BZA 16566

Document No. FHWA-DC-EIS-95-01-F

# IMPROVEMENTS TO THE CANAL ROAD ENTRANCE OF GEORGETOWN UNIVERSITY

## FINAL ENVIRONMENTAL IMPACT STATEMENT and FINAL SECTION 4(f) STATEMENT

Submitted Pursuant To:
42 U.S.C. 4332 (2) (c); 23 U.S.C 128 (a); 49 U.S.C. 303 (c)

U.S. Department of Transportation
Federal Highway Administration

'00 JAN 31 P4:15

12/10/98
Date of Approval

Division Engineer, Eastern Federal Lands Highway Division, Federal Highway Administration

12/14/98
Date of Approval

Division Administrator, District of Columbia Division, Federal Highway Administration

Cooperating Agencies:
National Park Service, National Capital Region (NPS);
District of Columbia, Department of Public Works (DCDPW); and
National Capital Planning Commission (NCPC)

The following persons may be contacted for additional information concerning this document:

Mr. Edward Sheldahl
Federal Highway Administration
Union Center Plaza - Suite 750,
820 First Street, N.E.,
Washington, D.C. 20002
Phone (202) 523-0163

#1

Mr. Alan Teikari
Federal Highway Administration
Eastern Federal Lands
21400 Ridgetop Circle
Sterling, VA 20166
Phone (703) 285-0082

The proposed project is to provide for an upgraded entrance to Georgetown University from Canal Road in Washington, D.C. Traffic turning movements in all directions would be provided. Alternatives considered include a No-Action Alternative, an At-Grade Intersection with variations, and two Interchange Alternatives. The Preferred Alternative (Alternative 2A - Modified) has been selected following the circulation of the Draft Environmental Impact Statement, a Location Public Hearing, and full consideration of comments received.

Board of Zoning Adjustment
District of Columbia
CASE NO.16566
EXHIBIT NO.7A1

Document No. FHWA-DC-EIS-95-01-F

# IMPROVEMENTS TO THE CANAL ROAD ENTRANCE OF GEORGETOWN UNIVERSITY

## FINAL ENVIRONMENTAL IMPACT STATEMENT and FINAL SECTION 4(f) STATEMENT

Submitted Pursuant To:
42 U.S.C. 4332 (2) (c); 23 U.S.C 128 (a); 49 U.S.C. 303 (c)

U.S. Department of Transportation
Federal Highway Administration

12/10/98
Date of Approval

Division Engineer, Eastern Federal Lands Highway Division, Federal Highway Administration

12/14/98
Date of Approval

Division Administrator, District of Columbia Division, Federal Highway Administration

Cooperating Agencies:
National Park Service, National Capital Region (NPS);
District of Columbia, Department of Public Works (DCDPW); and
National Capital Planning Commission (NCPC)

The following persons may be contacted for additional information concerning this document:


Mr. Edward Sheldahl
Federal Highway Administration
Union Center Plaza - Suite 750,
820 First Street, N.E.,
Washington, D.C. 20002
Phone (202) 523-0163

Mr. Alan Teikari
Federal Highway Administration
Eastern Federal Lands
21400 Ridgetop Circle
Sterling, VA 20166
Phone (703) 285-0082



The proposed project is to provide for an upgraded entrance to Georgetown University from Canal Road in Washington, D.C. Traffic turning movements in all directions would be provided. Alternatives considered include a No-Action Alternative, an At-Grade Intersection with variations, and two Interchange Alternatives. The Preferred Alternative (Alternative 2A - Modified) has been selected following the circulation of the Draft Environmental Impact Statement, a Location Public Hearing, and full consideration of comments received.

# SUMMARY

***Note: Highlighted text indicates substantive information different from the Draft Environmental Impact Statement (DEIS) or new to this Final Environmental Impact Statement (FEIS).***

**This is the Final Environmental Impact Statement (FEIS) and Final Section 4(f) Statement for** a Proposed Action that would reconstruct the Canal Road entrance to Georgetown University to provide for all directional movements for traffic entering and leaving the main academic campus. The Proposed Action is on the south side of the University, along Canal Road between the Whitehurst Freeway and Foxhall Road in Washington, D.C.

Preliminary alternatives **that were** considered included transportation system management actions and a variety of roadway alternatives. Initially nine conceptual roadway alternatives were presented at public meetings. Based on the public comments from these meetings **and studies done by the Agency**, it was determined that the most critical factors in comparing the alternatives were their visual and traffic impacts. **Four Build alternatives** and the No Action Alternative **were selected for more detailed evaluation in the Draft Environmental Impact Statement (DEIS). The DEIS alternatives were:**

- **Alternative 1**, the No Action Alternative, would maintain the existing entrances to the academic campus of Georgetown University from Canal Road and Prospect Street.
- **Alternative 2**, the At-Grade Alternative, consists of an at-grade intersection to allow for all movements to and from the University. Traffic signals at the intersection would control access into and out of the Main Academic Campus. The Prospect Street entrance would be closed.
- **Alternative 2A**, is identical to Alternative 2, except **that** it would keep the Prospect Street entrance open and prevent left turns out of the University **onto Canal Road** in the AM peak.
- **Alternative 3B**, elevates the westbound lanes of Canal Road at the location of the entrance road. These westbound lanes would cross over an access road connecting the Canal Road's eastbound lanes to the University entrance. Eastbound Canal Road **would be** kept at the existing grade in its existing location. The Prospect Street entrance would be closed.
- **Alternative 3H**, depresses both the eastbound and westbound lanes of Canal Road below existing grade level. There **would** be a bridge over the depressed lanes, connecting the eastbound Canal Road lanes to the University entrance. The Prospect Street entrance would be closed.

**The DEIS was circulated in July, 1995. A public hearing was conducted on September 19, 1995. The public comment period on the DEIS extended to September 30, 1995.**

**In response to the comments on the DEIS and subsequent agency coordination, numerous potential other variations were analyzed. None appeared to satisfy the purpose and need for the project or significantly reduce environmental impacts, except for variations to Alternative 2/2A. Examples of the variations to Alternative 2/2A that were further studied included:**

- **Reducing the number of traffic signals and their cycle lengths on Canal Road;**
- **Increasing or decreasing stacking lanes;**
- **Reducing the height and length of the retaining wall along the eastern side of the new entrance location;**
- **Eliminating any use of private property other than that belonging to Georgetown University;**
- **Reducing the footprint of construction at the entrance to the University.**

**For various options of Alternative 2/2A, including what became the Preferred Alternative, detailed traffic analysis was performed to further refine and identify appropriate traffic mitigation options. These options to reduce traffic impacts demonstrated that keeping the Prospect Street entrance open (i.e. Alternative 2A or its variations) and improving access at the Canal Road entrance provided the least impact to traffic on Canal Road. Additional mitigation concepts considered traffic flow on Canal Road. Proposed mitigation involved traffic signal timing and the reduction of the number of lanes exiting the University. Also, as mitigation, it was considered whether the Canal Road and Whitehurst Freeway intersection should be widened to allow for three lanes eastbound on Canal Road. The above improvements were combined to constitute Alternative 2A-Modified.**

**For this Final Environmental Impact Statement (FEIS), the Preferred Alternative is Alternative 2A-Modified. It is described in detail in the Preferred Alternative section. Alternative 2A-Modified offers fewer environmental impacts than the original Alternative 2A by condensing the construction footprint, and eliminates or ameliorates many concerns of the public and Agencies with the original Alternative.**

**The alternatives addressed in this FEIS are summarized in Table S-1.**

## ENVIRONMENTAL CONSEQUENCES

Existing land uses would not be affected by any of the Alternatives, since all of the land that would be needed for construction of each of the alternatives is currently vacant. There would be no displacements of residents or businesses. **Potential secondary impacts are possible if access is provided to private properties other than Georgetown University. The Preferred Alternative does not impact private properties, except Georgetown University. The impact to the Georgetown University will not result in secondary impacts.**

**The Proposed Action** is being proposed in order to improve vehicular circulation and **to** focus access to Georgetown University's Main Academic Campus parking lot at the Canal Road Entrance. By shifting traffic from some of the streets of Georgetown, all Build Alternatives (2, 2A, 3B, 3H **and 2A-Modified)** could have a positive impact on neighborhood cohesion. The No Build Alternative would continue to require Main Academic Campus parking lot traffic **primarily** to use the residential streets of Georgetown.

The aesthetics of the area are very important; and while the Build Alternatives would have varying degrees of aesthetic impacts, **the Preferred Alternative has no significant visual and aesthetic impacts and has the least effects of the Build Alternatives.**

**TABLE S-1**

**Summary of Alternatives**

| ALTERNATIVE | GEOMETRICS | DIRECTIONAL MOVEMENT AT ENTRANCE | STATUS OF PROSPECT STREET | ESTIMATED COSTS ($ 1998) |
|---|---|---|---|---|
| **Preferred Alternative Alternative 2A – Modified** | **At-Grade Intersection; Adds thru lane on Canal at Whitehurst** | **All directions-- Left turn exit restrictions during AM peak** | **No change** | **$ 1.12 m.** |
| Alternative 1 | **No Build** | Right-in/Right-out | No change | None |
| Alternative 2 | **At-Grade Intersection** | All directions | Entrance at Prospect Street Closed | $ 1.86 m. |
| Alternative 2A | **At-Grade Intersection** | All directions -- Left turn exit restrictions during AM peak | No change | $ 1.86 m. |
| Alternative 3B | **Westbound Elevated Ramp** | All directions | Entrance at Prospect Street Closed | $ 12.23 m. |
| Alternative 3H | **Grade-Separated Interchange** | All directions | Entrance at Prospect Street Closed | $ 21.77 m. |

***Note: Preferred Alternative has been added. Costs have been updated to 1998 dollar estimates.***

A portion of the land to be used by any of the Build Alternatives is National Park Service (NPS) property. Georgetown University would provide an in-kind replacement of similar suitable adjacent land. **Alternative 2A-Modified requires the least amount of NPS property, compared to the other build alternatives, even with the proposed mitigation reconstruction at the Whitehurst Freeway intersection.**

The Proposed Action is located within the Georgetown Historic District and adjacent to the C&O Canal Historic District. **Only the Preferred Alternative, Alternative 2A-Modified, requires** land from the C&O Canal Historic District, **taking less than 800 square feet**. Each of the Build Alternatives would require property within the Georgetown Historic District. A Phase I archaeological survey (Identification) has been completed; and the results indicate that there appear to be archeological remains in portions of the study area. **The Preferred Alternative avoids archaeological sites. Refer to Chapter 4 for further discussion on archaeological resources.**

Reconstructing the Canal Road entrance and closing the Prospect Street entrance would cause a redistribution of traffic entering and leaving Georgetown University's Academic Campus. The primary change would occur on Canal Road. Alternatives 2, 2A **and 2A-Modified** would place an additional traffic signal along Canal Road at the Georgetown University entrance. These **Alternatives** would also add a left turn lane to the eastbound lanes at that location. **The Prospect Street Entrance would remain open for Alternative 2A and 2A-Modified**. Alternatives 3B and 3H would maintain the through lanes of Canal Road at the University entrance, but would change their configuration and elevations.

There would be no violation of air quality standards by any of the alternatives. According to the computer model used to predict noise impacts, Alternatives 2, 2A **and 2A-Modified reduce noise from current levels.** Alternative 3B violates the noise standards, while 3H has the lowest noise impacts of all the alternatives.

**The environmental impacts for each alternative are summarized in Table S-2.**

## CONTROVERSIAL ISSUES

Providing access to properties currently with no right of access is a controversial issue. With access, property owners could seek development, which is in conflict with the adjacent National Park Service scenic goals for the Potomac Palisades. This issue is addressed as part of the Section 4(f) evaluation. **The Preferred Alternative, 2A-Modified, does not provide access to or easement on private property other than that of Georgetown University.**

A related issue is the property ownership of Lot 822. This property was originally part of the right-of-way for a trolley which ran from the District to Glen Echo, and which was owned by the D.C. Transit System, Inc.; but transferred to the Metropolitan Area Riders' Fund at a foreclosure sale. **On May 31, 1996 this property was transferred by order of the U.S. District Court to the Washington Metropolitan Area Transit Authority (WMATA). WMATA is still investigating the issue of whether adequate title was transferred. Selection of Alternative 2A-Modified avoids any right-of-way or easement from this parcel.**

**Since the DEIS, some citizens have questioned the validity of the traffic analysis. There have similarly been questions regarding the size of the area of impact, with some organizations and citizens wanting a larger coverage. The concerns expressed were considered and addressed,**

**where determined appropriate, in the traffic analysis. Traffic issues are discussed in Chapters 4 and 5.**

## TABLE S-2

### Summary of Environmental Impacts

| ISSUE | ALTERNATIVE | | | | | |
|---|---|---|---|---|---|---|
| | **Preferred 2A – Mod.** | **1 No-Build** | **2** | **2A** | **3B** | **3H** |
| **NEW RIGHT-OF-WAY** In Hectares (Acres) | | | | | | |
| **National Park Service lands** | **0.22 (0.53)** | 0 (0) | 0.39 (0.97) | 0.39 (0.97) | 0.30 (0.74) | 0.69 (1.71) |
| **Georgetown University** | **0.09 (0.22)** | 0 (0) | 0.25 (0.61) | 0.25 (0.61) | 0.29 (0.71) | 0.29 (0.73) |
| **WMATA (Riders' Fund)** | **0 (0)** | 0 (0) | 0.05 (0.11) | 0.05 (0.11) | 0.04 (0.10) | 0.12 (0.29) |
| **TOTAL** | **0.31 (0.75)** | 0 (0) | 0.69 (1.69) | 0.69 (1.69) | 0.63 (1.55) | 1.10 (2.73) |
| **TRAFFIC IMPACTS** | **Minor** | **None** | **Minor** | | | |
| **UTILITIES IMPACTS** | **Minor** | **None** | **Moderate** | **Moderate** | **Moderate** | **High** |
| **VISUAL IMPACTS** | **Minor** | **None** | **Moderate** | **Moderate** | **High** | **High** |
| **CULTURAL IMPACTS** | **Minor** | **None** | **Moderate** | **Moderate** | **High** | **High** |
| **HABITAT LOSS** In Hectares (Acres) | | | | | | |
| **Wooded** | **0 (0)** | 0 (0) | 0.15 (0.37) | 0.15 (0.37) | 0.26 (0.64) | 0.51 (1.26) |
| **Clear** | **0.31 (0.75)** | 0 (0) | 0.35 (0.88) | 0.35 (0.88) | 0.34 (0.83) | 0.45 (1.18) |
| **IMPACTED AIR SITES** | No exceedances | | | | | |
| **NOISE STANDARDS** | No violations | | | | Violates NAC | No violations |
| **CONSTRUCTION IMPACTS** | **Minor** | None | Moderate | Moderate | High | High |
| **ESTIMATED TOTAL COST ($ MILLION 1998)** | **$1.1** | 0 | $1.9 | $1.9 | $12.2 | $21.8 |

***Note: Preferred Alternative has been added. Costs have been updated to 1998 dollar estimates. More issue categories are shown.***

## UNRESOLVED ISSUES WITH OTHER AGENCIES

**There are no unresolved issues relating to the information provided in this FEIS. Some issues remain regarding details of the land transfer and detailed final design. These issues will be resolved prior to construction of the Proposed Project.**

**The legislation authorizing the project states that Georgetown University will dedicate at least 2.5 acres of scenic easement. (See *Appendix A-1.*)**

**In addition, the 1991 Memorandum of Agreement (MOA) among the Federal Highway Administration (FHWA), the National Park Service (NPS), the District of Columbia, and Georgetown University states that the University will donate any Georgetown University land that is needed for construction. (See *Appendix A-2.*) Georgetown University will further provide, in addition to the 2.5 acre scenic dedication and its land required for construction, land of equal value to that which is taken for project purposes from the NPS. It is expected that the proposed Demonstration Project requires an access easement across NPS land. The NPS and Georgetown University are to work together to mutually determine the access easement location.**

**At this time, no land has been officially dedicated or transferred. This land will be dedicated prior to any construction.**

**Details of final design are also specifically mentioned in the initial project MOA. It states that the final design must be reviewed and approved by the National Capital Planning Commission (NCPC) and the Commission of Fine Arts.**

**A second MOA, on historic resources, states that** Section 106 coordination (required under the National Historic Preservation Act of 1966, as amended) would continue following this **Final** Environmental Impact Statement and be incorporated in the Record of Decision. **(See *Appendix G.*) As part of this MOA, the District of Columbia State Historic Preservation Officer (SHPO) will review and approve landscape and design plans prior to construction.**

## REEVALUATION OF DRAFT EIS

*Note: This section is new to the Final Environmental Impact Statement*

**In accordance with 23 CFR 771.129, a written evaluation of a Draft EIS must be prepared if a Final EIS has not been completed within three years from the date of the Draft EIS. The Federal Highway Administration performed an evaluation in October 1998 which concluded that a supplemental Draft EIS or a new Draft EIS is not required. (See *Appendix H.*) The changes and new information that have occurred since the Draft EIS was distributed, including the addition of Alternative 2A-Modified and its traffic mitigation at the intersection of Canal Road and the Whitehurst Freeway, do not result in**

**previously unidentified significant adverse impacts or additional new significant adverse impacts.**

# TABLE OF CONTENTS

*Note: New sections or figures have been highlighted.*

**SUMMARY**

**TABLE OF CONTENTS**

PAGE

*PREFACE* ..... P-1
*P.1 DOCUMENT FORMAT* ..... P-1
*P.2 PREFERRED ALTERNATIVE* ..... P-1
*P.3 COMMITMENTS FOR MITIGATION* ..... P-3

**CHAPTER 1. PURPOSE AND NEED** ..... 1-1

1.1 PROJECT DESCRIPTION ..... 1-1
1.2 PURPOSE OF THE PROJECT ..... 1-1
1.2.1 Project History ..... 1-1
1.2.2 Congressional Mandate ..... 1-1
**1.2.3 *Draft Environmental Impact Statement*** ..... **1-2**
**1.2.4 *Post Draft Environmental Impact Statement Activities*** ..... **1-3**
1.3 NEED FOR THE PROJECT ..... 1-3
1.3.1 Project Objective - Improve Roadway Utilization ..... 1-3
1.3.2 Project Benefits ..... 1-4

**CHAPTER 2. ALTERNATIVES** ..... 2-1

2.1 PRELIMINARY ALTERNATIVES CONSIDERED ..... 2-1
2.1.1 Transportation System Management/Transportation Demand Management ..... 2-1
2.1.2 Mass Transit ..... 2-3
2.1.3 Bicycle and Pedestrian Facilities ..... 2-3
2.1.4 Roadway Alternatives ..... 2-4
2.2 ALTERNATIVES SELECTED FOR ANALYSIS **IN DEIS** ..... 2-6
2.2.1 Alternative 1 - No Build ..... 2-8
2.2.2 Alternative 2 - At-Grade Intersection ..... 2-8
2.2.3 Alternative 2A - At-Grade Intersection With Prospect Street Open ..... 2-9
2.2.4 Alternative 3B - Westbound Canal Road Elevated ..... 2-9
2.2.5 Alternative 3H - Canal Road Underpass ..... 2-10
2.3 ***ALTERNATIVES CONSIDERED AFTER DEIS AND PUBLIC HEARING*** **2-10**
2.4 ***COMPARISON OF ALTERNATIVES CONSIDERED IN DEIS AND THE PREFERRED ALTERNATIVE*** ..... **2-13**

**CHAPTER 3. AFFECTED ENVIRONMENT** ..... 3-1

3.1 COMMUNITY DESCRIPTION ..... 3-1
3.1.1 Land Use and Zoning ..... 3-1
3.1.2 Socioeconomic and Community Characteristics ..... 3-2
3.1.3 Community Facilities and Services ..... 3-4
3.1.4 Visual Context ..... 3-6
3.1.5 Historic and Archaeological Resources ..... 3-7
3.1.6 ***NCPC's Comprehensive Plan*** ..... 3-8
3.2 TRANSPORTATION SYSTEM ..... 3-9
3.2.1 Transportation Facilities and Services ..... 3-10
3.2.2 Travel and Traffic Characteristics ..... 3-14
3.2.3 Traffic Operations ..... 3-18
3.3 PHYSICAL AND NATURAL ENVIRONMENT ..... 3-18
3.3.1 Air Quality ..... 3-18
3.3.2 Noise ..... 3-21
3.3.3 Land Form, Geology, and Soils ..... 3-24
3.3.4 Water Resources ..... 3-24
3.3.5 Wetlands ..... 3-25
3.3.6 General Ecology/Wildlife and Habitat ..... 3-26
3.3.7 Floodplains and Hydrology ..... 3-27
3.3.8a Wild and Scenic Rivers ..... 3-29
3.*3.8b* ***American Heritage Rivers Initiative*** ..... 3-29
3.3.9 Coastal Barriers and Coastal Zones ..... 3-29
3.3.10 Threatened or Endangered Species ..... 3-29

**CHAPTER 4. ENVIRONMENTAL CONSEQUENCES** ..... 4-1

4.1 COMMUNITY IMPACTS ..... 4-1
4.1.1 Land Use ..... 4-1
4.1.2 Social Impacts ..... 4-3
4.1.3 Economic Impacts/Joint Development ..... 4-4
4.1.4 Community Facilities and Utilities ..... 4-4
4.1.5 Visual Context ..... 4-6
4.1.6 Historic and Archaeological ..... 4-9
4.1.7 ***Conformance with NCPC's Comprehensive Plan*** ..... 4-12
4.2 TRAFFIC AND TRANSPORTATION ..... 4-12
4.2.1 Transportation Facilities and Services ..... 4-13
4.2.1.a Regional and Local Roads ..... 4-13
4.2.1.b Public Transportation System ..... 4-13
4.2.1.c Pedestrian and Bicycle Facilities ..... 4-13
4.2.1.d Access to Georgetown University ..... 4-14

4.2.2 Travel and Traffic Characteristics ..... 4-14
4.2.2.a Changes in Travel Pattern to the University ..... 4-15
4.2.2.b Changes in Traffic Volumes on Local Streets ..... 4-15
4.2.3 Traffic Operations by Alternative ..... 4-18
4.2.3.a Level of Service at Intersections ..... 4-19
4.2.3.b Travel Time ..... 4-20
4.2.3.c Queuing Analysis ..... 4-20
4.2.3.d Weaving Analysis ..... 4-22
4.3 AIR, NOISE, AND ENERGY IMPACTS ..... 4-23
4.3.1 Air Quality ..... 4-23
4.3.1.a Introduction and Methodology ..... 4-23
4.3.1.b Carbon Monoxide Analysis ..... 4-23
4.3.1.c "Worst Case" Location Determination ..... 4-24
4.3.1.d Air Quality Impacts ..... 4-24
4.3.1.e Conformity with State Implementation Plan ..... 4-27
4.3.2 Noise ..... 4-28
4.3.2.a Federal Regulations ..... 4-28
4.3.2.b Traffic Generated Noise Levels ..... 4-28
4.3.2.c Noise Impact Analysis ..... 4-28
4.3.2.d Consideration of Abatement Measures ..... 4-28
4.3.2.e Noise Abatement Measures to Minimize Impacts ..... 4-30
4.3.3 Energy ..... 4-30
4.4 NATURAL RESOURCES ..... 4-31
4.4.1 Land Form ..... 4-31
4.4.2 Water Quality Impacts ..... 4-31
4.4.3 Wetland Impacts ..... 4-32
4.4.4 Wildlife and Habitat Impacts ..... 4-32
4.4.5 Floodplains and Hydrology ..... 4-33
4.4.6a Wild and Scenic Rivers ..... 4-33
4.4.6*b* ***American Heritage Rivers Initiative*** ..... 4-33
4.4.7 Coastal Barriers and Coastal Zone Management ..... 4-33
4.4.6 Threatened or Endangered Species ..... 4-34
4.5 HAZARDOUS WASTE SITES ..... 4-35
4.6 CONSTRUCTION IMPACTS ..... 4-35
4.6.1 Permits Required ..... 4-35
4.6.2 Excavation and Blasting ..... 4-36
4.6.3 Maintenance of Traffic Impacts ..... 4-37
4.6.4 Air and Noise Impacts ..... 4-38
4.7 LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY RELATIONSHIP ..... 4-38
4.8 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES ..... 4-38

*CHAPTER 5. ADDITIONAL TRAFFIC ANALYSIS ON THE PREFERRED ALTERNATIVE* ..... 5-1

*5.1 INTRODUCTION* ..... 5-1
*5.2 LEVEL OF SERVICE AT INTERSECTIONS* ..... 5-2
*5.3 TRAVEL TIME* ..... 5-5
*5.4 QUEUING ANALYSIS* ..... 5-6

**CHAPTER 6. LIST OF PREPARERS** ..... 6-1

**CHAPTER 7. LIST OF AGENCIES AND ORGANIZATIONS SENT COPIES OF THE DEIS, & COMMENTORS ON THE DEIS** ..... 7-1

7.1 RECIPIENTS OF DEIS ..... 7-1
*7.2 COMMENTORS ON DEIS* ..... 7-3

**CHAPTER 8. COMMENTS AND COORDINATION** ..... 8-1

8.1 EARLY AGENCY COORDINATION ..... 8-1
8.2 PUBLIC PARTICIPATION EFFORTS ..... 8-2
8.3 AGENCY COORDINATION ..... 8-5

**CHAPTER 9. SECTION 4(f) EVALUATION** ..... 9-1

9.1 PROPOSED ACTION ..... 9-1
9.1.1 Purpose of Proposed Action ..... 9-1
9.1.2 Need for Section 4(f) Evaluation and Section 106 Process ..... 9-1
9.1.3 Project Alternatives ..... 9-2
9.2 DESCRIPTION OF SECTION 4(f) PROPERTIES AND RESOURCES ..... 9-3
9.2.1 Georgetown Historic District ..... 9-3
9.2.2 National Park Service Property (Potomac Palisades) ..... 9-4
9.2.3 National Park Service Property (Chesapeake and Ohio Canal Historic Park) ..... 9-4
9.2.4 Potomac Gorge ..... 9-5
9.2.5 National Park Service Property (George Washington Memorial Parkway) ..... 9-5
9.2.6 National Park Service Property (Glover Archbold Park) ..... 9-5
9.2.7 Georgetown University and Other Historic Structures ..... 9-5
9.2.8 Archaeological Resources/Phase I Survey ..... 9-6
9.2.9 Summary of 4(f) Sites ..... 9-6
9.3 IMPACTS ON THE SECTION 4(f) PROPERTIES AND RESOURCES ..... 9-7
9.3.1 Alternative 2 - At-Grade Intersection ..... 9-7
9.3.2 Alternative 2A - At-Grade Intersection (No Left Turn in AM) ..... 9-8

9.3.3 Alternative 3B - Westbound Canal Road Elevated ..... 9-9
9.3.4 Alternative 3H - Canal Road Underpass ..... 9-11
9.3.5 ***Alternative 2A - Modified - At-Grade Intersection*** ..... 9-12
9.4 AVOIDANCE ALTERNATIVES ..... 9-14
9.5 SUMMARY OF SECTION 4(f) PROPERTIES AND RESOURCES TAKEN 9-15
9.6 MITIGATION MEASURES ..... 9-16
9.7 COORDINATION ..... 9-16
9.8 ***BASIS FOR CONCLUSION OF NO FEASIBLE AND PRUDENT ALTERNATIVE TO USE OF SECTION 4(f) LAND*** ..... 9-17
9.9 ***MINIMIZATION OF HARM TO SECTION 4(f) PROPERTY*** ..... 9-17
9.10 ***COORDINATION WITH DEPARTMENT OF INTERIOR, NATIONAL PARK SERVICE*** ..... 9-18
9.11 ***CONCLUSION*** ..... 9-19

**INDEX**

**BIBLIOGRAPHY**

**APPENDICES**

A. Project Documentation
B. Agency Correspondence Prior to Draft Environmental Impact Statement
C. Georgetown University Comprehensive Transportation Management Plan
D. Public Coordination
E. Construction Sequencing & Maintenance of Traffic
***F. Comments and Responses on Draft Environmental Impact Statement***
***G. Section 106 Correspondence***
***H. Reevaluation of DEIS***

## LIST OF FIGURES

| | | Follows Page |
|---|---|---|
| 1-1 | Location Map | 1-1 |
| 1-2 | Vicinity Map | 1-1 |
| 1-3 | Georgetown University Access and Parking | 1-3 |
| 2-1 | Preliminary Alternatives | 2-4 |
| 2-2 | Alternative 1 - No Build | 2-8 |
| 2-3 | Alternative 2 - At Grade Intersection; Alternative 2A- with Prospect Street Entrance Open | 2-9 |
| 2-4 | Alternative 3B - Westbound Canal Road Elevated | 2-9 |
| 2-5 | Alternative 3H - Canal Road Underpass | 2-10 |
| 2-6 | ***Alternative 2A - Modified - At Grade Intersection*** | 2-12 |
| 2-7 | ***Preferred Alternative - Canal Road Configuration at Whitehurst Freeway*** | 2-12 |
| 3-1 | General Land Use Plan | 3-1 |
| 3-2 | Zoning Map | 3-2 |
| 3-3 | Communities and ANC Boundaries | 3-2 |
| 3-4 | Census Tracts | 3-3 |
| 3-5 | Georgetown University Campus | 3-4 |
| 3-6 | Community Facilities | 3-4 |
| 3-7 | National Park Service Property | 3-5 |
| 3-8 | View from Westbound Canal Road | 3-6 |
| 3-9 | View from Eastbound Canal Road | 3-6 |
| 3-10 | Views of Georgetown Entrance Road | 3-6 |
| 3-11 | Tree Canopy | 3-6 |
| 3-12 | Historic Resources | 3-7 |
| 3-13 | Primary Georgetown University Access Routes | 3-10 |
| 3-14 | Public Transportation System | 3-11 |
| 3-15 | G.U.T.S. Shuttle Routes | 3-11 |
| 3-16 | 1993 Peak Hour Traffic | 3-14 |
| 3-17 | Distribution of Commuter Trips | 3-15 |
| 4-0 | ***Property Parcels*** | 4-2 |
| 4-1 | Cross Sections of Alternative 1- No Build | 4-6 |
| 4-2 | Cross Sections of Alternative 2 and 2A | 4-6 |
| 4-3 | ***Cross Sections of Preferred Alternative, 2A-Modified*** | 4-6 |
| 4-4 | Cross Sections of Alternative 3B | 4-6 |
| 4-5 | Cross Sections of Alternative 3H | 4-7 |
| 4-6 | Elevations of Alternatives | 4-7 |
| 4-7 | A.M. Peak-Hour University-Generated (Main Academic Campus) Traffic | 4-15 |
| 4-8 | P.M. Peak-Hour University-Generated (Main Academic Campus) Traffic | 4-15 |

**LIST OF FIGURES (Continued)** ..... Follows Page

4-9 1998 A.M. Peak-Hour Traffic ..... 4-16
4-10 1998 P.M. Peak-Hour Traffic ..... 4-16
4-11 2016 A.M. Peak-Hour Traffic ..... 4-16
4-12 2016 P.M. Peak-Hour Traffic ..... 4-16
4-13 Air Quality Receptor Sites ..... 4-24
4-14 Noise Receptor Sites ..... 4-28

9-1 General Area 4(f) Resources ..... 9-2
9-2 National Park Service and Other 4(f) Property ..... 9-2
9-3 View of C&O Canal Historic Park ..... 9-13

## LIST OF TABLES

Page

S-1 Summary of Alternatives ..... S-3
S-2 Summary of Environmental Impacts ..... S-5

P-1 ***Commitments for Mitigation under Preferred Alternative, 2A-Modified*** ..... P-3

2-1 Summary of Alternatives ..... 2-14

3-1 Population and Housing Characteristics ..... 3-3
3-2 Existing On-Campus Parking Spaces, Georgetown University ..... 3-12
3-3 Parking Accumulations, Georgetown University Main Academic Campus ..... 3-13
3-4 Traffic Volumes - Daily and Peak Hours, Entrances to Main Academic Campus, 1982-1988-1993 ..... 3-14
3-5 Commuter Trips Distributed By Major Routes Used By Main Academic Campus Entrance In Percent By Arrival and Departure ..... 3-16
3-6 ***Peak Hour Turning Movement Counts, University In Session and Out of Session*** ..... 3-17
3-7 National Ambient Air Quality Standards ..... 3-20
3-8 FHWA Noise Abatement Criteria ..... 3-23
3-9 Plants of the Littoral Shelf, C&O Canal ..... 3-26
3-10 Common Flora of the Georgetown Entrance Project Area ..... 3-27
3-11 Expected Wildlife Species In The Georgetown Project Area ..... 3-28

4-1 Right-of-Way Requirements ..... 4-2
4-2 ***Impacts to Utilities*** ..... 4-5
4-3 Historic Property Required ..... 4-10
4-4 ***Archeological Resource Concerns*** ..... 4-11
4-5 Net Changes in Peak Hour Traffic ..... 4-17
4-6 Intersection Level of Service/Delay ..... 4-21

**LIST OF TABLES (Continued)** ..... Follows Page

4-7 Air Quality Sensitive Receptor Locations ..... 4-25
4-8 Modeled Peak One Hour Carbon Monoxide Concentrations ..... 4-25
4-9 Predicted Noise Levels - dBA, $L_{eq}$ ..... 4-29
4-10 Impacts to Land Forms ..... 4-31
4-11 Estimated Habitat Loss in Hectares (Acres) ..... 4-32
4-12 Construction Impact Per Alternative ..... 4-36

5-1 ***NETSIM Summary of Intersection Levels of Service/Delay (Seconds)*** ..... 5-3
5-2 ***NETSIM Summary of Average Corridor Travel Time and Speed – Primary Route*** ..... 5-5
5-3 ***NETSIM Summary of Average Corridor Travel Time and Speed – Local Routing*** ..... 5-6

## LIST OF TECHNICAL REPORTS

- Traffic and Transportation Technical Report (1995)
- Air Quality Analysis (June 1995, and ***May 1998)***
- Analysis of C&O Canal Wall (1995)
- Phase I Archeological Identification Survey (1995)
- Preliminary Archeological Assessment (1993)
- Noise Impacts Analysis (1995)
- ***Final Network Simulation Traffic Operations Analysis Report (1998)***

Many of these reports have been previously made available for review at:

ML King Memorial Library
901 G Street, NW
Washington, DC

Georgetown Regional Library
Wisconsin Ave. & R Street
Washington, DC

Palisades Branch Library
49th & V Streets, NW
Washington, DC

FHWA District Division Office
Union Center Plaza, Suite 750
820 First Street, N.E.
Washington, DC

FHWA Eastern Federal Lands Highway Division Office
21400 Ridgetop Circle
Sterling, VA 20166

DC Department of Public Works Office

National Park Service, National Capital Region

# PREFACE

***Note: This entire section is new to the Final Environmental Impact Statement.***

## P.1 DOCUMENT FORMAT

This document is the Final Environmental Impact Statement (FEIS) and Final Section 4(f) Statement for a proposed transportation improvement to the Canal Road entrance to Georgetown University, in Washington, D.C. The FEIS was prepared in accordance with Federal Highway Administration *Technical Advisory T6640.8A, Guidance For Preparing and Processing Environmental and Section 4(f) Documents.* **The FEIS highlights important changes in or additions to text from the Draft Environmental Impact Statement (DEIS).** The Federal Highway Administration or its consultants developed all data for this project, except where other sources are identified.

The FEIS is divided into nine chapters and eight appendices.

The first section of this FEIS provides introductory and explanatory material, discusses the Preferred Alternative for the proposed project, and provides a Summary. Commitments for mitigation of impacts associated with the Preferred Alternative are also presented. These mitigation measures are compiled from the environmental consequences section of the FEIS and from Agency correspondence received throughout the study process.

Subsequent chapters cover the contents necessary for a FEIS, including: Chapter 1 – Purpose and Need; Chapter 2 – Alternatives; Chapter 3 – Affected Environment; Chapter 4 – Environmental Consequences. The Final Section 4(f) Statement appears as Chapter 9.

Appendices A, B, and C are identical to the DEIS. Appendix D includes one additional newsletter than was in the DEIS. Appendix E includes a construction sequence for the Preferred Alternative, which is a modification of Alternative 2/2A in the DEIS. Copies of public and agency correspondence concerning the DEIS and responses appear in Appendix F. Appendix G contains the Memorandum of Agreement (MOA) among the State Historic Preservation Officer (SHPO), the District of Columbia Department of Public Works (DCDPW), the National Park Service (NPS), and FHWA for the mitigation of effects to the Section 106 properties. Appendix H is the FHWA evaluation concluding that no supplemental DEIS is required.

## P.2 PREFERRED ALTERNATIVE

***Note: This entire section is new to the Final Environmental Impact Statement.***

Four build alternatives and the No Build were evaluated in detail in the Draft Environmental Impact Statement (DEIS). All are described and discussed in Chapter 2 of this Final Environmental Impact Statement (FEIS). The No Build was not selected as the Preferred Alternative because it did not

adequately meet the Purpose and Need for the project. Build Alternatives 3B and 3H were eliminated due to greater environmental and aesthetic impacts, higher costs, and the lack of significant traffic benefits. Through an alternatives analysis process, it became apparent that Build Alternatives 2 and 2A (at-grade intersection, with- and without closing the Prospect Street entrance) satisfied the Project's Purpose and Need while minimizing social, economic, engineering, and environmental impacts. These two alternatives also had received considerable public support during the public hearing and comment process. However, both alternatives had considerable visual and aesthetic impacts to the bluffs of the Palisades, and also might have triggered secondary development.

All alternatives were evaluated equally for their ability to accommodate the reduced impacts sought by the Agencies and public. Numerous additional concepts such as frontage roads and traffic circles were suggested and evaluated. Alternative 2A provided the best traffic solution with the least impacts, and thus efforts were made to further mitigate its impacts.

Using many of the suggestions made by Agencies and the public, various concepts and adjustments were applied to Alternative 2A. Alternative 2A-Modified resulted from numerous designs and evaluations. The modifications to Alternative 2A which resulted in the Preferred Alternative, Alternative 2A-Modified include:

- Maintain the existing University entrance drive at the bluffs.
- Eliminate a merge lane on Canal Road for exiting westbound traffic.
- Provide one entrance lane to and one exit lane from the University.
- Reduce the design speed of the entrance/exit.
- Require only one retaining wall on the north side of Canal Road.
- Reduce the height and length of the retaining wall.
- Provide maximum "green" time for Canal Road signals.
- Provide an additional eastbound lane on Canal Road at Whitehurst Freeway

Alternative 2A-Modified disturbs less property than the other Build Alternatives. It avoids Lot 822 completely and reduces impacts to Section 4(f) land by about 50 percent. A more detailed description of the Preferred Alternative is found in Chapter 2. Table S-2, contained in the Summary, provides an overview of the potential impacts associated with the various alternatives, including the Preferred Alternative.

In order to maintain at least the same level of service for traffic on Canal Road as the No Build Alternative, a mitigation measure at the entrance to the Whitehurst Freeway was developed as part of the Alternative 2A-Modified. Specifically, the roadway lanes along Canal Road will be reconfigured to add another lane. This will provide for one through lane, one turning lane, and one combined through/turning lane in the middle.

Based on the alternatives development process described in Chapter 2.0 and the environmental evaluation presented in Chapter 4.0, Alternative 2A-Modified was selected as the Preferred Alternative.

# P.3 COMMITMENTS FOR MITIGATION

***Note: This entire section is new to the Final Environmental Impact Statement.***

Several mitigation measures are proposed as part of the Preferred Alternative. This section highlights the mitigation measures associated with each of the identified environmental impacts, which are discussed in greater detail in Chapter 4 – Environmental Consequences, and Chapter 9 – Section 4(f) Statement.

The first of such mitigation commitments is compliance with the 1991 initial project multi-party Memorandum of Agreement, which appears in Appendix A. From a design perspective, one of the most notable requirements of that MOA is the design approval mechanism, which is intended to assure optimum landscaping and appropriate aesthetic considerations in the design details.

The second commitment is compliance with the 1998 cultural resources multi-party Memorandum of Agreement, which appears in Appendix G. From a design perspective, this MOA also involves coordination and approval of details specific to use of the Chesapeake and Ohio Canal Historic District and the Georgetown Historic District. Among the aesthetic concerns to be coordinated with the National Park Service (NPS) and the State Historic Preservation Officer (SHPO) will be: refacing of the reconstructed Canal Road retaining wall at the Whitehurst Freeway; providing continued access for the National Park Service service road on the north side of the C&O Canal near the Whitehurst Freeway intersection; and providing landscape treatments such as brick sidewalks at the reconstructed entrance to the University and the Canal Road/Whitehurst intersection.

The following multi-page table summarizes other specific commitments of the cooperating Agencies in the completion of the proposed improvements:

**Table P-1**
**Commitments for Mitigation**
**under the Preferred Alternative, 2-A Modified**

| ISSUE | PROPOSED MITIGATION |
|---|---|
| **COMMUNITY IMPACTS**<br>• Land Use | • Ensure Georgetown University provides in-kind replacement land for National Park Service property to be taken for the project.<br>• Avoid any construction on or use of Lot 822. |
| • Social, Relocation, Environmental Justice | No mitigation necessary |
| • Utilities | No blasting |
| • Visual | • Coordinate with the Commission of Fine Arts regarding |

**Table P-1**
**Commitments for Mitigation**
**under the Preferred Alternative, 2-A Modified**

| | |
|---|---|
| • Visual (cont'd) | plantings, textures, and materials.<br>• Attempt to reduce further the height of the retaining wall on the north side of Canal Road from the presently estimated 3 meters.<br>• Provide a landscaped median and sidewalk between the entrance road and Canal Road.<br>• Provide suitable treatment (facing) of retaining walls along entrance road and reconstructed Whitehurst intersection. |
| • Historic and Archeological | • Coordinate with the SHPO and NPS for design details at the C&O Canal, i.e. retaining wall along Canal Road at the Whitehurst Freeway intersection.<br>• Coordinate with the SHPO for design details at the entrance to reduce visual impacts to the Georgetown Historic District appearance. |
| **TRAFFIC AND TRANSPORTATION** | • Disallow left turns outbound onto Canal Road from the Georgetown University during morning peak hours.<br>• Provide third eastbound lane at the intersection of Canal Road and Whitehurst Freeway.<br>• Maintain Prospect Street for entrance and exit to the University.<br>• Synchronize signal timing for signals at the entrance with those at Canal/Foxhall and Canal/Whitehurst. |
| **AIR QUALITY** | No mitigation necessary |
| **NOISE** | No mitigation necessary |
| **NATURAL RESOURCES** | |
| • Land Form | No mitigation necessary |
| • Water Quality | Apply Best Management Practices during construction |
| • Wetlands | No mitigation necessary |
| • Wildlife and Habitat | No mitigation necessary |
| • Floodplains and Hydrology | No mitigation necessary |
| • Threatened and Endangered Species | No mitigation necessary |

**Table P-1**
**Commitments for Mitigation**
**under the Preferred Alternative, 2-A Modified**

| | |
|---|---|
| **HAZARDOUS WASTE SITES** | • Avoid abandoned trolley right-of-way<br>• No other mitigation necessary |
| **CONSTRUCTION ACTIVITIES**<br>• Permits | Obtain stormwater permit from DC |
| • Excavation and Blasting | • No blasting<br>• Avoid reconstruction of eastbound lane of Canal Road closest to the C&O Canal except at the tapering point for the Whitehurst Freeway intersection widening.<br>• Perform stability tests along the C&O canal wall supporting Canal Road at the entrance location and at the Whitehurst mitigation location. |
| • Maintenance of Traffic | • Maintain two lanes on Canal Road during peak periods in both directions.<br>• Minimize duration of disruption to automobiles, pedestrians, and bicyclists.<br>• Maximize safety to workers and travellers.<br>• Provide proper construction zone signing and traffic control. |
| • Air and Noise During Construction | • Ensure compliance with standard specifications for minimizing fugitive dust emissions and construction equipment emissions.<br>• Ensure compliance with DCDPW restrictions regarding nighttime construction activities.<br>• Provide specifications for stoppage of construction noise during passage of mules along the C&O Canal towpath. |

# CHAPTER 1. PURPOSE AND NEED

***Note: Highlighted text indicates substantive information different from the Draft Environmental Impact Statement (DEIS) or new to this Final Environmental Impact Statement.***

## 1.1 PROJECT DESCRIPTION

The Proposed Action would reconstruct the Canal Road entrance to Georgetown University in order **to substantially improve vehicle access** to the Main Academic Campus Parking Lot. At present only right turn movements are allowed to and from the westbound lanes of Canal Road due to the raised barrier median that separates the eastbound and westbound lanes.

Georgetown University is located in the District of Columbia (District or D.C.) along the Potomac River (see **Figure 1-1**). It is bounded by Reservoir Road on the north, 35th Street on the east, Canal Road on the south and Glover-Archbold Park on the west (**Figure 1-2**). The Proposed Action is on the south side of the University, along Canal Road between the Whitehurst Freeway and Foxhall Road. Canal Road in this area is a four-lane, divided roadway in a narrow right of way, bounded by the historic Chesapeake and Ohio Canal to the south and the steep slopes of the Potomac Palisades to the north.

## 1.2 PURPOSE OF THE PROJECT

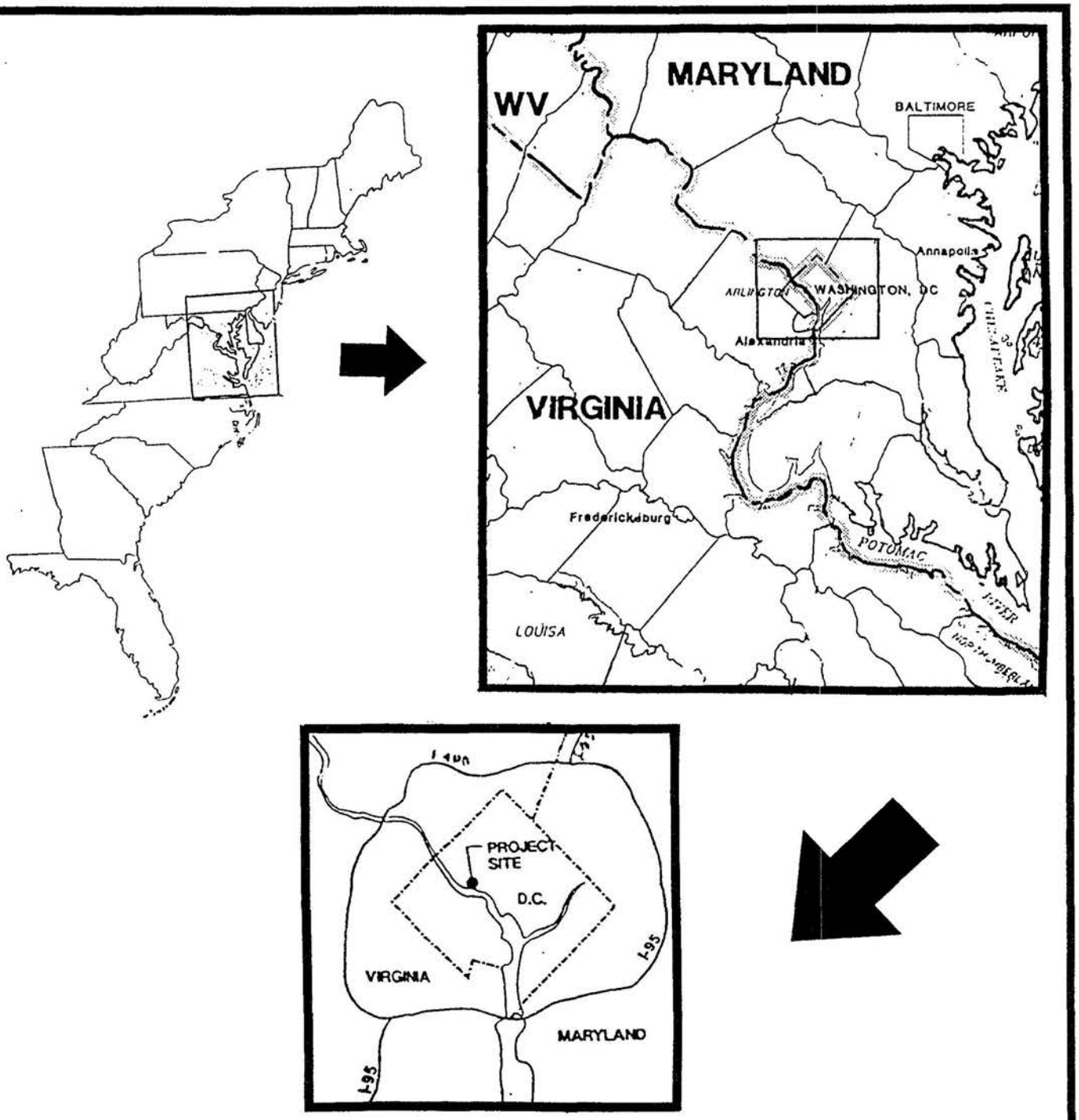
The purpose of the proposed project is to provide **improved** vehicular access at the intersection of the Canal Road entrance to Georgetown University.

### 1.2.1 Project History

For almost two decades, it has been proposed to upgrade the Canal Road entrance to Georgetown University. In 1976, the Congress authorized a study of this intersection using Federal Urban Mass Transportation Administration funds. An Environmental Assessment study published in 1982 recommended an at-grade signalized intersection. That analysis showed that the existing traffic on Canal Road would not be significantly affected. At a public hearing on that proposal, however, residents expressed the fear that traffic backups would be caused by the left-turning traffic. Because of these concerns, this plan was never implemented.

### 1.2.2 Congressional Mandate

In 1987, the United States Congress authorized the current project in the Surface Transportation and Uniform Relocation Assistance Act of 1987, Public Law 100-17, Section 149(a)(14), See Appendix A. The law provides for "a demonstration project in the vicinity of the C&O Canal in the District of Columbia for the purpose of substantially improving motor vehicle access at a major

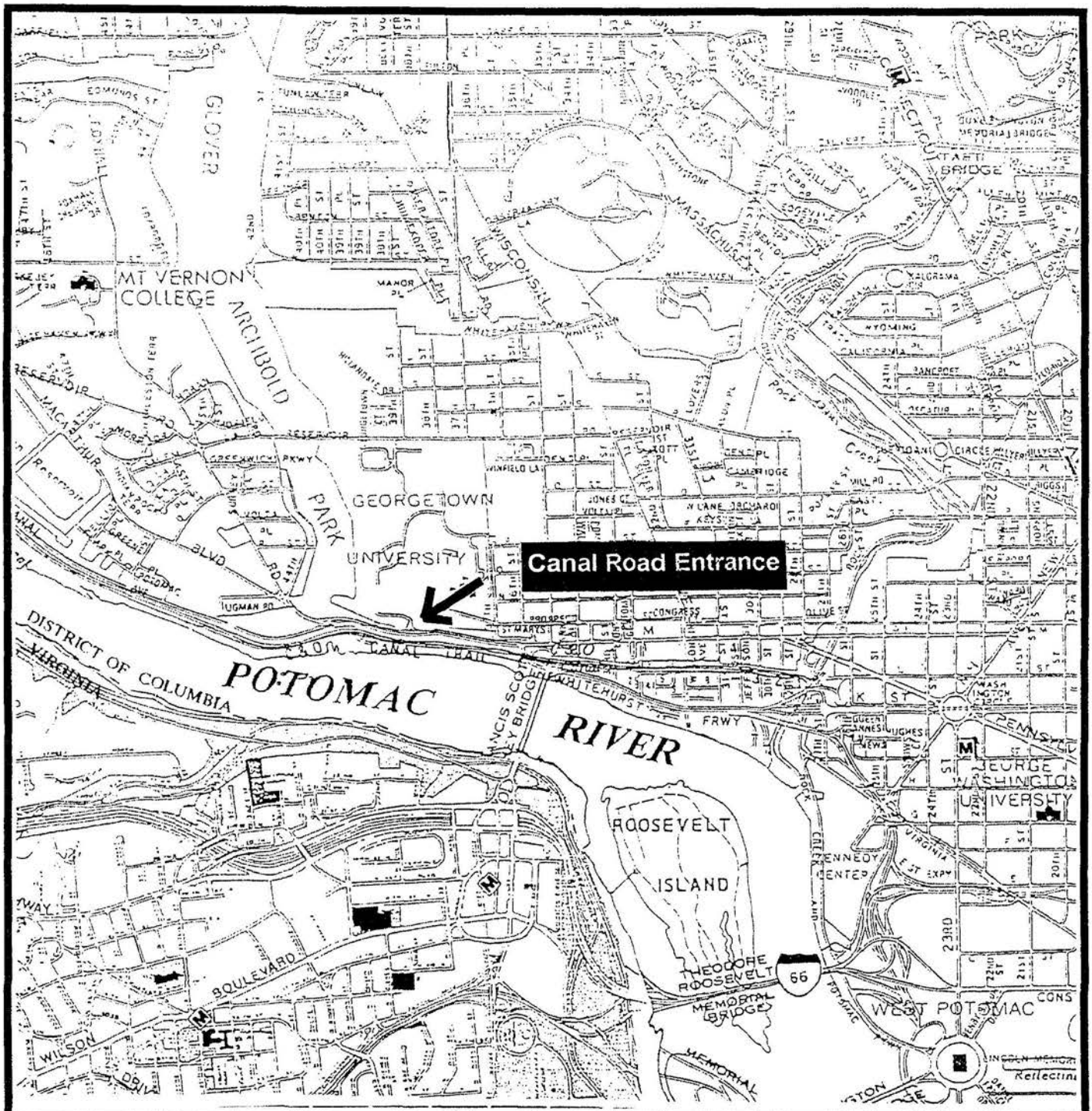



**Location Map**

Georgetown University Entrance Road ● Environmental Impact Statement

**Figure 1-1**

Federal Highway Administration




**Vicinity Map**

Georgetown University Entrance Road ● Environmental Impact Statement | Figure 1-2

Federal Highway Administration

traffic generator without decreasing the efficiency of a Federal-aid primary highway." The 1987 Act provided approximately $6 million in funding for the Project. The 20 percent local matching share required for Federal funding is to be provided by Georgetown University in the form of a scenic easement of 1.01 hectares (2.5 acres) of land.

A number of Agencies share responsibility for planning and implementing this project. They include the District of Columbia Department of Public Works (DCDPW); the United States Department of the Interior, National Park Service (NPS); and two divisions of the Federal Highway Administration, the District of Columbia Division (FHWA-DC) and the Eastern Federal Lands Highway Division (FHWA-EFLHD). These Agencies and Georgetown University negotiated a Memorandum of Agreement setting forth responsibilities for carrying out the Project. (See Appendix A.)

Georgetown University was included because it was identified as a major sponsor of the Project who will be involved in the implementation of the Project through providing the 1.01 hectares (2.5-acres) scenic easement. Georgetown University will also provide additional scenic easements or such other interests in lands as may be mutually agreed upon by the University and the NPS in exchange for the access easement across NPS lands used for the reconstructed Canal Road entrance.

Under this Memorandum of Agreement, signed in December 1991, the FHWA-EFLHD is responsible for the project design and environmental documentation.

**The National Capital Planning Commission (NCPC) coordinates all Federal Planning activities in the Washington, D.C. region. The NCPC reviews federal developments and projects. Projects are reviewed for compliance with the Comprehensive Plan, as well as with federal environmental and historic preservation laws.**

**This Project would require NCPC approval on two bases. The NCPC would review and approve transfers of jurisdiction over properties within the District of Columbia owned by the United States or the District among Federal and District authorities. This authority stems from 40 USC #122, D.C. Code #8-111. Also the project MOA stipulates in Section 1d that the FHWA, NPS, Georgetown University, and the District agree that FHWA shall be responsible for seeking "review and approval of the design of the Demonstration Project by the National Capital Planning Commission...."**

**Since NCPC approval is required, the NCPC was asked by the FHWA to be a cooperating agency for this EIS. NCPC has provided historical or statistical information for this EIS. In addition, NCPC staff has coordinated meetings with FHWA, NPS, and the District, and attended public meetings since the initiation of the study as well as subsequent to the DEIS.**

### 1.2.3 Draft Environmental Statement

**The study conducted by FHWA-EFLHD resulted in a Draft Environmental Impact Statement (DEIS) which was distributed in July 1995. The DEIS explained the preliminary**

**Alternatives considered, and the process involved in public participation and the development of additional Alternatives. Four Build Alternatives and the No Build alternative received detailed evaluation in the DEIS. A Public Hearing was conducted in September 1995, with the public comment period extending to September 30, 1995.**

### 1.2.4 Post Draft Environmental Statement Activities

**In response to comments on the DEIS, and subsequent Agency coordination, numerous proposed alternatives and mitigation options were analyzed. None appeared to satisfy the purpose and need for the project or significantly reduce environmental impacts, except for variations to Alternatives 2/2A. Refer to additional discussion in Chapter 2.**

**Detailed analyses were subsequently conducted on numerous options of Alternatives 2/2A to further reduce impacts, and identify and refine mitigation options. Detailed traffic analyses for Alternative 2/2A and variations of Alternative 2A, which is herein referred to as Alternative 2A-Modified, provided operational simulations allowing real-time assessments and comparisons for signal timings and traffic flow.**

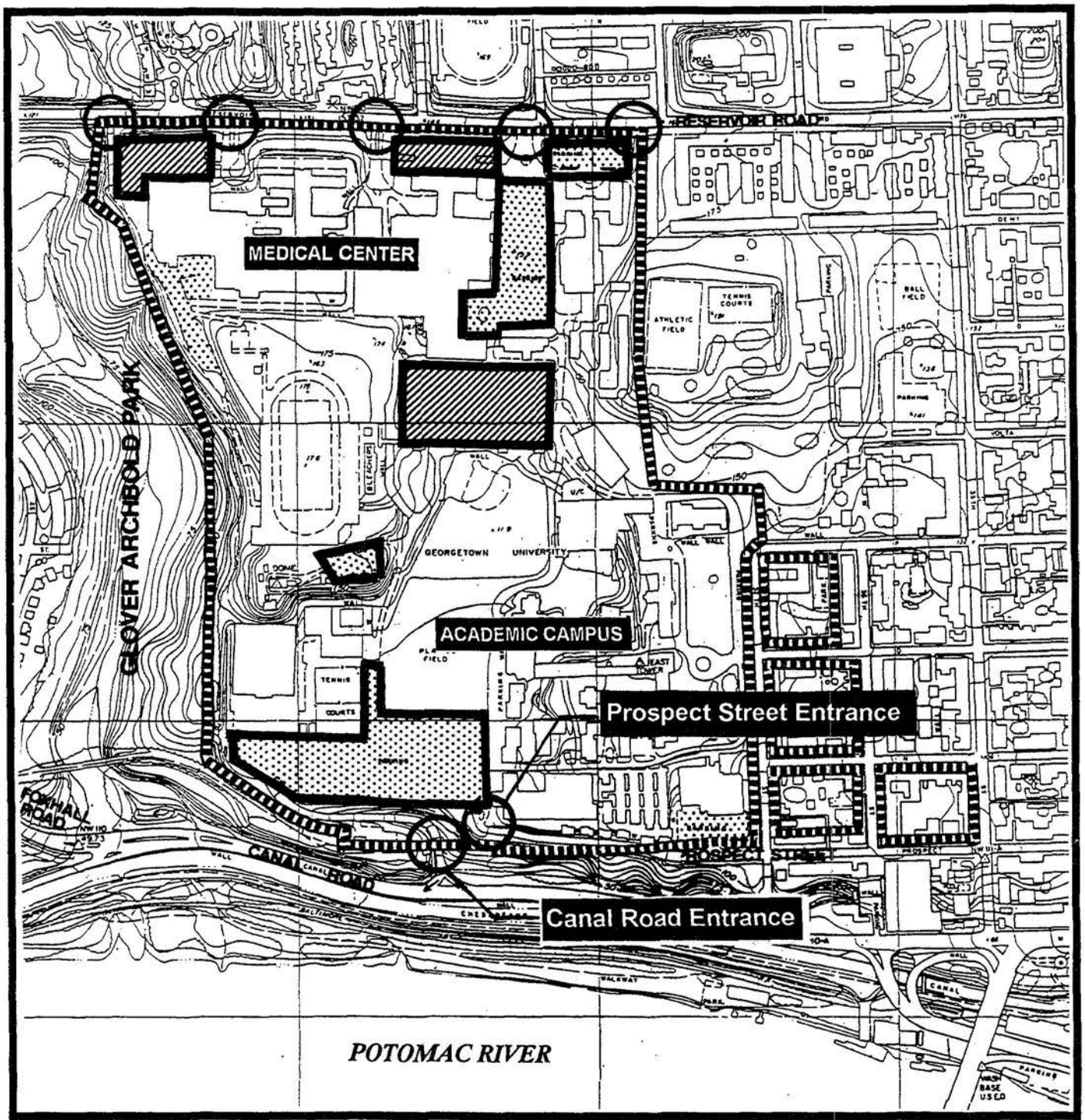
**Since the DEIS, the study area did not change, nor did the surrounding environmental conditions, nor did the basic alternative solutions. No additional significant impacts would be incurred by the Preferred Alternative. Therefore, a supplemental DEIS was determined to be not required. (*See Appendix H.)***

## 1.3 NEED FOR THE PROJECT

The need for the Project is generated by the limited turning movements that are available at the Canal Road entrance to Georgetown University. Current access to the Main Academic Campus parking lot of Georgetown University is divided between the Canal Road entrance and the Prospect Street entrance as a result of the physical restrictions of the raised barrier median on Canal Road. There is no access to the Main Academic Campus off of Reservoir Road. The lack of full turning movement capability at the Canal Road entrance causes additional University-intended traffic to use the Georgetown neighborhood streets and utilize the Prospect Street access to the University. By improving the Canal Road entrance, the Proposed Action would focus access to the Main Academic Campus on an arterial roadway, namely Canal Road. **Other universities in Washington, D.C. have their main entrances served by arterial routes.**

### 1.3.1 Project Objective - Improve Roadway Utilization

The project would provide access to the University from Canal Road **from both eastbound and westbound lanes.** (See **Figure 1-3**). Currently, much of the traffic to and from the University uses local streets rather than Canal Road, a roadway classified as a Principal Arterial by the D.C. Department of Public Works (DCDPW). The levels of traffic generated by the Main Academic Campus parking lot for Georgetown University are more appropriately accommodated by an arterial roadway system since local roads primarily serve residential trip needs. Canal Road is an




**Georgetown University Access and Parking**

Georgetown University Entrance Road ● Environmental Impact Statement

**Figure 1-3**

Federal Highway Administration

east-west commuter route for traffic between residential areas in northwest D.C., Virginia and Maryland and the District's office centers. Canal Road also carries traffic between northwest D.C. and the Rosslyn and Crystal City business districts in Arlington County, Virginia.

West of the University entrance, Canal Road connects with the Clara Barton Parkway along the Potomac River, MacArthur Boulevard to the northwest, and Foxhall Road to the north. East of the University, Canal Road feeds into M Street and the Whitehurst Freeway to downtown D.C., and Key Bridge to Virginia.

The Canal Road entrance currently accommodates only right turns to and from westbound Canal Road. The Prospect Street entrance forces traffic through the Georgetown residential neighborhood. Vehicles arriving from the west must use the Prospect Street entrance by way of Reservoir Road or 35th Street. Vehicles arriving from the east, including from Virginia via the Key Bridge, can enter from Canal Road, but must depart by way of Prospect Street to return to the east.

**Providing full turning movements on Canal Road at the University entrance substantially improves motor vehicle access, particularly for emergency vehicles, G.U.T.S. buses, and delivery vehicles. This access would exist at all hours of the day, and reduce the need for these vehicles to use Prospect Street and the surrounding neighborhood streets as the sole entry point to the Main Academic Campus area.**

### 1.3.2 Benefits of the Proposed Action

Improving the Canal Road entrance would **shift some** University-intended traffic **to Canal Road** from Prospect Street and the north-south residential streets east of the University. Existing traffic counts have shown that about 2,200 vehicles use the Canal Road entrance daily, and about 4,300 vehicles gain access via the Prospect Street entrance. The residential streets east of Georgetown are narrow and congested, lined with historic houses. Many of the local streets are one-way, providing only one lane for traffic with parking on both sides. Vehicle back ups at the Prospect Street entrance and cross streets cause congestion locally, impeding residential and emergency access to these local streets. Improving the Canal Road entrance would help to alleviate these conditions. The **shifting** of the Main Academic Campus parking lot traffic from the Georgetown streets would improve safety for the pedestrians and access for emergency vehicles.

**Alternatives to close Prospect Street were studied (DEIS Alternatives 2, 3B and 3H). In order to minimize traffic impacts on eastbound Canal Road during AM peak, the Preferred Alternative would not allow left turns from the Canal Road exit so as not to stop eastbound Canal Road traffic. This accommodation to disallow left turns from the Canal Road exit in the morning peak hours in turn requires the Prospect Street entrance to be left open. Furthermore, leaving the Prospect Street entrance open provides drivers with maximum flexibility in selecting routes to access and exit the Main Academic Campus parking lot. The District of Columbia Board of Zoning Adjustment (BZA) has actively sought to achieve a balance of traffic on residential streets in its approval processes.**

One of the District of Columbia's goals has traditionally been to encourage reducing traffic volumes through residential neighborhoods. **By accommodating left turns into Georgetown University at the Canal Road entrance (and left turns out at all times other than the morning peak hours) and thus diverting traffic from the Prospect Street entrance, the proposed Project** would help to further this objective.

The Proposed Action is also **included in** Georgetown University's 1989 *Bicentennial Master Plan.* The BZA approved the University's Master Plan in 1990. **The proposed improvement implements one of the features included in that Master Plan.**

# CHAPTER 2. ALTERNATIVES

***Note: Highlighted text indicates substantive information different from the Draft Environmental Impact Statement (DEIS) or new to this Final Environmental Impact Statement.***

A number of alternatives were developed for consideration as part of the Draft Environmental Impact Statement (DEIS). These alternatives, which include both roadway and non-roadway proposals, were evaluated for their ability to meet the Project Purpose and Need. Following this initial reasonableness check, the remaining alternatives were then evaluated based on their construction cost and physical/ aesthetic impacts. As a result of this tiered evaluation approach, five Alternatives were selected for further study. **Subsequent to publication of the DEIS in July of 1995 and the Public Hearing held on September 19, 1995 several additional conceptual alternatives were investigated. This evaluation resulted in further refinement of one of the previously developed Alternatives.** This chapter discusses the process used to develop and evaluate these Alternatives and describes the selected Alternatives.

## 2.1 PRELIMINARY ALTERNATIVES CONSIDERED

The preliminary alternatives considered for the Proposed Action included Transportation Systems Management (TSM) and Transportation Demand Management (TDM) actions, mass transit, bicycle/pedestrian alternatives, and several roadway alternatives. These alternatives were developed based on the Purpose and Need of the Project to provide full access to the University's Main Academic Campus at Canal Road. Following is a description of these alternatives and a review of the reasons why they were eliminated from or selected for further detailed evaluation.

### 2.1.1 Transportation System Management/Transportation Demand Management

Transportation Systems Management (TSM) techniques are designed to maximize the efficiency of the existing transportation system. TSM includes methods to reduce congestion and better manage traffic by using existing facilities or low-cost improvements. Closely related to TSM is Transportation Demand Management (TDM). Instead of increasing the capacity of the existing transportation system, TDM attempts to reduce the demand for transportation and thus reduce the number of vehicles using the system. These strategies include measures that can be part of a Transportation Management Plan.

Potential options for Georgetown University, under this alternative, would include: minor reconstruction of the existing Canal Road entrance to provide left turns; signalization and the removal of parking on selected streets in the Georgetown neighborhood; and University implemented TDM programs. The following addresses each of these techniques.

*Minor Reconstruction of the Existing Canal Road Entrance*

The inexpensive alternative of simply cutting through the center median and providing signalization would allow left turns at the existing Canal Road entrance. However, this alternative would present safety and traffic problems. Traffic waiting to turn left into the campus would delay through traffic along Canal Road since there is no room to provide a left-turn stacking lane with the current road configuration. The left turn from eastbound Canal Road would be a safety hazard without dedicated left turn signals and adequate stacking lanes. Queuing lane(s) for traffic entering Canal Road would also be required.

*Signalization and Removal of Parking on Selected Streets*

TSM measures on the streets of Georgetown could improve traffic flow at the existing Prospect Street entrance. These measures might include limiting parking or signalizing intersections in Georgetown. However, these measures are not consistent with the District of Columbia planning policies, which attempt to channel through traffic to the arterial streets and away from residential streets. It can be expected that any plans to improve traffic flow **by limiting parking** on the residential streets would be opposed strongly by Georgetown residents. These measures would alter the character of the neighborhood, both by increasing the speed of automobiles and by reducing the already constrained parking capacity.

*Transportation Demand Management (TDM) Techniques*

Georgetown University outlined a Transportation Management Plan (TMP) in the 1983 Campus Plan. It was restated in the 1989 *Bicentennial Master Plan.* The plan encouraged ridesharing by: (1) reduction of overtime work; (2) provision of cab fares or a University vehicle for ridesharing participants who must work overtime; and (3) use of a University vehicle for staff members that need use of a vehicle to perform University business. The TMP also states that undergraduate students residing in on-campus housing or in close proximity to the campus are not allowed to park on campus. A copy of the "Comprehensive Transportation Management Plan" is included in Appendix C.

The University continues to work with local and regional transportation agencies to reduce demand for private vehicles on campus. Current measures to reduce demand include: (1) a limit on the number of parking spaces provided on campus; (2) financial incentives for carpools; and (3) the support of the campus bus system. The University in its approved campus plan has committed to not increase on-campus parking to more than 4,000 spaces. The University currently has 3,600 parking spaces and approximately 400 spaces for valet parking.

**One TDM alternative that has been studied is the use of the north/south road (or "spine") that exists on the Georgetown campus between the medical center and the main academic campus parking lot. This road has controlled access, limiting the number of users. It has been suggested to open the use of this road for all campus traffic. However, the BZA has mandated that the University keep traffic split between the medical center and the academic**

**campus. In addition, this option would not meet the Purpose and Need of this Project, which is to provide full vehicular access at the intersection of the Canal Road entrance to Georgetown University.**

**The potential exists for the University to provide satellite parking. Sites in the I-270 corridor, in Tenley Town, and in Georgetown Park theoretically capture a large geographic population. However, the likely number of users diminishes when considering the weighted values of waiting time and transfers to another mode. To provide shuttle service to the University would involve annual operating costs (between $145,000 and $250,000 per year per location).**

Attempts to manage or reduce traffic on campus through Transportation Systems Management or Transportation Demand Management techniques are desirable, but they will not meet the full Purpose and Need of the Proposed Action. Neither TSM nor TDM alternatives address the issue of full access from Canal Road, and therefore they were eliminated as standalone Alternatives.

### 2.1.2 Mass Transit

Mass transit alternatives focus on adding to the rail and bus service provided by the Washington Metropolitan Area Transit Authority (WMATA) and the campus bus service provided by the Georgetown University Transit Society (G.U.T.S.). These existing transit services are discussed in detail in Chapter 3 - Affected Environment, Section 3.2.

WMATA's MetroRail rapid transit service does not stop within convenient walking distance of Georgetown University. The nearest stations are a mile or more away. WMATA Metrobuses have routes on Reservoir Road and on 37th Street which border the University. The University's GUTS bus system provides service between the University and the Rosslyn and Dupont Circle Metro stations.

**Even with** a significant expansion of transit services to the University, (i.e. a closer Metro station or extended WMATA Metrobus routes), this alternative would not fulfill the Purpose and Need of this Project. At this time, no plans or funding are in place for such expansion, therefore the feasibility of these measures are uncertain and unlikely at this time. However, any improvements to the street circulation to and from the University could enhance current bus transit service by making the buses more maneuverable.

**G.U.T.S., with ridership of 809,000 for the 1997-1998 college year, provides a needed and increasingly popular service. (Ridership was 117,000 during 1993.) Nevertheless, there continues to be full usage of the Main Academic Campus parking lot.**

Dependence on mass transit is not a valid alternative to the Project because it does not address the Purpose and Need of the Proposed Action. Therefore, this alternative was eliminated from further study. However, all of the Build Alternatives would accommodate bus use.

### 2.1.3 Bicycle and Pedestrian Facilities

Georgetown University encourages bicycling and walking as modes of transportation. The University's campus plan includes a program to integrate vehicular, pedestrian and bicycle traffic on campus. Improvements have been made in pathways linking the campus with the surrounding community. Bicycle storage and locking stands are provided at key points throughout the campus. The University has a policy of not issuing parking permits to students and staff living near the campus. This policy encourages bicycling and walking.

The Federal government, in response to surface transportation legislation in recent years, is placing greater emphasis on bicycles and walking as a means of transportation. Because of this, the number and percentage of people bicycling or walking to work is expected to increase in future years. However, with the change in Federal transportation policy and support from local governments, bicycling and walking are not anticipated to supplant the automobile for transportation for most Americans in the foreseeable future. Bicycling and walking alternatives only could not serve as a practical alternative to the proposed Project, and were eliminated from further study. However, all of the Build Alternatives would accommodate pedestrian and bicycle use.

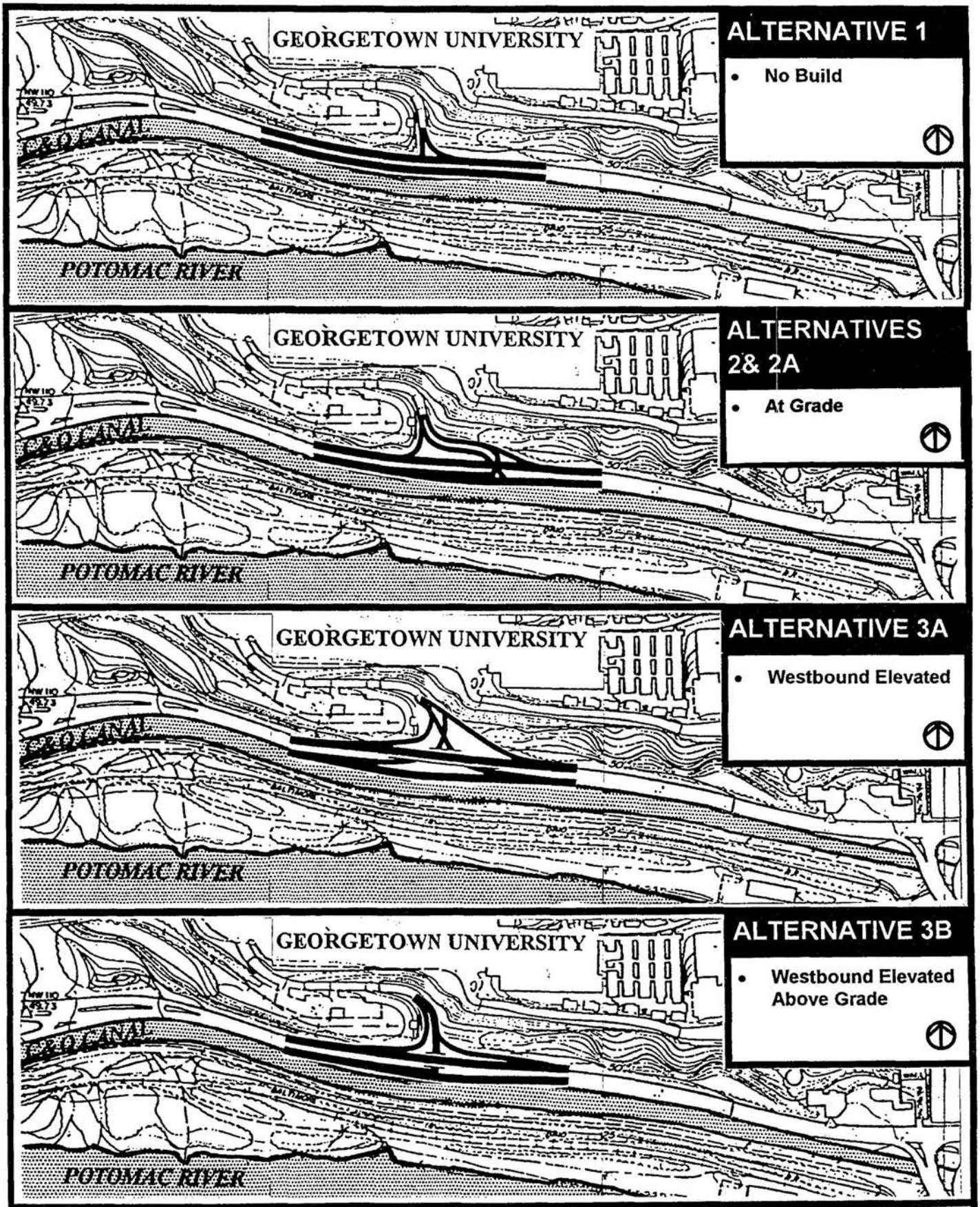
### 2.1.4 Roadway Alternatives

Conceptual roadway designs, shown in **Figure 2-1 (a-c),** were developed and evaluated as part of the environmental process. These include one at-grade alternative and eight grade-separated concepts. These Alternatives were developed in addition to the No Build Alternative. Important criteria for the development of the Alternatives was to limit new construction to north of the wall of the Chesapeake and Ohio (C&O) Canal, and to avoid Glover-Archbold Park to the west. Any additional right-of-way would be taken from the north side of Canal Road. Thus, none of the grade-separated alternatives includes a full cloverleaf type of design, and all ramps are as close as possible to Canal Road.

The nine conceptual Alternatives were presented at the initial scoping Public Meeting and at several neighborhood meetings. Based on the public comments from these meetings it was determined that the most critical factors **to the public** in comparing the Alternatives were their aesthetic and traffic impacts. As a result of the Public Meetings, two more conceptual alternatives were added to the initial list. These Alternatives included depressing both the eastbound and westbound lanes of Canal Road, and modifying the at-grade alternative.

Following are brief descriptions of the preliminary Alternatives. **(Sketches appear in *Figure 2-1-a, 2-1-b, and 2-1-c.*)** A brief rationale on why they were either eliminated or selected for more detailed evaluation in the EIS is also provided.

*Alternative 1*, the No Build Alternative, would maintain the existing right-turn-only intersection with westbound Canal Road. Alternative 1 is a "no action" option, and is included in the EIS to provide a baseline for analysis and comparison with the various build alternatives.



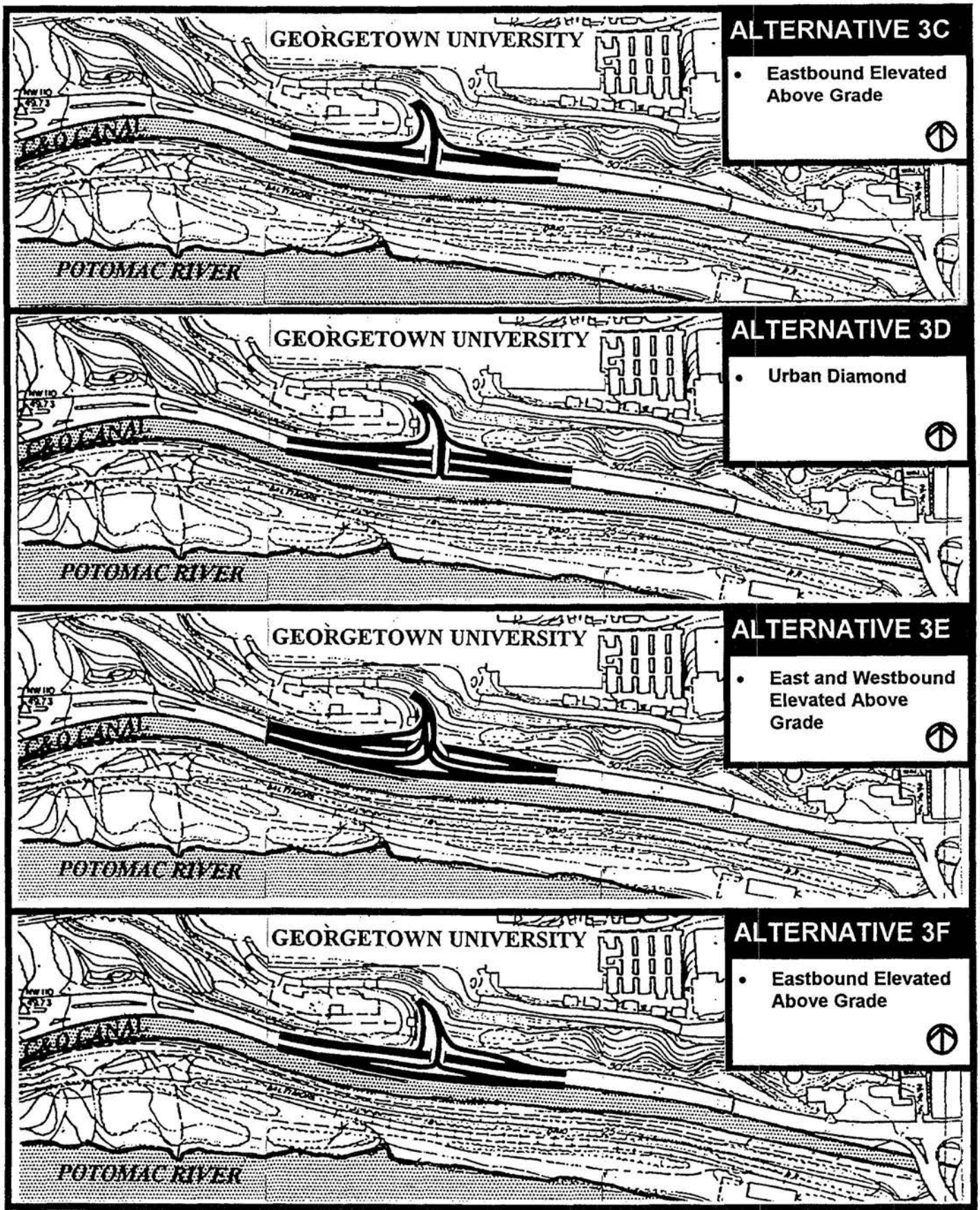

(NOT TO SCALE)

**Preliminary Alternatives**

Georgetown University Entrance Road ● Environmental Impact Statement

Figure 2-1-a

Federal Highway Administration



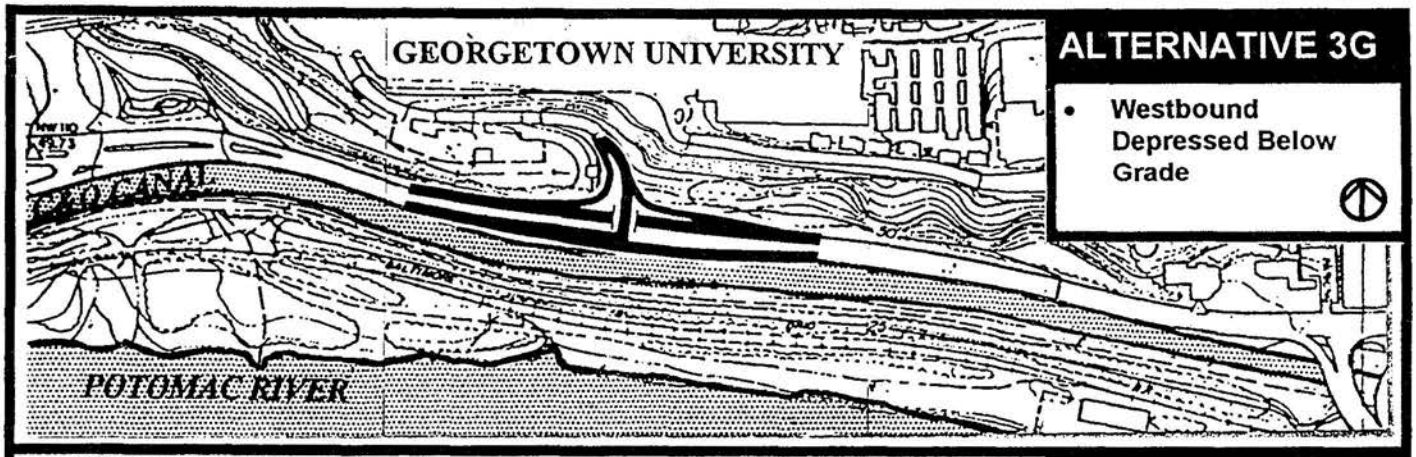

(NOT TO SCALE)

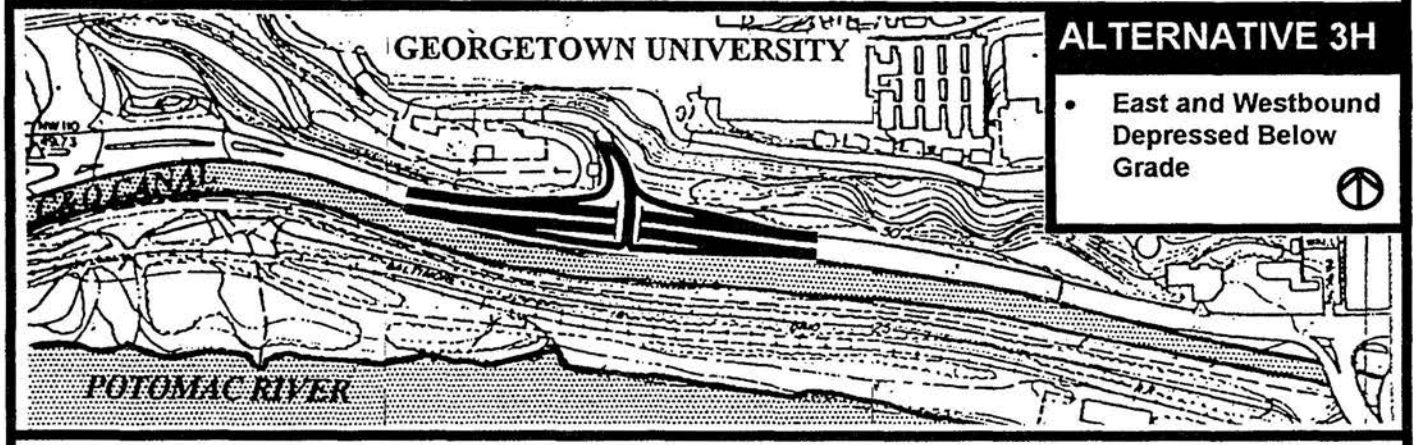
**Preliminary Alternatives**

Georgetown University Entrance Road ● Environmental Impact Statement

Figure 2-1-b

Federal Highway Administration




(NOT TO SCALE)

**Preliminary Alternatives**

Georgetown University Entrance Road ● Environmental Impact Statement

Figure 2-1-c

*Alternative 2*, an at-grade Alternative, consists of an intersection design similar to the one included in the 1982 Environmental Assessment. This Alternative encompasses traditional TSM techniques. Traffic signals would be placed at the intersection to control access into and out of the Main Academic Campus. Alternative 2 was selected for further evaluation because of its ability to meet the Project Purpose and Need at a low cost and with minimal aesthetic impacts. As part of this Alternative, the Prospect Street entrance to the main academic campus parking area would be closed.

*Alternative 2A,* which is similar to Alternative 2, would be an at-grade intersection similar to the one included in the 1982 Environmental Assessment. Traffic signals would be placed at the intersection to control access; however, left turns out of the Main Academic Campus onto eastbound Canal Road would not be allowed during morning peak hours. In addition, Prospect Street would also remain open at all times. This Alternative was selected for further evaluation in order to consider potential options for minimizing impacts to traffic operations along Canal Road.

*Alternative 3A* shifts the westbound lanes of Canal Road to the north and elevates them at the location of the entrance road. Eastbound Canal Road is kept at the existing grade. Left hand exit and entrance ramps are connected to eastbound Canal Road, and these ramps pass under westbound Canal Road. These ramps cross at-grade and would require signalization or other type of control on the ramps themselves, but not on Canal Road. The ramps for both eastbound and westbound Canal Road would include adequate queuing lanes for a 65 km/h (40 mph) design speed. This Alternative was eliminated because of the land required to accommodate the expansive layout. The Prospect Street entrance to the main academic campus would be closed as part of this Alternative.

*Alternative 3B* is similar in concept to Alternative 3A, but the entrance and exit for eastbound Canal Road are combined into a single roadway. It was selected for further study, because the terrace-like design of the elevated roadways would relate to the natural terrain, lessening visual impacts.

*Alternative 3C* elevates the eastbound lanes of Canal Road and has a roadway bridging over the westbound lanes for traffic to and from the University. The westbound lanes would be shifted to the north to provide space for the left-hand entrance and exit ramps connecting to the eastbound lanes of Canal Road. Entrance and exit ramps for westbound Canal Road would be provided. As part of this Alternative, the Prospect Street entrance would be closed. This Alternative was eliminated in favor of Alternative 3B, which achieves the same results with less of a visual impact.

*Alternative 3D* is the "urban diamond" concept. The Alternative would shift both the eastbound and westbound lanes of Canal Road to the north. Right-hand exit and entrance ramps to eastbound Canal Road would connect with a bridge over Canal Road. Right-hand exit and entrance ramps from westbound Canal Road would also connect with the elevated entrance road. The Prospect Street entrance to the academic campus main parking area would be closed. This Alternative was eliminated because of the aesthetic impacts of the elevated ramps adjacent to the Canal Road.

*Alternative 3E* shifts the westbound lanes of Canal Road to the north to provide room for elevated left-hand exit and entrance ramps to both eastbound and westbound Canal Road. As part of this

Alternative, the Prospect Street entrance would be closed. An additional right-hand entrance ramp to westbound Canal Road would be provided to serve traffic heading north on Foxhall Road at the Canal-Foxhall intersection. This Alternative was eliminated in favor of more compact ramp designs, such as Alternative 3B.

*Alternative 3F* shifts the westbound lanes of Canal Road to the north and provides elevated left-hand exit and entrance ramps for eastbound Canal Road. Right-hand exit and entrance ramps serve westbound Canal Road. The Prospect Street entrance would be closed. This Alternative was eliminated because of the aesthetic impacts of the elevated ramps.

*Alternative 3G* keeps eastbound Canal Road at-grade and provides left-hand exit and entrance ramps to eastbound Canal Road. Westbound lanes of Canal Road are shifted to the north to accommodate the ramps from eastbound Canal Road, which are depressed below-grade so that they pass below the ramps to eastbound Canal Road. As part of this Alternative, the Prospect Street entrance would be closed. Because of its similarity to Alternative 3B, this Alternative was eliminated from further study.

*Alternative 3H* shifts both the eastbound and westbound lanes of Canal Road to the north, like Alternative 3D, and depresses them below existing grade level. (This Alternative was added to the list based on public comments.) A bridge would carry traffic to and from eastbound Canal Road from the University. Right-hand exit and entrance lanes for eastbound Canal Road would be located along the Canal wall and would remain at grade. Right-hand exit and entrance ramps would also be provided for westbound Canal Road. The Prospect Street entrance would be closed. This Alternative was selected **for further study** to provide the opportunity to analyze the impacts of lowering Canal Road below grade level.

## 2.2 ALTERNATIVES SELECTED FOR ANALYSIS

In evaluating the preliminary roadway Alternatives, it became apparent that many of these design options were similar in physical features. Therefore, Alternatives with similar features were grouped together to form "families of alternatives." One from each of these families was selected for further study. Out of the eleven preliminary Alternatives, five were considered for further analysis in the Draft Environmental Impact Statement and Section 4(f) Statement (DEIS). These five were the 2, 2A, 3B, 3H, and No-Build Alternatives.

Following development and initial evaluation of the roadway and non-roadway alternatives, it was concluded that the TSM/TDM, Mass Transit, and Bicycle/Pedestrian Facilities Alternatives did not fulfill the Purpose and Need of this project and were eliminated as "stand alone" Alternatives.

Design criteria of the American Association of State Highway and Transportation Officials (AASHTO) were applied in the preliminary engineering of the Alternatives. Criteria for such factors as lane width, suitable grades, speeds, degree of curvature, sight distances and other safety

considerations were applied. Approximate limits of earthwork, retaining walls, and right-of-way requirements for each Build Alternative were identified.

Estimated costs were developed for each of the DEIS Alternatives and are shown. Estimated annual maintenance costs are also shown. Direct costs are broken down into the following areas:

- **Construction.** These costs include roadway excavation and pavement, bridge structures, piles, lagging, architectural facing and retaining walls, engineering costs, and contingency items. Costs have been compiled from FHWA unit costs and applying features and quantities specific to each Alternative were obtained from preliminary engineer's estimates from the Federal Highway Administration, Eastern Federal Lands Highway Division. **Costs are shown in 1998 dollars.**

- **Right-of-way.** This represents the cost of purchasing additional right-of-way. For all DEIS Build Alternatives, the only additional right-of-way which would need to be purchased directly is from one property, which will hereinafter be referred to as Lot 822.[1] The 1993 assessed value by the District of Columbia's Property Assessor's Office is $1.00 per square foot. Property belonging to Georgetown University, or to the National Park Service, or the District of Columbia which may be required for any selected Alternative is subject to consideration of the terms of the Memorandum of Agreement among these parties.

- **Utility costs**. These costs include relocating such utilities as water lines, electrical conduits, and storm sewers. Location and size of utility structures and facilities were obtained and unit costs applied to the estimated quantities involved.

- **Maintenance of traffic costs.** These were generally calculated based upon the length of time estimated for construction activity and the complexity of staging continuing traffic operations. (A more detailed discussion of construction-related impacts appears in Section 4.6 of Chapter 4 - Environmental Consequences; and in Appendix E.)

- **Maintenance**. Annual costs associated with maintenance and operation activities, such as signal maintenance, electric bills, pump maintenance, bridge inspection, etc. It does not include any assessment of reconstruction or major rehabilitation costs.

[1] This property was originally part of the right-of-way for a trolley which ran from the District to Glen Echo, and was owned by the D.C. Transit System, Inc., as the operating company for the trolley. It was acquired **by a Court-appointed trustee** on behalf of a group titled the Washington Metropolitan Area Riders' Fund ("Riders' Fund") at a foreclosure sale. **On May 31, 1996 this property was transferred by order of the U.S. District Court to the Washington Metropolitan Area Transit Authority (WMATA). WMATA is still investigating the issue of title.**

### 2.2.1 Alternative 1 - No Build

Alternative 1, the No Build Alternative, would maintain the existing entrance to Georgetown University from Canal Road. **(See Figure 2-2.)** This Alternative would continue to allow only right turns into the University from westbound Canal Road and right turns onto westbound Canal Road. The Prospect street entrance would remain open for all types of vehicles to enter and exit the Main Academic Campus.

There are no construction costs associated with this Alternative.

There are no additional annual maintenance costs associated with this Alternative.

### 2.2.2 Alternative 2 - At-Grade Intersection

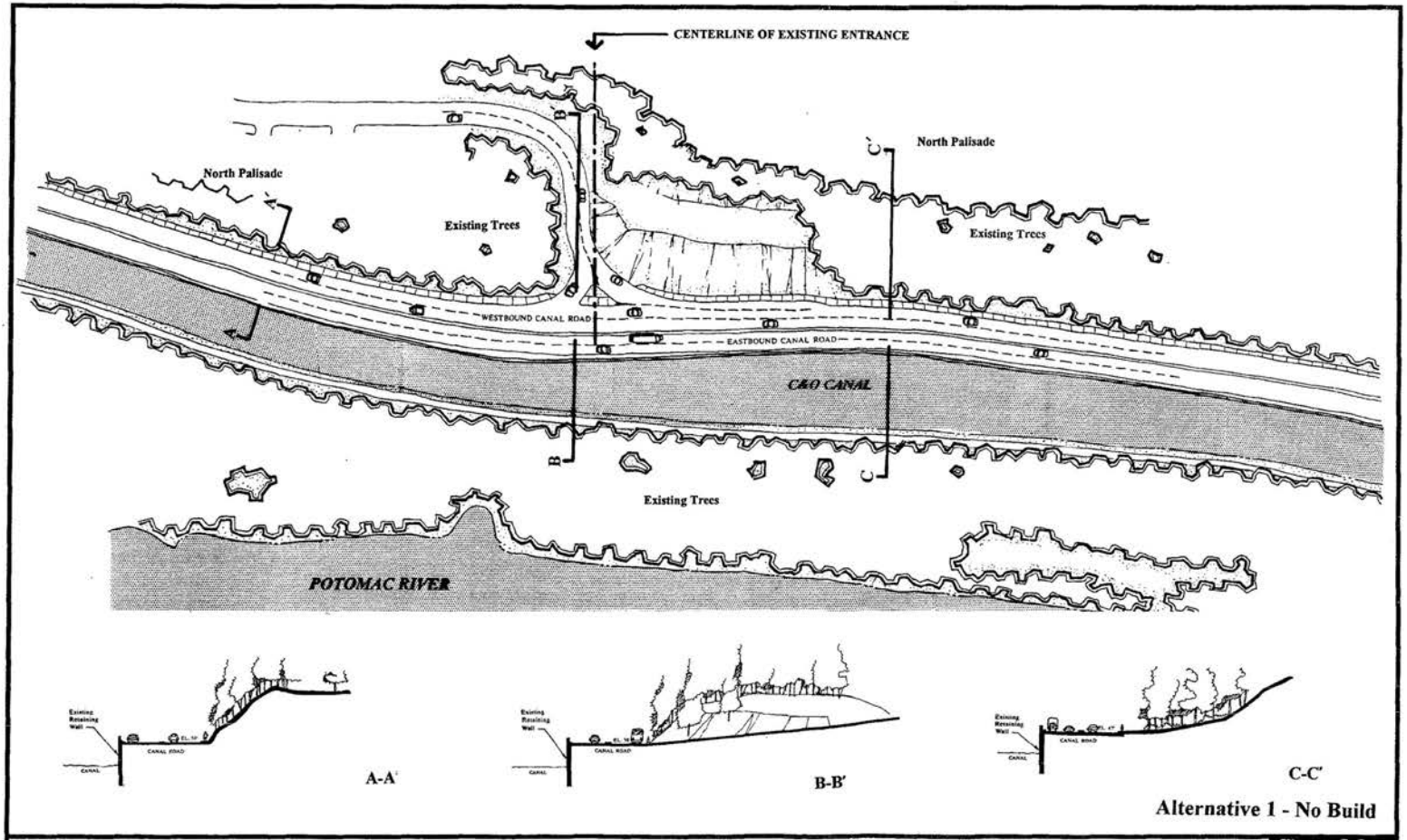
Alternative 2 (shown in **Figure 2-3**) is an at-grade signalized intersection that would reconstruct the existing entrance and provide for turning movements in all directions. It would move the intersection about 100 meters (330 feet) east of the current entrance road to allow adequate queuing of cars entering and exiting the entrance road. This shift would also minimize direct impact to the intersection of Canal Road and Foxhall Road. The westbound lanes of Canal Road would be shifted to the north to provide room for a left-turn lane, about 100 meters (330 feet) long, on eastbound Canal Road. For westbound Canal Road turning right, there would be a deceleration lane about 100 meters (330 feet) in length. For traffic exiting the campus and turning left onto eastbound Canal Road, a double lane approximately 75 meters (250 feet) in length would be provided. The timing of the traffic signal at this intersection would be coordinated with those at the Whitehurst Freeway and at Foxhall Road.

The need to widen Canal Road and provide turning lanes would require excavation of a small part of the hillside east of the entrance and construction of a retaining wall about 15 meters (50 feet) long and approximately 6 meters (20 feet) in height. **A second retaining wall, along the northern edge of the reconstructed entrance drive, would be approximately 35 meters (115 feet) in length and about 12 meters (40 feet) in height.**

Direct costs for implementing Alternative 2 are estimated to be:

| | |
|---|---|
| Construction Costs | **$1,716,000** |
| Right-of-Way Costs (direct) | $ 4,725 |
| Maintenance of Traffic Costs | $ 120,000 |
| Utilities Costs | $ 20,000 |
| Total Costs | **$1,860,725,** say **$ 1,861,000.** |

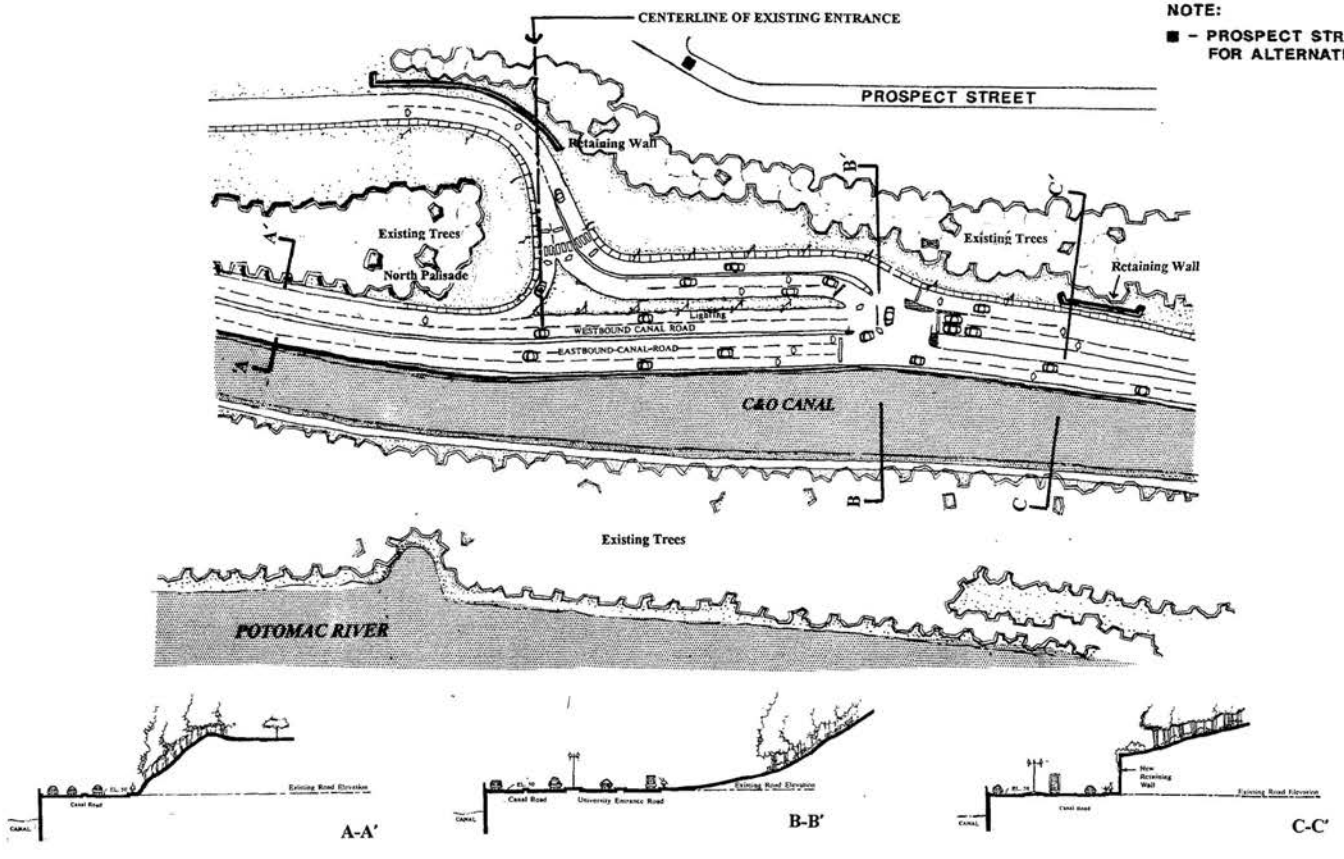
Additional maintenance costs are estimated to be $1,500 per year.




**Alternative 1 - No Build**

Georgetown University Entrance Road ● Environmental Impact Statement

**Figure 2-2**




**Alternative 2 & 2A - -At Grade Intersection**