–	–	–	4:21	5:21	6:21
Metro Station (19th & Moore)	–	–	–	4:30	5:30	6:30
Arlington Towers (Ft. Meyer & Fairfax)	–	–	–	4:32	5:32	6:32
14th & Meade	7:24	8:14	9:14	4:33	5:33	6:33
Prospect House	7:25	8:15	9:15	4:34	5:34	6:34
12th & Queen St.	7:26	8:16	9:16	4:35	5:35	6:35
14th & Rhodes St.	7:27	8:17	9:17	4:36	5:36	6:36
15th & Courthouse Rd.	7:28	8:18	9:18	4:37	5:37	6:37
13th & Courthouse Rd.	7:29	8:19	9:19	4:38	5:38	6:38
Pershing Dr. & Wayne St.	7:31	8:22	9:22	4:40	5:40	6:40
9th & Barton St.	7:32	8:23	9:23	4:41	5:41	6:41
11th & Barton St.	7:33	8:24	9:24	4:42	5:42	6:42
16th & Courthouse Rd.	7:35	8:26	9:26	4:44	5:44	6:44
16th & Rhodes St.	7:36	8:27	9:27	4:45	5:45	6:45
14th & Rhodes St.	7:37	8:28	9:28	4:46	5:46	6:46
Arlington Towers (Lynn St.)	7:38	8:30	9:30	4:48	5:48	6:48
Metro Station (Bus alley-Moore St.)	7:39	8:32	9:32	4:50	5:50	6:50
CCC	7:50	8:48	9:48	5:00	6:00	7:00
St. Mary's	7:52	8:50	9:50	5:02	6:02	7:02
Healy	7:55	8:55	9:55	5:06	6:06	7:06

0 3000'

GUTS ROUTE 50 ROUTE

jhk & associates

FIGURE No. 32

and is used instead of Metrorail because it is directly linked to campus. Provision of a frequent, low cost shuttle service between the Rosslyn station and campus would result in lower travel times and significantly more frequent service for most of these commuters.

The key to success of the proposed action, however, would be the guarantee of a free or very low cost transfer from both Metrorail and Metrobus and the provision of frequent and direct shuttle service between the Rosslyn station and campus. Means for guaranteeing a low cost transfer are discussed in the analysis of the next alternative. However, it should be noted that unless a low cost transfer is permitted, transit commuting costs for Georgetown University students, faculty, and staff who presently use GUTS buses from Northern Virginia would increase considerably.

The ability of Georgetown University to provide frequent service would be increased considerably if GUTS buses were allowed to make all movements at the University's Canal Road entrance. Except in cases of severe congestion a round trip between campus and the Rosslyn Metrorail station could be accomplished in 15 minutes, thus permitting 15 minutes headways with only one bus in operation. This one bus could be supplemented by one or two others during peak periods if demand warranted it, and thus either eight or five minute headways on the shuttle route could be maintained. Transit demand to campus from Northern Virginia could be expected to increase significantly because of the increased level of service. At the present time approximately one-fourth of the total Georgetown University commuting population (2,585 of 10,295 commuters) is from Arlington County[1/]. Yet of these commuters only about 220 use GUTS to travel to and from campus. Since nearly all of these commuters have convenient access to either a Metrorail station or a Metrobus route which is destined to the Rosslyn station, the number who would use transit if convenient, low-cost direct transit service between the Rosslyn station and campus were provided could be expected to at least

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1/ Data from Technical Memorandum No. 4: Georgetown University Transportaion Survey.

double, while GUTS vehicle operating requirements would drop or remain the same depending on the level of peak period shuttle service provided.

(2) Accept Metrorail or Metrobus transfers in lieu of payment or as a discount toward payment of fare. One of the most prevalent comments made by respondents to the Georgetown University Transportation Survey was that the level of transit service provided to the Georgetown University campus from the respondent's trip origin is inadequate. However the majority of commuters to Georgetown University live in areas which do not have high enough travel demand to Georgetown University to justify direct transit service. A large number of these commuters, however, have covenient access to Metrorail and need only a convenient connection between Metrorail and campus to make transit an attractive travel option. This is particularly true of commuters from Northern Virginia. However, there are two requirements if a transit connection between Metrorail and campus is to be well used. One is that it provide frequent, reliable, and direct service. The other is that it have low fares. Otherwise, the total cost of taking transit to campus will be so high that commuters will be discouraged from using this mode. If a commuter uses both Metrorail and GUTS or Metrobus and GUTS two fares must be paid, resulting in quite high total costs for these trips. It is partly for this reason that less than one percent of the Georgetown University Transportation Survey respondents indicated they used GUTS in combination with Metrorail or Metrobus.

If more effective transit access is to be provided to the campus, discounts should be allowed on GUTS buses for passengers who are transferring to or from Metrorail or Metrobus. This is particularly necessary if the existing Virginia GUTS routes are to be replaced by a shuttle service between the Rosslyn Metrorail station and campus. The ideal transfer arrangement between GUTS and WMATA would be one where GUTS transfers

were accepted on Metrobus and Metrorail and vice versa. However, the possibility of arranging such a transfer agreement appears remote, so alternative arrangements should be investigated. Under one such scheme a Metrorail or Metrobus transfer could be presented to the GUTS driver (together with a discounted fare ticket if a fare were required in addition to the transfer). The driver could then issue a special transfer which would be good for the return trip to Metrobus or Metrorail. Another option for trips leaving campus would be to collect fare tickets as passengers alight from the bus. If the passenger alights at certain predesignated transfer points, such as the nearest Metrorail station or key bus transfer points, a discount fare ticket would be permitted to be used. For trips to campus a Metrobus or Metrorail transfer would have to be shown to the driver in order to use a discount fare ticket.

An important issue associated with permitting discounted fares for Metrobus and Metrorail transfers is who will pay for the revenue lost as a result of the fare discounts. At the present time GUTS revenues on its five regular routes pay for only 36 percent of operating costs. The University is understandably not anxious to increase the subsidy it must pay GUTS to maintain present levels of bus operations. However, in the near future GUTS operations are scheduled to be reduced by approximately 30 percent with the closing of Alban Towers and the simultaneous termination of the Alban Towers GUTS route. This route presently runs all day on one-hour headways and accounts for almost one third of the hours of service provided by GUTS. Thus the subsidy the University presently provides to operate the Alban Towers route could be shifted to make up for some of the revenue lost as a result of discounted fares for Metrorail and Metrobus transfers.

In addition, it is forecasted that ridership on GUTS from Northern Virginia could be expected to more than double if

low-cost transfers are permitted on a frequently running shuttle bus to the Rosslyn Metrorail station. Even if vehicle operating requirements for Northern Virginia GUTS routes remained the same as today, a doubling of GUTS ridership could allow a halving of the present fare for transfer riders with no loss in revenue or increase in subsidy. If a transfer policy is adopted which required an increase in GUTS subsidies, it is recommended that the additional moneys come from increased parking costs.

(3) Allow for fare payment on GUTS buses, instead of present ticket system. At the present time users of the GUTS system must prepurchase tickets on campus if they are to take a trip on a GUTS bus. This prepurchase requirement was cited as an inconvenience by a number of respondents to the Georgetown University Transportation Survey, and undoubtedly discourages some potential riders from using the system. A number of respondents felt that riders should be allowed to pay a cash fare on the bus, in much the same manner Metrobus riders do. Their argument becomes even stronger if differential fares are established for Metrobus and Metrorail transferring passengers because it would be even more inconvenient to have to carry different types of tickets for different destinations. However, Georgetown University as a matter of policy would prefer not to permit cash transanctions to take place on GUTS buses, primarily for security reasons. If only tickets are allowed, it is much easier to limit boardings to only Georgetown University students, faculty, and staff; there is less likelihood of drivers trying to cheat the system; and there is less likelihood of attempted burglary. This being the case, it is important that it be as easy as possible to purchase tickets. Knowledge of where tickets can be bought is at present not good. The location of ticket machines and outlets should be clearly posted throughout the Main Campus, Medical Center, and Law Center. Consideration should be given to expanding ticket

sales locations to include receptionists who can make change. A number of complaints were raised in the Georgetown University Transportation Survey regarding the need to use four dimes in the ticket machines. Every effort should be made to make the purchase of tickets as convenient as possible in order not to discourage potential users of the system from using it.

(4) Revise GUTS schedules to better coordinate with the start of classes and actual running times. A large number of comments were made by respondents to the Georgetown University Transportation Survey about GUTS schedules not being well coordinated with class and work schedules. For example most routes are designed to arrive on campus 5-10 minutes before the hour. However many students' first classes start at 8:50 AM, so GUTS arrives on campus too late to adequately serve the needs of these students. Because of the unpredictability of traffic conditions in the Georgetown area, GUTS often does not meet its schedule resulting in students being late for class. More slack time would appear to be necessary in some of the schedules. GUTS does not run early enough to adequately serve Medical Center staff, many of whom start work at 7 AM.

Decisions regarding GUTS schedules are made by a University committee on transportation. Every effort is made to tailor schedules to students' class schedules. Perhaps through consideration of some of the above-cited comments, the committee could slightly revise schedules to overcome the deficiencies noted. Much more scheduling flexibility could also be attained by the replacement of the existing GUTS Virginia routes with a shuttle service from the Rosslyn Metrorail station running on frequent headways. Under this alternative if students, faculty, or staff wanted to arrive on campus at a different time than 5 to 10 minutes before the hour they could do do.

(5) Change Virginia and Law School GUTS routes so as to access the University at the Southern Entrance. Georgetown University's Master Plan calls for the Canal Road entrance to become the main access point to the campus for all transportation modes. Present plans call for a terminal facility to be built at the Southern Entrance which would permit buses to turn around and passengers to conveniently transfer from GUTS and WMATA buses to an intra-university transportation system. The planned University Center would be in the immediate vicinity of the proposed terminal facility and would be a major focal point for persons entering and leaving campus.

With all these planned changes, and assuming the Canal Road entrance is upgraded to allow all turning movements, it is quite logical for GUTS routes to be changed so they access the University at its Southern Entrance. This would reduce the travel times for Virginia routes considerably because they would no longer have to make their circuitous route around campus. It would enable a shuttle service from the Rosslyn Metrorail station to operate with round trip travel times of fifteen minutes, thus allowing frequent service between campus and Metrorail. Finally, it would remove GUTS buses from Georgetown's residential streets east of campus, thus reducing their impact on the residences along these streets.

(6) Establish a transit and carpool information center on campus. A clear finding of the Georgetown University Transportation Survey was that many respondents were not aware of what transit services are available to Georgetown University commuters. A number of respondents indicated the need for better information dissemination regarding transit routes serving the University, and some included suggestions as to how this could be done effectively. One way to make information more readily available would be to create a transit information center or centers where routes would be

shown on a map of the Georgetown area, schedules to both GUTS and Metrobus routes would be available at all times, and information on how to use GUTS, Metrobus, and Metrorail would be posted. A main information center could be established at a central location such as Healy Hall or the planned University Center where a large transit display could be set up together with a carpool matching board. The carpool matching board could have a map of the metropolitan area divided into zones together with a signup sheet where persons interested in forming a carpool would leave their name, address, telephone number, zone of origin, time of arrival and departure and whether they needed a ride or would drive the carpool. Also, information about the Metropolitan Washington Council of Governments' (MWCOG) carpool matching program could be displayed. In addition to the central transit/carpool information center, smaller transit information centers could be set up in strategic locations around campus such as the library, bookstore, reception areas of the Medical Center, and at the law center. These smaller centers could contain transit route maps and schedules, information on how to use the system, and information about the on-campus and MWCOG carpool matching programs.

(7) Create a transit information package to be distributed to students at registration and faculty and staff through the campus mail. This alternative is also an attempt to better disseminate information to students, faculty, and staff about what transit services are available for their use. A reproducible booklet could be developed containing route maps and schedule information for GUTS and Metrobus routes serving the University, and key information on how to use GUTS and WMATA services. This booklet could be made available to students at registration and could be periodically mailed to faculty and staff through the campus mail. Copies could also be made available at any time at the Healy Hall information booth and other central locations

around the University. If the booklet were kept to about 10 pages in length, it would not become cumbersome and reproduction costs could be kept low, yet enough information could be presented that anyone could use the transit services available to Georgetown University commuters.

(8) Increase parking costs and use additional revenues to subsidize GUTS service. This measure has been proposed as a means to pay for any additional subsidies required for GUTS either through increased operating costs, increases in service, or reductions in fares for passengers transferring between Metrobus or Metrorail and GUTS. This measure would act both as a disincentive to commuting by auto and as an incentive to commuting by GUTS because it would permit higher levels of GUTS service at lower fares. It should be noted, however, that Georgetown University already pays for GUTS subsidies through parking fees and plans to continue to do so. GUTS fares and parking rates are both established by the transportation committee of the University which consists of representatives of all parts of the University. GUTS presently collects enough revenues from the fare box to pay for only 36 percent of its operating costs, so it can be seen that revenues from parking fees already pay for a substantial portion of the GUTS operation, and it is likely that operating costs will continue to climb at a faster rate than fares, resulting in higher subsidy requirements in the future. Therefore it is likely this measure will occur naturally over time. The one measure which has been recommended which may result in significant increases in subsidy requirements is discount fares for passengers transferring between GUTS and Metrorail or Metrobus. Increasing parking fees would appear to be the most acceptable means of paying for additional subsidies required as a result of this measure.

(9) Reduce the discount for monthly or yearly parking to encourage parkers to pay daily and use transit when feasible. At the present time Georgetown University issues annual parking

permits to faculty, staff, and students who commute to campus. The 9 month fee for Main Campus students is $66.60 and Medical Center students is $180.00. The 12 month fee for Main Campus faculty and staff is $138.10 and Medical Center faculty and staff is $240.00. A total of 3,642 annual parking permits are issued to Georgetown University faculty, staff, and students. If an auto commuter does not have an annual parking permit, he or she must pay a daily fee of $2.00 to park on campus. It was noted by several respondents to the Georgetown University Transportation Survey that once they had paid the annual parking fee there was little incentive to take transit on those days they did not have to drive. It was noted by others that the average daily fee with a permit worked out to be considerably less than the one day fee for non-permit holders (anywhere from 37 cents to $1.00 for permit holders versus $2.00 for non-permit holders). Therefore, for those who might be inclined to take transit some of the time if they had to pay the full daily fee for parking every day, there is little incentive to do so with an annual permit. For this reason it has been suggested that the discount given permit holders be reduced to encourage parkers to pay daily and take transit when feasible. However, there are two major disadvantages to such an alternative. First, by having a much higher daily charge for non-permit holders, it is much easier to control the number of non-permit holders parking on campus, thus guaranteeing the availability of spaces for those commuters who most need them (the availability of annual permits being based on need). Second, under the present system relatively little cash is collected by the parking lot attendants, thus minimizing the security risks resulting from their collecting money. By increasing the proportion of parkers who pay daily, the amount of cash collected by attendants would increase substantially, and so would the associated security risks. For these reasons, this alternative is no longer recommended for further consideration.

(10) Reserve most convenient parking spaces for carpools with three or more persons. Within the resources available, it is the policy of the University to provide parking accomodations to the faculty, staff, and student body, when available, in the area most convenient to the individual. In order to encourage a higher proportion of commuters to Georgetown University to carpool it has been suggested that the most conveniently located spaces be reserved for carpools. This measure could result in significant time savings for carpoolers who park in the larger lots or those who are not presently assigned to the lot which is most convenient for them. A system for reserving the most convenient spaces for carpoolers at a university should allow for flexibility because carpools will change almost on a daily basis due to the high variances in commuting schedules. One way to allow for this variance is to have parking lot attendants issue a ticket (to be displayed in the windshield) to each car entering campus with three or more persons. Only cars with these tickets would be permitted in the spaces designated for carpools. Another way to give carpools priority is to allow them entry to campus even after parking lots have filled (saving several spaces specifically for these late coming carpools). The University presently sells special carpool parking permits which can be transferred among the cars of the carpool members. This practice should be continued, and consideration given to reduced rates both for annual carpool permits and daily parking fees for carpools. The practice of issuing special tickets to carpools with three or more persons and reserving the most convenient spaces for cars displaying these tickets could begin immediately. At the present time this program could be expected to be most effective in the larger lots and garages. This measure will be even more effective however once all Main Campus parking is consolidated into the proposed single parking garage to be located just north of the University's Southern Entrance.

(11) Expand GUTS service. A large number of the respondents to the Georgetown University Transportation Survey indicated a desire to have direct GUTS service to campus from the area in which they live. Technical Memorandum No. 4 summarizes the number of respondents expressing such a desire by location of residence. For the most part the respondents residences are dispersed throughout the Washington metropolitan area with no single corridor having a high enough response rate to warrant consideration of a new GUTS route. The highest density of responses was in the corridor northwest of campus, and it was partially based upon this information that the proposed WMATA route between Chevy Chase Circle and Farragut Square via American University was recommended. It should be noted that Georgetown University does not desire to substantially increase GUTS subsidy requirements and is unlikely to start new GUTS service in corridors for which high demand potential has not been identified. Given these considerations, it is concluded that the focus of revising GUTS routes should be upon improving access to Metrorail, which can provide a high level of transit service to many of the disperse locations to which transit service is desired. It is recommended that efforts concentrate upon providing frequent shuttle service between the Rosslyn Metrorail station and Georgetown University with discount fares for passengers transferring between GUTS and Metrobus or Metrorail, rather than providing new routes into corridors not presently served by GUTS.

(12) Vanpooling program. Vanpooling has proven to be an effective paratransit alternative for employees at large employment centers throughout the United States. In a typical vanpooling program groups of 10-12 employees will commute together in leased or employer-provided vans for a basic monthly charge which covers their portion of the van's monthly operating costs. Vanpools have proven to be most popular among employees living 15 miles or more

from the employment site who do not have a good transit alternative between their residence and employment location. Generally, the members of a vanpool all live in a single area or along a well defined radial corridor leading to the employment site, and all members of the vanpool have non-variable and similar working hours. Very few students or faculty members at Georgetown University fit this category, and therefore very few of these commuters could be expected to participate in a vanpool program. However, more interest could be expected to be generated among the 3,834 staff members of the University who tend to have less variance and more commonality in their working hours. Even a very small vanpool program of 10 vans could be expected to reduce the number of vehicles driving to and parking on campus by approximately 80 to 90. Experience at other employment locations has shown that vanpool programs tend to have a snowball effect. Programs tend to have modest beginnings, sometimes with as few as 3 or 4 vans, and as news of the program spreads through the employment site, interest increases and the number of vanpools grows. If the vanpool program is given high visibility and vanpools are provided the most convenient parking spaces, the program is much more likely to succeed and grow. It is recommended that Georgetown University further investigate the possibility of purchasing several vans for use in a vanpool program and that a small program targetted at staff members not presently well served by transit be started on an experimental basis. The program could be set up so the monthly charges for passengers cover operating costs. Even if the program proves to be a failure, the vehicles could be used by the University for other purposes. If it proves to be a success, it could be expected to reduce campus parking demand, and the program could be expanded as demand dictates.

CHAPTER 8. TRAVEL DEMAND ANALYSIS

The previous chapters have analyzed the impacts which could be expected from each of a large number of candidate access improvement alternatives for the Georgetown area. In order to test the impacts on travel demand which could be expected from the candidate access improvement alternatives, a number of the alternatives which were not eliminated from further consideration because of non-travel demand reasons were combined into four packages of alternatives to be tested using the travel demand modeling chain.

ALTERNATIVES TESTED

In developing packages of alternatives to be tested, several philosophies, or general categories of alternatives, emerged which formed the basis for grouping alternatives for demand analysis purposes. Travel demand runs were made for each of four packages of alternatives for forecast year 1985 as well as for a 1979 base case. The four packages of 1985 alternatives included a null alternative, an increased transit alternative, a traffic restraint alternative, and a trolley alternative. Each candidate access improvement alternative discussed previously was either grouped into one or more of the four packages, not included in a specific package because its impact on travel demand could not be specifically forecast, or dropped from further consideration because the analysis of non-travel demand impacts indicated the alternative should not be implemented. The treatment of each candidate alternative in the demand analysis and the makeup of the four travel demand analysis packages is shown in Table 2.

The null alternative included no changes from the existing transit and highway systems in the Georgetown area except those access improvements which are presently committed to be implemented by 1985. These include the implementation of a

Table 2. Candidate Georgetown Area Access Improvements

CANDIDATE PHYSICAL ROADWAY IMPROVEMENT ACTIONS	Null Alternative	Increased Transit Alternative	Traffic Restraint Alternative	Trolley Alternative	Not in Demand Analysis	No Longer to be Considered
(1) Tie the existing stub-end ramps at the east end of Whitehurst Freeway to M Street and Pennsylvania Avenue.			X	X		
(2) Extend lower K Street to intersect with Canal Road opposite the Southern Entrance to Georgetown University.						X
(3) Repave lower K Street, moving the railroad tracks to either the north or south side of K Street.					X	
(4) Depress K Street between Washington Circle and Whitehurst Freeway.					X	
(5) Construct a double left turn lane at the Canal Road-Foxhall Road intersection for use by westbound Canal Road traffic during the PM peak.	X	X	X	X		
(6) Upgrade Southern Entrance to Georgetown University (treated separately).		X				
(7) Provide pedestrian access along K Street between Georgetown and the West End.		X				
CANDIDATE TRAFFIC OPERATION IMPROVEMENT ACTIONS						
(1) One-way streets. (a) South of M Street (29th, 30th, 31st, Thomas Jefferson Streets)					X	
(b) North-south streets north of M Street (28th, 29th, 30th, 31st Streets)						X
(c) East-west streets north of M Street (N, P, Q Streets)						X
(2) Upgrade the traffic signal system.					X	
(3) Reversible lanes on Key Bridge.						X
(4) Remove reversible lanes on M Street.			X	X		
(5) Extend bus lanes on M Street from Wisconsin Avenue to Key Bridge.						X
(6) Make right lane of Key Bridge northbound right turn only at Whitehurst Freeway ramp.			X			
(7) High occupancy vehicle lanes on Key Bridge.						X
(8) High occupancy vehicle lanes on Whitehurst Freeway.						X
(9) High occupancy vehicle lanes on Canal Road and Whitehurst Freeway from Chain Bridge to Washington Circle.			X			
(10) High occupancy vehicle lanes on P and Q Streets.						X
(11) Reduce the number of lanes on Key Bridge to four.						X
(12) Reduce the number of lanes on Chain Bridge to two.						X

Table 2. Candidate Georgetown Area Access Improvements
(CONTINUED)

CANDIDATE PARKING MANAGEMENT ACTIONS	Null Alternative	Increased Transit Alternative	Traffic Restraint Alternative	Trolley Alternative	Not in Demand Analysis	No Longer to be Considered
(1) Extend residential parking permit program to evenings and weekends.					X	
(2) Extend peak hour on-street parking restrictions along M Street and Wisconsin Avenue to midday, evenings, and weekends.						X
(3) Convert a percentage of parking spaces along M Street and Wisconsin Avenue to loading zones.					X	
(4) Build a parking garage in the Wisconsin Avenue commercial area north of M Street.					X	
(5) Park and ride lots.						
(a) Glen Echo Amusement Park		X	X			
(b) McLean, Virginia area					X	
(c) Georgetown University					X	
(6) Remove peak hour on-street parking spaces south of M Street.					X	
(7) Convert a percentage of on-street parking spaces south of M Street to loading zones.					X	
(8) Marketing of private garage spaces, particularly on weekends and evenings.					X	
(a) expand parking validation programs						
(b) posting parking information					X	
(c) signing for parking					X	
(9) Increase parking meter rates and extend hours.					X	
(10) Increase number of on-street parking spaces which are metered.					X	
CANDIDATE TRANSIT IMPROVEMENT ACTIONS						
(1) New or modified large bus routes.						
(a) Glen Echo park-and-ride express service		X	X			
(b) Chevy Chase Circle - Tenley Circle - American University - Georgetown University - Foggy Bottom		X				
(2) Reinstitution of Georgetown trolley service.				X		

Table 2. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE TRANSIT IMPROVEMENT ACTIONS (CONTINUED)	Null Alternative	Increased Transit Alternative	Traffic Restraint Alternative	Trolley Alternative	Not in Demand Analysis	No Longer to be Considered
(3) Small bus routes.						
(a) K Street - Pennsylvania Avenue loop						X
(b) K Street - Georgetown University Loop						X
(c) K Street Georgetown University Medical Center						X
(d) Foggy Bottom - Georgetown University loop						X
(e) Rosslyn - Georgetown University Medical Center						X
(f) Rosslyn - Wisconsin / Massachusetts Avenues		X				
(g) Rosslyn - Dupont Circle						X
(h) Rosslyn - Foggy Bottom		X				
(i) Foggy Bottom - Dupont Circle via Wisconsin Avenue		X				
(j) Extension of above routes to Kennedy Center and other points in Foggy Bottom, or to Farragut Square					X	
(4) Transit marketing.						
(a) Transit information centers					X	
(b) Transit information package for Georgetown employees					X	
(c) Employer subsidy of transit fares					X	
(d) Transit fare validation scheme					X	
(e) Transit information brochure for patrons of Georgetown shops, restaurants, and entertainment spots					X	
CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ALTERNATIVES						
Physical Intersection Alternatives						
(1) Null alternative: the intersection would be left as it is today with no left turns from the University to eastbound Canal Road or from eastbound Canal Road to the University allowed.	X					

Table 2. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ALTERNATIVES (CONTINUED)	Null Alternative	Increased Transit Alternative	Traffic Restraint Alternative	Trolley Alternative	Not in Demand Analysis	No Longer to be Considered
Physical Intersection Alternatives (continued)						
(2) At grade signalized intersection at present access location with no widening or change in Canal Road alignment. Under this alternative an opening would be made in the existing median strip through which left turns could be made, but no turn bays would be installed.						X
(3) At grade signalized intersection at present access location with provision of a 200 foot left turn bay from eastbound Canal Road into the University and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment.						X
(4) At grade signalized intersection 200 feet to the east of the existing University entrance with provision of a 200 foot left turn bay from eastbound Canal Road and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment.		X				
(5) Grade separated interchange with flyover ramps carrying left turning movments into and out of Georgetown University.						X
(6) A third roadway with three lanes would be built along the crest of the Potomac Palisades. This roadway would be used by westbound Canal Road traffic, with perhaps a reversible lane to accommodate AM peak loads. The existing westbound lanes would become an access road to serve University traffic.						X
Operational Alternatives						
(1) Allow all turning movements into and out of Georgetown Univeristy at all times.						X
(2) Prohibit left turns into and out of Georgetown University by all vehicles during peak periods, allowing full access during the remainder of the day.						X
(3) Prohibit left turns into and out of Georgetown University by all vehicles, except buses and emergency vehicles, during peak periods allowing full access during the remainder of the day.						X
(4) Prohibit left turns into and out of Georgetown University at all times except to buses and emergency vehicles.						X
(5) Prohibit left turns into and out of Georgetown University during the AM peak only.						X
(6) Prohibit left turns out of Georgetown University during the AM peak.		X				

Table 2. Candidate Georgetown Area Access Improvements (CONTINUED)

CANDIDATE GEORGETOWN UNIVERSITY SOUTHERN ENTRANCE ALTERNATIVES (CONTINUED)	Null Alternative	Increased Transit Alternative	Traffic Restraint Alternative	Trolley Alternative	Not in Demand Analysis	No Longer to be Considered
Alternatvies to Overcome Grade Differential Between Canal Road and Main Campus						
(1) Use the existing roadway.	X					
(2) At the midpoint of the existing roadway reverse the roadway direction to make a U-shaped roadway.						X
(3) Build a structure containing ramps to overcome the grade differential.					X	
Complementary Alternatives						
(1) Incorporate a double left turn at the intersection of Canal and Foxhall Raods for westbound Canal Road traffic during the PM peak.	X	X	X	X		
(2) Maintain the Prospect Street Entrance to the University as a major entrance for vehicles accessing the campus from the north and east and to provide a relief valve to the Canal Road Entrance during periods of peak traffic flow.	X	X	X	X		
(3) Build an entrance to the proposed Main Campus parking structure from Reservoir Road.		X				
OTHER CANDIDATE GEORGETOWN UNIVERSITY ACTIONS						
(1) Reorient GUTS Virginia routes to avoid duplication with Ballston Metrorail line. Provide frequent shuttle service between Rosslyn station and Georgetown University at lower fare than for longer trips.		X				
(2) Accept Metrorail or Metrobus transfers in lieu of payment or as a discount toward payment of fare.		X				
(3) Allow for fare payment on GUTS buses, instead of present ticket system.						X
(4) Revise GUTS schedules to better coordinate with the start of classes and actual running times.					X	
(5) Change Virginia and Law School GUTS routes so as to access the University at the Southern Entrance.		X				
(6) Establish a transit and carpool information center on campus.					X	
(7) Create a transit information package to be distributed to students at registration and faculty and staff through the campus mail.					X	

Table 2. Candidate Georgetown Area Access Improvements
(CONTINUED)

OTHER CANDIDATE GEORGETOWN UNIVERSITY ACTIONS (CONTINUED)	Null Alternative	Increased Transit Alternative	Traffic Restraint Alternaitve	Trolley Alternative	Not in Demand Analysis	No Longer to be Considered
(8) Increase parking costs and use additional revenues to subsidize GUTS service.					X	
(9) Reduce the discount for monthly or yearly parking to encourage parkers to pay daily and use transit when feasible.						X
(10) Reserve most convenient parking spaces for carpools with three or more persons.					X	
(11) Expand GUTS service.						X
(12) Vanpooling program.					X	

double left turn for westbound Canal Road traffic at the intersection of Canal and Foxhall Roads during the PM peak period; the opening of several new Metrorail lines, including the lines to Shady Grove and Vienna, both of which will have a significant impact on traffic in Georgetown; and the opening of Interstate 66 between the Capital Beltway and Rosslyn. The null alternative for 1985 serves both as a base for comparing future access conditions with current conditions assuming only those changes which are presently committed are implemented and as a base against which to compare the other packages of candidate access improvement alternatives.

The increased transit alternative assumed the implementation of the three most highly rated small bus routes analyzed in Chapter 5 . These included routes between Rosslyn and Foggy Bottom via K Street; Rosslyn and Wisconsin and Massachusetts Avenues via M Street and Wisconsin Avenue; and Foggy Bottom and Dupont Circle via K Street, Wisconsin Avenue, and P Street. In addition it was assumed that a park and ride lot would be implemented at the Glen Echo Amusement Park and connected to downtown Washington by an express bus route, and a local Metrobus route would be instituted between Chevy Chase Circle and Farragut Square via Tenley Circle, American University, and Georgetown University. It was also assumed that all movements could be made at the Georgetown University Southern Entrance and Georgetown University would be connected to the Rosslyn Metrorail Station via a shuttle bus and a transfer arrangement could be worked out between GUTS buses and Metrorail.

The traffic restraint alternative included several measures designed to reduce the amount of vehicular traffic passing through Georgetown proper. It was assumed that the ramps at the east end of Whitehurst Freeway are connected to L Street, and 26th Street between L and M Streets is made two-way. In addition it was assumed that the right lane of northbound Key Bridge would become

a right turn only lane at the ramp to Whitehurst Freeway in order to encourage through traffic to use Whitehurst Freeway. It was further assumed that a modest reduction in the capacity of Key Bridge would be achieved, most likely through signal retiming at the north end of the bridge. It was also assumed that an HOV lane would be implemented on Canal Road between the Maryland State Line and Foxhall Road and on Chain Bridge during the AM peak period, together with a park and ride lot at the Glen Echo Amusement Park. The traffic restraint package also assumed removal of the peak period reversible lanes on M Street through Georgetown.

The trolley alternative to as great a degree as possible included only those actions which it was felt would be necessary to make trolley service feasible. It was assumed that trolley service would be provided between Wisconsin Avenue and M Street and the Foggy Bottom Station and would operate on ten minute headways in its own exclusive right of way. It was assumed that the ramps at the east end of Whitehurst Freeway would be tied to L Street in order to provide an alternate route to M Street which would lose two traffic lanes. As a result of the center lanes of M Street being dedicated to the trolley, it was also assumed that reversible lane operations on M Street would be eliminated.

ANALYSIS PROCEDURES AND ASSUMPTIONS

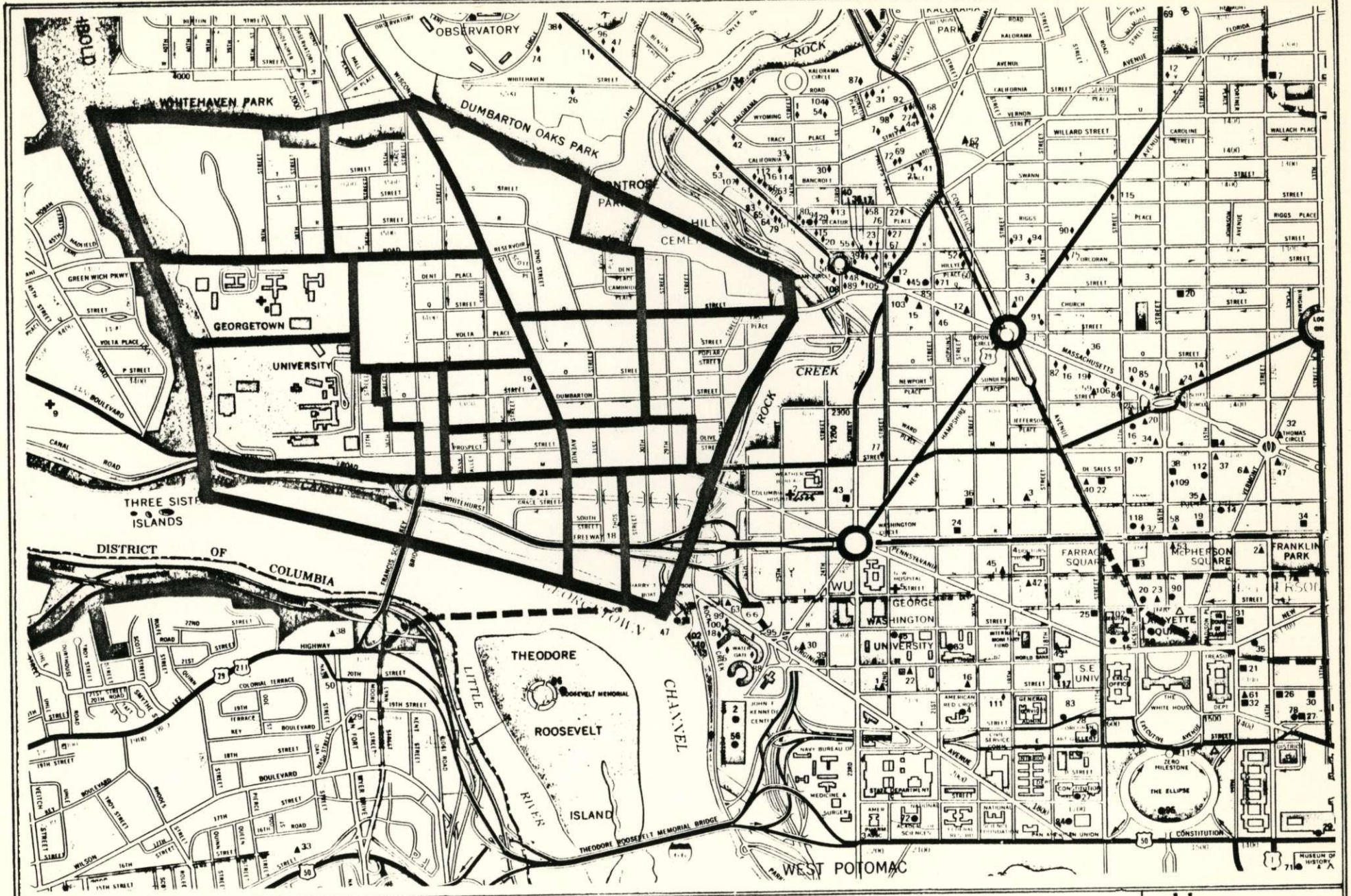
In performing the analysis of changes in travel demand which could be expected for each of the packages of alternatives tested, the traditional four step travel demand modeling chain was employed. The steps of the chain include trip generation, the determination of the number of trips produced and attracted by each type of land use; trip distribution, the determination of where the generated trips go to or come from; modal choice, the

determination of how trips to and from various locations are allocated among modes; and trip assignment, the determination of which routes are used by trips to and from various locations.

The primary tool used for performing the travel demand analysis was the TRIMS modeling package, a package of computer models developed by the Metropolitan Washington Council of Governments (MWCOG) for travel demand forecasting in the Metropolitan Washington region. Based upon certain input data, the TRIMS modeling package performs the four steps of the modeling chain described above.

For the purposes of this study the Washington metropolitan area was divided into 181 traffic analysis zones. The smallest zones were within the Georgetown cordon where there were sixteen zones as shown in Figure 33. Zones in the area immediately surrounding Georgetown were slightly larger and increased in size with distance from Georgetown. For each traffic analysis zone land use data were compiled for 1979 and 1985 using MWCOG's Cooperative Round I forecasts. Within Georgetown 1979 zonal land use data were compared with MWCOG Cooperative Round II land use data, with land use data provided by the D.C. Metropolitan Planning Organization, with data provided by Georgetown University, and with knowledge of land uses within Georgetown zones, and were appropriately adjusted. To obtain 1985 land use data within Georgetown, data for developments which are in the final planning stages or beyond as provided by the D.C. Metropolitan Planning Organization, were added to 1979 land use numbers. A summary of 1979 and 1985 land use projections as input to the travel demand modeling process is shown in Table 3. A more detailed discussion of changes in land use expected to result from new developments in Georgetown is presented in Chapter 2 of Technical Memorandum 3.

Table 3 shows that significant growth is projected for Georgetown in the next several years with the number of households increasing 28 percent and non-university employment increasing 53 percent. The number of non-university parking spaces is also



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TRAFFIC ANALYSIS ZONES WITHIN GEORGETOWN CORDON

jhk & associates

FIGURE No. 33

TABLE 3

GEORGETOWN LAND USE PROJECTIONS	1979	1985	% CHANGE
GEORGETOWN -- NON-UNIVERSITY			
GEORGETOWN HOUSEHOLDS	6,900	8,800	+28%
GEORGETOWN NON-UNIVERSITY EMPLOYMENT	15,400	23,600	+53%
GEORGETOWN NON-UNIVERSITY PARKING SPACES	9,607	13,563	+41%
GEORGETOWN UNIVERSITY			
GEORGETOWN UNIVERSITY STUDENTS	8,400	8,400	-0-
GEORGETOWN UNIVERSITY EMPLOYMENT	4,700	4,800	+ 2%
GEORGETOWN UNIVERSITY PARKING SPACES	3,708	3,708	-0-
TOTAL GEORGETOWN			
TOTAL GEORGETOWN EMPLOYMENT	20,000	28,400	+41%
TOTAL GEORGETOWN PARKING SPACES	13,315	17,271	+30%

projected to increase significantly, by 41 percent. Little change is expected in the size of Georgetown University with the student population remaining constant and total employment increasing only slightly. However, the large increases in non-university residents and employees are expected to result in over a 40 percent increase in total Georgetown trip generation between 1979 and 1985.

Almost as significant as the absolute increase in number of residents and employees is the projected distribution of the new development. The vast majority of the new development is to be concentrated in the area south of M Street, in an area presently served by narrow congested streets. Other development is scheduled or presently underway in the area immediately north of M Street and in the area north of Georgetown University where a new French Chancery and a number of residences are to be built.

Beside land use data, the other critical input to the TRIMS modeling process is a highway and transit network description. Each link of the highway and transit system is described by certain critical information such as distance, speed, capacity, and whether the link is one-way or two-way. This network data is then used to determine zone-to-zone travel times by auto and transit. These travel times get input to the trip distribution and mode choice steps of the travel demand modeling chain. The network data is also used in determining travel paths for assigning interzonal traffic volumes during trip assignment.

The highway and transit networks used in this study were quite detailed in the Georgetown area and became less detailed in areas farther from Georgetown. Certain critical assumptions regarding the networks used should be noted. The Metrorail system used for the 1979 base case analysis included the Red Line between Dupont Circle and Silver Spring and the Blue-Orange Line between New Carrollton and National Airport. It did not include the section of the Orange Line between Rosslyn and Ballston which

did not open until December 1979. In 1985 it was assumed that the following additional sections of Metrorail would be open: the Red Line between Dupont Circle and Shady Grove, the Orange Line from Rosslyn to Vienna, the Blue Line from National Airport to Huntington and from RFK Stadium to Addison Road, the Green Line from Gallery Place to Anacostia, and the Yellow Line from Gallery Place to King Street. In addition it was assumed that Interstate 66 from the Capital Beltway to Rosslyn would be open with peak period, peak direction flows being restricted to buses and carpools with four or more persons. It was also assumed that the Dulles Toll Road and the Dulles Airport Access Road Connector between the Capital Beltway and Interstate 66 would be open. Gasoline and parking costs were assumed to remain constant in real dollars. It is important to note that significant increases in gasoline or parking costs or significant decreases in gasoline availability would tend to decrease auto traffic volumes forecast in this study.

The TRIMS modeling process produces a number of data which were used directly or indirectly in the evaluation of travel demand impacts of the four packages of alternatives, including total number of zonal productions and attractions for home-based work trip auto drivers, auto passengers, and transit riders; home-based shop auto drivers; home-based other purpose auto driver trips, and non-home based auto driver trips. TRIMS does not directly perform a modal choice analysis for non-work trips. To perform a mode choice analysis for non-work trips, the procedures outlined in NCHRP Report 187 [1/] were used for non-work mode choice estimation. In this way non-work transit ridership could be estimated for each alternative tested and appropriate changes to non-work auto driver trip generation rates made.

1/ National Cooperative Highway Research Program Report 187. Quick-Response Urban Travel Estimation Techniques and Transferable Parameters, Transportation Research Board, Washington, D.C., 1978.

TRIMS also produces traffic volume estimates for each highway link in the coded highway network. These link volumes were adjusted to account for HOV restrictions on Interstate 66 and to distribute volumes on immediately adjacent streets more evenly among the streets. The adjusted volumes were then reported for certain critical highway links in the Georgetown area.

Through trip percentages were determined by dividing total Georgetown vehicular productions and attractions by total Georgetown cordon line vehicular crossings. In order to obtain transit usage by mode an analysis was performed of transit origins and destinations for trips destined to or originating from sections of Georgetown. Trips for each travel movement were manually allocated among transit modes, depending upon modal availability and travel times by mode.

TRIMS produces VMT summary information by speed range for prespecified geographical areas for use in air quality analyses. These data were used in conjunction with the U. S. Environmental Protection Agency's latest mobile source emissions factors to determine the impacts of the various packages on carbon monoxide and hydrocarbon emissions.

The procedures described above were used to analyze five conditions or sets of alternatives. The first was a 1979 base case analysis. This was performed for two reasons, in order to calibrate the highway and transit networks so the modeling process forecast 1979 link traffic volumes similar to those measured and reported in Technical Memorandum No. 3, and so existing conditions could be compared with those forecast for 1985. Once a satisfactory 1979 model run was completed, travel demand analyses were performed for each of the 1985 packages of alternatives. The results of these analyses follow.

TRAVEL DEMAND ANALYSIS RESULTS

The results of the travel demand analysis for the 1979 base case and for the four 1985 packages of candidate access improvement alternatives are shown in Tables 4 to 9. The information shown in these tables include the results of a mode choice analysis for both non-Georgetown University and Georgetown University trips to and from Georgetown, an analysis of modal shares for transit trips, an analysis of 24 hour traffic link volume estimates for a number of key streets in the Georgetown area, a through trip analysis, and an analysis of changes which could be expected in vehicle miles of travel and air pollution emissions. A discussion of the results of these analyses follows.

Mode Choice Analysis

The results of the mode choice analysis for trips to and from Georgetown for the 1979 base case and for each of the four 1985 alternatives is shown in Table 4 . The discussion of the results of this analysis will be divided into three sections: the 1979 base case analysis, an analysis of changes between the 1979 base case and the 1985 base (null) alternative, and an analysis of the impacts of each of the other three 1985 alternatives vis a vis the null alternative.

In 1979, it is estimated that on an average weekday close to 200,000 trips are made to and from points in Georgetown. Of these approximately 12 percent, or 23,300 are trips to and from the Georgetown University Main Campus and the Georgetown University Medical Center. Of all trips made to and from points in Georgetown, 87 percent are by auto and 13 percent by transit. The 24 hour average auto occupancy is 1.44, with the average non-University auto occupancy being 1.47 and the average University auto occupancy being 1.25. The lower University auto occupancy is explained by the much higher proportion of commuter

TABLE 4

MODE CHOICE OF TRIPS TO AND FROM GEORGETOWN										
ALTERNATIVE	1979 BASE		1985 BASE		1985 TRANSIT		1985 TRAFFIC RESTRAINT		1985 TROLLEY	
MODE	#	%	#	%	#	%	#	%	#	%
GEORGETOWN - - NON-UNIVERSITY										
AUTO DRIVER	103,100	59	147,500	58	143,200	56	145,700	57	146,700	57
AUTO PASSENGER	48,500	28	71,000	28	68,900	27	70,300	28	70,600	28
AUTO OCCUPANCY	1.47		1.48		1.48		1.48		1.48	
TRANSIT	22,700	13	35,600	14	42,000	17	38,100	15	38,000	15
NON-UNIV. TOTAL	174,300	100	254,100	100	254,100	100	254,100	100	255,300	100
GEORGETOWN UNIVERSITY										
AUTO DRIVER	16,400	70	16,500	70	15,700	67	16,400	70	16,500	70
AUTO PASSENGER	4,100	18	4,300	18	4,300	18	4,300	18	4,300	18
AUTO OCCUPANCY	1.25		1.26		1.27		1.26		1.26	
TRANSIT	2,800	12	2,800	12	3,600	15	2,900	12	2,800	12
G. U. TOTAL	23,300	100	23,600	100	23,600	100	23,600	100	23,600	100
TOTAL GEORGETOWN										
AUTO DRIVER	119,500	60	164,000	59	158,900	57	162,100	58	163,200	58
AUTO PASSENGER	52,600	27	75,300	27	73,200	26	74,600	27	74,900	27
AUTO OCCUPANCY	1.44		1.46		1.46		1.46		1.46	
TRANSIT	25,500	13	38,400	14	45,600	17	41,000	15	40,800	15
GEORGETOWN TOTAL	197,600	100	277,700	100	277,700	100	277,700	100	278,900	100

trips going to and from the University, which tend to have significantly lower occupancies than shopping or social-recreation trips, and by the higher variance in work schedules among University faculty, staff, and students which makes carpools difficult to maintain.

A breakdown of the data shown in Table 4 by trip purpose shows that of all the trips to and from points in Georgetown approximately 20 percent are home-based work trips. Of the work trips that are produced in Georgetown (i.e., made by Georgetown residents) approximately 30 percent are by transit; of those that are attracted to Georgetown (i.e., made by Georgetown employees), approximately 20 percent are made by transit. Of all non-work trips to and from Georgetown, approximately 10 percent are made by transit.

Although work transit percentages are significantly higher than non-work transit percentages, work auto occupancies are significantly lower. It is estimated that 1979 work trip auto occupancies average 1.30 while non-work auto occupancies average 1.51. Peak hour transit percentages and auto occupancies tend to closely track work trip numbers because the vast majority of trips during the peak hour are home-based work trips.

Between 1979 and 1985 some significant changes in travel to and from Georgetown are forecast. The total number of person trips generated in Georgetown is forecast to increase by 41 percent, from 197,600 to 277,700. The majority of this increase is projected to occur as a result of the development scheduled to occur south of M Street. Other increases result from several developments going in just north of M Street, the building of the French Chancery off Reservoir Road, and the residential development slated to go in immediately adjacent to the French Chancery. It should be noted that little change is forecast in Georgetown University trip generation.

Total Georgetown transit productions and attractions are forecast to increase by 51 percent, with the overall transit share increasing from 13 to 14 percent. This increase in transit's share is explained by the scheduled opening of several new Metrorail lines, including lines to Vienna and Shady Grove and by the increased difficulty of parking which is expected for Georgetown commuters.

Average auto occupancies are also projected to increase from 1.44 to 1.46,with the auto passenger share of trips increasing by 4 percent. Most of this increase will be due to the opening of Interstate 66 and the resultant diversion of trips to 4-or-more person carpools during peak periods. During the peak hour average Georgetown auto occupancies are expected to jump from the 1979 average of 1.30 to a 1985 average of 1.47.

The total number of auto driver trip ends in Georgetown will increase by 37 percent from 119,500 to 164,000. Although the auto driver share of trips drops by 3 percent due to the increases in both transit and auto passenger shares, a 37 percent increase in auto driver trip ends in Georgetown poses serious problems both in terms of parking and traffic flow. It is essential that measures be taken both to divert more trips to high occupancy vehicles and to improve traffic circulation within Georgetown, particularly in the area of highest growth, south of M Street.

A comparison of the remaining packages of candidate alternatives with the 1985 base case shows that there is potential for significant change in travel patterns in Georgetown if a number of the candidate alternatives are implemented. Implementation of the transit alternative would result in a 19 percent increase in transit trip ends in Georgetown, from 38,400 to 45,600. Transit's share would increase from 14 percent to 17 percent of all trips. Significant increases are forecast both for non-University and University trips. Auto driver trips

would decrease by 3.2 percent, from 164,000 to 158,900, and the auto driver share would decrease from 59 percent to 57 percent. The primary underlying cause for these modal shifts is greatly improved transit access to and from Metrorail and significantly lower fares for the relatively short bus trips to and from Metrorail stations (small bus fares were assumed to be 25 cents, as opposed to Metrobus fares of 50 cents to Dupont Circle and Foggy Bottom, and 80 cents to Rosslyn, and transfers were assumed to be allowed beteween GUTS and Metrorail).

The primary impact of the traffic restraint alternative is on trips passing through Georgetown and on travel paths within Georgetown, and therefore this alternative has somewhat less of an impact on Georgetown trip ends than the transit alternative. Auto driver trip ends are forecast to decrease by 1.2 percent, from 164,000 to 162,000, and transit trip ends are forecast to increase by 7 percent from 38,400 to 41,000. The primary cause for these shifts is the increased difficulty of commuting to and from Georgetown by auto as a result of the traffic restraint measures.

The trolley alternative is a combination transit improvement and traffic restraint alternative as a result of the two center lanes of M Street and Pennsylvania Avenue being dedicated to trolley operations, therefore its impact on travel demand is both an increase in transit ridership and a change in traffic patterns within Georgetown. Total Georgetown transit trip ends are projected to increase by 6 percent with the reinstitution of trolley service between the Foggy Bottom Metrorail Station and the intersection of Wisconsin Avenue and M Street. Approximately half of the projected increase of 2,400 transit trips will be due to induced trips, i.e., trips which would not have been made to Georgetown if the trolley did not exist. The increased difficulty of driving through Georgetown as a result of the

restraint aspects of the trolley also contributes to increased transit ridership.

Mode of Georgetown Transit Trips

A breakdown of Georgetown transit trip ends by transit mode is shown in Tables 5 and 6 for non-University and University trips. The following discussion of this modal breakdown will be divided into non-Georgetown University transit trips and Georgetown University transit trips.

In 1979 it is estimated there are a total of 22,700 non-University transit trip ends in Georgetown on an average weekday. Of these trips 43 percent, or 9,800, use Metrorail for part or all of their trip. The remaining 57 percent of the transit trips are made by Metrobus. Of the transit trips to and from Georgetown which use Metrorail, approximately one-third involve a walk between the Georgetown end of the trip and a Metrorail station, a small number, 500, involve a dropoff or pickup by automobile (kiss and ride) at a Metrorail station, and the remainder involve a bus trip between Georgetown and a Metrorail station. The primary reasons more trips are not made via Metrorail are the increased cost involved with a Metrorail transfer versus a bus-only trip within the District of Columbia and the high level of direct Metrobus service between Georgetown and downtown Washington.

Between 1979 and 1985 a number of significant changes are forecast to occur in transit ridership to and from Georgetown. The number of non-University transit trip ends in Georgetown will increase by an estimated 57 percent, from 22,700 to 35,600. This increase is due both to the new development slated to take place in Georgetown and an increase in transit's modal share. The proportion of Georgetown non-University transit trip ends which involve the use of Metrorail for part or all of the trip

TABLE 5

MODE OF GEORGETOWN NON-UNIVERSITY TRANSIT TRIPS										
ALTERNATIVE	1979 BASE		1985 BASE		1985 TRANSIT		1985 TRAFFIC RESTRAINT		1985 TROLLEY	
MODE	#	%	#	%	#	%	#	%	#	%
WALK/METRORAIL	2,700	12	7,000	20	5,700	13	7,800	20	6,900	18
KISS & RIDE/ METRORAIL	500	2	800	2	700	2	800	2	800	2
METROBUS/ METRORAIL	6,600	29	12,700	36	8,100	19	14,000	37	12,500	33
SMALL BUS/ METRORAIL	-	-	-	-	11,300	27	-	-	-	-
TROLLEY/ METRORAIL	-	-	-	-	-	-	-	-	1,400	4
TOTAL METRORAIL	9,800	43	20,500	58	25,800	61	22,600	59	21,600	57
METROBUS ONLY	12,900	57	15,100	42	12,900	31	15,500	41	15,300	40
SMALL BUS	-	-	-	-	3,300	8	-	-	-	-
TROLLEY	-	-	-	-	-	-	-	-	1,100	3
TOTAL TRANSIT	22,700	100	35,600	100	42,000	100	38,100	100	38,000	100

TABLE 6

MODE OF GEORGETOWN UNIVERSITY TRANSIT TRIPS

Alternative	1979 Base		1985 Base		1985 Transit		1985 Traffic Restraint		1985 Trolley	
Mode	#	%	#	%	#	%	#	%	#	%
GUTS/Metrorail	30	1	100	3	800	22	100	3	100	3
Metrobus/Metrorail	570	20	1,000	36	800	22	1,050	36	1,000	36
Small Bus/Metrorail	-		-		500	14	-		-	
TOTAL METRORAIL	600	21	1,100	39	2,100	58	1,150	40	1,100	39
Metrobus Only	1,390	50	1,100	39	1,000	28	1,150	40	1,100	39
GUTS/Metrobus	70	3	50	2	50	1	50	2	50	2
GUTS Only	740	26	550	20	400	11	550	19	550	20
TOTAL GUTS	840	30	700	25	1,250	35	700	24	700	25
Small Bus Only	-		-		50	1	-		-	
TOTAL TRANSIT	2,800	100	2,800	100	3,600	100	2,900	100	2,800	100

will increase from 43 to 58 percent. This is due to the opening of a number of new Metrorail lines including the Red Line to Shady Grove and the Orange Line to Vienna and the higher proportion of transit trip ends within walking distance of a Metrorail station. Metrorail trips which involve a walk between a Metrorail station and a Georgetown origin or destination are projected to increase in number from 2,700 to 7,000, and overall Metrorail ridership for Georgetown transit trips is expected to more than double between 1979 and 1985. Although the percentage of transit trips which use Metrobus only will drop from 57 percent to 42 percent, the number of these trips will nonetheless increase by 2,200 due to the large overall increase in transit ridership.

A comparison of the 1985 transit alternative with the 1985 base case shows that total non-University transit trips are estimated to be 18 percent higher under the transit alternative. The vast majority of the increased ridership would use Metrorail, reflecting the orientation of the new bus routes to Metrorail stations. The three small bus routes (Rosslyn-Foggy Bottom, Rosslyn-Wisconsin Avenue/Massachusetts Avenue, Foggy Bottom-Dupont Circle) would carry a total of 14,600 passengers. Of these, 77 percent, or 11,300, would be Metrorail access or egress trips. Ridership on Metrobuses would be 6,800 less than in the null alternative but still higher than 1979 levels.

In the traffic restraint alternative non-University transit trip ends increase by 7 percent over the base condition. Eighty-four percent of the increase of 2,500 trips is via Metrorail, reflecting the fact that Metrobuses will also suffer from increases in congestion which would result from a traffic restraint alternative.

In the trolley alternative, non-University transit trip ends also increase by 7 percent over the base case, although in this alternative a significant portion of the increase is due to induced trips rather than trips diverted from auto. It is

estimated that total average weekday ridership on the trolley line between Foggy Bottom and the intersection of M Street and Wisconsin Avenue is 2,500. This number was derived through a conservative analysis and could well be significantly higher, particularly during summer months and on weekends. Of the 2,500 trips via trolley, 56 percent access or egress from Metrorail. It is estimated that approximately one-half of the ridership on the trolley would be induced trips, i.e., trips which would not have been made if the trolley did not run. Although some trips made on the trolley would be diverted from Metrobus, these diverted trips would be offset by the increased transit usage resulting from the traffic restraint features of the trolley.

Table 6 shows the modal breakdown of Georgetown University transit trips. It should be noted that trips both to the Georgetown University Main Campus and the Georgetown University Medical Center are included in this table. In 1979 it is estimated there are a total of 2,800 transit trip ends at Georgetown University on an average weekday. Of these 840, or 30 percent use the University's GUTS buses. Fifty of the remaining 70 percent use Metrobus alone, and 20 percent use a combination of Metrobus and Metrorail. A further breakdown of existing Georgetown University transit usage by route is provided in "Technical Memorandum No. 4: Georgetown University Transportation Survey."

Between 1979 and 1985 the number of average weekday Georgetown University transit trip ends is projected to remain unchanged. However, total GUTS ridership is expected to drop by 17 percent, from 840 to 700 with the closing of Alban Towers as a dormitory. Georgetown University Metrorail ridership will increase from 600 to 1,100 as new lines to Vienna, Shady Grove, Huntington, and Anacostia are opened.

The only alternative which has a significant impact on Georgetown University transit ridership is the transit alternative.

In this alternative, it was assumed that the Southern Entrance to the University is opened to allow all turning movements and that a transit terminal is built at the Southern Entrance. It was assumed that all GUTS routes would end at the Southern Entrance terminal. In addition it was assumed that the Virginia GUTS routes would be discontinued and replaced by a frequent shuttle service between the Rosslyn Metrorail station and the Southern Entrance terminal. In addition it was assumed that a discount would be allowed for transfers between GUTS and Metrorail. The effect of this alternative would be to increase total Georgetown University transit trip ends by 20 percent, from 2,800 to 3,600. The portion of trips using Metrorail would increase from 39 percent to 58 percent. GUTS ridership would increase from 700 to 1250, but the vast majority of these trips will be short trips between the University and Metrorail with a discount fare.

Traffic Volume Estimates

Twenty-four hour weekday traffic volume estimates at each of the eleven cordon crossings into and out of Georgetown and at three other key locations are reported for each of the alternatives tested in Table 7 . All traffic volume estimates were calibrated to actual 1979 weekday volumes as reported in Technical Memorandum No. 3. A detailed discussion of 1979 traffic volumes can be found in that report.

Between 1979 and 1985 total cordon crossings are forecast to increase by 16 percent, from 298,900 to 345,900. Total crossings grow considerably less than Georgetown auto trip generation because little growth is forecast in vehicle trips passing through Georgetown. The most significant single link volume increases are on those streets which directly serve the high growth area south of M Street, K Street increasing from 18,500 to 28,600 and Pennsylvania Avenue/M Street together

TABLE 7

24 HOUR TRAFFIC LINK VOLUME ESTIMATES

	1979 Base	1985 Base	1985 Transit	1985 Traffic Restraint	1985 Trolley
GEORGETOWN CORDON POINTS					
Key Bridge	61,200	72,400	70,400	63,100	70,600
Whitehurst Freeway	49,400	57,300	57,100	58,400	60,400
K Street	18,500	28,600	27,500	27,800	28,400
Penn. Ave./M St.	36,900	44,900	43,900	35,800	39,300
P St.	12,300	12,900	12,800	13,900	13,600
Q St.	10,600	11,100	11,000	12,000	11,700
Wisconsin Ave.	34,000	37,100	36,700	36,400	36,900
37th St.	10,300	10,500	10,500	10,500	10,500
Reservoir Rd.	16,500	19,200	18,200	21,700	20,100
Canal Rd.	49,200	51,900	52,100	50,000	50,800
TOTAL CORDON CROSSINGS	298,900	345,900	340,200	329,600	342,300
OTHER LOCATIONS					
Roosevelt Bridge	52,700	60,400	60,100	68,500	62,600
George Washington Parkway	76,900	62,600	62,100	63,100	62,700
Southern Entrance to G. U.	1,300	1,300	5,900	1,300	1,300

increasing from 36,900 to 44,900. Key Bridge and Whitehurst Freeway show increases of 18 and 16 percent respectively as a result of a combination of Georgetown's high growth and the opening of Interstate 66. Roosevelt Bridge shows a considerable jump in traffic while the George Washington Parkway shows a considerable drop in traffic volume, both changes being a result of the opening of Interstate 66.

Under the transit alternative total cordon vehicular crossings drop by 2 percent from the null alternative, with the largest drops occuring on the streets directly affected by trips being diverted to Metrorail, i.e., Key Bridge, M Street/Pennsylvania Avenue, and K Street. Canal Road volumes are projected to increase slightly while Reservoir Road volumes decrease slightly, as a result of the opening of the Georgetown University Southern Entrance to all traffic movements.

Under the traffic restraint alternative, total cordon crossings decrease by 5 percent from the null alternative. The bulk of the decrease occurs on Key Bridge and M Street/Pennsylvania Avenue. Twenty-four hour traffic volumes on Key Bridge are projected to drop by 9,300 as a result of capacity restrictions on Key Bridge. This drop is offset by an increase of 8,100 on the Roosevelt Bridge. M Street/Pennsylvania Avenue traffic volumes decrease by 9,100 as a result of decreased capacity on M Street and the opening of the ramps at the east end of Whitehurst Freeway. In spite of the large drop in volume on Key Bridge, Whitehurst Freeway volumes do not decrease because of the increased traffic from the Whitehurst ramps which carry a two-way twenty-four hour volume of 6,400. P Street, Q Street, and Reservoir Road all show slight increases in traffic volumes as a result of increased difficulty in passing through South Georgetown.

The impacts of the trolley alternative on traffic volumes are similar, although smaller, than those of the traffic restraint alternative because of the reduction in capacity on

M Street resulting from the installation of the trolley and the construction of the Whitehurst Freeway ramps. Volumes on M Street/ Pennsylvania Avenue drop from 44,900 to 39,300. This decrease is somewhat offset by an increase in Whitehurst Freeway traffic of 3,100, slight increases in P Street, Q Street, and Reservoir Road traffic, and a diversion of some Georgetown through traffic to the Roosevelt Bridge.

Through Trip Analysis

The results of the analysis of the impact of each of the alternatives on Georgetown through traffic is shown in Table 8. Based upon the through trip percentages calculated for peak and off-peak periods in Technical Memoranda 3 and 7, it is estimated that 60 percent of the vehicle trips entering Georgetown on an average weekday are trips passing through Georgetown. The proportion of through trips reaches a peak of 72 percent during the PM peak hour and a low of 52 percent during the midday and evening periods. For a detailed analysis of through trip patterns, see Technical Memorandum No. 3.

Between 1979 and 1985, significant changes in through trip percentages are forecast for Georgetown, the overall 24 hour percentage dropping from 60 to 53 percent. The total number of through trips shows almost no change between 1979 and 1985 in spite of growth forecast for the Northwest business district of the Washington CBD. Vehicle trips to and from points in Georgetown is forecast to grow by 37 percent, however, resulting in the drop of the percentage of through trips. There are several reasons the number of through trips is expected to remain stable between 1979 and 1985. The opening of a number of new Metrorail lines, including lines to Vienna and Shady Grove, is expected to divert some through trips to Metrorail. The opening of Interstate 66 will divert some CBD-oriented

TABLE 8

GEORGETOWN THROUGH TRIP ANALYSIS

	1979 Base		1985 Base		1985 Transit		1985 Traffic Restraint		1985 Trolley	
	#	%	#	%	#	%	#	%	#	%
Vehicle Trips to and from points in Georgetown	119,500	40	164,000	47	158,900	47	162,100	49	163,200	48
Through trip cordon crossings[1/]	179,400	60	181,900	53	181,300	53	167,500	51	179,100	52
Total Vehicle Trips Entering & Leaving Georgetown	298,900	100	345,900	100	340,200	100	329,600	100	342,300	100

1/ Through trips are counted both entering and leaving Georgetown.

traffic to higher occupancy autos and other traffic to the Roosevelt Bridge. Also with the completion of the development forecast for South Georgetown and the resultant traffic congestion, Georgetown will become less attractive as an alternative route for through trips.

In comparing the through trip percentage for the transit alternative with the null alternative, it is seen that vehicle trips to and from points in Georgetown decrease by a greater percentage than through trips, but the decrease is not enough to significantly change the through trip percentage. In the traffic restraint alternative, the number of through trip cordon crossings decreases by 8 percent. The number of Georgetown vehicle trip ends also drops slightly, resulting in an overall drop of through trip percentage from 53 percent to 51 percent. The trolley alternative has a similar type impact on through trips as the traffic restraint alternative, but to a lesser extent, through trips decreasing by 2 percent, and the through trip percentage decreasing from 53 to 52 percent.

VMT and Air Pollution Emissions

Estimates of total vehicle miles of travel (VMT) and total hydrocarbon (HC) and carbon monoxide (CO) emissions within the Georgetown cordon for the 1979 base case and each of the four 1985 alternatives is shown in Table 9 . Between 1979 and 1985 VMT is projected to increase by 16 percent. This is a much less dramatic increase than the increase in Georgetown trip ends because of the relative lack of growth in through trips which account for higher VMT within Georgetown per trip. Between 1979 and 1985 total HC and CO emissions are forecast to drop almost in half due to the much higher percentage of autos on the road with Federal Motor Vehicle Controls (catalytic converters).

TABLE 9

VMT AND AIR POLLUTION EMISSIONS ANALYSIS WITHIN GEORGETOWN

	1979 Base	1985 Base	1985 Transit	1985 Traffic Restraint	1985 Trolley
Average Weekday Vehicle Miles of Travel (VMT)	239,100	276,700	272,200	263,700	273,800
% Change from 1985 Base Case VMT	-	-	-1.6%	-4.7%	-1.0%
Average Weekday Mobile Source Hydrocarbon (HC) Emissions (lbs)	2,210	1,250	1,230	1,210	1,250
% Change from 1985 Base Case HC Emissions	-	-	-1.6%	-2.8%	-0-
Average Weekday Mobile Source Carbon Monoxide (CO) Emissions (lbs)	27,500	14,500	14,300	14,200	14,500
% Change from 1985 Base Case CO Emissions	-	-	-1.6%	-2.4%	-0-

In the transit alternative, total VMT and emissions are both forecast to drop by 1.6 percent as a result of diversion of trips to transit. In the traffic restraint alternative VMT drops by 4.7 percent, largely as a result of diversion of through trips to the Roosevelt Bridge and other routes outside Georgetown. However, emissions do not decrease proportionately with VMT because of lower vehicular speeds resulting from increased congestion. The trolley alternative results in a 1.0 percent reduction in VMT, but no reduction in emissions because as in the traffic restraint alternative, average vehicular speeds are lower.

CHAPTER 9. CONCLUSIONS AND RECOMMENDATIONS

During the course of the Georgetown Area Access Alternatives Study a wide range of candidate access improvement alternatives were identified and analyzed. The previous chapters of this report documented the analysis of each of these candidate actions, listed the advantages and disadvantages of each alternative, and provided a rationale for either dropping candidate actions from further consideration or recommending that actions be implemented as a Georgetown area access improvement. In the previous chapter the results of a travel demand analysis of four packages of alternatives were presented in order to provide information regarding what effect combinations of alternatives of various philosophies could be expected to have on travel in Georgetown.

The major conclusion to be drawn both from the analysis of individual access improvement alternatives and from the analysis of packages of alternatives is that no one single action or type of action by itself can be expected to solve Georgetown's access problems, but that the final set of adopted actions should consist of many different kinds of complementary actions working in concert to meet the objectives for Georgetown area access as outlined in Chapter One. The final set of actions should consist of physical roadway improvements, traffic operations improvements, parking improvements, transit improvements, and access improvements specifically targetted for Georgetown University.

Georgetown is an area which is undergoing rapid change. Trip generation within Georgetown is projected to grow by 40 percent between 1979 and 1985. Most of this growth will be concentrated in the already congested southern part of Georgetown. Future extensions of Metrorail and the opening of Interstate 66 between the Capital Beltway and Rosslyn will result in significant

changes in travel to, from, and through Georgetown. It is important that actions be adopted which will ensure adequate levels of transportation service in the Georgetown area without seriously impacting residences and businesses in the area. It is critical that all responsible government agencies recognize the rapidly changing transportation conditions and needs of Georgetown and that timely implementation of access improvements take place in order that the objectives outlined in Chapter One may be realized.

Based upon the conclusions drawn in the previous chapters of this report JHK and Associates recommends that the following set of access improvement actions be implemented in the Georgetown area:

PHYSICAL ROADWAY IMPROVEMENTS

- Begin environmental impact analysis for the following elements of an alternative to connect Whitehurst Freeway with L and M Streets:
  - Tie existing ramps at the east end of Whitehurst Freeway to termini on L Street (see Figure 2).
  - Convert 26th Street between L and M Streets to two-way operation, removing parking in this section of 26th Street, and making the center lane reversible.
  - Remove parking on L Street between the Whitehurst Freeway ramps and 26th Street, redesigning the intersection of 26th and L Streets to accommodate double left turns. Make L Street one-way eastbound between 26th Street and Pennsylvania Avenue.
- In coordination with design for the reconstruction of Whitehurst Freeway, redesign both eastbound and westbound ramps at the west end of Whitehurst Freeway in order to improve traffic flow.
- Repave K Street between 29th Street and Key Bridge, moving the railroad tracks to the south side of K Street.
- Construct a double left turn lane at the Canal Road-Foxhall Road intersection for use by westbound Canal Road traffic during the PM peak.
- In conjunction with the reconstruction of Whitehurst Freeway provide pedestrian access along K Street between Georgetown and the West End.

TRAFFIC OPERATIONS ALTERNATIVES

- Convert 29th and Thomas Jefferson Streets to one-way northbound and 31st Street to one-way southbound between K and M Streets. (Thirtieth Street between K and M Streets is currently one-way southbound.)
- Install a new traffic signal at the Southern Entrance to Georgetown University at the time of its upgrading. Carefully monitor traffic volumes during the next 5 to 6 years at all intersections along K and M Streets between 29th Street and Wisconsin Avenues in order to determine if unsignalized intersections warrant traffic signals or signalized intersections require retiming. Implementation of one-way street operations will likely require new signals along K and M Streets.
- Make right lane of Key Bridge northbound, right turn only at Whitehurst Freeway ramp.
- Develop implementation plans to convert the right lane of Canal Road between the D.C.-Maryland state line and Foxhall Road and the right lane of Chain Bridge to HOV lanes during the AM peak period, so such an action could be quickly implemented at an appropriate time (such as the next gasoline shortage).
- Coordinate with the ongoing Interstate 66 Management Study in developing traffic management measures for Key Bridge.
- Monitor directional distribution on M Street. As through trip percentage decreases directional unbalance will likely decrease and consideration should be given to removal of reversible lanes.

PARKING IMPROVEMENTS

- Convert three parking spaces per block along M Street, Wisconsin Avenue, 29th Street, 30th Street, Thomas Jefferson Street, and 31st Street to truck loading zones.
- Support long term goal of implementing a park and ride facility in the Potomac River corridor.
- In coordination with the conversion of north-south streets south of M Street to one-way operation and the opening of additional off-street parking facilities south of M Street, remove on-street parking

on one side of north-south streets south of M Street during peak periods. As development continues to occur in this area, traffic flows on these streets should be carefully monitored to determine whether parking prohibitions should be extended to both sides of the street or to other periods of the day.

- Encourage parking garage owners and local merchants to expand parking validation programs during evenings and on weekends.
- Post parking information in prominent locations in stores, restaurants, and entertainment spots.
- Install signs along K and M Streets indicating locations of off-street parking.
- Extend coverage of parking meters and allow permit-holders to park in selected metered spaces without paying fee.
- Support long term goal of increasing short term off-street parking in the Wisconsin Avenue commercial area north of M Street.
- Ensure adequate short term off-street parking is provided with any new development which is proposed in Georgetown.

TRANSIT IMPROVEMENTS

- New Metrobus Route
  - Chevy Chase Circle-Farragut Square via Connecticut Avenue, Nebraska Avenue, New Mexico Avenue, Tunlaw Road, 37th Street, Reservoir Road, Wisconsin Avenue, M Street, Pennsylvania Avenue, and K Street (see Figure 11).
- Small Bus Routes
  - Rosslyn Metrorail Station - Foggy Bottom Metrorail Station via Lynn Street, Key Bridge, M Street, and Wisconsin Avenue (see Figure 20).
  - Rosslyn Metrorail Station - Wisconsin and Massachusetts Avenues via Lynn Street, Key Bridge, M Street, and Wisconsin Avenue (see Figure 18).
  - Foggy Bottom - Dupont Circle via 23rd Street H Street, 24th Street, K Street, Wisconsin Avenue, and P Street (see Figure 21).

  - Give serious consideration to extension of above routes to the Kennedy Center and other points in Foggy Bottom or to Farragut Square.

- Develop a transit information package to be distributed to Georgetown employees and to be made available to patrons of stores, restaurants, and entertainment spots.
- Encourage employer subsidies of transit fares and/or payroll deduction plans for transit passes.
- Encourage transit fare validation schemes, particularly in conjunction with small bus system, trolley, and Metrorail (e.g., issuance of Metrorail farecards to customers).

GEORGETOWN UNIVERSITY ACCESS IMPROVEMENTS

- Install an at grade signalized intersection between Canal Road and the Southern Entrance to Georgetown University approximately 200 feet to the east of the existing Southern Entrance with provision of a 200-foot left turn bay from eastbound Canal Road and a realignment of westbound Canal Road to a maximum of 12 feet north of its existing alignment (see Figure 27). All turns would be allowed at this intersection, except left turns out of the University between 7 and 9 AM. Emergency vehicles and buses would be allowed to make all turns at all times. Design an aesthetically and environmentally acceptable terminal facility at the Southern Entrance to Georgetown University which would contain a ramp system to overcome the grade differential between Canal Road and the main campus, a turnaround facility for GUTS and WMATA buses, and a convenient transfer to an intra-university transportation system, and enter environmental review process.
- Maintain Prospect Street Entrance to the University.
- Build an entrance to Main Campus from Reservoir Road.
- Provide a frequent GUTS shuttle service between the Rosslyn Metrorail Station and the Southern Entrance to Georgetown University at a lower fare than for longer GUTS trips. Eliminate GUTS service along Wilson Boulevard, and if a transfer arrangement between Metrobus/Metrorail and GUTS buses can be worked out, drop Virginia GUTS routes except for the Rosslyn-Southern Entrance shuttle.

- Accept Metrorail or Metrobus transfers in lieu of payment on GUTS buses, or charge discounted fares for Metrorail and Metrobus passengers.
- Adjust parking costs to cover additional subsidies required if transfer discounts are allowed between GUTS and Metrobus and Metrorail.
- Change Virginia and Law School GUTS routes so as to access the University at the Southern Entrance.
- Establish a transit and carpool information center at central locations both on Main Campus and at the Georgetown University Medical Center and provide information about the Council of Governments' carpool matching program.
- Create a transit information package to be distributed to students at registration and faculty and staff through the campus mail.
- Reserve most convenient parking spaces for carpools with three or more persons.
- Establish a vanpool service for interested faculty and staff members.

ALTERNATIVES TO RECEIVE MORE DETAILED STUDY

- Georgetown Trolley Study.
- Extension of hours of residential parking permit program.

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