Draft

Environmental Impact Report

CambridgePark

Cambridge, Massachusetts

EOEA #4512

May, 1983

Submitted In Compliance With

General Laws: Chapter 30 Section 62

Vanasse / Hangen Associates, Inc.
Transportation Engineers & Planners
184 High Street, Boston, Massachusetts 02110

DRAFT
ENVIRONMENTAL IMPACT REPORT
CAMBRIDGEPARK

EOEA #4512

SUBMITTED IN COMPLIANCE WITH
GENERAL LAWS
CHAPTER 30 SECTION 62

PREPARED FOR

TRIANGLE PARK ASSOCIATES
(C/O SPAULDING & SLYE, INC.)

BY

VANASSE/HANGEN ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
BOSTON, MASSACHUSETTS

MAY, 1983

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF FIGURES
(Continued)

LIST OF TABLES

LIST OF TABLES
(Continued)

MEPA
CORRESPONDENCE

PART I

MEPA CORRESPONDENCE

ENVIRONMENTAL NOTIFICATION FORM

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE SCOPE OF THE ENVIRONMENTAL IMPACT REPORT

APPENDIX A
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL NOTIFICATION FORM

I. SUMMARY

A. Project Identification

1. Project Name CambridgePark

2. Project Proponent Triangle Park Associates
   Address c/o Spaulding & Slye, 15 New England Executive Park, Burlington, MA 01803

B. Project Description: (City/Town(s) Cambridge, Massachusetts

1. Location within city/town or street address Rindge Avenue Extension

2. Est. Commencement Date: 1982 Est. Completion Date: 1988
   Approx. Cost $ 70 million Current Status of Project Design: 10 % Complete

C. Narrative Summary of Project

Describe project and give a description of the general project boundaries and the present use of the project area. (If necessary, use back of this page to complete summary).

Triangle Park Associates proposes to develop a six-story, 183,000 square-foot office building as the first phase of a multiple building office project within the Alewife Triangle in Cambridge. The proposed building is to be part of the Alewife Revitalization Project conceived by the City of Cambridge Community Development Department. The ultimate size of the project to be built by Triangle Park Associates is as yet undetermined. Two more buildings are planned on land currently under agreement and would bring the total project to 670,000 square feet. The developer is seeking to acquire additional land within the Triangle and, if successful, will submit a plan in conformance with the City's specific Planned Unit Development - 5 (PUD-5) guidelines. Under PUD-5 the amount of office development within the Triangle is limited to 2,250,000 square feet including existing and proposed projects on this and other sites.

The Alewife Triangle is bounded on the North by the Metropolitan District Commission Alewife Reservation, to the East by Alewife Brook Parkway and to the south by railyards of the Boston and Maine Railroad.

The site is currently used for light and medium industries. The bulk of the buildings and roads in the Triangle are in poor repair and some land has fallen into disuse.

Copies of this may be obtained from:
Name: Roger W. Altreuter Firm/Agency: Spaulding and Slye Corporation
Address: 15 New England Executive Park, Burlington, MA Phone No. 523-8000

79

THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.
For Information call (617) 727-5830

Use This Page to Complete Narrative, if necessary.

For the purposes of this Notification Form all numerical answers are based upon a project of 670,000 square feet.

This project is one which is categorically included and therefore automatically requires preparation of an Environmental Impact Report: YES________ NO________

D. Scoping (Complete Sections II and III first, before completing this section.)

1. Check those areas which would be important to examine in the event that an EIR is required for this project. This information is important so that significant areas of concern can be identified as early as possible, in order to expedite analysis and review.

	Construction Impacts	Long Term Impacts		Construction Impacts	Long Term Impacts
Open Space & Recreation			Mineral Resources		
Historical			Energy Use		
Archaeological			Water Supply & Use		
Fisheries & Wildlife			Water Pollution		
Vegetation, Trees			Air Pollution		
Other Biological Systems			Noise		
Inland Wetlands			Traffic		
Coastal Wetlands or Beaches			Solid Waste		
Flood Hazard Areas		X	Aesthetics		
Chemicals, Hazardous Substances, High Risk Operations			Wind and Shadow		
Geologically Unstable Areas			Growth Impacts		
Agricultural Land			Community/Housing and the Built Environment		
Other (Specify)________					

2. List the alternatives which you would consider to be feasible in the event an EIR is required.

Different configuration and/or orientation of proposed buildings

E. Has this project been filed with EOEA before? Yes ____ No X
If Yes, EOEA No. ________ EOEA Action? ________

F. Does this project fall under the jurisdiction of NEPA? Yes ____ No X
If Yes, which Federal Agency? ________ NEPA Status? ________

G. List the State or Federal agencies from which permits will be sought:

Agency Name	Type of Permit

H. Will an Order of Conditions be required under the provisions of the Wetlands Protection Act (Chap. 131, Section 40)?
Yes X No ____
DEQE File No., if applicable: Pending

I. List the agencies from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
None	

II. PROJECT DESCRIPTION

A. Include an original 8½ x 11 inch or larger section of the most recent U.S.G.S. 1:24,000 scale topographic map with the project area location and boundaries clearly shown. Include multiple maps if necessary for large projects. Include other maps, diagrams or aerial photos if the project cannot be clearly shown at U.S.G.S. scale. If available, attach a plan sketch of the proposed project.

B. State total area of project: 18.7 acres
Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed .... ____ acres
2. Open Space/Woodlands/Recreation ____ acres
3. Wetlands .... ____ acres
4. Floodplain .... ____ acres
5. Coastal Area .... ____ acres
6. Productive Resources
   - Agriculture .... ____ acres
   - Forestry .... ____ acres
   - Mineral Products .... ____ acres

C. Provide the following dimensions, if applicable:
Length in miles 0.4 Number of Housing Units ____ Number of Stories 10

	Existing	Immediate Increase Due to Project
Number of Parking Spaces	100 (approx.)	~~4675~~ 1800
Vehicle Trips to Project Site (average daily traffic)	3000 Ridge Av Ext.	6,200
Estimated Vehicle Trips past project site	55,000 Alewife Brook Pkwy	~~4650~~ 6200

D. If the proposed project will require any permit for access to local or state highways, please attach a sketch showing the location of the proposed driveway(s) in relation to the highway and to the general development plan; identifying all local and state highways abutting the development site; and indicating the number of lanes, pavement width, median strips and adjacent driveways on each abutting highway; and indicating the distance to the nearest intersection.

III. ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: Consider direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result.

Also, state the *source* of information or other basis for the answers supplied. If the source of the information, in part or in full, is not listed in the ENF, the preparing officer will be assumed to be the source of the information. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. Might the project affect the condition, use or access to any open space and/or recreation area?
   Yes ______ No __X__

   Explanation and Source:

   Reference to mapping and site inspection indicates that the project is proposed on land that is currently fully developed and separated from the nearest open space by a railroad line.

B. Historic Resources

1. Might any site or structure of historic significance be affected by the project? Yes ______ No __X__

   Explanation and Source:

   Field inspection indicates the existence of steel sheds and 20th Centurey industrial buildings of no historic significance.

2. Might any archaeological site be affected by the project? Yes ______ No __X__

   Explanation and Source:

   The site is previously filled low land, fully developed and, as such, would contain no recoverable evidence of archaeological significance.

C. Ecological Effects

1. Might the project significantly affect fisheries or wildlife, especially any rare or endangered species?
   Yes ______ No __X__

   Explanation and Source:

   Site inspection indicates no vegetation, water, wetlands or habitat to effect.

2. Might the project significantly affect vegetation, especially any rare or endangered species of plant?
Yes ____ No X
(Estimate approximate number of mature trees to be removed: ____)

Explanation and Source:

Field inspection indicates none on site.

3. Might the project alter or affect flood hazard areas, inland or coastal wetlands (e.g., estuaries, marshes, sand dunes and beaches, ponds, streams, rivers, fish runs, or shellfish beds)? Yes ____ No X

Explanation and Source:

Most of site is above 100-year flood. Those portions below flood level will either remain or be compensated totally per City of Cambridge regulations.

4. Might the project affect shoreline erosion or accretion at the project site, downstream or in nearby coastal areas? Yes ____ No x

Explanation and Source:

No shoreline or open channels

5. Might the project involve other geologically unstable areas? Yes ____ No X

Explanation and Source:

Geological survey indicates site is fill over clay with rock over 60 feet below surface. Site is stable but pile supports are probably required for mid-to-high rise buildings.

D. Hazardous Substances

1. Might the project involve the use, transportation, storage, release, or disposal of potentially hazardous substances?
Yes ____ No X

Explanation and Source:

Project is wholly an office complex

E. Resource Conservation and Use

1. Might the project affect or eliminate land suitable for agricultural or forestry production?
Yes ______ No __X__
(Describe any present agricultural land use and farm units affected.)

Explanation and Source:

Field inspection indicates the site is almost entirely roof, pavement and granular surface.

2. Might the project directly affect the potential use or extraction of mineral or energy resources (e.g., oil, coal, sand & gravel, ores)? Yes ______ No __X__

Explanation and Source:

Test borings reveal no such resources

3. Might the operation of the project result in any increased consumption of energy? Yes __X__ No ______

Explanation and Source:
(If applicable, describe plans for conserving energy resources.)

It might; however, existing poorly or uninsulated buildings along with high-energy type uses currently on-site probably result in more energy consumption than the energy efficient office structure proposed.

F. Water Quality and Quantity

1. Might the project result in significant changes in drainage patterns? Yes ______ No __X__

Explanation and Source:

Survey data indicates that all runoff currently discharges into adjacent municipal system as will run off from the proposed surfaces.

2. Might the project result in the introduction of pollutants into any of the following:
(a) Marine Waters .... Yes ______ No __X__
(b) Surface Fresh Water Body .... Yes ______ No __X__
(c) Ground Water .... Yes ______ No __X__

Explain types and quantities of pollutants.

Pavement runoff is only source. Because of the use of sumps and oil traps in the new system, the effluent will be less polluted than under present conditions.

3. Will the project generate sanitary sewage? Yes X No ____
   If Yes, Quantity: 50,000 gallons per day
   Disposal by: (a) Onsite septic systems .... Yes ____ No ____
   (b) Public sewerage systems .... Yes X No ____
   (c) Other means (describe) ____

4. Might the project result in an increase in paved or impervious surface over an aquifer recognized as an important present or future source of water supply? Yes ____ No X

   Explanation and Source:

   Field inspection indicates that site is mostly roof, pavement and very compact low permeability soil over a deep clay layer , thus little recharge is possible and clay soil precludes the presence of any usable aquifer.

5. Is the project in the watershed of any surface water body used as a drinking water supply?
   Yes ____ No X
   Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?
   Yes ____ No X

   Explanation and Source:

   All water is furnished by the M.D.C. per City records.

6. Might the operation of the project result in any increased consumption of water? Yes ____ No X
   Approximate consumption 50,000 gallons per day. Likely water source(s) ____

   Explanation and Source:

   Probably not because of the nature of the present on-site operations. If yes, the differential should be minimal.

7. Does the project involve any dredging? Yes ____ No X
   If Yes, indicate:
   Quantity of material to be dredged ____
   Quality of material to be dredged ____
   Proposed method of dredging ____
   Proposed disposal sites ____
   Proposed season of year for dredging ____

   Explanation and Source:

   No water areas from which to dredge

G. Air Quality

1. Might the project affect the air quality in the project area or the immediately adjacent area?
Yes X No ____

Describe type and source of any pollution emission from the project site. Mobile Source Emissions

The site is currently a stationary source of emissions, due to the nature of the present industries. However, as an office complex, emission will be reduced. In addition, contribution to ambient conditions from on-site emissions will be insignificant when compared to those from Alewife Brook Parkway, Route 2 and the MBTA access ramps.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any pollution emissions caused by the project, including construction dust? Yes ____ No X

Explanation and Source:

Field investigations show that the nearest receptors (a Playground and residential areas) are more than 1,000 feet from the site.

3. Will access to the project area be primarily by automobile? Yes X No ____
Describe any special provisions now planned for pedestrian access, carpooling, buses and other mass transit.

Mass transit is within close distance of site.

H. Noise

1. Might the project result in the generation of noise? Yes ____ No X

Explanation and Source:
(Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

Existing noise levels from the steel fabrication plant operations and railroad siding, trucking, gantry crane operation, etc., likely exceed or at least equal construction noises and certainly exceed post-development noises. Furthermore, current MBTA and other construction operations generate comparable noises.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project? Yes ____ No X

Explanation and Source:

The site is central to a very large industrial area over 1,000 feet from the nearest residential or non-industrial, -commercial facility.

I. Solid Waste

1. Might the project generate solid waste? Yes X No ____

Explanation and Source:

(Estimate types and approximate amounts of waste materials generated, e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures.)

1.7 tons/week mostly paper from office facility (Rate based on B.F.I. waste studies)

J. Aesthetics

1. Might the project cause a change in the visual character of the project area or its environs? Yes ____ No X

Explanation and Source:

From visual inspection, it is evident that a modern first class office building will be considerably more aesthetically desirable than the existing conditions.

2. Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use? Yes ____ No X

Explanation and Source:

Similar buildings are currently under construction in the area.

3. Might the project impair visual access to waterfront or other scenic areas? Yes ____ No X

Explanation and Source:

No waterfront

K. Wind and Shadow

1. Might the project cause wind and shadow impacts on adjacent properties? Yes ____ No X

Explanation and Source:

Present buildings already shadow each other and the change in such conditions will not be significantly adverse.

IV. CONSISTENCY WITH PRESENT PLANNING

A. Describe any known conflicts or inconsistencies with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

None

V. FINDINGS AND CERTIFICATION

A. The notice of intent to file this form has been/will be published in the following newspaper(s):

(Name) ______________________ (Date) ______________

______________________ ______________

______________________ ______________

B. This form has been circulated to all agencies and persons as required by Appendix B.

______________ ______________________

Date Signature of Responsible Officer or Project Proponent

____

Name (print or type)

Address ______________________

____

Telephone Number ______________

______________ ______________________

Date Signature of person preparing ENF (if different from above)

____

Name (print or type)

Address ______________________

____

Telephone Number ______________

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

CERTIFICATE OF THE SECRETARY ON THE SCOPE OF THE ENVIRONMENTAL IMPACT REPORT

PROJECT NAME :	Triangle Park
PROJECT LOCATION :	Cambridge
EOEA NUMBER :	4512
PROJECT PROPONENT :	Spaulding and Slye
DATE NOTICED IN MONITOR :	September 22, 1982

Pursuant to Mass G.L., Chapter 30, Section 62A and Sections 10.04(1) and 10.04(9) of the Regulations Governing the Implementation of the Massachusetts Environmental Policy Act, I hereby determine that the above referenced project does require the preparation of an Environmental Impact Report, prior to the commencement of Buildings Two and Three. Permits necessary to Building One may be issued forthwith, as provided by the Final Record of Decision issued herein. The scope and alternatives for the EIR for Buildings Two and Three shall be as follows :

INTRODUCTION

This project is one of several transportation and development projects in the Alewife area. The Alewife area includes a major intersection of two regional highways -- Route 2 and Alewife Brook Parkway, and is a focus for concentrated new development.

Some of the projects proposed or underconstruction in the area are :

(a). MBTA Station and garage, now under construction (EOEA # 2082)

(b). 300,000 s.f. of office space on the Mugar site (EOEA # 4167),

(c). Cambridge's Alewife Boulevard Project and related roadways (EOEA #4326)

(d). Cambridge Park proposal by Spaulding and Slye, 670,000 S.F. of office (EOEA # 4511)

(e). various other projects in the "triangle" and "quadrangle" areas, and

(f) Up to 1,000,000 s.f on the Grace property

THE USEFULNESS OF THIS EIR

The City of Cambridge is preparing an EIR for the Alewife Boulevard project, which considers the long term impacts of area development and roadway modifications. Part of the City's assessment includes consideration of development growth within the Triangle area. Clearly, there is little value in Spaulding and Slye duplicating the work that Cambridge is doing. The function of an Environmental Impact Report should be to present new and usefAl information which is useful to the general public as well as public officials. Therefore, the most useful function of an EIR for the Triangle Park project is to concentrate the scope of the report on those issues which are not otherwise receiving analysis and review.

The Cambridge report will consider development and roadway impacts for the period 1987 and thereafter. Similarly, the Mass DPW Route 2 roadway study will be looking at longer range impacts. Two elements of the overall problem stand out as issues which will not be central to public agency EIRs and can be effectively addressed in the Triangle Park EIR :

* Short term impacts (1983-1987), including the effect of delays in implementing any highway capacity improvements.

* Mitigation of traffic : methods of reducing the number of peak hour vehicles in the Alewife area.

Because the Cambridge Alewife Boulevard EIR will be the basic document which describes the long-range impacts of area development, the Triangle Park EIR should focus on the short-term period (up to 1987), including an allowance for likely new development in the Alewife area, based on current construction or announced plans for project completion by 1987.

The EIR for the Cambridge Boulevard Project will assess the implications of building or not building the Boulevard, with and without the Route 2 ramps. Therefore, the Triangle Park EIR should consider only the relatively near-term condition of a dead-ended Rindge Avenue Extension, with no Boulevard connection to Concord Avenue. Design concepts for any mitigating actions which might reduce traffic impacts (construction, schedules, shuttlebuses, etc.) should be presented and evaluated.

TIME PERIODS OF ANALYSIS

1. "Recent" (c.1980) traffic conditions, representing a traffic condition prior to any significant disruption from the MBTA construction.

2. "Initial Phase Project Completion" (c. 1984) including MBTA and new development in the area expected by 1984.

3. "Full Project Completion" (c. 1987) with neither Alewife Boulevard nor the Route 2 ramps completed and operational, and including new development in the area expected by 1987.

STUDY AREA

The scope of the study area should include :

* Alewife Brook Parkway between and including the intersections with Massachusetts Avenue to the North and Concord Avenue to the South and also including the Route 2 Rotary, Rindge Avenue, and Rindge Avenue Extension.

* Brighton Street and Blanchard Road -- the potential for existing Route 2/Parkway traffic to divert to this local route in the event of increased congestion in the Alewife area.

* Lake Street and Mass. Avenue -- similarly, the potential for traffic diversions to these local streets.

TRAFFIC ANALYSIS

A manual method of traffic analysis and projection should be utilized for the study area. For existing conditions, bottlenecks and levels of service (Volume/Capacity ratios) should be calculated and compared to actual conditions for verification.

Future traffic site generation, directional approaches, and background growth should be clearly presented, for both daily traffic and AM and PM peak hours, including assumptions regarding transit ridership. For the various roadway alternatives, concentration on key intersections and congestion points should be stressed. Volume-to-capacity ratios could be calculated within the study area.

The second step of traffic analysis should be a reassignment of trips wherever V/C ratios exceed 1.0, on the basis of peak spreading, increased transit ridership, increased vehicle occupancy, vehicles using alternate routes, or trips not being made at all (including vacancies within proposed development). The effects of peak spreading should assess the 2-Hour AM and PM peak, with descriptions of queuing growth or decline in comparing 1982, future alternatives and mitigation.

Traffic mitigation should include methods to control traffic spillover from Route 2 onto local streets in Belmont, Arlington and Cambridge, utilizing various traffic management methods such as traffic signal timing and location, ramp controls, etc.

Also, any short term (1984-1987) traffic measures to handle traffic better should be presented and evaluated, as part of potential mitigating options. Although the actual implementation responsibility for such mitigation might be the domain of other parties or agencies, the function of the EIR should be to discuss all reasonable and feasible mitigating actions.

A final assessment of congestion, queuing and impacts on alternative routes should be included in the EIR.

AIR POLLUTION

Assess 8-hour and 1-hour Carbon Monoxide levels at the Rindge Avenue/Alewife Brook Parkway intersection for the three time periods specified above. If violations are shown, assess effects of mitigating measures.

Any model used for analysis should either be calibrated in the field or be described extensively in the EIR with regard to recent calibration results of the same model when applied to other locations. Background levels for CO should be clearly stated and documented.

NOISE

The effects of increased traffic on local residential streets should be assessed, including both car and truck traffic.

COORDINATION AND REPORT CIRCULATION

Spaulding and Slye should offer periodic updates of progress to the Alewife Task Force during the preparation of the EIR.

Other projects, with their EIRs and schedules, are :

	DRAFT EIR STATUS	FINAL EIR STATUS	BEGIN OPERATIONS
MBTA Red Line	completed 1976	completed 1977	1984
Mugar Development	May 1982	October 1982	1983-1986
Alewife Boulevard Cambridge	Anticipated January 1983	-	1985-1988
Triangle Park Spaulding & Slye	Anticipated Spring 1983	-	1983-1988
Route 2 Ramps	Anticipated Spring 1983	-	1987-1990

The Alewife area is complicated by being a regional concern which overlaps numerous jurisdictional boundaries. State agencies and Divisions who should receive copies of the Draft EIR include :

* Executive Office of Environmental Affairs, MEPA office

* Executive Office of Transportation & Construction

* Mass Department of Public Works
    Bureau of Project Development
    District 4 and District 8

* Metropolitan District Commission
    Parks Engineering Division
    Planning Department

* MBTA Construction Division

* MAPC

* DEQE Division of Air Quality

In addition, local officials and groups are :

* City of Cambridge -- Community Development

* Town of Arlington -- Community Development

* Town of Belmont -- Planning Board

* Mystic River Watershed Association

* Various existing area business groups and developers

* East Arlington Citizen's Association
* North Cambridge Citizens
* Neighborhood 10 (Cambridge)

DATE

JOHN A. BEWICK, SECRETARY

SUMMARY

PART II

SUMMARY SHEET

PART II

SUMMARY SHEET

Name of Project: CambridgePark.

Description: The Triangle, named for its boundary configuration, is one of the several redevelopment areas identified by the City of Cambridge in its Alewife Revitalization Plan.

The proposed office park would be constructed in three phases: Phase I would entail construction of a single six-story office building containing approximately 183,000 square feet by 1984. Phases II and III would include an additional two office buildings which, in conjunction with Phase I, would bring the total site development by 1987 to approximately 670,000 square feet. Parking will be provided on-site for an estimated 2,000 cars.

The Project Area: The proposed site is approximately 18.7 acres located within the Alewife Triangle Area in Cambridge. The Triangle is bounded on the north by the Metropolitan District Commission Alewife Reservation. on the east by Alewife Brook Parkway, and by the Boston & Maine Railyards to the south and west.

The site is a developed area currently housing light and medium industries.

EOEA File Number: 4512

Name of Proponent: Triangle Park Associates (c/o Spaulding & Slye, Inc.)

Type of EIR: Draft EIR.

Counties and Municipalities Particularly Affected: City of Cambridge, Middlesex County, Massachusetts.

Summary of Major Benefits, Costs and Environmental Impacts:

Benefits

- An expanded tax base;
- Creation of approximately 550 construction jobs;
- Creation of approximately 1,850 jobs on a permanent basis after project completion;
- Revitalization of areas within the Alewife Triangle;
- Improvement of the aesthetic quality of the Alewife Triangle with an attractive multiple building complex and landscaping;
- Upgrading of the internal roadways on the site.

Costs

- The proposed project is estimated to cost $70 million.

Environmental Impacts

Transportation/Traffic. The existing highway network was analyzed for existing traffic conditions, 1984 No Build and Build conditions, and 1987 No Build and Build conditions. Analysis elements included geometry, traffic volumes, accidents/safety, local circulation and site access. A summary of impacts is indicated as follows:

- Estimates of 1987 average weekday traffic volumes due to projections of area background development projects indicate that traffic increases on area roadways will range from 1.7 to 11.9 percent independent of the proposed project development.

- At full development, the proposed office development will generate approximately 5,330 vehicles during the course of an average weekday evenly distributed between 2,665 vehicles entering and 2,665 vehicles exiting the site.

- To effectively accommodate the estimated traffic increases due to projected background developments and the proposed project development, potential roadway and traffic operational improvements are identified for the area roadway network. In addition, potential demand modification techniques are assessed for both areawide and the proposed project employers.

- Assuming the above modifications, it has been determined that the proposed office development can effectively and safely be accommodated by the area roadway network.

Air Quality. Ambient Air Quality for the area abutting the site was assessed for existing conditions, 1984 No Build and Build conditions, and 1987 No Build and Build conditions. The analysis was performed for CO concentrations during the worst hour and worst eight hours of each design condition. Modeling results indicated that estimated 1987 maximum one-hour and eight-hour concentrations will be below the Massachusetts and National Ambient Air Quality Standards (NAAQS) assuming the enforcement of the Commonwealth's Inspection and Maintenance program pertaining to automobile emission systems which was initiated on April 1, 1983. Thus, it can be concluded that the proposed development will not interfere with the attainment and maintenance of NAAQS for CO.

Noise. Ambient noise levels for the residential area nearest the site were assessed for existing conditions, 1984 No Build and Build conditions, and 1987 No Build and Build conditions. The analysis was performed for one-hour and 24-hour L_{eq} noise levels (dBA) for each of the five design conditions. Modeling results indicate that the existing and future 1987 maximum one-hour and 24-hour L_{eq} noise levels (dBA) will be below the EPA guideline values. Thus, it can be concluded that the proposed development will not significantly impact the future noise levels in the residential area nearest to the site.

PROJECT
DESCRIPTION

PART III

DESCRIPTION OF THE PROJECT

PART III

DESCRIPTION OF THE PROJECT

1. **<u>Type of Project</u>:** A proposed multiple-building office development.

2. **<u>Objective of the Project</u>:** The proposed project is to be a part of the Alewife Revitalization Plan developed by the City of Cambridge. The City's master plan is a guideline of development policies designed to encourage private investment in office/retail and industrial developments to meet the area's market demand while improving neighborhood and roadway amenities.

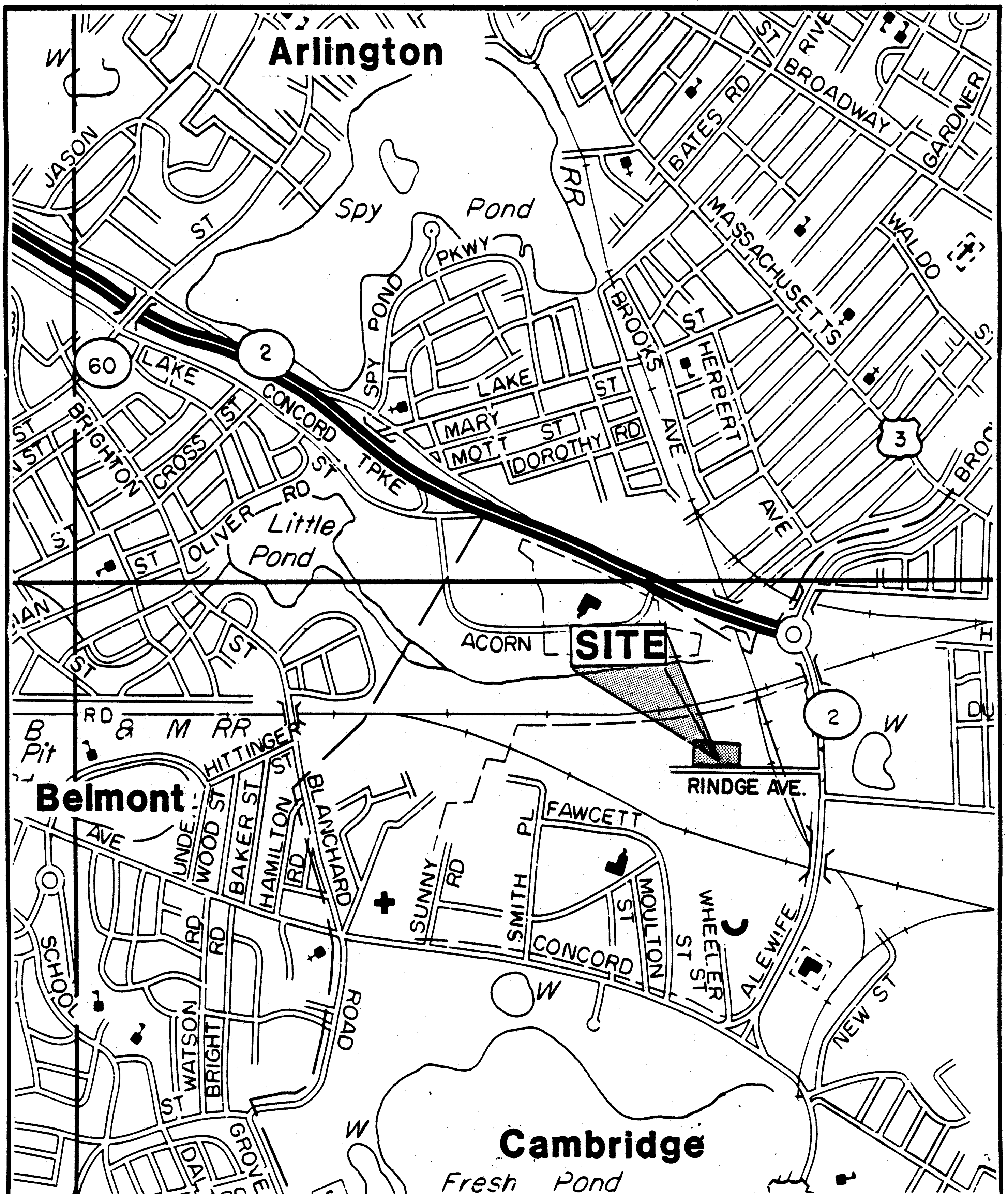
   The proposed CambridgePark office complex will supplement the present transformation of the Triangle area into an attractive environment which will also house the new MBTA station/garage and other existing developments. The proponent's objective is to further the economic vitality of the Alewife area without adversely affecting the surrounding ecological and residential environment. Among the major benefits to be derived from the proposed development are: (1) an expanded tax base; (2) creation of approximately 550 jobs during construction and 1,850 new jobs after completion; (3) revitalization of the Alewife Area; (4) aesthetic enhancement of the area through the architectural building and surrounding landscape designs.

3. **Project Characteristics:** The office park is to be situated on 18.7 acres within the Alewife Triangle. The site is currently a developed area occupied by light and medium industries. Much of the existing buildings and roads in the Triangle area are in relative disrepair.

The Alewife Triangle is bounded on the north by the Metropolitan District Commission Alewife Reservation to the east by Alewife Brook Parkway, and to the south and west by the Boston & Maine Railyards. The only access to the site will be via Rindge Avenue Extension. Figure III-1 depicts the project site location in relation to the Alewife Triangle.

4. **Project Timetable:** Development of the site will entail the construction of three buildings totaling 670,000 square feet. On-site parking will accommodate approximately 2,000 cars. Construction will proceed in three phases with total project development scheduled for 1987.

Phase I site development will consist of a 183,000 square foot building planned for 1984.



Alewife Triangle Park

EIR

Site Location Map

Vanasse/Hangen Associates
Boston, MA

Not to Scale

FIG III-1

TRANSPORTATION

A. TRANSPORTATION

PART IV-A	DESCRIPTION OF THE ENVIRONMENT
PART V-A	ALTERNATIVES TO THE PROJECT
PART VI-A	PROBABLE IMPACTS OF THE PROJECT
PART VII-A	MEASURES TO MITIGATE ENVIRONMENTAL IMPACT

IV-A DESCRIPTION OF THE ENVIRONMENT

TRANSPORTATION

General

The Alewife Area of Cambridge has been the locus of a considerable number of land development and transportation improvement proposals during recent years. Besides the MBTA station/garage complex which is presently under construction and located adjacent to the proposed CambridgePark office complex, there is planned expansion of the Arthur D. Little office complex, a proposed office park development on the undeveloped Mugar site, and a multi-use redevelopment proposal for the W.R. Grace site. In addition, environmental impact studies are presently underway in the Alewife Area for both local roadway improvements proposed by the City of Cambridge and for regional highway improvements proposed by the Massachusetts Department of Public Works (MDPW).

The transportation analysis study process can generally be divided into three distinct steps. Each step builds on the previous step in developing a comprehensive study of all traffic impacts stemming from the proposed project. These steps are described below:

1) Description of the Environment - Existing transportation conditions in the study area were analyzed including daily and peak hour traffic flow patterns, traffic volumes, transit service availability and use, accidents and roadway geometrics.

The description provides a good starting point on which to base project impact analysis for 1984 and 1987.

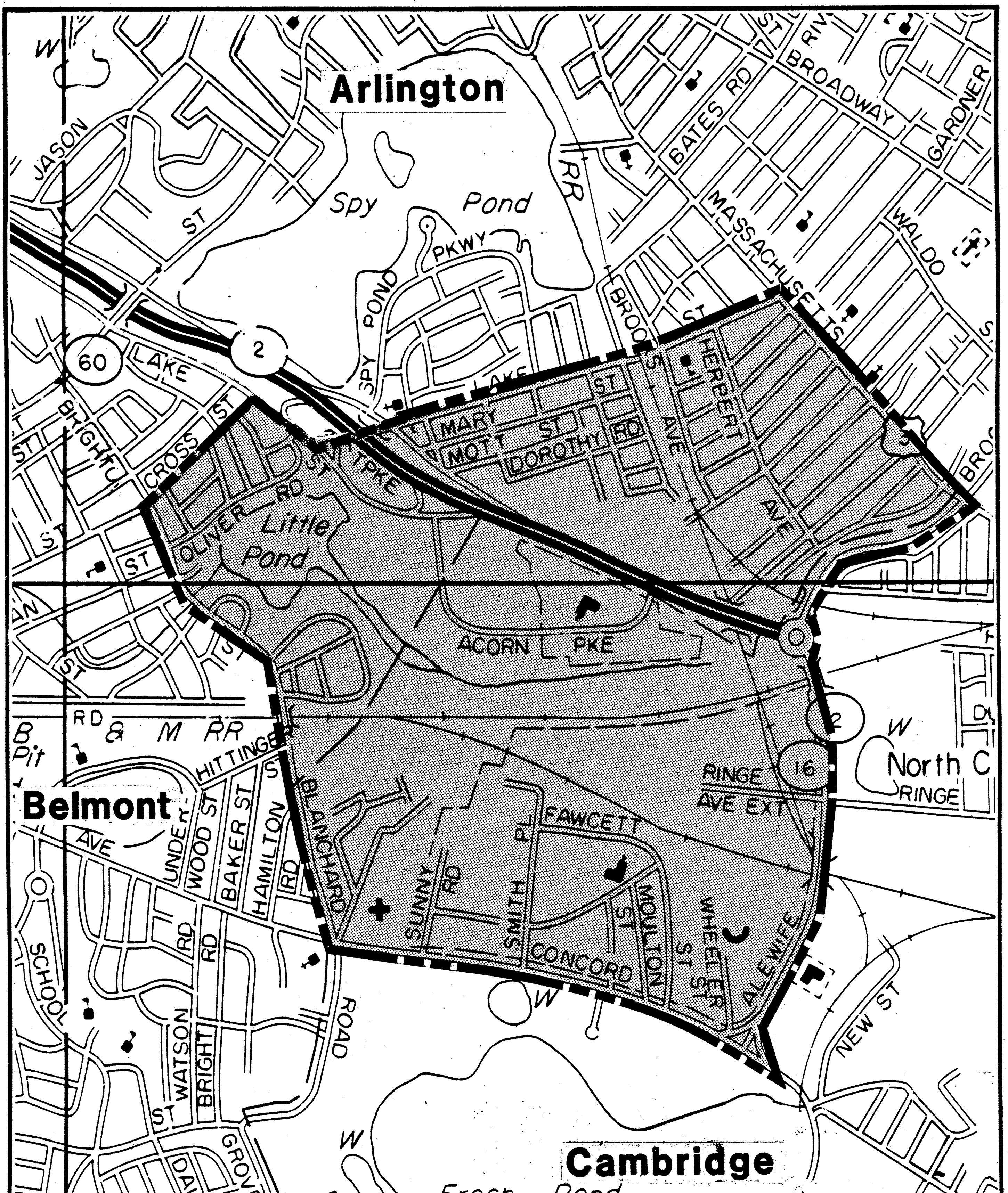
2) Probable Impacts of the Project - The second step involves projecting transportation demands generated by the proposed CambridgePark office complex in the Alewife Triangle along with projections of traffic generated from other anticipated land development in the study area. A comparison between the projected travel demands and existing roadway capacity was conducted to identify potential problem areas with the transportation system serving the study area.

3) Measures to Mitigate Environmental Impact - This final step in the study process was conducted to identify potential solutions and to provide recommendations on problematic transportation impacts identified in Step two.

A. TRANSPORTATION NETWORK

Regional Perspective

The Alewife area is located on the northwest fringe of the Boston core area. This area borders among the Towns of Arlington and Belmont and the City of Cambridge. The two primary roadways which traverse the Alewife Area are Route 2 (Concord Turnpike) and Alewife Brook Parkway. Figure IV-A-1 depicts the study area within its regional context.



Alewife Triangle Park *Cambridge, Ma.*	**Traffic Analysis Study Area**	**Vanasse/Hangen Associates** **Boston, MA** Not to Scale FIG.IV-A-1

1. Route 2 (Concord Turnpike)

Route 2, just north of the proposed site, is a four-lane median divided highway of limited access running east to west from the Alewife Brook Parkway at the Dewey and Almy traffic circle in Cambridge to Route 128 in Lexington. It serves as the major access corridor to the Alewife and Boston core area from the northwest suburbs of Arlington, Lexington, Concord, Bedford, Lincoln and beyond. On its northerly side there is no existing access to the abutting properties which include the Town of Arlington's Thorndike Field and the proposed Mugar Office Park. On the southerly side of Route 2, there is limited access to the existing strip of commercial, service and office developments. Ten-foot shoulders and sidewalks exist on both sides of the roadway from the Dewey and Almy circle west to the pedestrian overpass which is located in the vicinity of Thorndike Field (on the northerly side) and the Arthur D. Little, Inc. Complex (on the southerly side). Parking is prohibited, existing highway lighting is adequate, and the roadway is generally straight exhibiting a gradual decline travelling west from the railroad bridge located just to the west of the rotary. As a State highway, Route 2 falls within the jurisdiction of the MDPW.

2. Alewife Brook/Fresh Pond Parkway

Route 16, also known as the Alewife Brook/Fresh Pond Parkway, provides the major regional north-south access to the Alewife Area. The parkway is approximately 40 feet in width and operates basically as a four-lane undivided roadway running south from Route 38 in

Medford to Mount Auburn Street in Cambridge. Traffic on the parkway is principally controlled by a series of traffic signals and traffic circles at major intersection locations, such as Massachusetts Avenue and Route 2. Posted speed limits on these intersection approaches are 25 miles per hour. Roadway illumination is adequate; parking is prohibited, and lateral obstruction such as trees, utility poles and signs are located within 3 to 6 feet of the edge of roadway. As part of the designated parkway system of greater Boston, Alewife Brook/Fresh Pond Parkway falls within the jurisdiction of the Metropolitan District Commission (MDC).

3. General

Other roadways of regional significance include Route 2A/ Massachusetts Avenue, a multi-lane urban arterial running in a northwesterly direction from Boston to Lexington, and Route 60/ Pleasant Street running in a northeasterly direction from Belmont across Route 2 and terminating in West Meford.

Local Street Network

A detailed survey of roadway characteristics was conducted on the key arterials and local roadways in the study area. The field items inventoried and reviewed are listed in Table IV-A-1.

TABLE IV-A-1
FIELD ITEMS INVENTORIED

I. GEOMETRICS

1. WIDTH
2. CURBING
3. SHOULDERS
4. RADII
5. APPROACH ANGLES
6. OFFSETS
7. LANE USE

II. CONTROLS

1. PARKING RESTRICTIONS
2. SIGNING
3. PAVEMENT MARKINGS
4. BUS STOPS
5. LOADING ZONES
6. TRAFFIC SIGNALS

III. SAFETY

1. STOPPING SIGHT DISTANCE
2. PASSING SIGHT DISTANCE
3. HORIZONTAL ALIGNMENT
4. VERTICAL ALIGNMENT
5. LATERAL OBSTRUCTIONS
6. ILLUMINATION
7. APPROACH SPEEDS
8. SPEED LIMITS
9. WEIGHT LIMITS
10. PAVEMENT CONDITIONS
11. ACCIDENTS
12. GAP ACCEPTANCE - ARRIVAL FREQUENCY

IV. MISCELLANEOUS

1 PEDESTRIANS
2. LAND USE
3. CATCH BASINS
4. UTILITY POLES
5. HYDRANTS

1. Lake Street

Lake Street is a 28 to 32-foot, two-lane collector/distributor roadway running through East Arlington and Belmont connecting Route 2 with Massachusetts Avenue in Arlington, and Cross Street and Pleasant Street in Belmont. Land use along Lake Street is generally residential in nature. The roadway serves local traffic entering and exiting the residential neighborhoods as well as some longer distance through trips which primarily come from parts of Somerville, Medford, Arlington, Belmont, Watertown and Waltham.

Traffic signal control along Lake Street is located at the Massachusetts Avenue and Pleasant Street intersections. Left-turn traffic movements from the Route 2 exit ramps are controlled by stop signs.

2. Massachusetts Avenue

Massachusetts Avenue in East Arlington is generally a four-lane urban arterial roadway ranging in pavement width from 70 to 80 feet. The roadway serves the dual purpose of providing direct access to the abutting commercial/retail land use as well as serving through traffic between Arlington and Cambridge.

Traffic along Massachusetts Avenue is controlled by a series of independently operated signal installations at Alewife Brook Parkway, Lake Street and Thorndike Street. Parking is generally permitted on both sides of the roadway.

3. Blanchard Road/Brighton Street

Blanchard Road/Brighton Street is a two-lane, bi-directional roadway running through the City of Cambridge and the Town of Belmont. Within the study area, it is a local connector between Concord Avenue and Pleasant Street providing access to residential and commercial land uses along its length.

Roadway width ranges from 22 to 24 feet divided by a painted double yellow centerline. Pavement condition is basically fair to poor with areas of breakup. Parking is prohibited on both sides of the roadway. Illumination, in the form of mercury vapor lighting, is present along the roadway.

The roadway possesses a tangent alignment over relatively level terrain with several small radii curves. Lateral obstructions such as trees and hydrants are located at the edge of the roadway. Bus stops are located throughout the entire length of the roadway. Commercial vehicles over 2-1/2 tons are prohibited.

4. Cross Street

Cross Street is a two-way, two-lane local collector running between Lake Street and Brighton Road in Belmont. Abutting land use is predominantly residential in nature.

In addition to serving locally generated traffic, Cross Street serves through traffic from Lake Street destined to Concord Avenue via Brighton Street and Blanchard Road.

Sidewalks are located on both sides of the roadway and on-street parking is prohibited along its entire length. Roadway lighting is adequate.

Cross Street is controlled by a stop sign at Lake Street and a traffic signal at the Brighton Street intersection.

5. Rindge Avenue

Rindge Avenue is a two-lane, bi-directional roadway running in an east-west direction between Massachusetts Avenue and Alewife Brook Parkway in Cambridge. It serves as a local collector/ distributor roadway for local and through traffic. Land use along Rindge Avenue is generally residential in nature with commercial establishments located at and near both Massachusetts Avenue and Alewife Brook Parkway.

Pavement width is generally narrow (27 feet wide) with 6-foot sidewalks located on both sides of the roadway. Speed limit is 25 miles per hour and parking is prohibited on both sides of the roadway near the Alewife Brook Parkway intersection. Roadway lighting is present in the form of mercury vapor luminaires. Commercial vehicles over 2-1/2 tons are excluded. Pavement condition is fair to poor with numerous breakup of roadway surface noted on the approach to the Alewife Brook Parkway intersection.

Rindge Avenue possesses a tangent alignment over relatively level terrain with a slight curve at Rice Street. Principal traffic controls consist of the three traffic signals located at Massachusetts Avenue, Sherman Street and Alewife Brook Parkway.

6. Rindge Avenue Extension

Rindge Avenue Extension is a two-way, two-lane dead-end street which runs west from its intersection with Alewife Brook Parkway and provides access to the industrial/commercial establishments located within the Triangle area of Alewife. As part of the MBTA Alewife Station/garage project, Rindge Avenue Extension will be realigned and reconstructed to form a new "T" type intersection with Alewife Brook Parkway to be located approximately 200 feet north of Rindge Avenue.

Existing pavement condition is fair to poor with numerous potholes observed. No pavement markings exist. Roadway lighting is present and traffic is controlled at the Alewife Brook Parkway intersection by traffic signals.

7. Concord Avenue

Concord Avenue is a four-lane, bi-directional roadway running in an east-west direction. It serves as a local arterial serving the various commercial and industrial establishments which abut the roadway along its northerly side, and the various residential sections located in the West Quadrangle and Blanchard Road areas. The Fresh Pond Reservation borders on Concord Avenue along its entire southerly side. Concord Avenue is characterized by two rotaries located at Alewife Brook Parkway and Fresh Pond Parkway. The only signalized intersection within the study area is located at Blanchard Road.

The roadway consists of a 44-foot wide cross section from curb to curb with a double yellow centerline delineating the travelway. No lane markings were noted for either direction. Concord Avenue occasionally functions as a two-lane roadway with 22-foot lanes in each direction.

Sidewalks are 5 feet wide and are located on both sides of the roadway. Bus stop shelters were noted along the southerly side of the roadway, namely at the Sancta Marie Hospital near Blanchard Road, at Moulton Street, and at the International House of Pancake near the Alewife Brook Parkway rotary. Illumination in the area consists of mercury vapor luminairies mounted on their own poles.

The roadway possesses a relatively tangent alignment over level terrain. Pavement condition is fair to poor with numerous breakup of the roadway surface noted. Parking is prohibited on both sides of the roadway.

8. Lake Street at Massachusetts Avenue

The intersecton of Lake Street with Massachusetts Avenue is a "T" type intersection with Massachusetts Avenue passing Lake Street on a level tangent section of roadway. Massachusetts Avenue has an 80-foot cross section with two approach lanes in each direction and one-hour parking permitted on both sides of the street. Bus stops are located on both sides of Massachusetts Avenue where lateral obstructions such as utility poles and signs are located within 1 to 3 feet from the edge of the roadway. The posted speed limit on this section of roadway is 30 miles per hour.

Lake Street is approximately 34 feet wide with both left and right-turning lanes on approach to the intersection. Parking is prohibited on both sides and traffic at the intersection is controlled by a two-phase traffic signal. The posted speed limit on the Lake Street approach is 20 miles per hour. Eight to ten-foot sidewalks exist on both Lake Street and Massachusetts Avenue. The intersection is adequately illuminated.

9. Massachusetts Avenue at Alewife Brook Parkway

The intersection of Massachusetts Avenue with Alewife Brook Parkway is a four-way intersection with two-through lanes and a left-turn lane on each of the four approaches. Pavement markings consist of single and double yellow centerlines on Alewife Brook Parkway, and raised median islands exist on the Massachusetts Avenue approaches. Traffic is further controlled by a four-phase traffic signal. Horizontal and vertical alignment within the intersection area are satisfactory with both roadways intersecting on a level tangent. Approach speed limits are 25 miles per hour and area lighting is adequate. Sidewalks are present on both sides of Massachusetts Avenue on both approaches and on both sides of

Alewife Brook Parkway to the north of Massachusetts Avenue. Lateral obstructions in the form of light poles and signing are located 2 to 3 feet from the edge of the roadways.

10. Route 2 at Alewife Brook Parkway

Route 2 intersects Alewife Brook Parkway (Route 16) as the trunk of a "T" intersection which is principally controlled by a traffic circle and channelizing islands on the Route 2 and the southbound Route 16 approaches. Each of the three intersection approaches consist of two lanes where posted speed limits are 25 miles per hour. Roadway illumination is adequate due principally to an area lighting tower located in the center of the traffic circle. Vertical alignment is generally poor in that the circle is located on an incline as one traverses the intersection traveling southbound on Alewife Brook Parkway. In addition, super-elevation within the circle results in poor sight distance for vehicles traveling on the inside lane of the circle, which are at a lower elevation than the approaching southbound traffic on Alewife Brook Parkway. Sight distance is also poor for vehicles waiting to turn left onto Alewife Brook Parkway due to the crest of a vertical curve located on the northbound Alewife Brook Parkway approach. The poor vertical alignment contributes to the difficulty of necessary weaving maneuvers for some drivers under various traffic conditions.

It should be noted that present MBTA-related construction has introduced an additional constraint to traffic flow due to temporary roadway construction on Alewife Brook Parkway between Route 2 and Rindge Avenue. Such impacts include reduced lane width, horizontal roadway curvature, lateral obstructions such as concrete barriers and traffic flow interruptions due to construction-related truck activity.

11. Alewife Brook Parkway at Rindge Avenue/Rindge Avenue Extension

The intersection of Alewife Brook Parkway with Rindge Avenue and Rindge Avenue Extension is a four way signalized intersection with a double yellow centerline and a single yellow centerline on Alewife Brook Parkway and Rindge Avenue, respectively. The Parkway is 40 feet wide providing two lanes on both approaches which are on declining grades as the roadway intersects Rindge Avenue. Parking is prohibited and a sidewalk which is protected by a guardrail runs along the easterly side of the Parkway on both sides of the intersection. Left-turns are prohibited from the southbound Parkway approach on Rindge Avenue. Rindge Avenue is approximately 28 feet wide with sidewalks on both sides and a single-lane approach to the intersection.1/ Rindge Avenue Extension is a 33-foot wide, two-lane roadway without sidewalks that intersects Rindge Avenue on a level tangent section of roadway. Highway lighting within the intersection is adequate. Lateral obstructions, such as utility poles,

1/ During peak hour conditions, waiting motorists queue in two lanes.

signs, guardrail and concrete barriers associated with the on-going MBTA-related construction are located within 1 to 3 feet of the edge of the roadways.

12. Route 2 Westbound Ramp Terminal at Lake Street

The intersection of the Route 2 westbound off-ramp and Lake Street is a "T" type intersection with Lake Street intersecting the off-ramp on a level tangent section of roadway. The pavement widths of the northbound and southbound Lake Street approaches are 25 and 17 feet, respectively. The off-ramp is 23 feet wide and approximately 800 feet long. Pavement markings consist of a double yellow centerline on Lake Street with posted speed limits on the approaches of 30 miles per hour. Area lighting is adequate and traffic control consists of a stop sign on the ramp approach for left-turning vehicles. Six-foot wide sidewalks exist on both sides of Lake Street, and lateral obstructions such as light poles and signs are located 3 to 5 feet from the edge of the roadway.

13. Lake Street/Route 2 Eastbound Ramp Terminal

The intersection of Lake Street and the Route 2 eastbound ramps is a "T" type intersection over a level tangent section of roadway and is characteristically similar to the Route 2 westbound ramp terminal located just north of this intersection. Lane widths for both Lake Street approaches are 25 feet wide with 6-7 foot side-walks located on both sides of the roadway. The off-ramp is 24 feet wide and is characterized by a channelized island at the intersection for right and left-turning vehicles onto Lake Street. The on-ramp is 32 feet wide at the juncture of the Lake Street northbound and southbound on-ramp approaches.

Illumination is provided my mercury vapor luminaires. Speed limit is posted at 30 mile per hour. A bus stop is located at the northbound approach of Lake Street just south of the Route 2 on-ramps. Traffic control consists of a stop sign on the off-ramp approach for left-turning vehicles and a blinking yellow traffic signal located at the northbound Lake Street approach.

Land use at the intersection is residential. Pavement condition is fair with many transverse cracks and roadway patches noted.

14. Blanchard Road at Concord Avenue

Blanchard Road at Concord Avenue is a four-way signalized intersection. Both Concord Avenue approaches are median divided with two lanes for through and right-turning traffic. The westbound approach includes an additional left-turn lane. The southbound Blanchard Road approach is a single 12-foot lane, the northbound approach provides two lanes, one for left-turns and through movements which are controlled by the traffic signal and one lane for right-turns separated from the through and left-turn movements by a channelized island under yield control.

Sidewalks exist on all four approaches with push-button actuated pedestrian phase traffic signal control provided at the intersection.

Land use at the intersection is mixed consisting of a church, residential structures, a gas station and the Fresh Pond Reservation. In addition, the Sancta Maria Hospital is located on Concord Avenue just east of the intersection. Bus stops are provided in front of the hospital on Concord Avenue.

15. Concord Avenue at Alewife Brook Parkway

The intersection of Concord Avenue and Alewife Brook Parkway is an uncontrolled three-legged rotary. Both roadways are undivided four-lane facilities with two-lane channelized approaches on each of the three legs.

Land use at the rotary is characterized by a restaurant, a motor inn, and the Fresh Pond Reservoir. Two commercial establishments have access driveways situated within the rotary.

16. Cross Street at Brighton Street

The intersection of Cross Street and Brighton Street is a four-way signalized intersection. Both roads are two-lane, bi-directional roadways divided by a double yellow centerline. All four approaches have a single 16-foot lane. Residential homes abut all four quadrants with sidewalks traversing the entire length of both roadways. Parking is prohibited at the intersection and along the roadways. Trucks are prohibited on Brighton Street only.

It should be noted that a traffic crossing guard stops traffic during the AM peak hour to allow the safe crossing of Brighton Street by Elementary School children.

B. PUBLIC TRANSPORTATION

The Massachusetts Bay Transportation Authority (MBTA) is currently planning an evaluation of the implications of the MBTA Alewife Station/garage complex on existing and potentially new bus routes and schedules. Communities within the primary service area of the new station will be asked to formulate their needs for input into the planning process.

At present, the Alewife area is served by several MBTA bus routes. While definitive bus routings have yet to be established for the Alewife Station complex, a number of potential route changes have been identified by MBTA staff.

- Existing Bus Route 77 - Arlington Heights-Harvard Station

  becomes:

  Proposed Bus Route 77a - Arlington Heights-Alewife Station

  Proposed Bus Route 77b - Arlington Heights-Harvard Station

  The majority of trips on Arlington's primary route, Arlington Heights-Harvard Square, will be terminated at the new Alewife Station. Peak period service will operate at 4-6 minute headways. Separate trips will continue to operate between the Heights and Harvard Square to serve 30 percent of the passengers destined for points in Cambridge.

- <u>Existing Bus Route 84 - Arlmont-Harvard Square/ Bus Route 78-Park Circle-Harvard Square</u>

  becomes:

  <u>Proposed Bus Route - Arlmont-Harvard Square via Park Circle and Alewife Station</u>

  Bus Route 78 currently operates from Park Circle to Harvard Square via Blanchard Road and Concord Avenue on all trips. Bus Route 84 operates via Route 2 and Massachusetts Avenue to Harvard Square during the peak periods. During the off-peak, Bus Route 84 is combined with the Bus Route 78 service and operates via Blanchard Road. The proposed routing combines the portion of Bus Route 78 which operates between Park Circle and Pleasant Street with Bus Route 84, and will operate directly on Route 2 to Alewife Station on all trips. This bus route will continue from Alewife Station to Harvard Square making local stops in North Cambridge. Bus Route 78 south of Pleasant Street will continue to operate along its existing routing on Blanchard Road to Harvard Square.

- <u>Existing Bus Route 528 - Hanscom Air Base-Harvard Station</u>

  becomes:

  <u>Proposed Bus Route - Hanscom Air Base-Harvard Station via Alewife Station</u>

  This bus route will operate to Harvard Square via Alewife Station making local stops in North Cambridge along Massachusetts Avenue.

- <u>Existing Bus Route 529 - Bedford V.A. Hospital to Arlington Heights</u>

  becomes:

  <u>Proposed Bus Route - Bedford V.A. Hospital to Alewife Station</u>

  This bus route will continue along Massachusetts Avenue to the Alewife Brook Parkway. The extended service will eliminate one transfer for passengers destined to the Red Line. The addition of weekday evening service will be investigated.

- <u>Existing Bus Route 530 - Five Forks to Arlington Center</u>

  becomes:

  <u>Proposed Bus Route - Five Forks to Alewife Station</u>

  This bus route will continue along Massachusetts Avenue to Alewife Brook Parkway. As with the Bus Route 529 extension, a transfer will be eliminated for passengers destined to the Red Line.

- <u>Existing Bus Route 700 - Burlington-Park Station</u>

  becomes:

  <u>Proposed Bus Route - Burlington-Alewife Station</u>

  This bus route, which currently operates to Park Square, will terminate at Alewife Station.

- <u>New Bue Route - Malden Center-Alewife Station via Medford Square (Tentative Bus Route 600)</u>

  This bus route would provide a cross-town connector between the Orange Line and the Red Line. Arlington residents in the Medford Square area would have access to Alewife Station on this new bus route.

Again, it should be noted that these possible changes are only a preliminary assessment and represent the MBTA's initial thought on feeder bus strategy. It is still too early to define specific bus routings and schedules for the Alewife Station.

C. TRAFFIC VOLUMES

Based on a review of historical study area traffic volume information provided by the MDPW and its consultant, and previous traffic consultants to the municipalities of Arlington, Belmont and Cambridge, in addition to recently collected 1982 data contained in the Arlington Office Park DEIR (EOEA #4167), 1982 volumes of average weekday traffic (AWD) and peak hour traffic flows were estimated for the study area roadway network which are summarized in Table IV-A-2. The heavier traveled roadways are Route 2 between Lake Street and Alewife Brook Parkway which carries approximately 56,350 vehicles per day (vpd), Alewife Brook Parkway which services approximately 40,750 vpd north of Route 2 and 56,000 vpd south of Route 2, and Massachusetts Avenue west of Alewife Brook Parkway which handles approximately 16,400 vpd.

Review of recent areawide traffic growth trends indicate that while the average daily traffic within the study area has been growing at an annual rate of approximately 2 percent, peak hour traffic flows have grown at less than half of that rate. This is indicative of existing capacity constraints of the roadway network located primarily at the intersections of Alewife Brook Parkway with Rindge

TABLE IV-A-2
1982 TRAFFIC VOLUME SUMMARY

Location	AAWD	AM Peak Hour	K Factor	PM Peak Hour	K Factor
Lake St. north of Route 2	11,200	1,530	13.7%	1,620	14.5%
Lake St, south of Route 2	10,400	925	8.9%	1,130	10.9%
Massachusetts Ave. west of Alewife Brook Parkway	16,400	1,080	6.6%	1,500	9.1%
Route 2 eastbound on-ramp east of Acorn Park Dr.	800	122	15.3%	130	16.3%
Route 2 westbound on-ramp at Lake St.	4,050	590	14.6%	510	12.6%
Route 2 westbound off-ramp	2,800	185	6.6%	210	7.5%
Route 2 off-ramp at Acorn Park Dr.	3,850	205	5.3%	850	22.1%
Route 2 east of Lake St.	56,350	4,985	8.8%	5,080	9.0%
Alewife Brook Parkway north of Route 2	40,750	2,785	6.8%	2,620	6.4%
Alewife Brook Parkway south of Route 2	56,000	4,140	7.4%	4,300	7.7%
Concord Avenue east of Blanchard Road	14,000	1,315	9.3%	1,520	10.9%
Blanchard Road north of Concord Avenue	13,000	625	4.8%	895	6.9%

AAWD = Average Annual Weekday.

Avenue and with Massachusetts Avenue. This phenonmenom suggests that the duration of daily peak period flows is being slightly extended.

Figures IV-A-2 and IV-A-3 depict the 1982 AM and PM peak hour flows, respectively, for the study area.

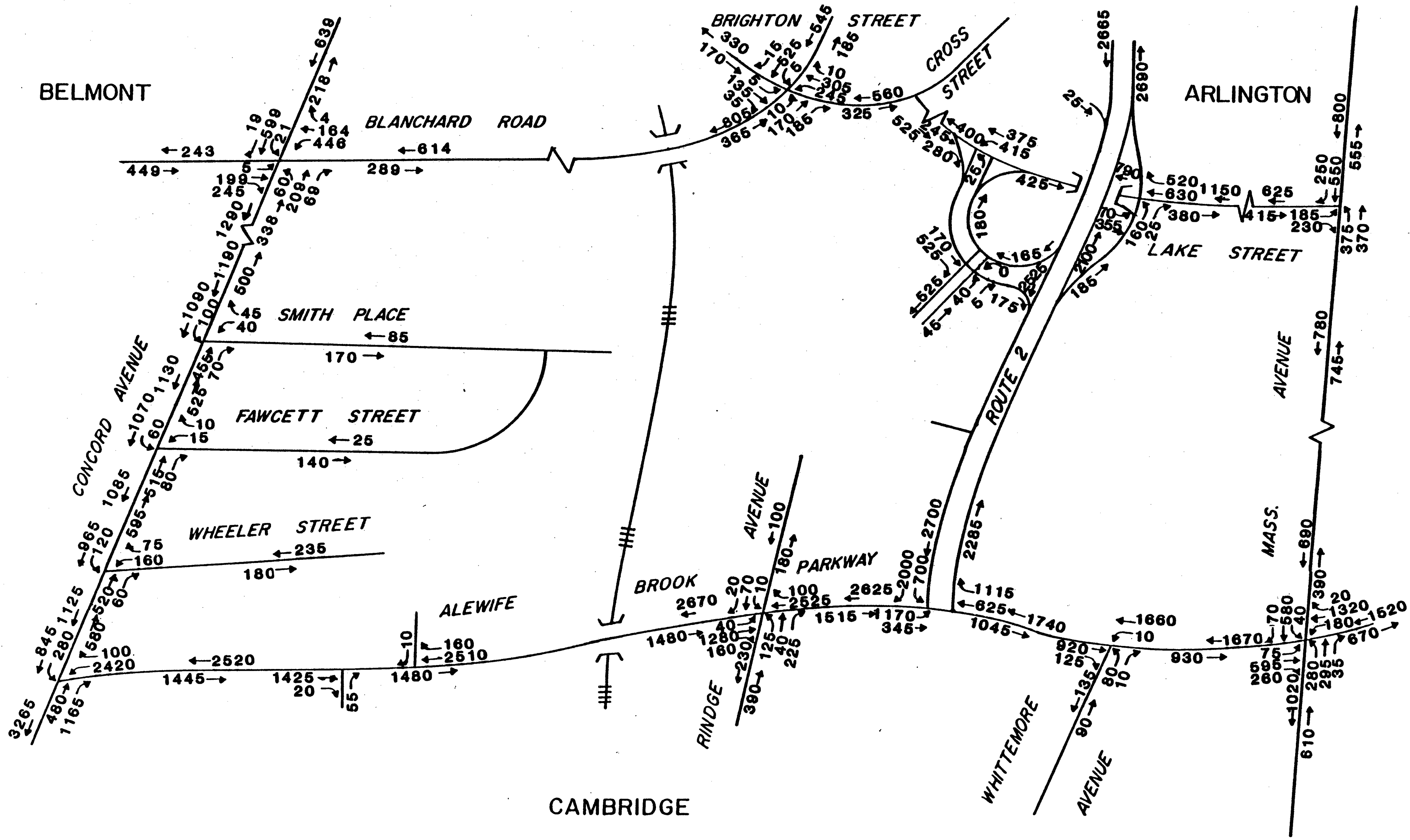
D. ACCIDENTS

Accident records were researched from the files of the Massachusetts Department of Public Works for the period between January, 1980 through December, 1981. Within the study area, twenty (20) intersections were selected for analysis. In addition, all reported accidents for major roadway links between the key intersections were reviewed.

Within the two-year analysis period, a total of 484 accidents were reported within the study area.1/ Tables IV-A-3 and IV-A-4 summarize all reported accidents for the study area, and Figure IV-A-4 presents an intersection accident spot map.

The intersection of Massachusetts Avenue and Alewife Brook Parkway experienced the highest accident frequency, accounting for 20 percent (83 accidents) of the reported 412 intersection accidents. At this location, angle/cross movement collisions were the most common type reported, accounting for 58 percent (48 of the

1/ No 1981 accident information was available from the MDPW computer files for Route 2.



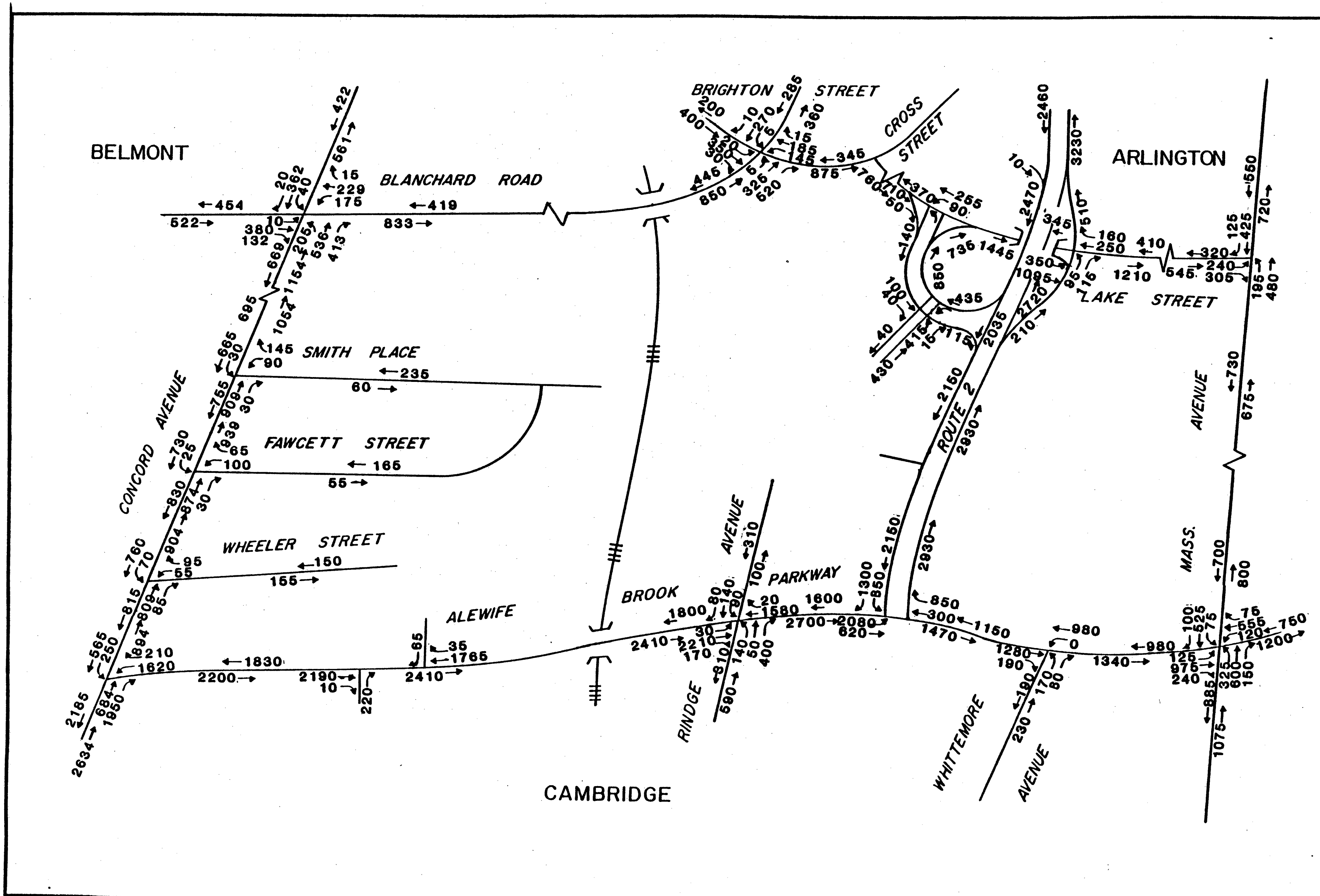
Alewife Triangle Park EIR

1982 Base Traffic Volumes AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

IV-



Alewife Triangle Park EIR

1982 Base Traffic Volumes PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG. IV-A-3

TABLE IV-A-3
ROADWAY LINK ACCIDENT SUMMARY
1980-1981

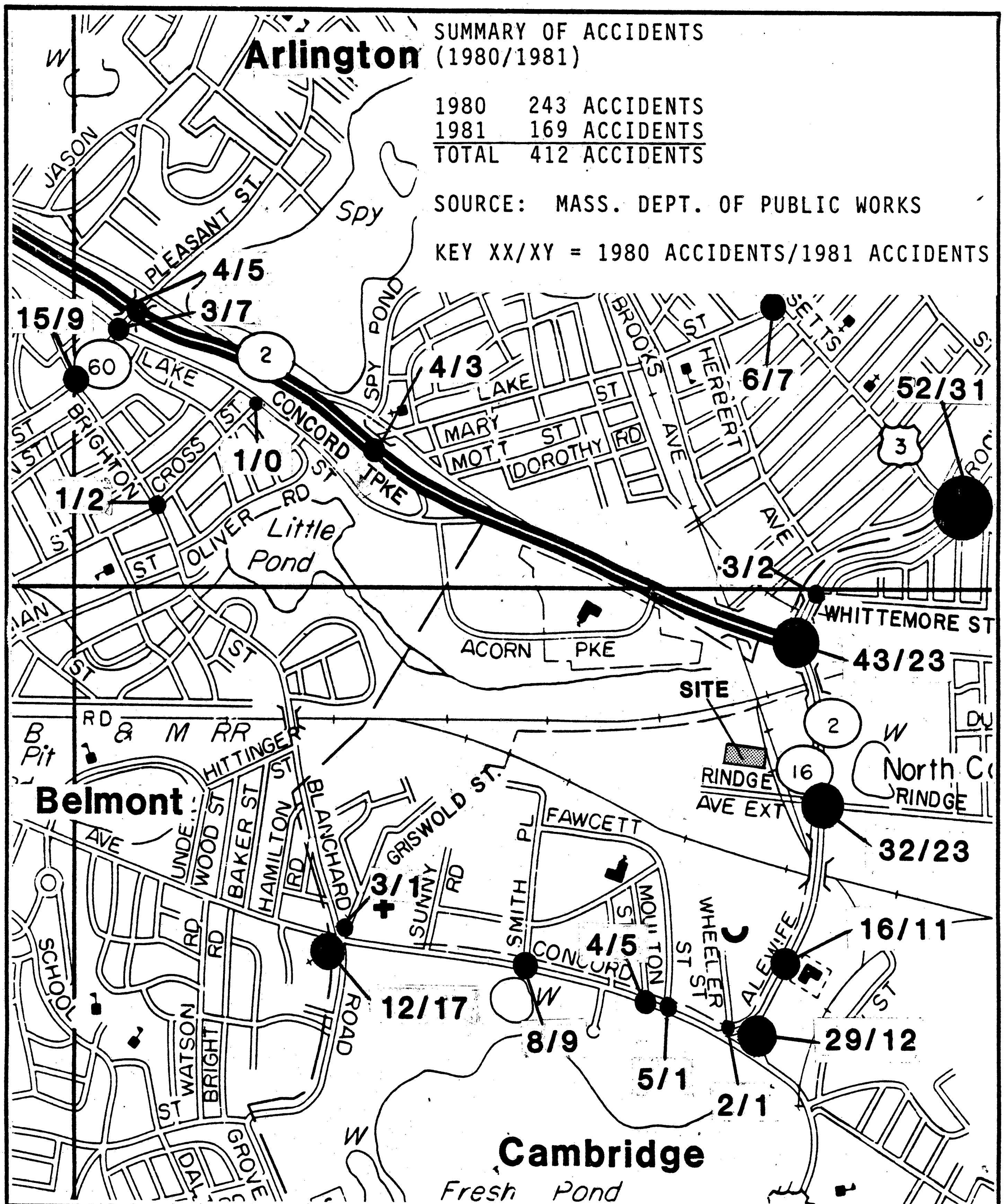
	Alewife Brook Parkway (between Concord Ave. and Route 2)3/	Massachusetts Avenue (between Lake St. and Alewife Brook Parkway)	Lake Street (between Mass. Ave. and Route 2)	Cross Street (between Brighton St. and Lake St.)	Blanchard Road (between Brighton St. and Concord Avenue)	Brighton Street (between Pleasant St. and Cross Street)2/	Brighton Street (between Cross St. & Blanchard Street)	Total
TYPE								
Cross movement	10	11	4	1	1	0	4	31
Rear end	2	7	1	1	1	1	8	21
Head-on	0	0	0	0	1	0	0	1
Other	5	4	5	0	0	0	5	19
Total	17	22	10	2	3	1	17	72
SEVERITY								
Fatal	0	0	0	0	0	0	0	0
Personal Injury	1	10	5	1	0	0	5	22
Property Damage	16	12	5	1	3	1	12	50
Total	17	22	10	2	3	1	17	72
WEATHER								
Cloudy	0	0	3	0	1	0	5	9
Rain	2	3	0	0	0	0	1	6
Snow	0	1	0	0	0	0	0	1
Clear	15	16	6	2	2	1	10	52
Unknown	0	2	1	0	0	0	1	4
Total	17	22	10	2	3	1	17	72
SEASON								
Winter	7	5	0	1	0	0	8	21
Spring	4	3	4	1	1	0	3	16
Summer	3	11	4	0	1	0	0	19
Fall	3	3	2	0	1	1	6	16
Total	17	22	10	2	3	1	17	72
HOUR OF DAY								
7:00-9:00 AM	2	1	3	0	0	0	3	9
4:00-6:00 PM	4	8	1	2	0	0	3	18
Remainder of Day	6	13	4	0	3	1	11	38
Unknown	5	0	2	0	0	0	0	7
Total	17	22	10	2	3	1	17	72
DAY OF WEEK								
Monday-Thursday	11	11	6	1	2	0	13	44
Friday-Sunday	6	11	4	1	1	1	4	28
Total	17	22	10	2	3	1	17	72

1, 2/ Only 1980 accidents reported at this location.

3/ No roadway link accidents were reported between Massachusetts Ave. and Route 2.

TABLE IV-A-4
INTERSECTION ACCIDENT SUMMARY
1980-1981

Intersection Location	Accident Type: Angle/ Cross Movement	Accident Type: Rear End	Accident Type: Head-on/ Hit Fixed Object	Accident Type: Other	Severity: Fatality	Severity: Personal Injury	Severity: Property Damage	Weather: Cloudy	Weather: Rain	Weather: Snow	Weather: Clear	Weather: Unknown	Season: Winter	Season: Spring	Season: Summer	Season: Fall	Hour of Day: 7:00- 9:00 AM	Hour of Day: 4:00- 6:00 PM	Hour of Day: Remainder of Day	Hour of Day: Unknown	Day of Week: Mon- Thurs	Day of Week: Fri- Sun	Year: 1980	Year: 1981	Total
Alewife Brook Pkwy. at Massachusetts Ave.	48	18	3	14	0	19	64	9	6	4	59	5	21	19	26	17	7	11	63	2	42	41	52	31	83
Alewife Brook Pkwy. at Whittemore St.	3	1	0	1	0	1	4	2	0	0	2	1	1	0	3	1	0	2	3	0	4	1	3	2	5
Alewife Brook Pkwy. at Route 2 Rotary	36	20	2	8	0	6	60	7	6	1	51	1	21	18	18	9	10	14	39	3	35	31	43	23	66
Alewife Brook Pkwy. at Rindge Ave.	20	22	3	10	0	9	46	7	7	1	39	1	22	9	18	6	6	8	38	3	28	27	32	23	55
Alewife Brook Pkwy. at Fresh Pond Shopping Center	17	3	0	7	0	9	18	4	6	0	14	3	8	8	7	4	3	5	18	1	16	11	16	11	27
Alewife Brook Pkwy. at Concord Ave.	19	13	0	9	0	6	35	6	4	0	24	7	10	11	12	8	4	10	25	2	25	16	29	12	41
Massachusetts Ave. at Lake Street	5	4	0	4	0	4	9	2	4	0	5	2	2	6	3	2	1	0	12	0	6	7	6	7	13
Concord Ave. at Wheeler Street	3	0	0	0	0	0	3	1	0	0	2	0	1	0	1	1	0	1	2	0	1	2	2	1	3
Concord Ave. at Fawcett Street	4	1	0	1	0	0	6	0	1	1	4	0	2	0	0	4	1	0	5	0	6	0	5	1	6
Concord Ave. at Moulton Street	3	3	1	2	0	2	7	1	0	0	7	1	2	2	3	2	2	1	6	0	6	3	4	5	9
Concord Ave. at Smith Place	11	5	1	0	0	1	16	1	4	1	9	2	6	4	5	2	0	4	11	2	13	4	8	9	17
Concord Ave. at Griswold Street	3	0	0	1	0	1	3	0	1	0	2	1	0	0	1	3	0	0	4	0	4	0	3	1	4
Concord Ave. at Blanchard Ave.	12	10	3	4	0	9	20	6	2	2	17	2	11	6	5	7	9	4	16	0	15	14	12	17	29
Brighton St. at Cross Street	3	0	0	0	0	1	2	1	0	0	2	0	0	2	1	0	1	1	1	0	3	0	1	2	3
Brighton St. at Pleasant St.	14	4	0	6	0	10	14	1	2	0	18	3	5	7	6	6	9	6	9	0	15	9	15	9	24
Pleasant St. at Lake St.	8	1	0	1	0	7	3	2	1	0	7	0	2	4	3	1	3	1	5	1	3	7	3	7	10
Pleasant St. at Route 2	7	2	0	0	0	3	6	0	2	0	7	0	3	1	3	2	3	2	4	0	5	4	4	5	9
Lake St. at Cross St.	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	1	1	0	1
Lake St. at Route 2	0	6	0	1	0	4	3	0	1	0	6	0	3	3	1	0	0	3	4	0	2	5	4	3	7
TOTAL	216	114	13	69	0	93	319	50	47	10	276	29	120	100	116	76	59	74	265	14	229	183	243	169	412



Alewife Triangle Park

Cambridge, Ma.

Accident Location Map

Vanasse/Hangen Associates
Boston, MA

Not to Scale

FIG.IV-A-4

total 83 accidents) of the accidents. Rear-end collisions were the next most frequent accident type accounting for 22 percent of the total. Angle/cross movement and rear-end accidents are typical of this type of signalized intersection which experiences heavy peak hour traffic volumes in conjunction with the relatively high number of turning vehicles.

The second highest accident frequency location, Alewife Brook Parkway and Route 2 Rotary, experienced 66 accidents. Angle/cross movement accidents accounted for 55 percent (36 accidents) while rear-end collisions accounted for 30 percent (20 accidents) of the accidents. This accident experience may reflect the heavy peak hour traffic volumes, the uncontrolled nature of the traffic movements, and the existing sight distance constraints.

The third highest accident frequency location, Alewife Brook Parkway at Rindge Avenue/Rindge Avenue Extension experienced 55 accidents over a two-year period. Angle/cross movement and rear-end accidents accounted for 36 percent (20 accidents) and 40 percent (22 accidents), respectively. Of these, 84 percent involved property damage only. This intersection will be realigned as part of the MBTA station/garage project.

The next two highest accident frequency locations are also located on Alewife Brook Parkway. They are the Concord Avenue Rotary and the entrance/exit driveways of the Fresh Pond Shopping Center. A total of 68 accidents were reported at these two locations. Of this, 36 accidents were angle/cross movement collisions. At the Concord Avenue Rotary, approximately 13 accidents were of a rear-end collision type. Traffic is uncontrolled at both locations with the exception of police officer control at the Shoping Center's northern drive during the PM peak hour.

The remaining intersections experienced a total of 40 accidents. In addition, there were 72 roadway link accidents in the study area. A review of overall accident experience revealed several trends:

- Approximately 85 percent of all reported accidents in the study area occurred at intersections.

- The majority of the reported accidents, approximately 52 percent, were angle/cross movement collisions. Rear-end collisions accounted for 28 percent of the intersection accidents.

- Over three-quarters (77 percent) of the total reported study area intersection accidents were of a property damage nature. There were no fatalities reported during the two-year review period within the study area.

- No significant temporal or seasonal trends were evident.

V-A ALTERNATIVES TO THE PROJECT

TRANSPORTATION

From the transportation analysis perspective, alternatives to the proposed project are either Build or No Build.

A. NO BUILD

If the proposed project does not proceed to full completion, future traffic increases on the existing study area roadway network can be attributed to: 1) the operations of the MBTA Alewife Station/garage complex which is presently under construction, and 2) realization of other proposed developments both within the Alewife Revitalization Areas designated by the City of Cambridge, and outside of Cambridge such as the Arlington Office Park.

B. BUILD

Under the Build alternative, site access would only be provided from Alewife Brook Parkway via Rindge Avenue Extension. For analysis purposes, the Rindge Avenue Extension/Alewife Brook Parkway intersection is assumed to be reconstructed as part of the MBTA site development. However, neither the proposed Alewife Boulevard (the extension of Rindge Avenue Extension from Alewife Brook Parkway to Concord Avenue) nor the proposed MDPW ramps from Route 2 to the MBTA station/garage have been assumed. As such, future short-range (1987) traffic impacts on the existing roadway network resulting from the project site generated traffic in addition to traffic generated by the MBTA facility and other proposed Alewife area developments were analyzed.

VI-A PROBABLE IMPACTS OF THE PROJECT

TRANSPORTATION

A. DEVELOPMENT TRAFFIC

Of the many types of land uses which create concentrations of traffic volumes, office parks generate trips which tend to occur in rather well defined patterns and are readily predictable by the use of variable empirical rates. The rates at which office parks generate vehicle trips depend primarily on their size, residential densities of adjacent communities, travel time to these communities and transit availability. Essentially, the working trip is somewhat inelastic and will be made regardless of many other external factors.

Typically, work trip demands are relatively uniform over days of the week with the heaviest use hour usually occurring during the adjacent street peak hour. Therefore, the critical impact on the adjacent street system will occur during the weekday morning and evening peak hours, and it is the traffic flow during this time period for which street requirements are usually designed.

B. TRIP GENERATION

The proposed project development consists of 670,000 square feet of office space to be developed, for analysis purposes, in two stages. Phase I, containing 183,000 square feet will be constructed and operational by 1984. The remaining 487,000 square feet is assumed to be developed by 1987. As such, both 1984 and 1987 traffic conditions will be analyzed.

The Institute of Transportation Engineers[1/] have developed, based on empirical studies, standard vehicle trip generation rates for various types of land use. The standard vehicle trip generation rate for general office development is based, for the most part, on suburban office developments with no public transit availability and on a relatively low level of employee ride sharing as reflected in a relatively low journey to work vehicle occcupancy rate of 1.20 persons per vehicle. Given the project site's proximity to the Alewife MBTA station, the constraints on parking due to the City of Cambridge's development policies, and the existing capacity constraints of the area's roadway network, the standard ITE vehicle trip generation rates have been modified to reflect anticipated higher than average transit usage and vehicle occupancy. Table VI-A-1 compares the standard ITE trip generation rates with the modified trip rates which assume a mode of arrival split of 30 percent transit (and "other" such as bicycle and walking) and a vehicle occupancy rate of 1.30 persons per vehicle.

Based on the refined trip generation rates, an estimated total of 1,456 vehicle-trips per day will be generated by the Phase I (1984) CambridgePark development. These average daily vehicle trips would be evenly distributed between 728 vehicles entering and 728 vehicles exiting the site over the course of a business day. An estimated 275 vehicles would be generated during the morning

1/ Institute of Transportation Engineers. Manual on Trip Generation, Revised 1979.

peak hour distributed between 231 entering vehicles and 44 exiting vehicles. During the evening peak hour, an estimated 260 vehicle-trips would be generated by the Phase I development program consisting of 42 entering and 218 exiting vehicles.

TABLE VI-A-1
TRIP GENERATION RATE COMPARISON
FOR GENERAL OFFICE DEVELOPMENT
(Vehicle Trips per 1000 Square Feet)

		ITE	Cambridge/Park
AM	In	1.95	1.26
	Out	0.37	0.24
	Total	2.32	1.50
PM	In	0.36	0.23
	Out	1.84	1.19
	Total	2.20	1.42
Average Daily		12.30	7.95

For the 1987 design year, the total site development program (670,000 square feet) would generate on an average weekday a total of 5,328 two-way vehicle trips evenly distributed between 2,664 vehicles entering and 2,664 vehicles exiting the site. During the morning peak hour, a total of 1,005 vehicle-trips would be generated consisting of 844 entering and 161 exiting vehicles. An estimated total of 951 vehicle-trips would be generated during the evening peak hour distributed between 154 entering vehicles and 797 exiting vehicles.

Table VI-A-2 summarizes the vehicle trip generating characteristics of the proposed CambridgePark office development.

TABLE VI-A-2
CAMBRIDGEPARK OFFICE DEVELOPMENT
TRIP GENERATION SUMMARY

	Phase I (1984)			Phase II (1987)1/		
	In	Out	Total	In	Out	Total
Total Average Weekday	728	728	1,456	2,664	2,664	5,328
AM Peak Hour	231	44	275	844	161	1,005
PM Peak Hour	42	218	260	154	797	951

1/ Phase II is the total site development program (670,000 s.f.).

C. TRAFFIC DISTRIBUTION

In the previous discussion, the quantity of vehicle trips either arriving or departing from the proposed CambridgePark development was determined. The trip distribution phase analyzes where the trips originate from or are destined. Several factors affect the distribution of trips to and from the project site including the roadway network, employee population densities, travel time and distance to the proposed site, and transit availability.

In estimating origins and destinations, it was assumed that the proposed office development will distribute trips in a pattern similar to those of the existing Arthur D. Little facility located just to the northwest of the project site on the southerly side of Route 2. Previous trip tables developed by the Central

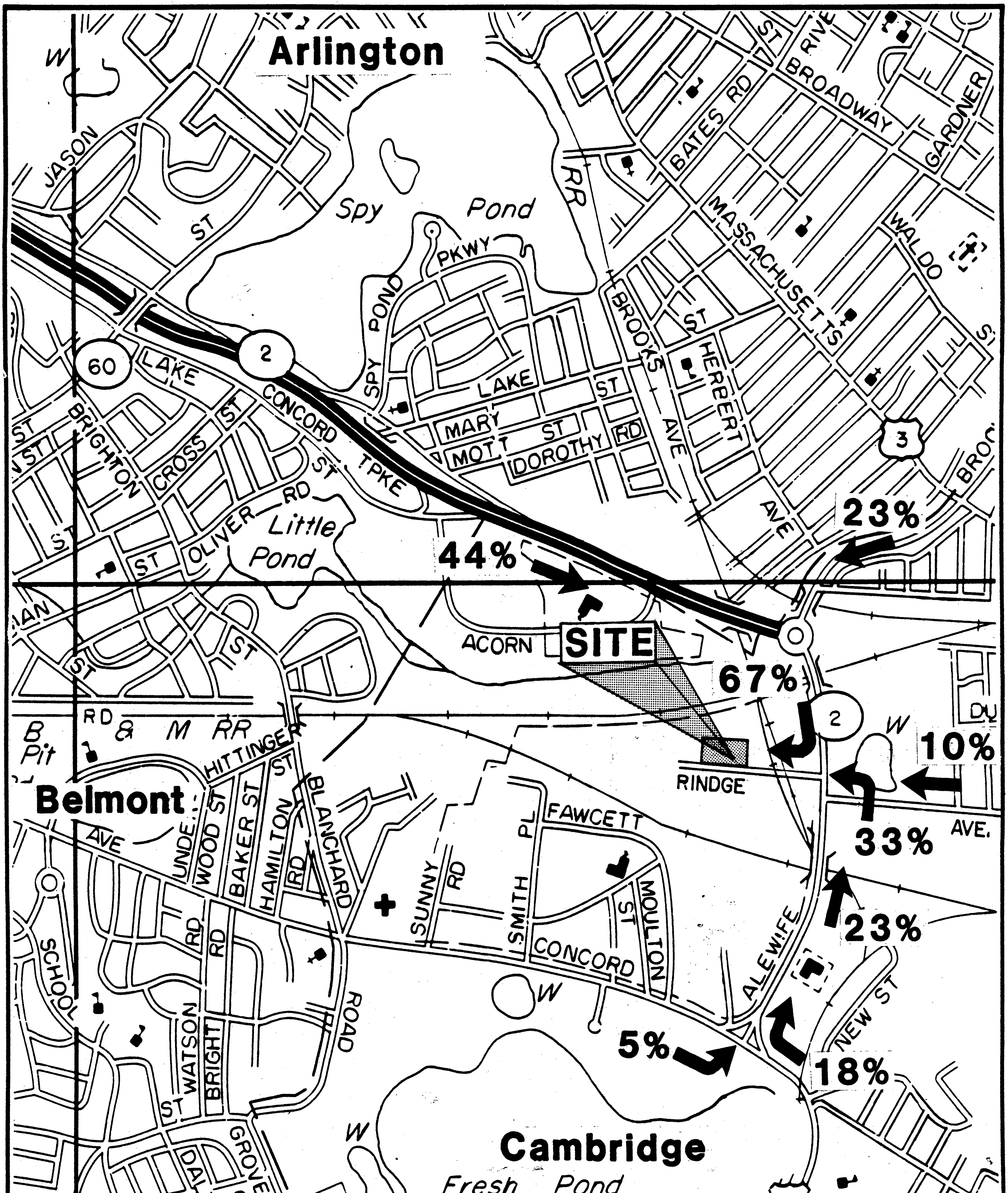
Transportation Planning Staff1/ for the Alewife area and a recent survey2/ of Alewife area employees as to their access route to work were reviewed. Current peak period traffic volumes were analyzed and compared with average weekday traffic volumes at a number of key study area locations. Figure VI-A-1 and VI-A-2 depict the arrival and departure pattern for CambridgePark site generated traffic; Figures VI-A-3 and VI-A-4 depict the respective AM and PM peak hour traffic flows generated by the Phase I, 1984 proposed CambridgePark development. Figures VI-A-5 amd VI-A-6 depict the respective AM and PM 1987 traffic flows generated by the total site development program.

D. AREA TRAFFIC GROWTH

Traffic growth on study area roadways is a function of the expected land use development in the region. Several methods can be used to estimate the growth. A procedure frequently employed is to estimate an annual percentage increase and apply that increase to all volumes under study. Those volumes are then factored to the design year. The drawback to such a procedure is that some turning volumes may not be growing at a particular intersection. Consequently, the impact of traffic growth can be easily overstated in some instances and underestimated in others.

1/ Central Transportation Planning Staff, Technical Report Number 5, Traffic Forecasts for the Alewife Brook MBTA Station Area, July, 1978.

2/ Abend, Norman A., Technical Memorandum, Alewife Area Employee Survey, November, 1976.



Alewife
Triangle Park

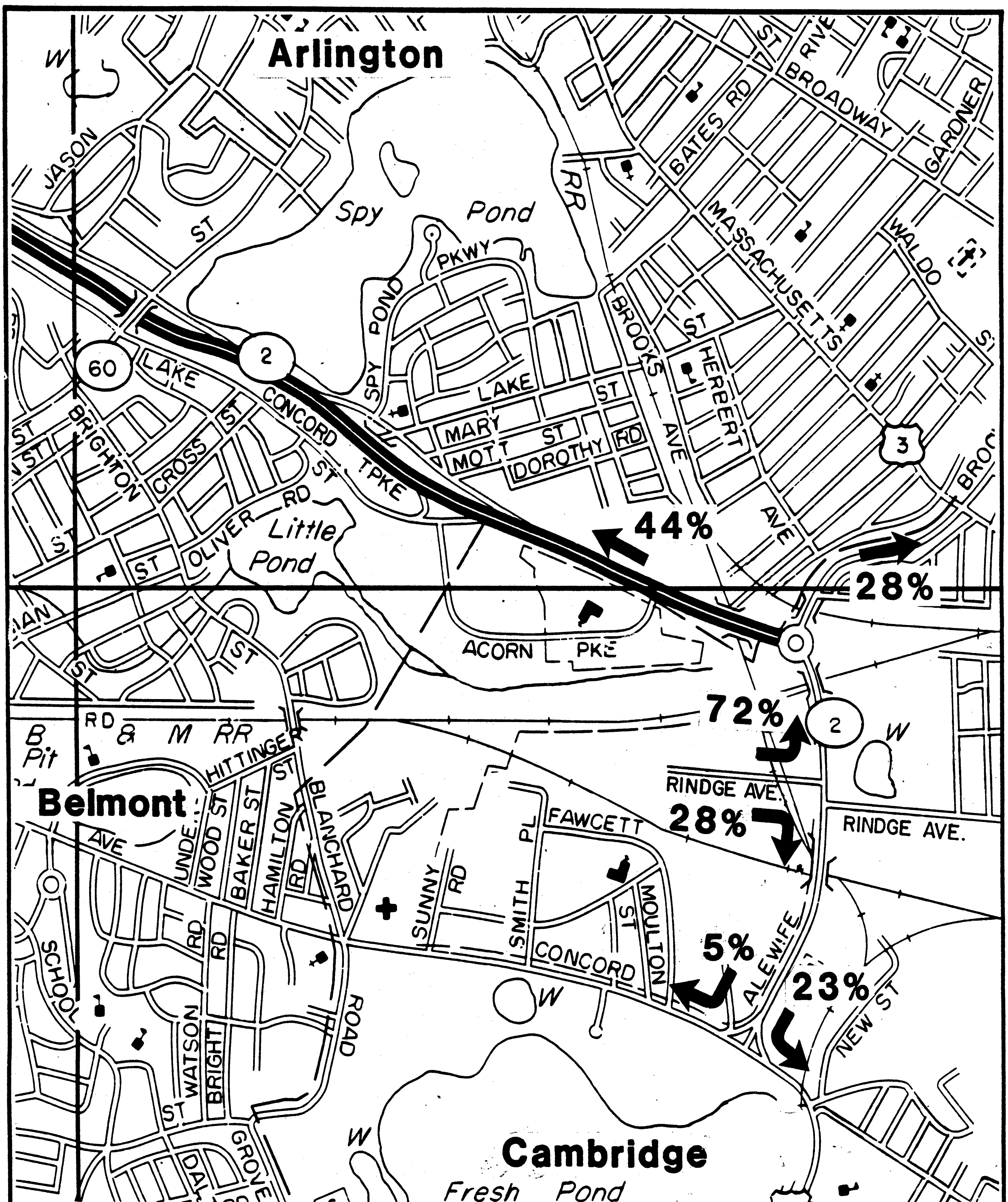
EIR

Traffic Arrival Pattern

Vanasse/Hangen Associates
Boston, MA

Not to Scale

FIG VI-A-1



Alewife Triangle Park

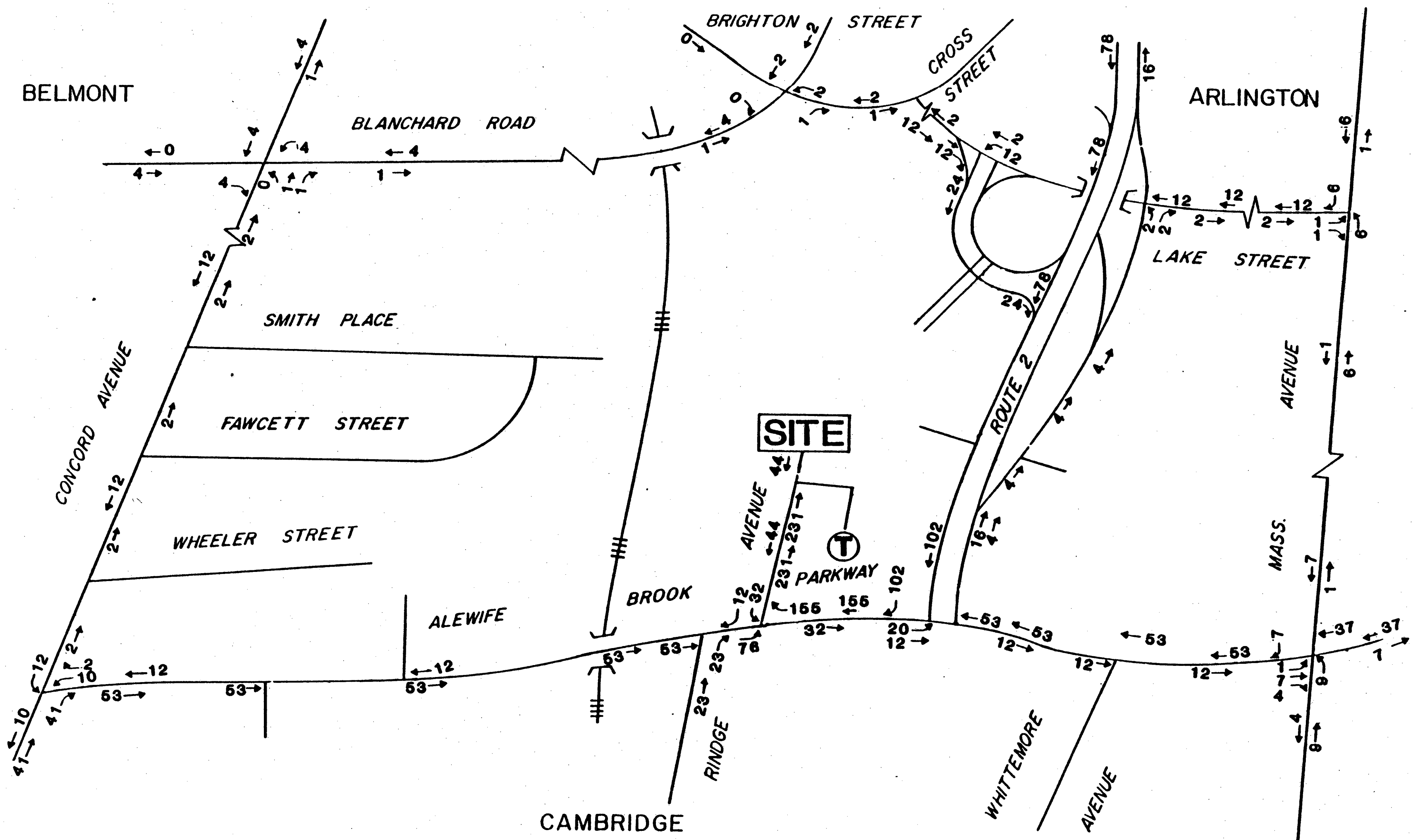
EIR

Traffic Departure Pattern

Vanasse/Hangen Associates
Boston, MA

Not to Scale

FIG VI-A-2



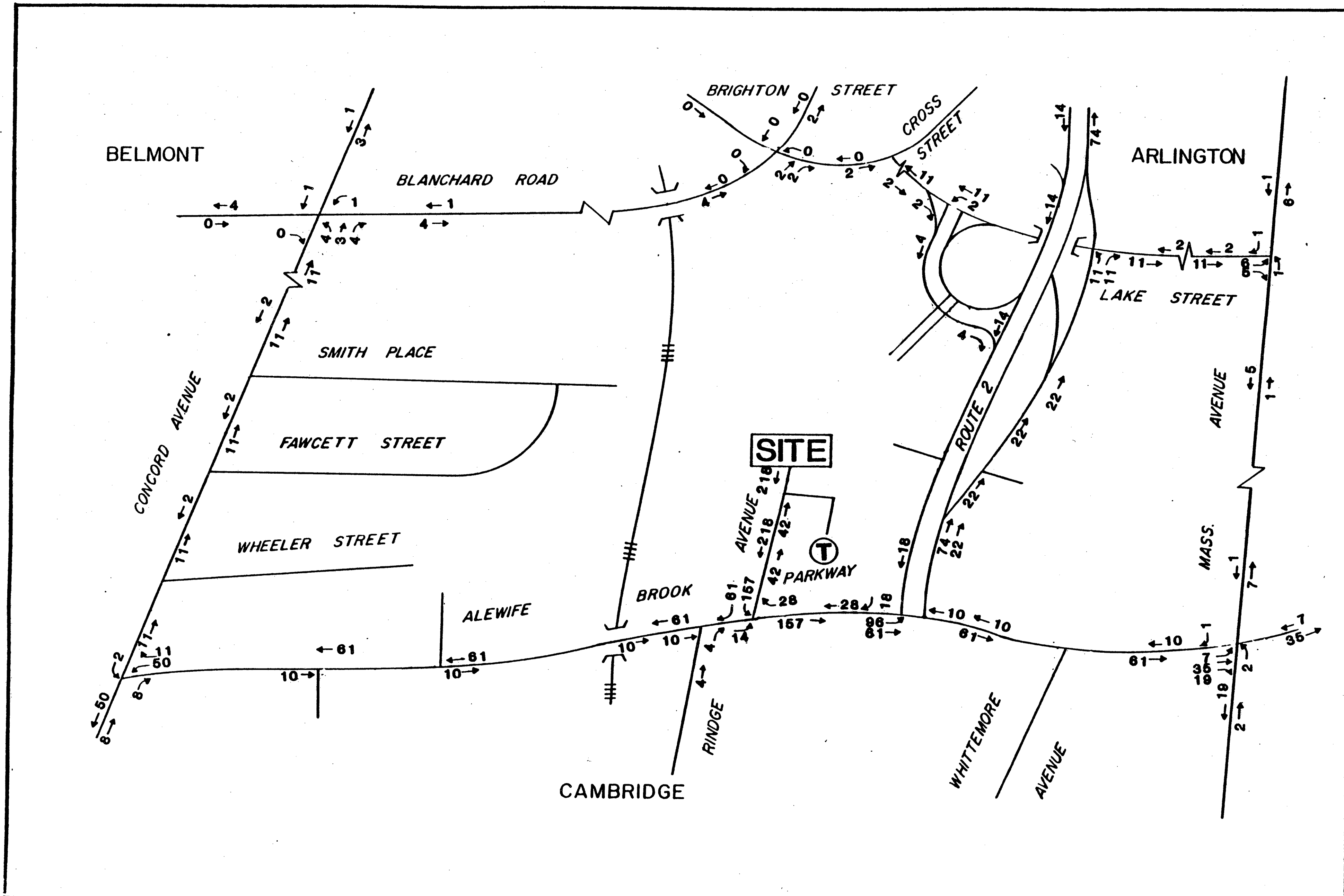
Alewife Triangle Park EIR

1984 Phase I Site Generated Traffic AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-3



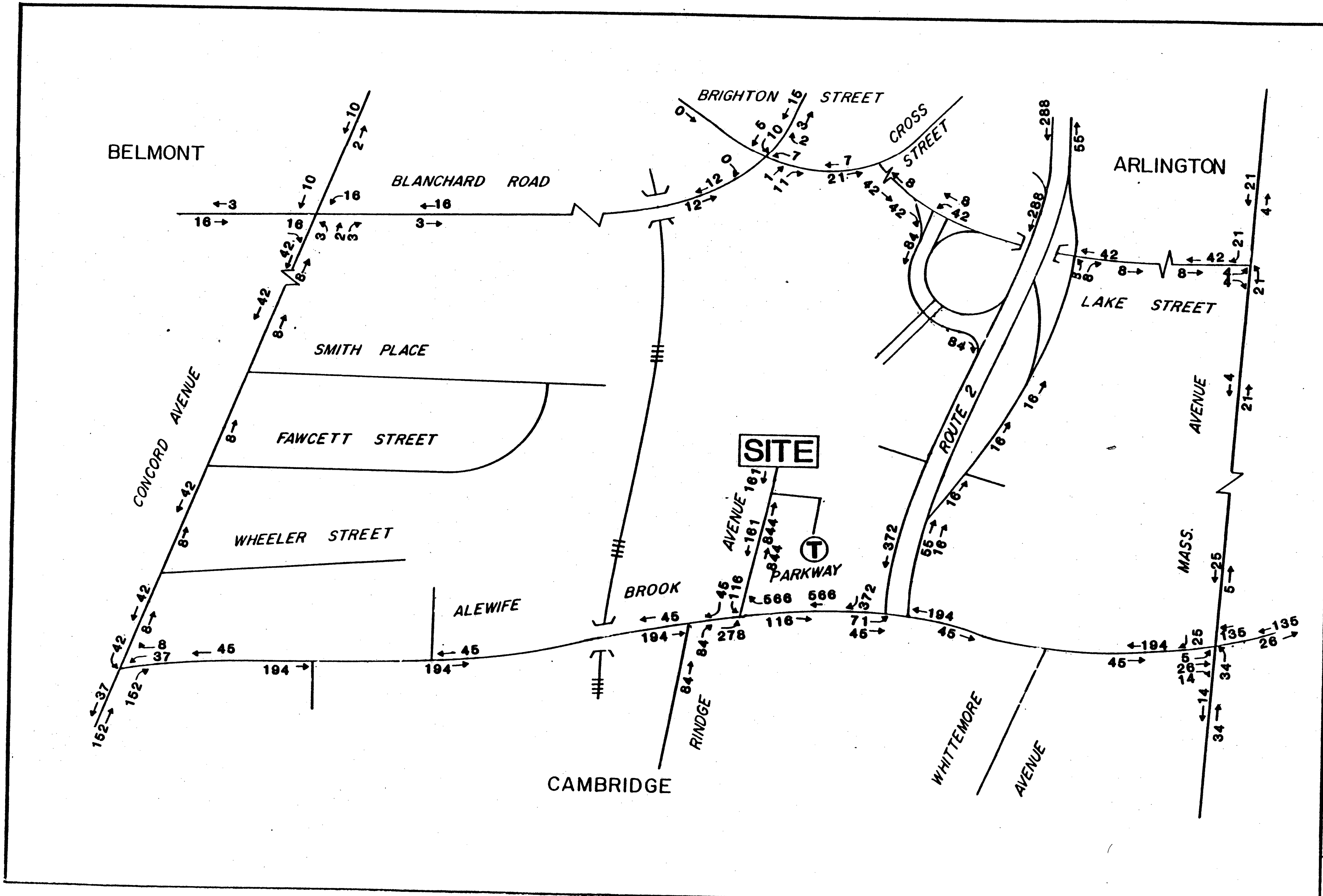
Alewife Triangle Park EIR

1984 Phase I Site Generated Traffic PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-4



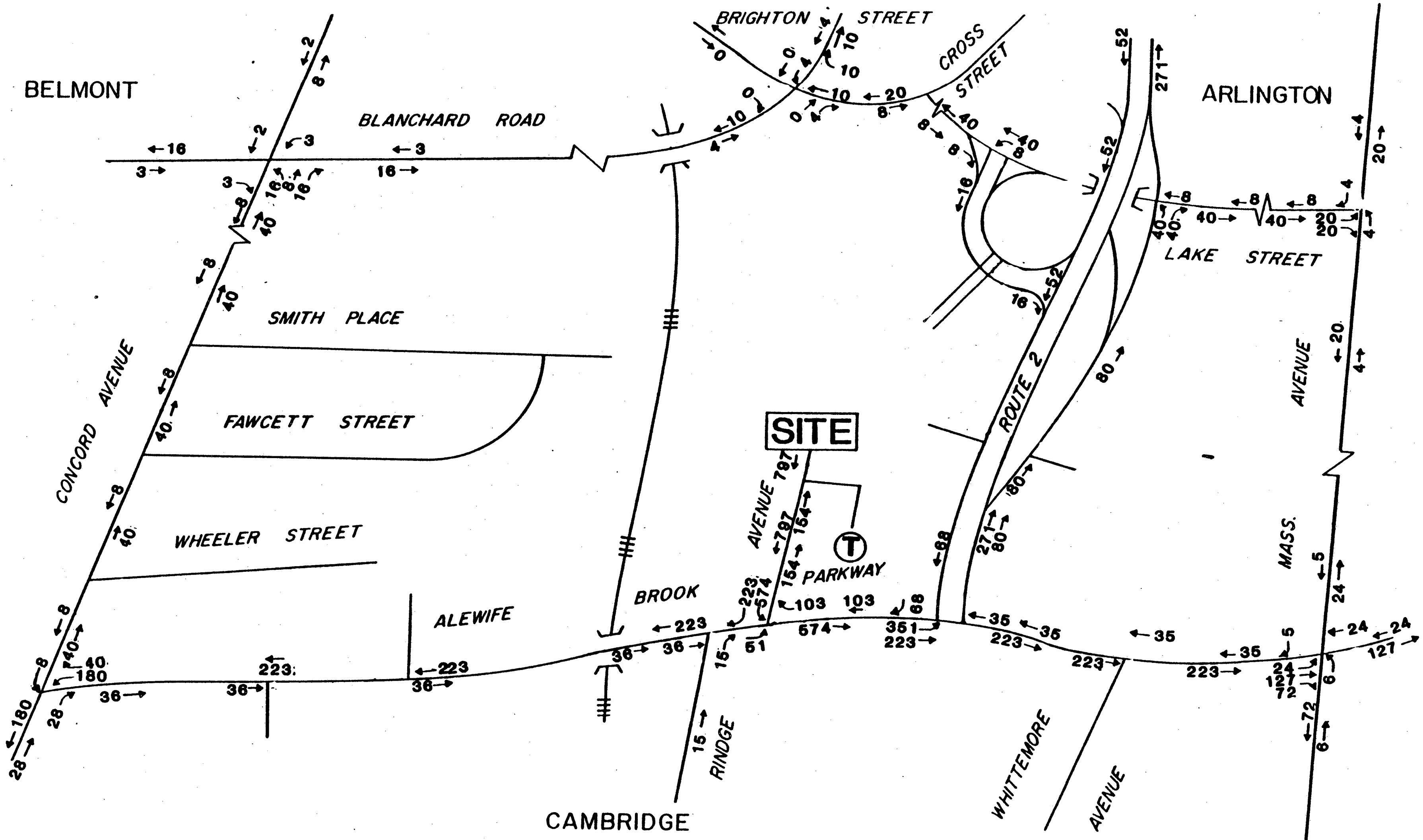
Alewife Triangle Park EIR

1987 Phase II Site Generated Traffic AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG-A-5



Alewife Triangle Park EIR

1987 Phase II Site Generated Traffic PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-6

An alternative procedure is to identify, for the design year, the location, nature and magnitude of planned new developments, estimate the traffic generated by the development and assign it to the study area roadway network. This may produce a more realistic estimate of study area traffic growth. However, it should be noted that this methodology is not without risk in that traffic projections may be overstated since some of the proposed land use developments are probably "more real" than others with respect to development nature, magnitude and schedule.

Within the Alewife study area, there are a number of major transportation and land use development projects in various stages of planning, design and construction. The MBTA's Alewife Station and 2,000 car garage complex is currently under construction and may be a reality by 1984. For trip generation, distribution and assignment purposes, it is assumed that the Alewife Station will remain the northwest terminus of the Red Line and that the 2,000 car capacity of the parking garage is not increased through 1990.

With respect to the overall Revitalization Plan for the Alewife area, the 1987 land use assumptions developed by the City of Cambridge for the Alewife Boulevard Project (EOEA #4326) were utilized, with minor revisions, to maintain consistency between concurrent planning studies. Table VI-A-3 summarizes a reasonable estimate of the location, nature and order of magnitude of development which is believed likely to occur between 1984 and 1987[1/].

1/ 1984 projections were factored from 1987 assumptions.

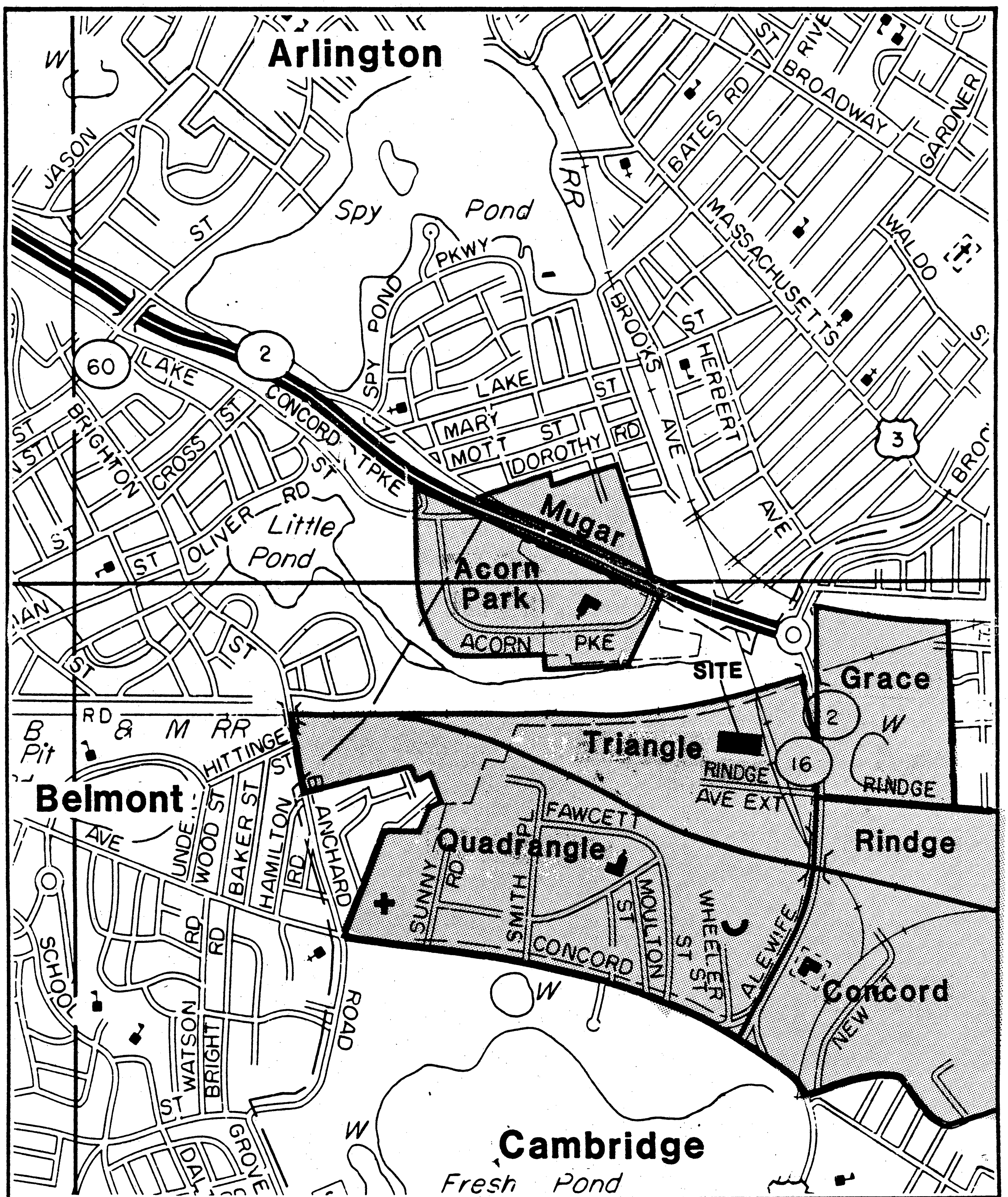
The principal nature of these projected development areas, depicted in Figure VI-A-7, are general office, research and development, and a 150-room hotel.

TABLE VI-A-3
ESTIMATED FUTURE BACKGROUND ALEWIFE DEVELOPMENT PROJECTS

Location	Use	Magnitude	
		1984	1987
Triangle Area	Office/ Light Industrial	15,000 s.f.	50,000 s.f.
Triangle Area	MBTA Station/ Garage	2,000 cars	2,000 cars
Quadrangle Area	Office	50,000 s.f.	230,000 s.f.
W.R. Grace Area	Office	50,000 s.f.	200,000 s.f.
W.R. Grace Area	Hotel	--	150 rooms
Mugar	Office	200,000 s.f.	360,000 s.f.
Acorn Park	R&D	--	200,000 s.f.

E. FUTURE BASE TRAFFIC

Traffic generated by the Alewife MBTA station and parking garage and by the proposed background land use developments was estimated, distributed and assigned to the existing roadway network of the study area based on the nature, order of magnitude and location of the proposed developments. This generated traffic was adjusted for mode split and vehicle occupancy according to the factors enumerated in Table VI-A-4 below.



Alewife Triangle Park ***Cambridge, Ma.***	**Areas of Background Development**	**Vanasse/Hangen Associates** **Boston, MA** Not to Scale FIG VI-A-7

TABLE VI-A-4
SUMMARY OF MODE SPLIT AND VEHICLE OCCUPANCY FACTORS

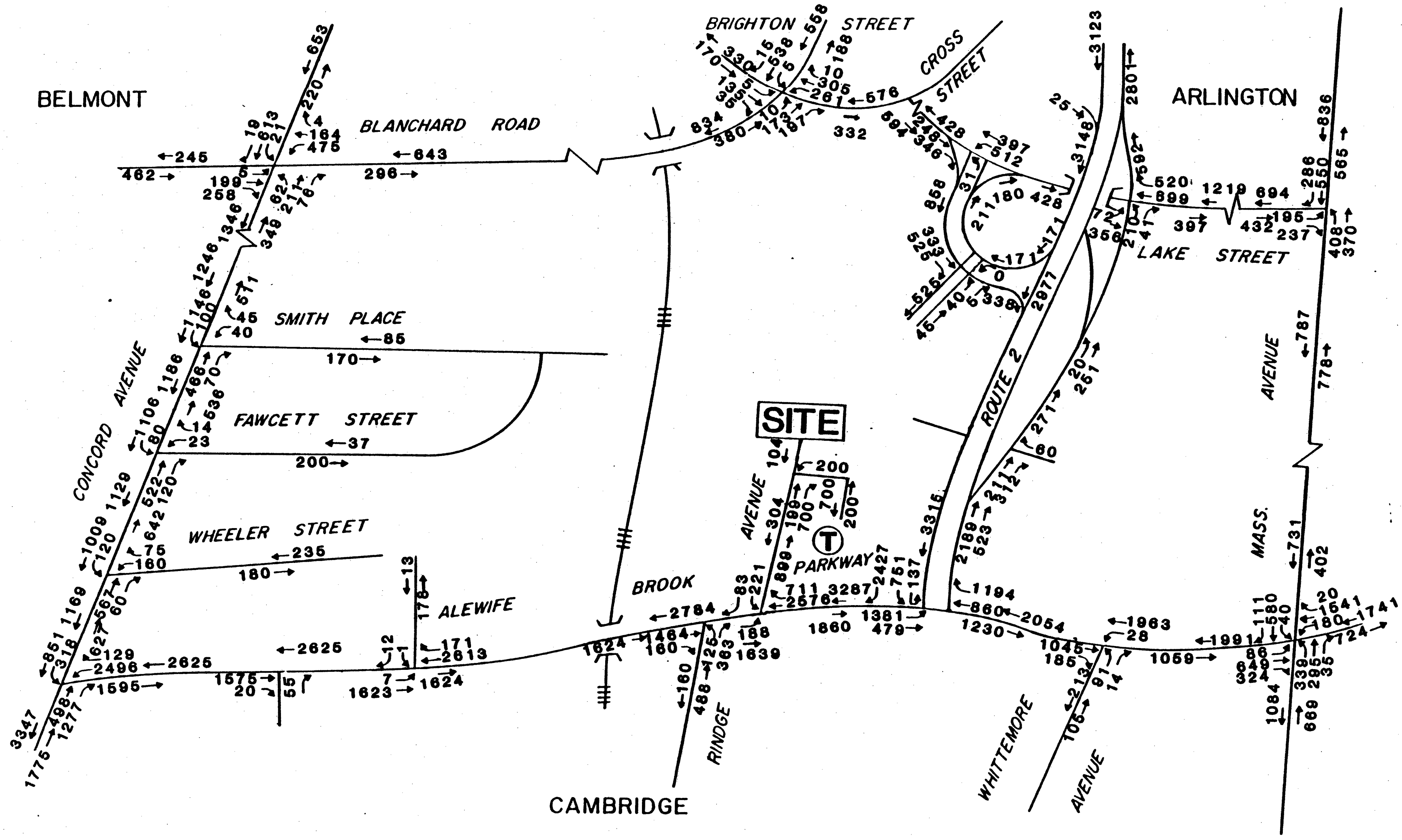
Development Area	Transit Mode Split	Vehicle Occupancy Rate
Triangle	30%	1.30
Quadrangle	25%	1.30
W.R. Grace	20%	1.20
Mugar	20%	1.20
Acorn Park	25%	1.20

It is generally assumed that transit usage will tend to be higher at those proposed developments that are located closer to the MBTA station. Tables VI-A-5 and VI-A-6 summarize the area background generated traffic which was added to the 1982 existing traffic volumes to form both 1984 and 1987 future base traffic flow networks. Figures VI-A-8 and VI-A-9 depict the respective AM and PM 1984 peak hour future base volumes which are equivalent to the 1984 project No Build traffic volumes. Figures VI-A-10 and VI-A-11 depict the respective AM and PM 1987 peak hour future base volumes which are equivalent to the 1987 project No Build traffic volumes.

TABLE VI-A-5
VEHICLE TRIPS GENERATED BY AREA
BACKGROUND DEVELOPMENTS - 1984

	AM			PM			Average
Development	In	Out	Total	In	Out	Total	Weekday1/
Triangle	19	4	23	4	18	22	120
MBTA	700	200	900	200	700	900	4,620
Quadrangle	78	15	93	15	74	89	494
W.R. Grace	78	15	93	15	74	89	494
Mugar	312	60	372	58	294	352	1,968
Total	1,187	294	1,481	292	1,160	1,452	7,696

1/ Two-way total.



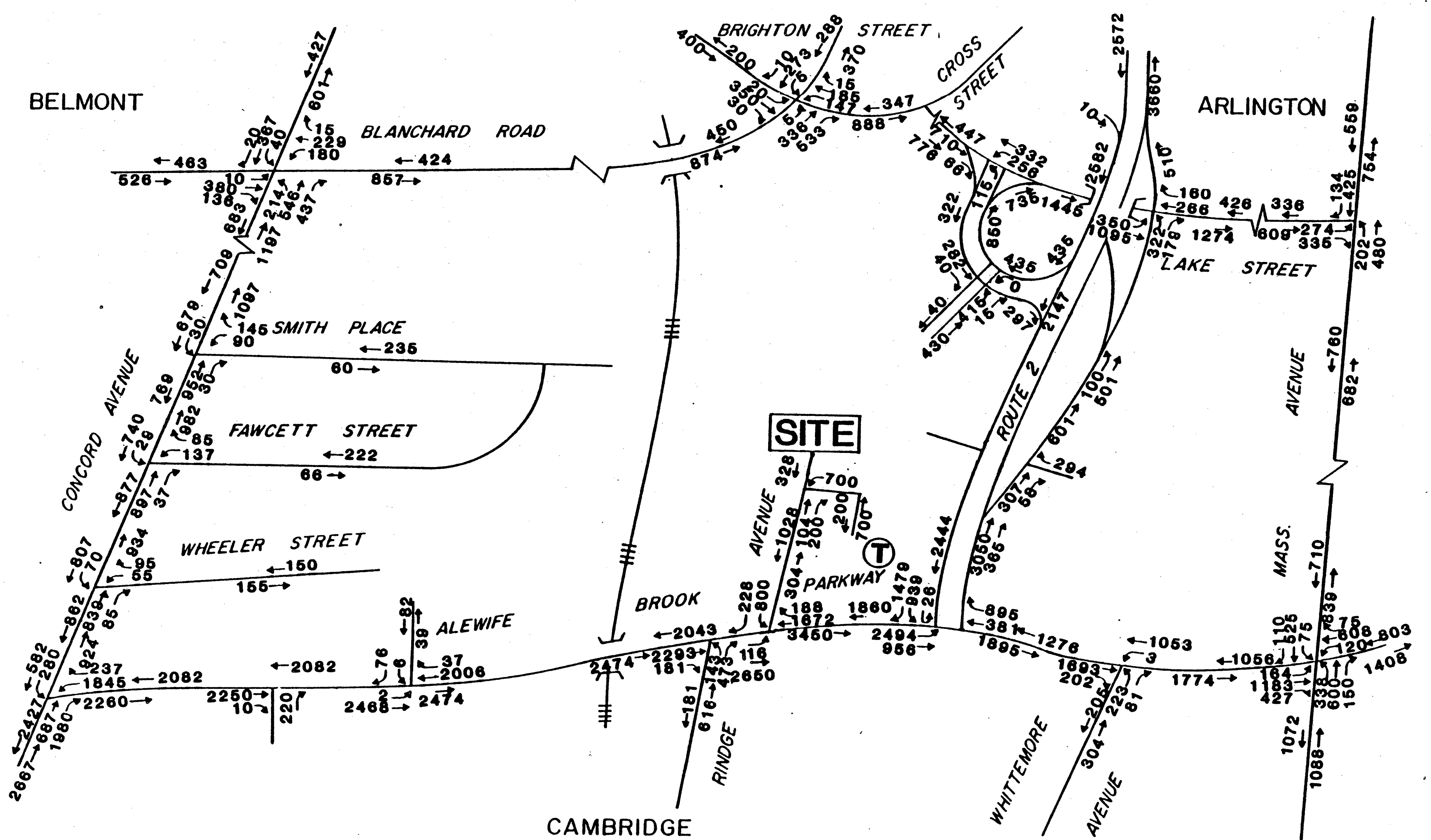
Alewife Triangle Park EIR

1984 Phase I No-Build Alternative AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-8



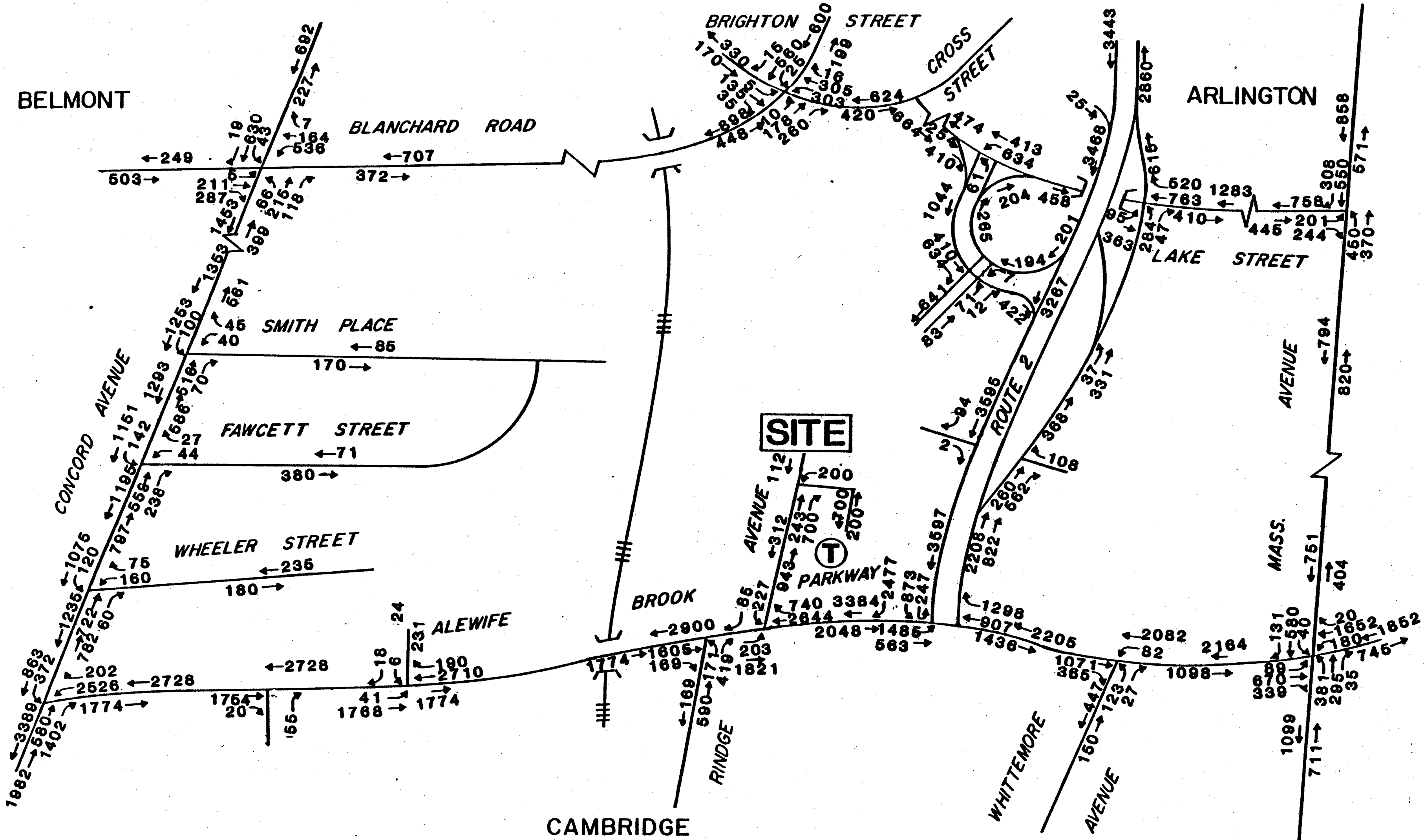
Alewife Triangle Park EIR

1984 Phase I No-Build Alternative PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-9



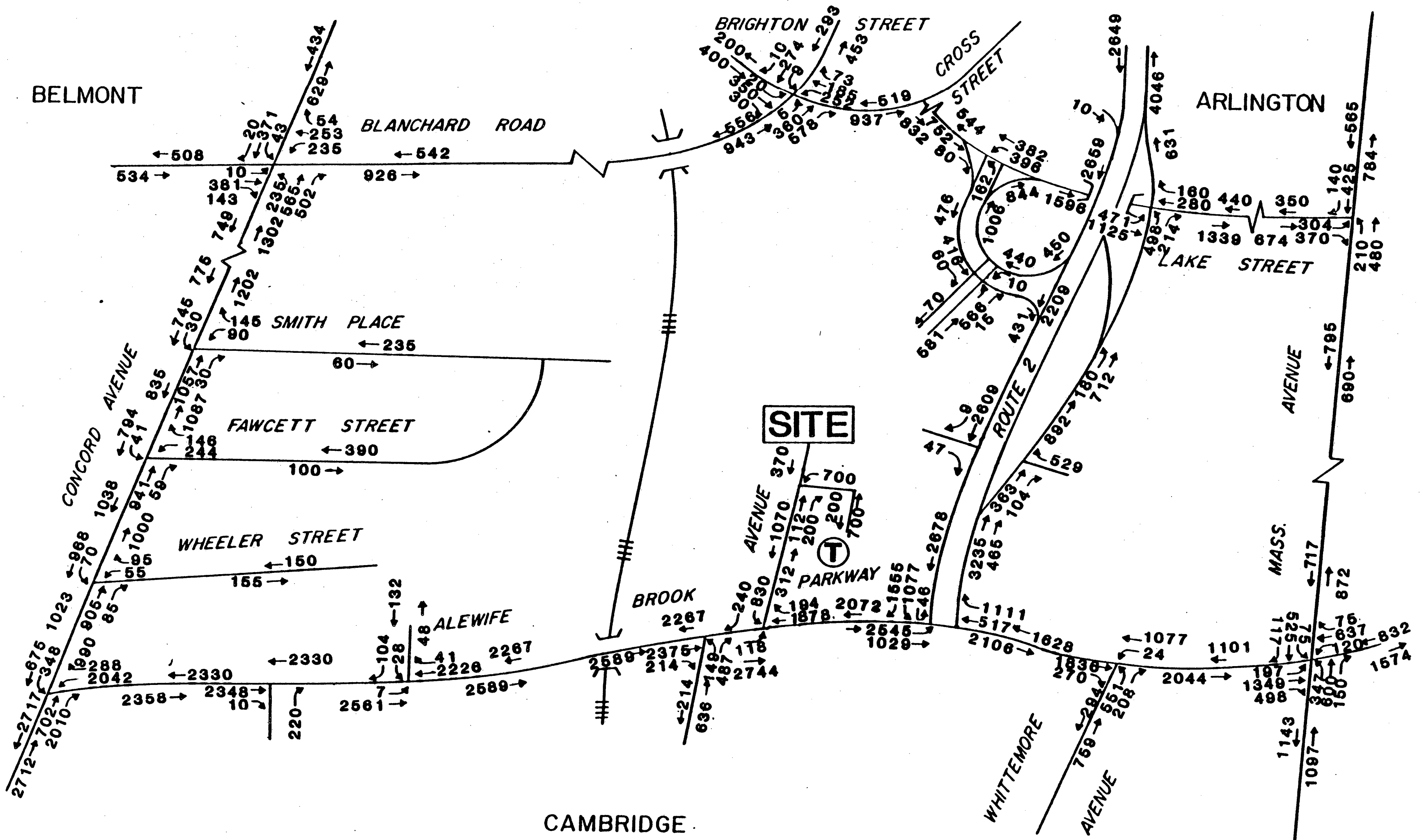
Alewife Triangle Park EIR

1987 Phase II No-Build Alternative AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-10



Alewife Triangle Park EIR

1987 Phase II
No Build Alternative
PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-11

TABLE VI-A-6
VEHICLE TRIPS GENERATED BY AREA
BACKGROUND DEVELOPMENTS - 1987

Development	AM			PM			Average Weekday1/
	In	Out	Total	In	Out	Total	
Triangle	63	12	75	12	60	72	398
MBTA	700	200	900	200	700	900	4,620
Quadrangle	311	60	371	58	292	350	1,960
W.R. Grace	353	85	438	79	319	398	2,530
Mugar	562	108	670	104	529	633	3,542
Acorn Park	210	40	250	39	198	237	1,338
Total	2,199	505	2,704	492	2,098	2,590	14,388

1/ Two-way total.

F. ROADWAY NETWORK

At the present time the Massachusetts Department of Public Works is preparing an environmental assessment of possible improvements to the Route 2/Alewife Brook Parkway area. Conceptual improvements under consideration include the redesign of the Dewey and Almy traffic circle, the construction of direct access ramps to Alewife Station from Route 2, the construction of a frontage road on both sides of Route 2, and the upgrading of Alewife Brook/Fresh Pond Parkway between Concord Avenue and Route 2 including reconstruction of the two bridges.

The City of Cambridge is presently assessing the environmental impacts of its proposed Alewife Boulevard project (EOEA #4326) which would extend existing Rindge Avenue Extension to form a connection with Concord Avenue. However, for purposes of this analysis which is in keeping with the scope of the study, none of the potential roadway improvements that are proposed in the aforementioned MDPW and City of Cambridge projects are assumed. As such, the following analysis will focus on the traffic impacts of project site generated traffic and other areawide background developments on the existing Alewife area roadway network with one exception. As part of the MBTA Alewife Station project, the intersection of Alewife Brook Parkway with Rindge Avenue and Rindge Avenue Extension will be reconstructed to form two "T" type intersections separated by approximately 200 feet. Thus, for all 1984 and 1987 traffic conditions, the following geometrics have been assumed for the Rindge Avenue Extension/Alewife Brook Parkway intersection:

- Alewife Brook Parkway - southbound approach
  2 lanes, through traffic
  1 lane, right-turn, high type design

- Alewife Brook Parkway - northbound approach
  2 lanes, through traffic
  1 lane, left-turn

- Rindge Avenue Extension
  2 lanes, left-turn
  1 lane, right-turn, high type design

- Three phase traffic signal control, interconnected and coordinated with traffic signals at Rindge Avenue/Alewife Brook Parkway intersection.

This is the only alteration to the existing highway network with the exception of the Mugar joint access/Lake Street exit service road paralleling westbound Route 2.1/

Figures VI-A-12 through VI-A-15 depict the respective AM and PM peak hour traffic volumes for both the 1984 and 1987 project Build alternatives.

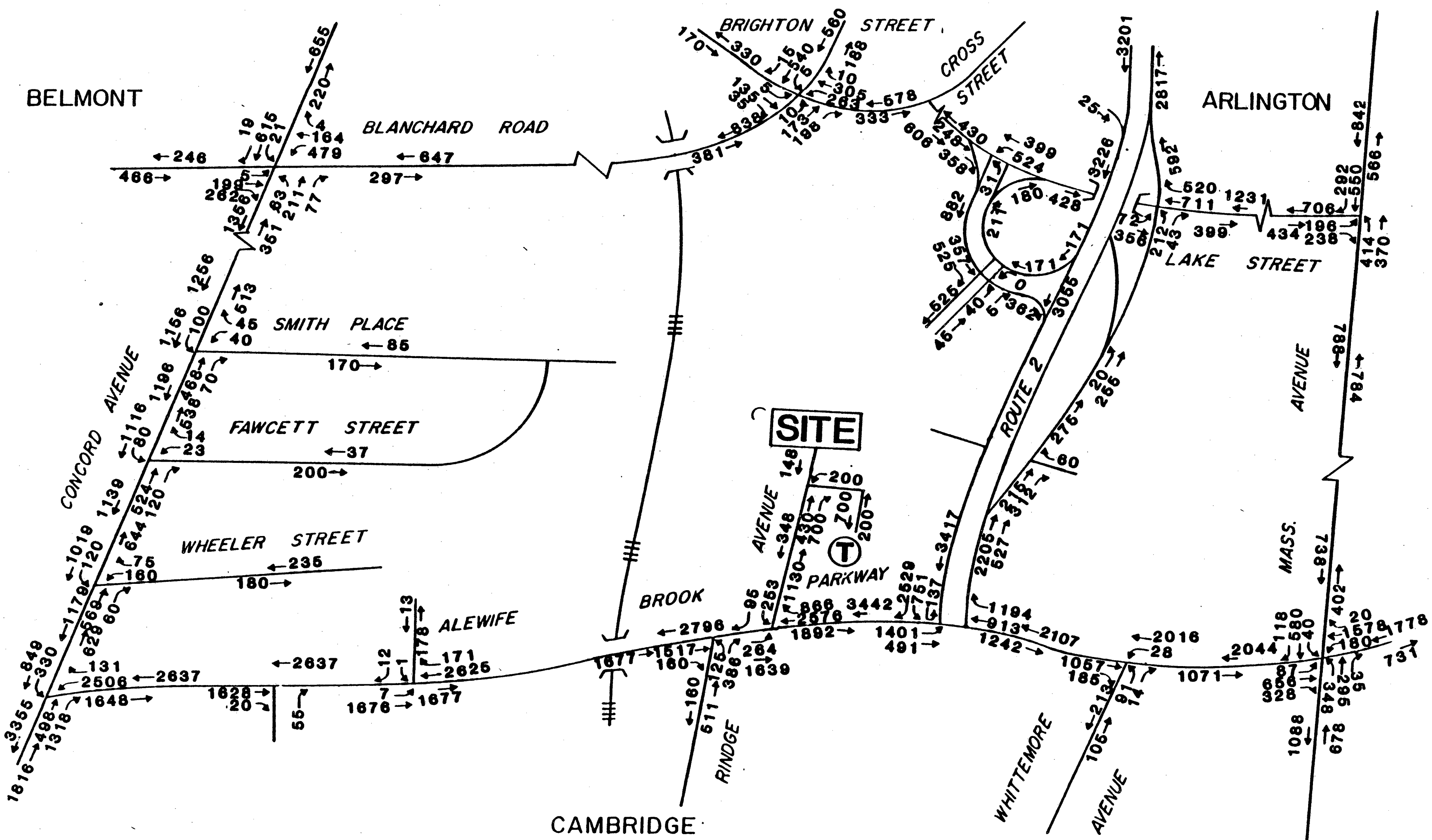
G. SYSTEM ANALYSIS/DEFICIENCY DELINEATION

Measuring traffic volumes on study area roadways such as Route 2, Alewife Brook Parkway and Concord Avenue indicates the importance of these routes to the existing roadway network within the study area and the greater Alewife area. However, these volume measurements, as summarized in Table VI-A-7, give little indication of the quality of traffic flow. To measure quality of flow, accident experience and capacity were analyzed with respect to the 1984 and 1987 traffic volumes described above for both the project Build and No Build alternatives.

Four general types of potential deficiencies were used to evaluate the safety and efficiency of traffic movement in the study area. These are:

- Deficiencies in roadway and intersection traffic-carrying capacity;

1/ Otherwise, the proposed Mugar development would not be included as part of the aforementioned background developments. Anticipitated traffic operations and safety conditions along the proposed service road were analyzed in the Draft Environmental Impact Report, Arlington Office Park, Route 2, Arlington, MA, EOEA #4167, May 1982.



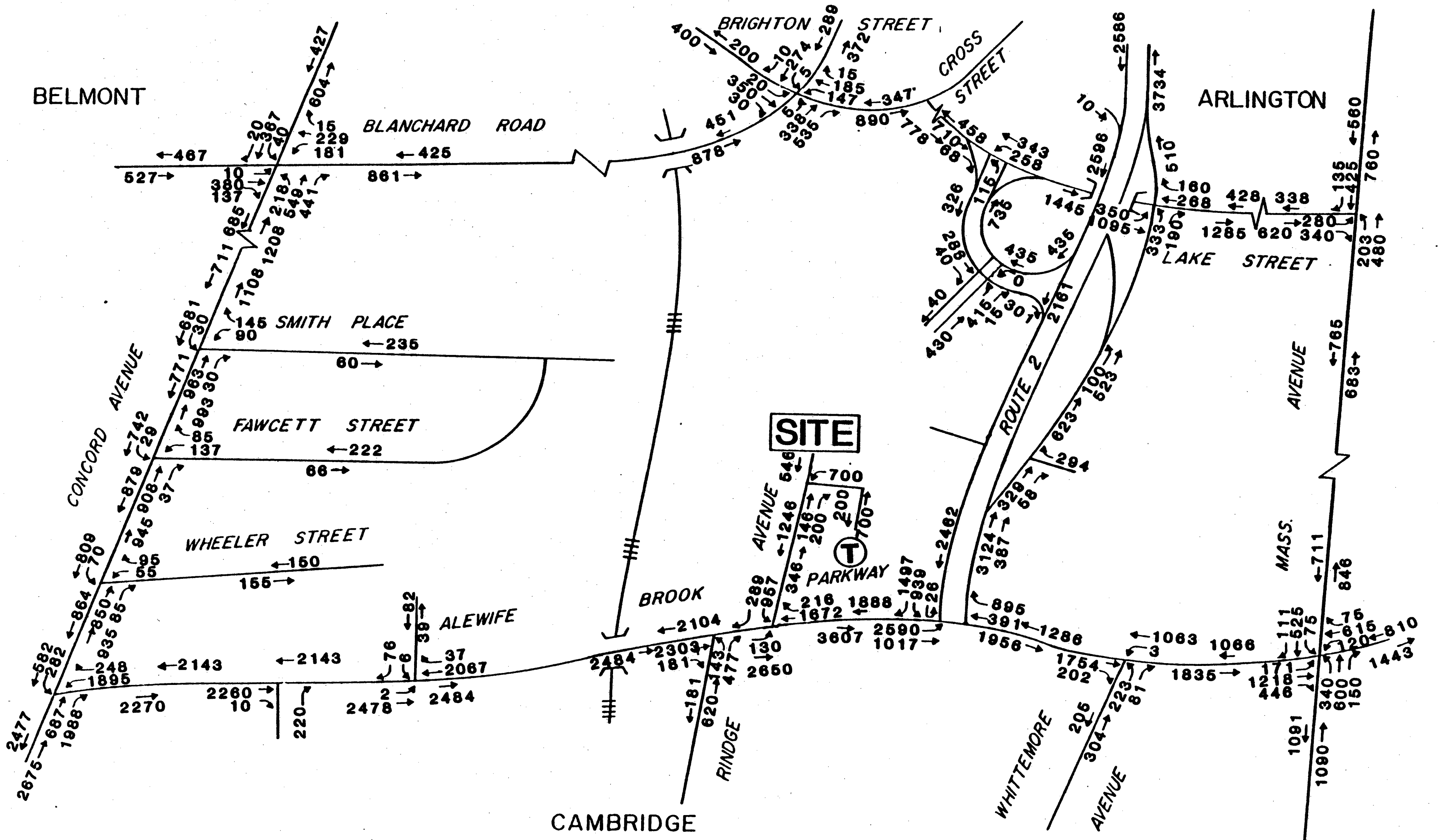
Alewife Triangle Park EIR

1984 Phase I Build Alternative AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-12



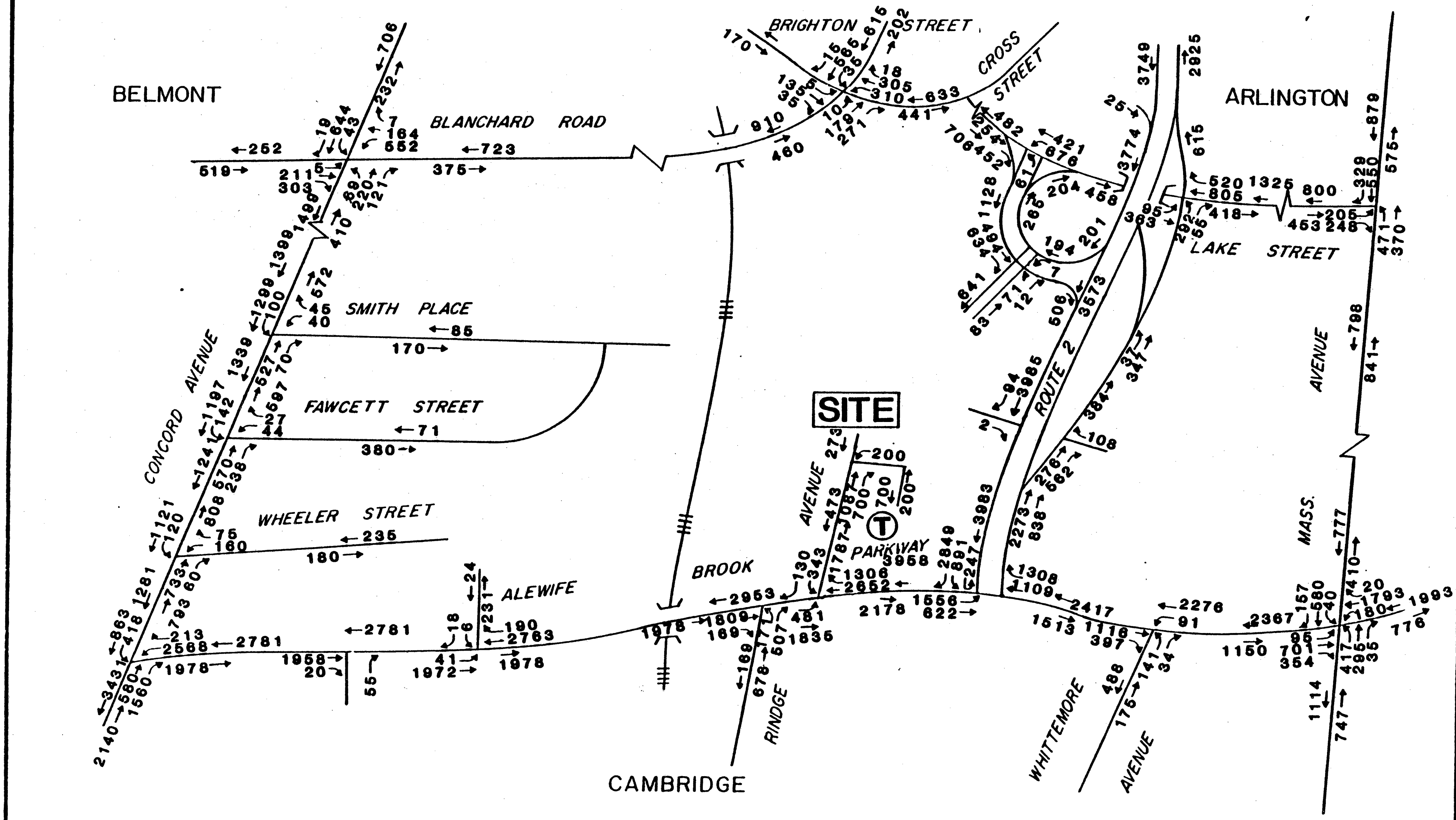
Alewife Triangle Park EIR

1984 Phase I Build Alternative PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-13



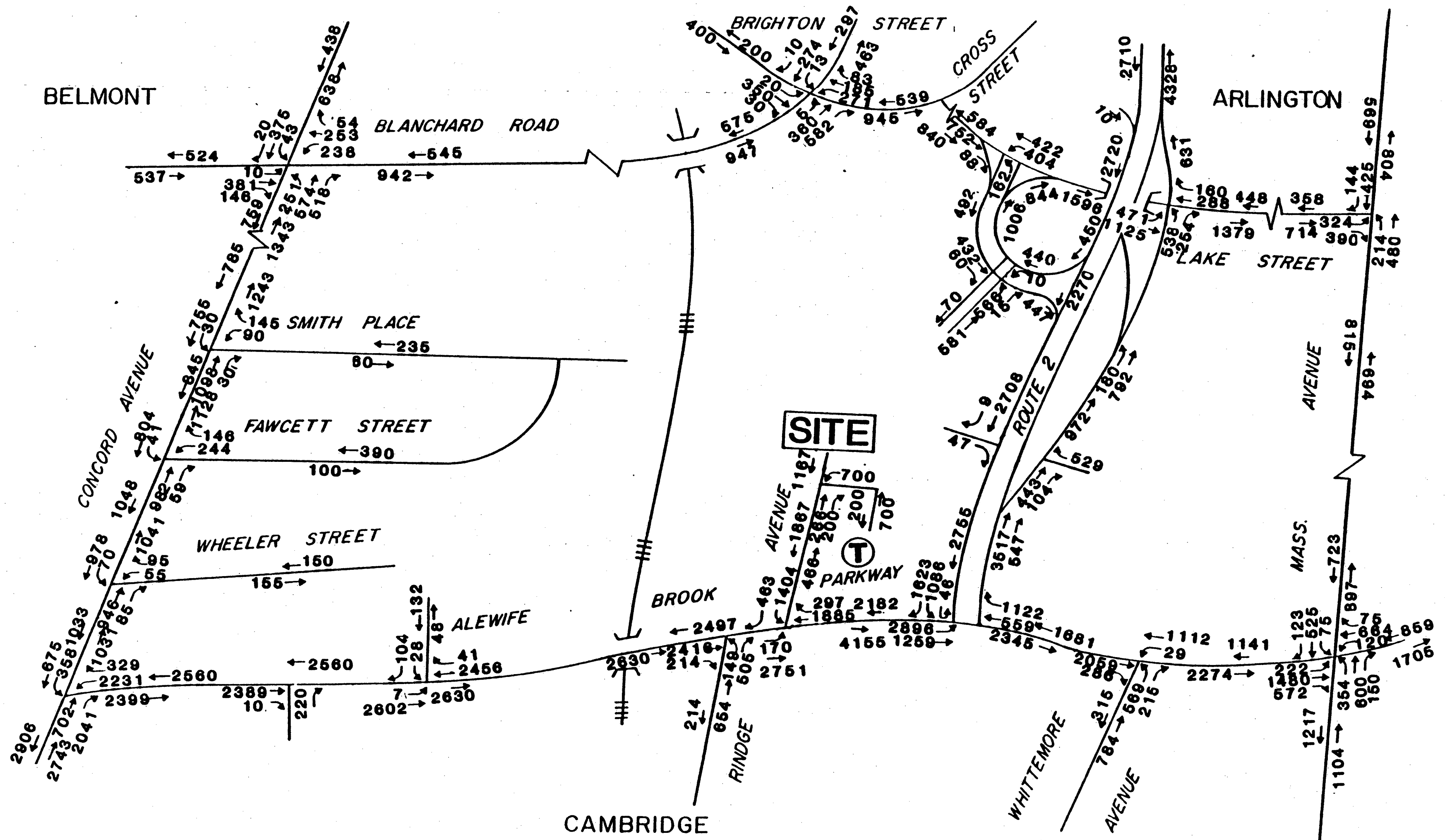
Alewife Triangle Park EIR

1987 Phase II Build Alternative AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-14



Alewife Triangle Park EIR

1987 Phase II Build Alternative PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-15

TABLE VI-A-7
ESTIMATED INCREASE OF AVERAGE DAILY TRAFFIC
DUE TO PROJECT AND BACKGROUND DEVELOPMENTS

Location	1982 AWD	1984				1987			
		No Build	% of Increase1/	Build	% of Increase2/	No Build	% of Increase3/	Build	% of Increase4/
Route 2, east of Lake Street	56,350	60,170	6.8%	60,810	1.1%	62,590	11.1%	64,930	3.7%
Alewife Brook Pkwy., north of Route 2	40,750	43,200	6.0%	43,410	0.5%	45,610	11.9%	46,970	3.0%
Alewife Brook Pkwy., south of Route 2	56,000	60,880	8.7%	61,900	1.7%	62,540	11.7%	66,250	5.9%
Concord Avenue, east of Blanchard Road	14,000	14,340	2.4%	14,420	0.6%	15,210	8.6%	15,480	1.8%
Blanchard Road, north of Concord Avenue	13,000	13,220	1.7%	13,250	0.3%	13,890	6.9%	13,990	0.7%
Lake Street, north of Route 2	11,200	11,630	3.8%	11,700	0.6%	12,010	7.2%	12,280	2.2%
Massachusetts Ave., west of Alewife Brook Parkway	16,400	16,670	1.7%	16,710	0.2%	16,840	2.7%	17,000	1.0%

1/ Percent increase from 1982 to 1984.
2/ Percent increase above 1984 base traffic.
3/ Percent increase from 1982 to 1987.
4/ Percent increase above 1987 base traffic.

- Deficiencies in safety;
- Deficiencies in mobility; and
- Deficiencies in traffic control.

1. Traffic Performance Measures

"Level of Service" is a term which defines the different operating conditions which occur on a roadway or intersection when accommodating various levels of traffic volumes. It is a qualitative measure responsive to the effects of a number of operational factors such as speed, travel delay, maneuverability and safety. In applying these level of service measurements to a roadway or an intersection, it is possible to index the operational qualities of the location being studied.

In practice, any roadway may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year. Level of Service "C", a condition of stable flow is generally considered desirable for peak or design traffic flow in urban areas such as Alewife. Level of Service "A" is the optimum condition of free flow where roadway operating conditions are at their best. Level of Service "E", on the other hand, represents an unstable flow condition where excessive congestion and delays are prevalent.

Efficiency of vehicular movement on urban roadways is directly affected by the capabilities and adequacy of associated intersections as well as that of the connecting road segments. For roadways such as Alewife Brook Parkway, Lake Street and Concord

Avenue, which have relatively short lengths of roadway between intersecting streets, the intersections generally control the level of service provided by the roadways.

Level of service for intersections may also be categorized. Level of Service "C" for an intersection represents a stable flow, with occasional backups behind turning vehicles. In the case of a signalized intersection at LOS "C", a driver may, on occasion, have to wait through more than one red signal indication. Level of Service "A" at an intersection represents a free flow operating condition. Typically, the intersection approach appears quite open and turning movements are made easily. Seldom, if ever, does a driver have to wait through more than one red signal indication. Capacity of the intersection occurs at Level of Service "E" and is characterized by long backups or queues of vehicles waiting to pass through the intersection. Delays are often substantial and may be more than one signal cycle in length.

2. Evaluation Criteria

Evaluation criteria used in analyzing area roadways and intersections are summarized below:

- **Roadways**

The level of service provided by roadway segments is evaluated on the basis of two criteria:

-- the volume to capacity ratio (V/C); and

-- operating speeds.

These criteria vary depending on the type of facility (ie., two-lane rural highway vs. freeway) and are summarized below1/:

	Freeway		Multi-Lane Highway		Two-Lane Highway	
LOS	V/C	Avg. Speed (mph)	V/C	Avg. Speed (mph)	V/C	Avg. Speed (mph)
A	.35	60	.30	60	.20	60
B	.50	55	.50	55	.45	50
C	.75	50	.75	45	.70	40
D	.90	40	.90	35	.85	35
E	1.00	30	1.00	30	1.00	30

Roadway capacities, in turn, are influenced by a number of factors including lane width, grades, lateral clearances and vehicle mix.

• Intersections

Level of service for a signalized intersection is determined by using the critical lane method of analysis. This procedure relates the capacity of an intersection to the lane utilization on each approach. The critical lane volume (CLV) is defined as the highest total of equivalent through traffic on an approach plus its

1/ Highway Capacity Manual, 1965.

opposing left turn movement assuming simple two-phase signal operation. The CLV for each phase is summed and the total used as an indication of level of service. The following table summarizes the relationship between level of service, signal phasing and critical lane volume1/.

	Maximum Sum of CLV		
LOS	Two Phase	Three Phase	Four + Phases
A	1,000	955	900
B	1,200	1,140	1,080
C	1,400	1,340	1,270
D	1,600	1,530	1,460
E	1,800	1,720	1,650

Level of service for unsignalized intersections is determined by using a procedure which is also described in Transportation Research Circular Number 212. The methodology can be applied to unsignalized intersections that are controlled by STOP and YIELD signs. The capacity or maximum flow of vehicles is calculated for each minor approach movement. These values are compared to the existing demand for each movement and the probable delay and level of service are estimated. The difference between available capacity and existing demand is defined as reserve capacity and is used as the criteria for determining level of service. The

1/ Transportation Research Board, National Academy of Sciences, "Transportation Research Circular Number 212. Interim Materials on Highways Capacity" (January, 1980).

following table summarizes the relationship between level of service, reserve capacity and expected traffic delay:

LEVEL OF SERVICE AND EXPECTED DELAY
FOR RESERVE CAPACITY RANGES

LOS	Reserve Capacity	Expected Traffic Delay
A	400 or more	Little or no delay
B	300 to 399	Short traffic delays
C	200 to 299	Average traffic delays
D	100 to 199	Long traffic delays
E	0 to 99	Very long traffic delays
E	Less than 0	Failure (extreme congestion)
F	(Any Value)	Intersection blocked by external causes

3. Capacity Analysis

Table VI-A-8 summarizes the roadway link capacity analysis. As can be seen, traffic volumes on several of the study area roadways such as Lake Street, north of Route 2 presently approach or exceed design capacities during part or all of the peak hours. By 1983, with no project development, the capacity limits of additional roadways such as Route 2, east of Lake Street and Alewife Brook Parkway, south of Route 2 will be realized. By 1987, still assuming no project development, peak hour traffic volumes will approach the capacity limit of Blanchard Road. In comparison to the area background development impacts on study area traffic conditions, the additional impact of the proposed project

TABLE VI-A-8

ROADWAY LEVEL OF SERVICE SUMMARY

Location	1982 Base Year								1984 No-Build Alternative								1984 Build Alternative							
	AM				PM				AM				PM				AM				PM			
	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C
Massachusetts Avenue, East of Lake Street																								
Eastbound	3,610	780	A/B	0.22	3,610	730	A/B	0.20	3,610	787	A/B	0.22	3,610	760	A/B	0.21	3,610	788	A/B	0.22	3,610	765	A/B	0.21
Westbound	3,610	745	A/B	0.21	3,610	675	A	0.19	3,610	778	A/B	0.21	3,610	682	A	0.19	3,610	784	A/B	0.22	3,610	683	A	0.19
Alewife Brook Parkway, South of Massachusetts Ave.																								
Northbound	3,489	930	A	0.27	3,489	1,340	B	0.38	3,489	1,059	A/B	0.30	3,489	1,774	C	0.51	3,489	1,071	B	0.31	3,489	1,835	C	0.53
Southbound	3,489	1,670	B/C	0.48	3,489	980	A	0.28	3,489	1,991	C	0.57	3,489	1,056	B	0.30	3,489	2,044	C	0.59	3,489	1,066	B	0.31
Alewife Brook Parkway, South of Route 2 Rotary																								
Northbound	3,309	1,515	B	0.46	3,309	2,700	D	0.82	3,309	1,860	C	0.56	3,309	3,450	E	1.04	3,309	1,892	C	0.57	3,309	3,607	E	1.09
Southbound	3,309	2,625	D	0.79	3,309	1,600	B	0.48	3,309	3,287	E	0.99	3,309	1,860	C	0.56	3,309	3,442	E	1.04	3,309	1,888	C	0.57
Alewife Brook Parkway, South of Rindge Ave.																								
Northbound	3,309	1,480	B	0.45	3,309	2,410	C	0.73	3,309	1,624	B	0.49	3,309	2,474	C	0.75	3,309	1,677	C	0.51	3,309	2,484	C	0.75
Southbound	3,309	2,670	D	0.81	3,309	1,800	C	0.54	3,309	2,784	D	0.84	3,309	2,043	C	0.62	3,309	2,796	D	0.85	3,309	2,104	C	0.64
Route 2, West of Lake St.																								
Eastbound	5,700	2,665	B	0.47	5,700	2,460	B	0.43	5,700	3,123	C	0.55	5,700	2,572	B	0.45	5,700	3,201	C	0.56	5,700	2,586	B	0.45
Westbound	5,700	2,690	B	0.47	5,700	3,230	C	0.57	5,700	2,801	B	0.49	5,700	3,660	C	0.64	5,700	2,817	B	0.49	5,700	3,734	C	0.66
Route 2, East of Lake St.																								
Eastbound	3,528	2,700	C/D	0.77	3,528	2,150	C	0.61	3,528	3,315	E	0.94	3,528	2,444	D	0.69	3,528	3,417	E	0.97	3,528	2,462	D	0.70
Westbound	3,528	2,285	C	0.65	3,528	2,930	D	0.83	3,528	2,712	D	0.77	3,528	3,415	E	0.97	3,528	2,732	D	0.77	3,528	3,511	E	0.99
Lake Street, South of Massachusetts Ave.																								
Total	1,649	1,040	C	0.63	1,649	865	C	0.52	1,649	1,126	C	0.68	1,649	945	C	0.57	1,649	1,140	C	0.69	1,649	958	C	0.58
Lake Street, South of Brooks Ave.																								
Total	1,649	1,530	E	0.93	1,649	1,620	E	0.98	1,649	1,616	E	0.98	1,649	1,700	E	1.03	1,649	1,630	E	0.99	1,649	1,713	>E	1.04
Lake Street, South of Route 2																								
Total	1,649	925	C	0.56	1,649	1,130	C	0.69	1,649	1,022	C	0.62	1,649	1,221	D	0.74	1,649	1,036	C	0.63	1,649	1,236	D	0.75
Concord Avenue, West of Alewife Brook Parkway																								
Eastbound	3,572	1,125	B	0.32	3,572	815	A	0.23	3,572	1,169	B	0.33	3,572	862	A	0.24	3,572	1,179	B	0.33	3,572	864	A	0.24
Westbound	3,572	580	A	0.16	3,572	894	A	0.25	3,572	627	A	0.18	3,572	924	A	0.26	3,572	629	A	0.18	3,572	935	A	0.26
Blanchard Road, North of Concord Avenue																								
Total	1,552	903	C	0.58	1,552	1,252	D	0.81	1,552	939	C	0.61	1,552	1,281	D	0.83	1,552	944	C	0.61	1,552	1,286	D	0.83
Brighton Street, South of Cross Street																								
Total	1,746	1,170	C	0.67	1,746	1,295	D	0.74	1,746	1,214	C	0.70	1,746	1,324	D	0.76	1,746	1,219	C	0.70	1,746	1,329	D	0.76

Location	1987 No-Build Alternative								1987 Build Alternative							
	AM				PM				AM				PM			
	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C	Cap.	Vol.	LOS	V/C
Massachusetts Avenue, East of Lake Street																
Eastbound	3,610	794	A/B	0.22	3,610	795	A/B	0.22	3,610	798	A/B	0.22	3,610	815	B	0.23
Westbound	3,610	820	A/B	0.23	3,610	690	A	0.19	3,610	841	A/B	0.23	3,610	694	A	0.19
Alewife Brook Parkway, South of Massachusetts Ave.																
Northbound	3,489	1,098	B	0.31	3,489	2,044	C	0.58	3,489	1,150	B	0.33	3,489	2,274	C	0.65
Southbound	3,489	2,164	C	0.62	3,489	1,101	B	0.32	3,489	2,367	C	0.67	3,489	1,141	B	0.33
Alewife Brook Parkway, South of Route 2 Rotary																
Northbound	3,309	2,048	C	0.62	3,309	3,574	E	1.08	3,309	2,178	C	0.65	3,309	4,155	E	1.25
Southbound	3,309	3,384	E	1.02	3,309	2,072	C	0.63	3,309	3,958	E	1.19	3,309	2,182	C	0.66
Alewife Brook Parkway, South of Rindge Ave.																
Northbound	3,309	1,774	C	0.54	3,309	2,589	D	0.78	3,309	1,978	C	0.59	3,309	2,630	D	0.79
Southbound	3,309	2,900	D	0.88	3,309	2,267	C	0.68	3,309	2,953	D	0.89	3,309	2,497	C	0.75
Route 2, West of Lake St.																
Eastbound	5,700	3,443	C	0.60	5,700	2,649	B	0.46	5,700	3,749	C	0.65	5,700	2,710	B	0.47
Westbound	5,700	2,860	B/C	0.50	5,700	4,046	D	0.71	5,700	2,925	C	0.51	5,700	4,328	D	0.75
Route 2, East of Lake St.																
Eastbound	3,528	3,597	E	1.02	3,528	2,678	D	0.76	3,528	3,987	E	1.12	3,528	2,755	D	0.78
Westbound	3,528	3,030	E	0.86	3,528	3,702	E	1.05	3,528	3,111	E	0.88	3,528	4,064	E	1.15
Lake Street, South of Massachusetts Ave.																
Total	1,649	1,203	D	0.73	1,649	1,024	C	0.62	1,649	1,253	D	0.76	1,649	1,072	C	0.65
Lake Street, South of Brooks Ave.																
Total	1,649	1,693	E	1.02	1,649	1,779	E	1.08	1,649	1,743	E	1.05	1,649	1,827	E	1.10
Lake Street, South of Route 2																
Total	1,649	1,138	C	0.68	1,649	1,376	D	0.83	1,649	1,188	D	0.71	1,649	1,424	D/E	0.86
Concord Avenue, West of Alewife Brook Parkway																
Eastbound	3,572	1,235	B	0.35	3,572	1,023	A	0.28	3,572	1,281	B	0.36	3,572	1,033	A	0.29
Westbound	3 572	782	A	0.22	3,572	990	A	0.28	3,572	793	A	0.22	3,572	1,031	A	0.27
Blanchard Road, North of Concord Avenue																
Total	1,552	1,079	C/D	0.70	1,552	1,468	E	0.95	1,552	1,098	D	0.71	1,552	1,487	E	0.96
Brighton Street, South of Cross Street																
Total	1,746	1,346	D	0.76	1,746	1,508	E	0.86	1,746	1,370	D	0.78	1,746	1,522	E	0.87

development will vary by location. For example, during the PM peak hour, traffic is projected to increase on Lake Street, north of Route 2 and on Blanchard Road, north of Concord Avenue by 9.8 and 17 percent, respectively, from 1982 to 1987 solely due to the aforementioned area background developments. Additional traffic generated by total project development will increase these 1987 future base traffic volume estimates by approximately 3 percent on Lake Street and by 1 percent on Blanchard Road. On the other hand, existing AM peak hour traffic volumes along eastbound Route 2 and southbound Alewife Brook Parkway, south of Route 2 may be expected by 1987 to have increased by 33 and 29 percent, respectively, due to background developments. In addition project site-generated traffic will increase these 1987 future base volume estimates by approximately 11 percent on Route 2 and 17 percent on Alewife Brook Parkway.

- **Intersections**

It is apparent, however, that a single level of service determination for sections of roadway under the general assumption of uninterrupted roadway conditions is not totally applicable. Given the nature of the study area's roadway network, the volume and turning movements associated with the base traffic flows and the distribution and assignment of site-generated traffic, level of service in terms of ease of traffic operations and safety is, for the most part, controlled by roadway conditions and traffic factors at a number of key intersections -- Massachusetts Avenue at Alewife

Brook Parkway, Alewife Brook Parkway at Route 2, Alewife Brook Parkway at Rindge Avenue Extension, Lake Street at Route 2 and Blanchard Road at Concord Avenue. As such, level of service analysis was performed at a number of study area intersections for existing 1982 traffic conditions, and for the 1984 and 1987 traffic conditions associated with both the project No-Build and Build alternatives. Table VI-A-9 summarizes the intersection level of service analysis.

Existing peak hour traffic volumes presently approach or equal capacity limits at a number of study area intersection locations. Level of service 'E' is experienced during both the AM and PM peak hours at the Rindge Avenue, Route 2 and Concord Avenue intersections with Alewife Brook Parkway.1/ During the PM peak hour, the intersection of Massachusetts Avenue with Alewife Brook Parkway and the Route 2 and Lake Street off-ramps (eastbound and westbound) operate under capacity constrained conditions. As traffic is projected to increase through 1987, peak hour levels of traffic congestion will intensify at these locations, and existing acceptable levels of service at other study area locations will progressively decline.

1/ Theoretical volume to capacity ratios calculated at the Route 2 and Concord Avenue rotaries are somewhat higher than the V/C ratio calculated at the Alewife Brook Parkway/Rindge Avenue Extension intersection. This is misleading since traffic operations at the signalized Rindge Avenue intersection are the principal controlling factors along the section of Alewife Brook Parkway between Route 2 and Concord Avenue. The unrealistically high V/C ratios calculated at the two rotaries suggest that the 2.5 second value of the critical gap utilized in the weaving analysis should be reduced in light of peak hour saturation traffic flows.

TABLE VI-A-9
INTERSECTION LEVEL OF SERVICE SUMMARY

Location	1982 Base Year				1984 No-Build Alternative				1984 Build Alternative				1987 No-Build Alternative				1987 Build Alternative			
	AM		PM		AM		PM		AM		PM		AM		PM		AM		PM	
	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Massachusetts Avenue, at Lake Street	D	0.80	D	0.80	D	0.88	D	0.85	E	0.89	D	0.86	E	0.98	E	0.90	E	1.03	E	0.93
Alewife Brook Parkway, at Massachusetts Ave.	D	0.84	E	0.91	E	0.96	E	1.07	E	0.98	E	1.09	E	1.08	E	1.17	E	1.16	E	1.26
Alewife Brook Parkway, at Whittemore Avenue	B	0.56	A	0.55	B	0.66	C	0.72	C	0.68	C	0.74	C	0.77	E	0.98	D	0.88	E	1.07
Alewife Brook Parkway, at Rindge Ave./Rindge Ave. Extension	E	1.00	E	1.02	E	1.02	E	1.14	E	1.08	E	1.20	E	1.05	E	1.18	E	1.28	E	1.38
Concord Avenue at Blanchard Road	D	0.83	D	0.82	D	0.88	D	0.84	D	0.89	E	1.00	E	0.99	E	1.07	E	1.02	E	1.09
Brighton Street at Cross Street	A	0.55	B	0.65	B	0.57	B	0.67	B	0.57	C	0.67	B	0.61	D	0.85	B	0.61	D	0.87
Lake Street at Route 2 1/ Eastbound Off-Ramps	D	0.20	E	1.24	B	0.65	C	0.67	B	0.66	C	0.68	C	0.78	D	0.83	D/E	0.84	D/E	0.84
Lake Street at Route 2 1/ Westbound Off-Ramps	E	1.17	E	1.25	A	0.55	C	0.77	A	0.56	C	0.78	B	0.63	D	0.85	B	0.66	D	0.86
Route 2 at Alewife Brook Parkway	E	1.19	E	1.39	E	1.44	E	1.64	E	1.48	E	1.68	E	1.58	E	1.83	E	1.74	E	1.98
Concord Avenue at Alewife Brook Parkway	E	1.33	E	1.11	E	1.36	E	1.20	E	1.36	E	1.22	E	1.42	E	1.32	E	1.47	E	1.39

1/ Assumes signalization of intersection by 1984.

For example, by 1984 and assuming no project development, capacity limits will be approached at the Massachusetts Avenue and Alewife Brook Parkway intersection during the AM peak hour. Under the 1984 project Build condition, capacity limits will be approached at the Massachusetts Avenue and Lake Street intersection during the AM peak hour, and at the Blanchard Road and Concord Avenue intersection during the PM peak hour. By 1987 and assuming no project development, additional intersection locations will be characterized by peak hour level of service "E" traffic operations: Massachusetts Avenue at Lake Street and Alewife Brook Parkway at Whittemore Avenue during the PM peak hour, and Concord Avenue at Blanchard Road during the AM peak hour.

Thus, by 1987 and assuming no project development, traffic operations at the key intersections which serve to meter traffic flows both into and out of the entire Alewife area - Lake Street at Massachusetts Avenue, Massachusetts Avenue at Alewife Brook Parkway, Lake Street at Route 2, Blanchard Road at Concord Avenue and Rindge Avenue at Alewife Brook Parkway - will be subject to peak hour capacity constraints. The estimated traffic increases due to project development will serve to increase existing levels of congestion at these locations and will likely have the effect of extending the duration of peak hour traffic conditions. Comparison of the 1987 No Build and Build volume to capacity ratios at these intersection location reveals that the location most significantly impacted due to project development is the intersection of Alewife

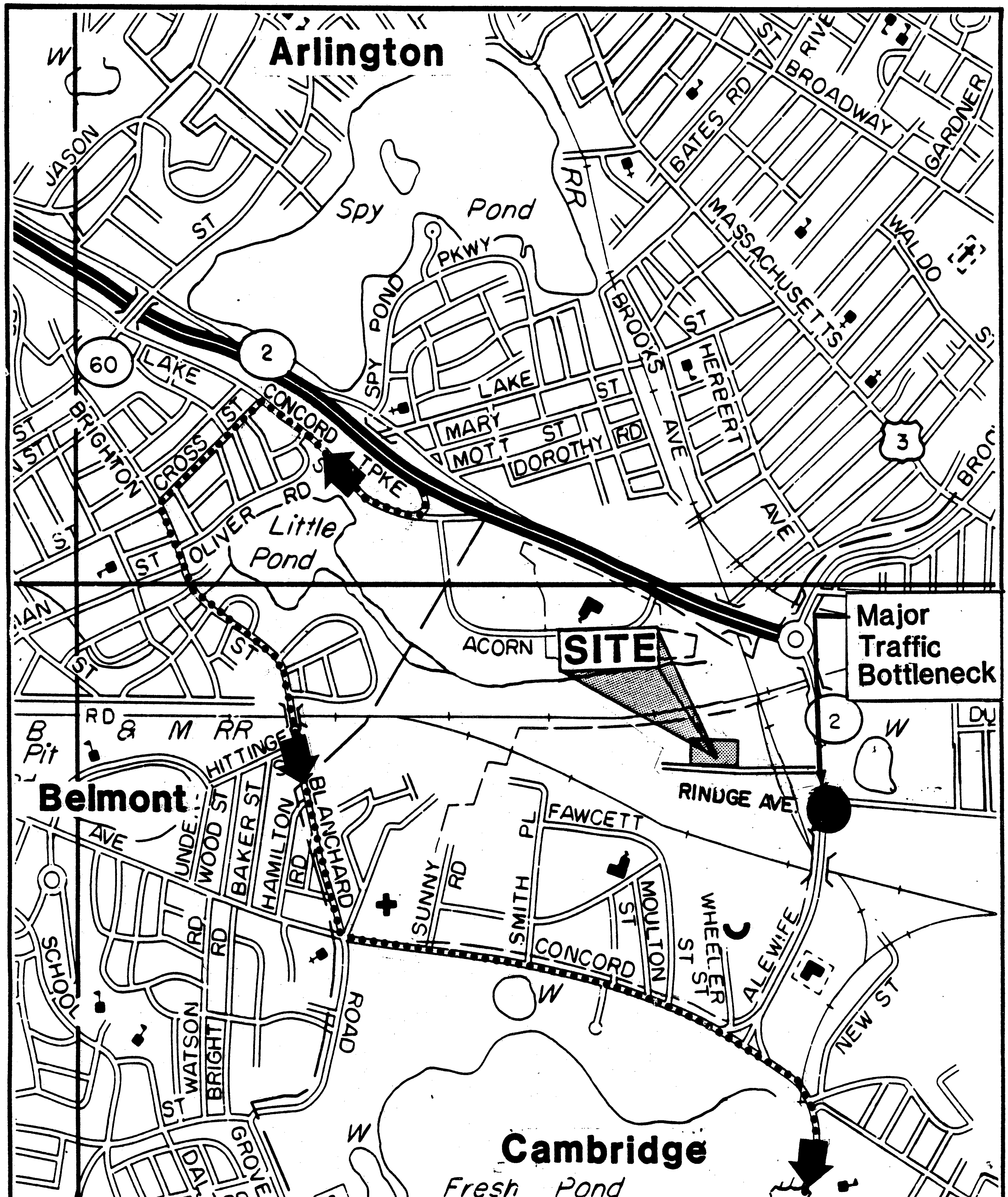
Brook Parkway with Rindge Avenue Extension. At this location, peak hour traffic volumes are expected to increase by 23 and 20 percent respectively, during the AM and PM peak hours. This results from the fact that this intersection location is the sole access/egress point for site-generated traffic.

4. Potential Traffic Diversion

The primary traffic bottleneck within the study area during both the AM and PM peak hour is the Alewife Brook Parkway at Rindge Avenue intersection. During the existing AM peak hour, southbound traffic customarily queues back from the Rindge Avenue intersection on Alewife Brook Parkway to the Route 2 rotary. Occasionally, a moving queue will extend back from the rotary on Route 2 towards Lake Street. Eastbound Boston-oriented traffic travelling on Route 2 and destined for Soldiers' Field Road, Storrow Drive and Memorial Drive could attempt within the study area to circumvent the Rindge Avenue bottleneck by exiting Route 2 at Lake Street1/ and cutting across town via Lake Street to Cross Street to Brighton Street to Blanchard Road to Concord Avenue, and then proceeding south on Fresh Pond Parkway. This alternate route is depicted in Figure VI-A-16.

Review of existing roadway link and intersection levels of service for Blanchard Road (LOS 'C') and the Blanchard Road and Concord Avenue intersection (LOS 'D') suggests that this alternate

1/ Eastbound Route 2 traffic could also exit outside of the study area at Pleasant Street and travel eastbound on Concord Avenue via Pleasant Street, or Leonard Street, or Brighton Street or Lake Street.



Alewife Triangle Park

EIR

Potential Route To Bypass The Rindge Avenue/Alewife Brook Parkway Intersection

Vanasse/Hangen Associates
Boston, MA

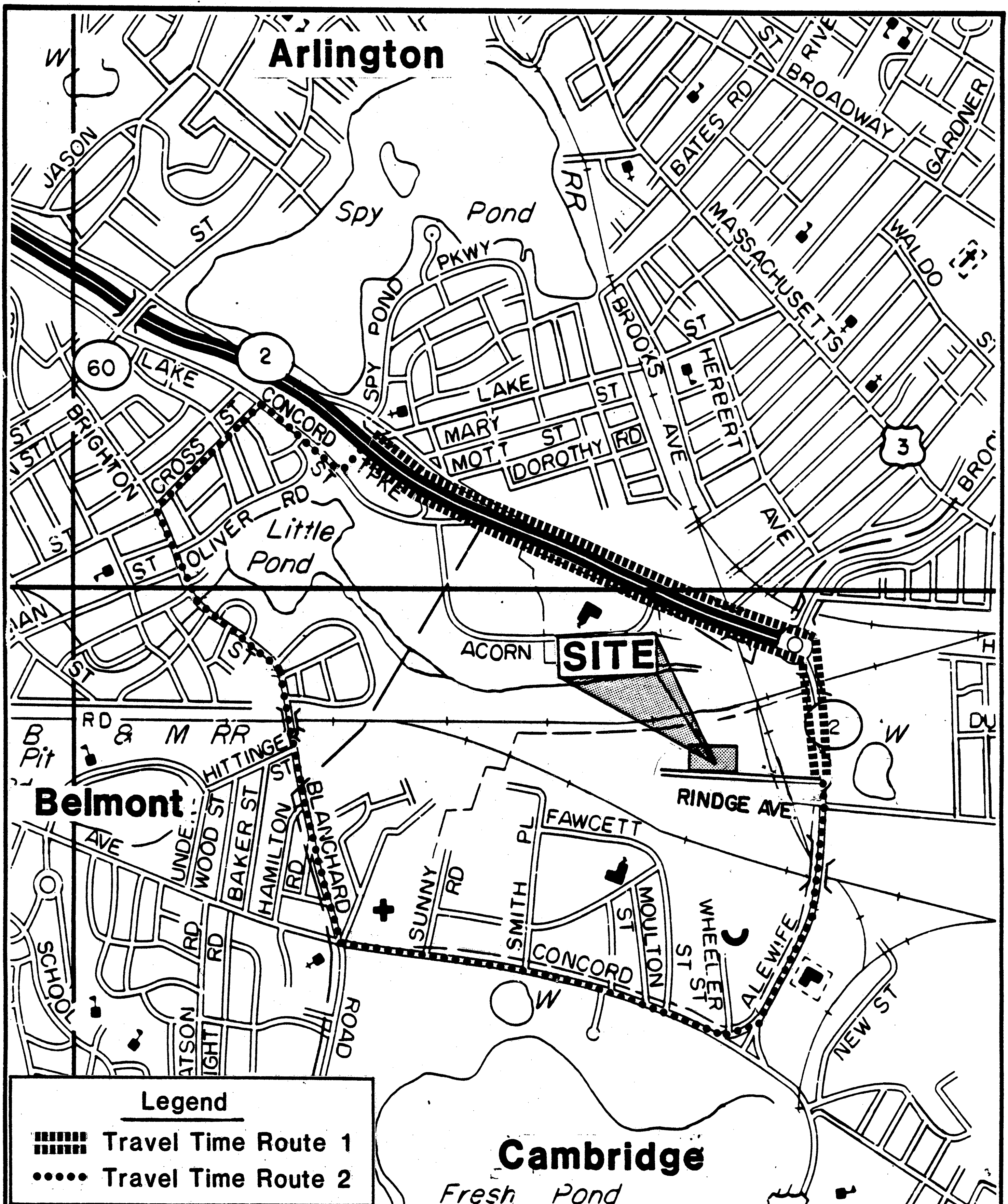
Not to Scale

FIG VI-A-16

bypass route might be utilized given its available, albeit limited, reserve capacity. As such, for analysis purposes, that portion of the Quadrangle area background generated traffic which originates to the west of the Alewife area and which was originally assigned to Route 2 and Alewife Brook Parkway 1/ was diverted to Blanchard Road and Concord Avenue via the Lake Street interchange. This reassignment seems reasonable given the Concord Avenue access to the Quadrangle area.

With respect to site generated traffic, it is reasonable to assume that there is very little potential for diversion of Route 2 traffic to the Blanchard Road and Concord Avenue bypass given the project site's sole access/egress from the Alewife Brook Parkway and Rindge Avenue Extension intersection. Travel time runs, depicted in Figure VI-A-17, were conducted during both the AM and PM peak hours comparing the Route 2/Alewife Brook Parkway route to the Lake Street/Brighton Street/Blanchard Road/Concord Avenue/ Alewife Brook Parkway route. During the AM peak hour, both runs were initiated at the Lake Street and Route 2 interchange and terminated at the Rindge Avenue Extension and Alewife Brook Parkway intersection. Points of initiation/termination were reversed during the PM peak hour travel time runs. Table VI-A-10 summarizes the travel time comparisons which reveal that the 1.5 mile Route 2

1/ The original assignment of Route 2 eastbound traffic destined for the Quandrangle area was split 60/40 between Blanchard Road and Alewife Brook Parkway, respectively.



Alewife Triangle Park	**Travel Time Routes**	**Vanasse/Hangen Associates** **Boston, MA**
		Not to Scale
EIR		FIG VI-A-17

alternative can be traversed in approximately one-third the time it takes to travel the 2.5 mile Blanchard Road bypass during both AM and PM peak hours. This results from a combination of factors. Aside from being a mile longer in distance, Lake Street, Cross Street, Brighton Street and Blanchard Road are two-way, two lane streets which serve as a collector/distributor roadway for the residential neighborhoods and the local business and industry which abut sections of Blanchard Road. There is a traffic signal at the Cross Street and Brighton Street intersection which, in addition to creating a normal degree of traffic delay, is preempted in the AM peak hour by a crossing guard for elementary age school children.

TABLE VI-A-10
SUMMARY OF TRAVEL TIME COMPARISON

Route	Distance (miles)	Average Travel Time (Minutes) AM (Inbound)	AM (Outbound)
Route 2	1.5	2.50	2.50
Lake Street/ Blanchard Rd.	2.5	7.75	7.00

The Blanchard Road and Concord Avenue intersection is also signalized. On the single lane southbound Blanchard Road approach existing traffic queues at an average of 17 vehicles, of which approximately 5 to 6 vehicles fail to clear on a given signal cycle. While traffic flows rather freely on Concord Avenue, at the Alewife Brook Parkway Rotary, left-turning Concord Avenue traffic must fight the predominant southbound through movement on Alewife

Brook Parkway. Travel times aside, once project site traffic arrives at the reconstructed Rindge Avenue Extension and Alewife Brook Parkway intersection, northbound traffic from Concord Avenue would have to wait at the traffic signal to turn left under an exclusive protected left turn phase of the signal cycle. Southbound site generated traffic from Route 2 would have a "free right" turn on the southbound intersection approach under the proposed high type right-turn design. As such, only the 5 percent of the project site generated traffic which was originally assigned to Route 2 from Lake Street, south of Route 2, was reassigned to the Blanchard Road/Concord Avenue bypass route during the AM peak hour.

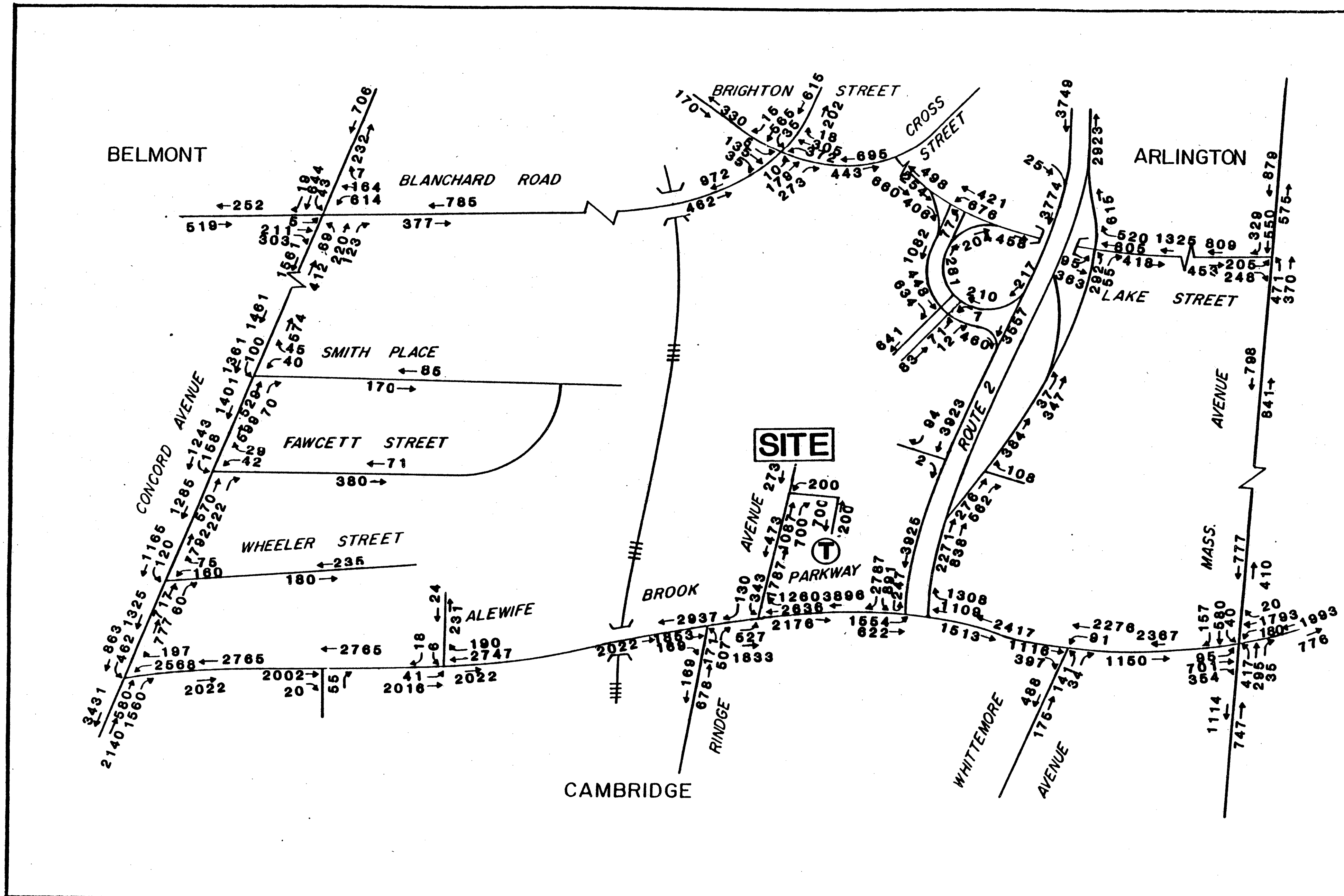
All site generated traffic exiting the site during the PM peak hour regardless of their travel route selection, will be delayed at the Alewife Brook Parkway/Rindge Avenue Extension due to the traffic signal operation. In light of the comparative travel times of the alternate routes described above, it is highly unlikely that site generated traffic destined for westbound Route 2 will opt for the Concord Avenue/Blanchard Road alternative. And given the existing northbound queue of traffic on Alewife Brook Parkway during the PM peak hour at the Rindge Avenue intersection which extends back to the entrance of the Fresh Pond Shopping Center (which is under police officer control) and often times as far back as to the Concord Avenue Rotary, the entire portion of the Quadrangle generated traffic which originates to the west and southwest of the

Alewife area was originally assigned to Concord Avenue. As such, there were no "additional" project site or background development generated traffic diversions to Concord Avenue during the PM peak hour.

Figures VI-A-18 and VI-A-19 depict the respective 1987 AM and PM peak hour traffic volumes for the Build alternative -- which have been adjusted to reflect potential traffic diversions. Table VI-A-11 compares the intersection levels of traffic service between the original 1987 Build alternative and the adjusted 1987 Build alternative which reflects potential traffic diversions. As can be seen, the most significant impact is located at the Concord Avenue/ Blanchard Road intersection where the AM peak hour volume to capacity (V/C) ratio increases from 1.02 to 1.10.

5. Summary of Analysis

The capacity analysis indicates that future 1987 base year traffic volumes based on the projections of area background development, excluding the proposed project development, will equal and/or exceed the design capacities of most of the major intersections within the study area. Within this context, the incremental increases of traffic generated by the proposed project development will, in and of itself, create no additional capacity deficiencies. It will, however, contribute to extending the duration of peak hour conditions during the average weekday.



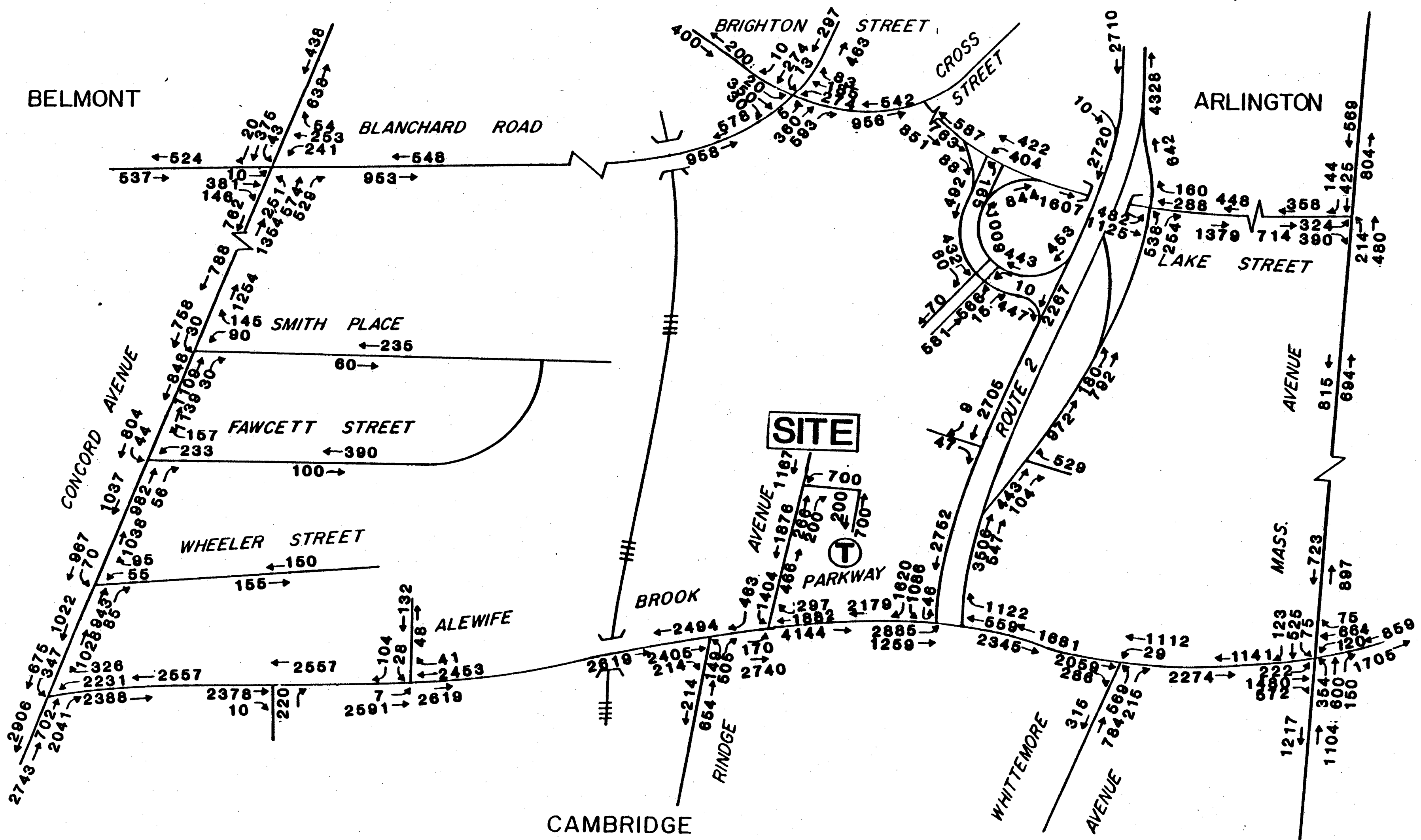
Alewife Triangle Park EIR

1987 Phase II Build Alternative With Diversions AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-18



Alewife Triangle Park EIR

1987 Phase II Build Alternative With Diversions PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VI-A-19

TABLE VI-A-11
INTERSECTION LEVEL OF SERVICE SUMMARY

Location	1987 Build Alternative				1987 Build Alternative With Diversions			
	AM		PM		AM		PM	
	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Massachusetts Avenue, at Lake Street	E	1.03	E	0.93	E	1.04	E	0.93
Alewife Brook Parkway, at Massachusetts Ave.	E	1.16	E	1.26	E	1.16	E	1.26
Alewife Brook Parkway, at Whittemore Avenue	D	0.88	E	1.07	D	0.88	E	1.07
Alewife Brook Parkway, at Rindge Ave./Rindge Ave. Extension	E	1.28	E	1.38	E	1.30	E	1.38
Concord Avenue at Blanchard Road	E	1.02	E	1.09	E	1.10	E	1.09
Brighton Street at Cross Street	B	0.61	D	0.87	B	0.65	D	0.88
Lake Street at Route 2 Eastbound Off-Ramps	D	0.84	D/E	0.84	D	0.81	D	0.84
Lake Street at Route 2 Westbound Off-Ramps	B	0.66	D	0.86	B	0.66	D	0.86
Route 2 at Alewife Brook Parkway	E	1.74	E	1.98	E	1.74	E	1.98
Concord Avenue at Alewife Brook Parkway	E	1.47	E	1.39	E	1.50	E	1.39

It must be noted that in order to be comprehensive in nature, each of the proposed area background developments has been assumed to be as viable as the next. No attempt was made to evaluate the feasibility of these proposals or their individual project development status with respect to the local and state review procedures. However, given the existing roadway and access constraints, and in light of future uncertainties pertaining to both market conditions and potential roadway improvements, it is highly unlikely that all of the assumed background development will be realized by 1987. In addition to market conditions and the status of the roadway infrastructure, development progress may also be influenced by changes in individual company policies of prospective tenants, changes in technology, and slippage in the development and construction schedule. As such, the area background traffic forecasts, by design, are probably conservative in nature, i.e. high, and result in an overstatement of the potential traffic impacts.

The potential for Route 2 traffic to divert to the Lake Street/Brighton Street/Blanchard Road/Concord Avenue "bypass" route was examined. Upon review of travel time data, project site access constraints and existing study area traffic capacity constraints, the potential for the traffic diversions was deemed relatively low.

However, it should be noted that a portion of the existing traffic on Blanchard Road and Concord Avenue represents through trip commuters who are presently bypassing the existing peak hour traffic condition on Alewife Brook Parkway between Route 2 and Concord Avenue. As traffic volumes increase along this section of Alewife Brook Parkway due to Alewife area access demands, additional through trip commuters will seek to avoid the anticipated increase of delay on Alewife Brook Parkway. In light of the analysis of the Lake Street/Brighton Street/Blanchard Road alternative, through traffic is likely to divert to the west of the study area via Pleasant Street and Belmont Center. These potential local traffic impacts serve only to underscore the need for the proposed improvements to both Route 2 and Alewife Brook Parkway which would enhance both through traffic mobility and areawide accessibility.

It is apparent, that the Alewife Brook Parkway and Rindge Avenue Extension intersection will remain the major bottleneck within the study area. Should this location remain the sole access point for the proposed project site development, the MBTA station and garage, and other proposed Triangle area developments, future peak hour traffic operations can be expected to be subject to increased levels of traffic congestion, even under the proposed redesign of the intersection.

VII-A. MEASURES TO MITIGATE ENVIRONMENTAL IMPACTS

TRANSPORTATION

As described in the previous sections of this report, the traffic impacts of the proposed CambridgePark development must be viewed within the larger context of the greater traffic impacts of the projected areawide growth. Thus, the proposed measures described below to mitigate traffic impacts should be considered independent of a Build/No Build decision on the proposed project in light of their benefit towards traffic relief for the greater Alewife area in general.

Given the limited capacity of the existing roadway network, and in light of the magnitude of existing and projected peak hour volumes which exceed the theoretical limits of roadway capacity, three distinct types of mitigation measures have been identified.

- increase physical capacity,
- modify traffic demands, and
- improve management of transportation system.

A. INCREASE PHYSICAL CAPACITY

1. Route 2/Lake Street Interchange: Assuming that the Mugar site is developed and that the 1987 Arthur D. Little, Inc. expansion proposal is realized, the reconstruction of both the eastbound and westbound Route 2 off-ramp terminals at Lake Street, as recommended in the Arlington Office Park DEIR

(EOEA #4167, May 1982), should be implemented. Such improvements include realignment and widening of the westbound ramps, restriping of Lake Street under Route 2 for two lanes per direction, and signalizing both the eastbound and westbound ramp intersections with Lake Street. The westbound ramp signal would incorporate pedestrian actuated control. The 1987 PM peak hour levels of service could be expected to improve from the existing LOS "E" to LOS "D" at both locations. An improved public safety condition would be realized by the provision for a safe pedestrian crossing at the westbound off-ramp location.

2. The reconstructed Alewife Brook Parkway and Rindge Avenue Extension intersection assumed for the 1984 and 1987 No-Build Alternatives will clearly experience extreme levels of peak hour traffic congestion as indicated by the estimated 1987 volume to capacity ratios of 1.30 and 1.38 for the respective AM and PM peak hours assuming project site development. Aside from attempting to alter the estimated traffic demand side of the equation, which is discussed below, future -- post 1987 -- modification of the 1984 geometrics may be warranted depending on the advancement of the project development process of the proposed highway improvements to both Route 2 and Alewife Brook Parkway which are presently under study. For example, if the proposed Route 2 ramps to the MBTA station/garage and Triangle area, and/or the "fly under" concept for the Route 2

rotary are not realized as planned or as scheduled, then the present redesign of the Alewife Brook Parkway and Rindge Avenue Extension intersection should be considered as an interim solution, and perhaps the feasibility of grade separating this intersection should be considered.

3. Temporary Inbound Ramp

In an effort to relieve some of the anticipated AM peak hour traffic demand at the Rindge Avenue Extension/Alewife Brook Parkway intersection, a temporary inbound only roadway might be feasible by coming off the Lake Street interchange. This concept would entail the reconstruction of the eastbound off-ramp to provide grade separation between off- and on-ramps, possible reconstruction and realignment of a segment of Acorn Park Road for joint use by ADL, MBTA, and Triangle area traffic, crossing of the Little River and running east along the railroad right-of-way to the MBTA garage and service road. This alignment would prevent MBTA and Triangle area related traffic from traversing the ADL campus. While offering potential relief at the Alewife Brook Parkway/Rindge Avenue Extension intersection during the AM peak hour, the Lake Street interchange would be hard pressed to accommodate the exiting traffic during the PM peak hour due to the at grade left-turn conflicts on the eastbound ramps and on Lake Street at the westbound on-ramp. As such, exiting MBTA and Triangle related traffic should be processed through the Rindge Avenue Extension/Alewife Brook Parkway intersection in the absence of any other potential egress alternative. In any event, the feasibilty of the concept of accessing (inbound only) the MBTA garage and service road from the Lake Street interchange can only be determined upon further study and review.

B. DEMAND MODIFICATION

Since the traffic capacity provided by the proposed geometric modifications to the existing roadway network, such as the redesign and reconstruction of the Alewife Brook Parkway and Rindge Avenue Extension intersection, is less than adequate in satisfying the 1987 future base year traffic demand generated by the projected area background development alone, exclusive of the proposed project generated traffic, traffic demand modification techniques such as ridesharing and alternative work schedules should be encouraged among areawide and project site employers.

1. Ridesharing

Ridesharing is an overall term that includes carpools, vanpools and public transit. The goal of ridesharing is to provide a lower cost, more efficient mode of transportation for workers. Additional benefits include reduced congestion on the transportation system and increased fuel efficiency. Carpooling programs are best implemented at the company level with an appointed program administrator overseeing the program. The developers will, to the best of their ability, help provide incentives including reserved carpool parking areas in the most convenient and desirable locations. Other incentives necessary to make a ridesharing program successful will necessarily require the cooperation of the tenant firms. The desirability of a carpooling program will be explained to each tenant and each will be requested to organize their own pool programs. All available forms of technical assistance including Federal, State and local resources will be utilized.

Vanpooling programs are generally successful when employees have long commutes to work (typically more than 15 miles). The location of the site on the regional highway network greatly increases the potential for vanpooling. Tenants will be encouraged by the developer to investigate the potential for vanpool usage. Where the data indicates that vanpool formation is feasible, the tenants will be encouraged to institute vanpools. Again, the developer will participate in this process by maintaining a good working relationship with the tenants and by offering incentives such as preferred carpool/vanpool parking spaces.

2. Public Transportation

The proximity of Alewife Station and the fact that the MBTA in conjunction with the surrounding communities will be reviewing feeder bus routes and schedules in the near future should serve to encourage higher than average public transit ridership by project site employees. In addition, the MBTA is also in the preliminary phase of evaluating the feasibility of a satellite fringe parking/ shuttle bus system with locations in Belmont, Waltham and Lexington.

Such a program, if developed, would also have a positive impact in reducing peak hour traffic demand on the study area roadway network.

3. Alternative Work Schedules

Alternative work schedules have become an increasingly popular method of managing travel demand. Flextime, staggered work hours and compressed work weeks have all been used successfully to reduce peak hour congestion on the transportation system. The developers of CambridgePark are firmly committed to using techniques such as these to meet the goals of reducing traffic generated by the development. In order to encourage increased conservation and traffic reductions among the firms operating at the park, the developer will provide incentives and where feasible, incorporate these programs into tenants' leases. The following sections describe briefly each type of traffic reduction plan and describe the commitments that the developers will make to guarantee the program's success.

Staggered work hours are generally set up in such a way that groups of employees are assigned staggered starting times, typically at 15-minute intervals over a one or two hour interval. The effect of this method is to spread out peak hour traffic demands over a longer period of time. Staggered hours allow transportation facilities to more effectively accommodate the peak demands placed on them while resulting in decreased travel times.

Flexible work hours give employees some control over their working hours. Typically, employees are allowed to choose their own starting and finishing times, as long as they are present during a central part of the day (called core time).

Results of a typical flextime program at the Transportation Systems Center (TSC) in Cambridge, Massachusetts indicate that flex-time can have a very significant impact on employee travel to work.1/ As a result of TSC's flextime program, single occupant automobile usage dropped by 2 percent while the number of employees carpooling increased by a similar amount. Transit usage also increased by approximately 1 percent.

The shift to temporally dispersed work schedules, either using flextime or staggered work hours, has had positive impact on reducing peak hour traffic congestion. It also has the effect of reducing employee travel time to work, resulting in increased fuel efficiency. Evaluations of large-scale variable work hour programs show that peak hour bus loads and automobile arrivals at parking garages decrease 10 to 20 percent, while peak hour automobile traffic volumes on major approaches to work centers are reduced 5 to 10 percent.

The use of compressed work weeks is another method for reducing transportation facility demand. Compressed work weeks

1/ Marian Ott et al., "Behavioral Impacts of Flexible Working Hours," Transportation Research Record No. 767, 1980.

mean shifting some workers from a standard five days per week, eight hours per day schedule to fewer days of longer hours (e.g., four days per week, ten hours per day). Compressed work weeks decrease total weekly travel to work and can also flatten peak period demand similar to flextime. This is because commuting times are likely to occur before the highest morning peak and after the highest afternoon peak.1/

The programs described clearly outline the benefits of the use of alternative work schedules as a means to reduce traffic congestion. The developers of this project are committed to alternative work schedules and will do everything within their power to encourage them within the office park. The developers will work with the various tenants of the CambridgePark to set up a set of staggered work hours for their employees.

The use of flextime programs and compressed work weeks are also very desirable. The final decision regarding these two options rests with the individual tenants. The developers will, however, do their best to encourage all tenants to consider the use of flextime and compressed work weeks for their employees.

1/ "Alternative Work Schedules: Impacts on Transportation," National Cooperative Highway Research Program Synthesis of Highway Practice No. 73, November, 1980.

4. Impact of Demand Modification Techniques

During the course of the study, the traffic generating characteristics of the Arthur D. Little, Inc. facility (the single largest employer within the Alewife area) were monitored both during peak and off-peak periods of a typical weekday. The data collected revealed the following:

- Actual trip generation rates (per employee and per 1,000 square feet) were strikingly similar to the ITE rates for a Research and Development facility.

- Morning time of arrivals and evening time of departures were concentrated in single peak hours. Alternative work schedules were not evident.

- Vehicle occupancy was relatively low. Approximately 90 percent of peak hour site generated traffic were single occupancy vehicles.

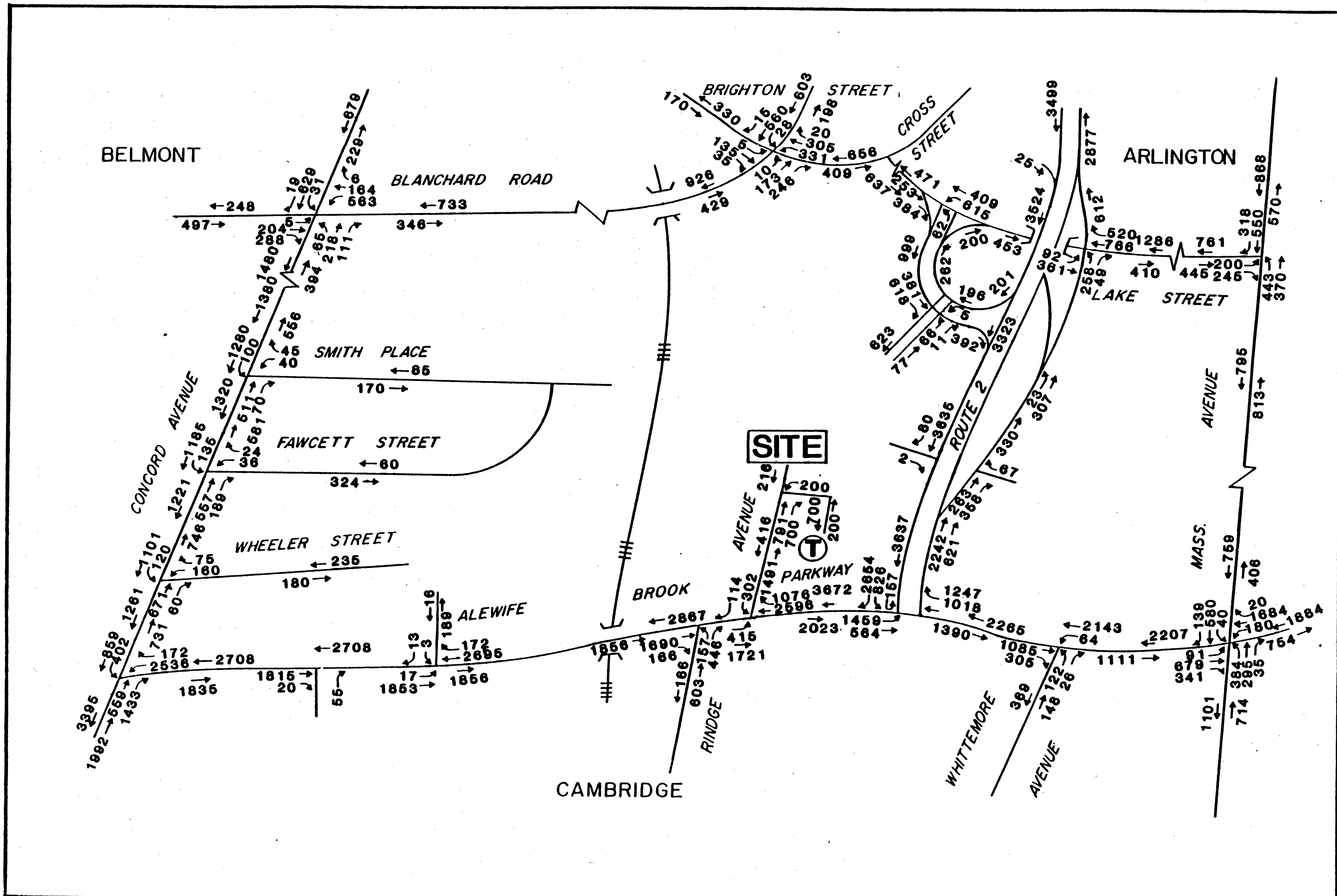
Review of the data suggests that implementation of demand modification techniques could have an impact on both existing as well as future traffic operations.

In an effort to determine the potential impact of the aforementioned demand modification techniques on the future traffic operations at the major traffic bottleneck location within the study area -- the Alewife Brook Parkway and Rindge Avenue Extension intersection -- the original traffic demand modification assumptions pertaining to mode split and vehicle occupancy were revised for both project site and area background developments as follows:

TABLE VII-A-1
TRAFFIC DEMAND MODIFICATION FACTORS

Location	Original		Revised	
	Transit Mode Split	Vehicle Occupancy Rate	Transit Mode Split	Vehicle Occupancy Rate
Triangle	30%	1.3	40%	1.4
Quadrangle	25%	1.3	35%	1.4
W.R. Grace	20%	1.2	30%	1.4
Mugar	20%	1.2	30%	1.4
Acorn Park	25%	1.2	35%	1.4

Figures VII-A-1 and VII-A-2 depict study area traffic flows for both the respective AM and PM peak hour conditions assuming the 1987 project Build alternative and the revised mode split and vehicle occupancy factors. In addition, these traffic flows reflect a 15 percent reduction in anticipation of peak spreading due to alternative work schedules. Table VII-A-2 compares the study area intersection level of service summaries for the 1987 project Build alternatives assuming the diversions and revised traffic demand modification factors. The most significant impact resulting from the revised factors occurs at the Alewife Brook Parkway and Rindge Avenue Extension intersection where the AM and PM peak hour volume to capacity ratios decrease by 9 and 7 hundredths respectively.



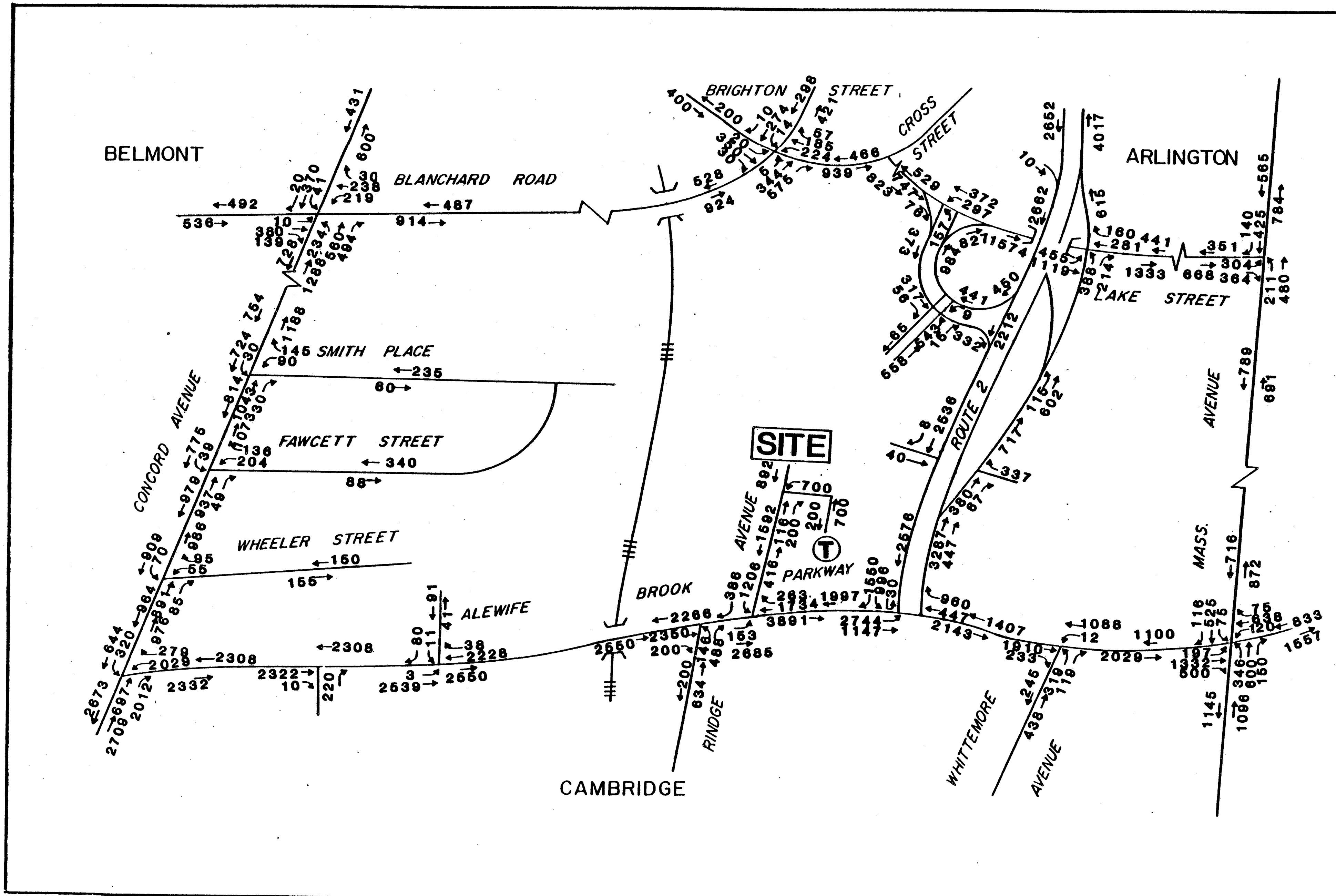
Alewife Triangle Park EIR

1987 Phase II Build Alternative With Demand Modifications AM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VII-A-1



Alewife Triangle Park EIR

1987 Phase II Build Alternative With Demand Modifications PM Peak Hour

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG VII-A-2

TABLE VII-A-2
INTERSECTION LEVEL OF SERVICE SUMMARY

Location	1987 Build Alternative With Diversions				1987 Build Alternative With Demand Modifications			
	AM		PM		AM		PM	
	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Massachusetts Avenue, at Lake Street	E	1.04	E	0.93	E	0.96	E	0.90
Alewife Brook Parkway, at Massachusetts Ave.	E	1.16	E	1.26	E	1.09	E	1.17
Alewife Brook Parkway, at Whittemore Avenue	D	0.88	E	1.07	C	0.77	D	0.85
Alewife Brook Parkway, at Rindge Ave./Rindge Ave. Extension	E	1.30	E	1.38	E	1.20	E	1.29
Concord Avenue at Blanchard Road	E	1.10	E	1.09	E	0.99	E	1.05
Brighton Street at Cross Street	B	0.65	D	0.88	B	0.62	D	0.79
Lake Street at Route 2 Eastbound Off-Ramps	D	0.81	D	0.84	C	0.75	C	0.75
Lake Street at Route 2 Westbound Off-Ramps	B	0.66	D	0.86	B	0.62	D	0.81
Route 2 at Alewife Brook Parkway	E	1.74	E	1.98	E	1.61	E	1.80
Concord Avenue at Alewife Brook Parkway	E	1.50	E	1.39	E	1.43	E	1.30

A final note on projected area traffic demands pertains to the background estimate of MBTA related traffic which does not account, by design, for existing traffic diversion. For purposes of analysis, all MBTA generated traffic was assumed to be "new traffic". In reality, a portion of this traffic are vehicles which are presently passing the site and, upon the construction and operation of the station/garage facility, would thus be removed from the traffic travelling through the Alewife area. Assuming that 50 percent of the MBTA related traffic is diverted, the volume to capacity ratios for the Rindge Avenue Extension/Alewife Brook Parkway intersection would be further reduced to 1.07 and 1.16 for the respective 1987 Build AM and PM traffic conditions, assuming the effects of implementation of the aforementioned traffic demand modification techniques.

It must be acknowledged that the ultimate impact of the aforementioned demand modification techniques on peak hour traffic operations within the study area will obviously rest on the nature and extent of program implementation.

C. TRANSPORTATION SYSTEM MANAGEMENT

1. Traffic Signal Operations

By providing alternate right-of-way to various traffic movements, traffic signals exert a profound influence on traffic flow and can operate to the advantage or disadvantage of the vehicles or pedestrians they control. Consequently, the proper application, design, operation and maintenance of traffic signals is critical to the orderly movement of traffic at specific locations and may be expected to increase the traffic handling capability of an intersection. Conversely, improperly operated or inadequately maintained signals can cause excessive, unnecessary delay and reduced intersection capacity.

Within the study area, there are a number of signalized intersections -- such as Alewife Brook Parkway at Rindge Avenue Extension, Concord Avenue at Blanchard Road, Massachusetts Avenue at Lake Street, and Lake Street at Route 2 (proposed) -- which tend to meter or regulate the flow of peak hour traffic. By adjusting the signal timing to favor one movement over another, motorists can be encouraged, or discouraged as the case may be, to alter their travel routes and/or their travel schedule. For example, the timing of the reconstructed Rindge Avenue Extension and Alewife Brook Parkway signal can be adjusted within practical limitations to favor the through traffic movement on Alewife Brook Parkway, particularly during the AM peak hour.

However, before local and state officials and local residents consider the prospect of altering traffic signal timings in hopes of discouraging study area traffic from diverting to local streets to avert anticipated peak hour delays on Alewife Brook Parkway, traffic volumes should be monitored and travel time data collected to estimate the degree to which the perception of the problem (and potential solution) matches the reality of the problem. As was revealed in the review of the Lake Street to Blanchard Road alternative of bypassing the Alewife Brook Parkway and Rindge Avenue Extension intersection, existing traffic data suggests that this route is, in fact, not such an attractive alternative for project site generated traffic. Secondly, if an alternate route is identified which is attractive vis a vis travel time, and modifications are proposed to alter traffic signal timings to discourage through traffic, care must be taken that traffic is not inadvertently diverted to a less appropriate route, i.e., a local residential street. Lastly, it should be noted that inconvenience designed for through traffic will also be realized by local commuters who reside within the study area and the abutting municipalities.

2. Local Circulation Patterns

Alternatives to existing local traffic circulation patterns can be sought to minimize the potential impact of through traffic on neighborhood streets. Previous studies1/ have identified possible circulation changes for East Arlington that would mitigate existing peak hour traffic impacts. Similar traffic circulation and control strategies could be identified for the Town of Belmont. However, it is recognized that changes in local circulation require

1/ CityDesign Collaborative, Inc., Applied Economic Research, Inc., Vanasse/Hangen, Associates and Interdisciplinary Environmental Planning, Inc. East Arlington Development and Open Space Study, March, 1980 - January, 1981.

considerable input from all affected parties including area residents, fire and police officials, as well as Town representatives. Consequently, it is recommended that the Town of Belmont seek the necessary technical assistance to identify, analyze, and assess alternative traffic circulation and control strategies.

3. Bicycle Access

In order to further reduce vehicular traffic generated impacts within the study area, the project proponents will support any state or municipal efforts to provide safe bicycle access to the site. Internal site roadways will be designed with sufficient width to safely accommodate bicyclists. Additionally, the proponents are willing to provide secure bicycle storage racks at various locations on-site. These racks would be located in high visibility areas in order to reduce theft and/or vandalism. The proponents will encourage individual tenants to accommodate cyclists by providing a designated changing area and by providing shower facilities if there is sufficient demand for these facilities.

AIR QUALITY

B. AIR QUALITY

PART IV-B	DESCRIPTION OF THE ENVIRONMENT
PART V-B	PROJECT ALTERNATIVES
PART VI-B	PROJECT IMPACT
PART VII-B	MEASURES TO MITIGATE ENVIRONMENTAL IMPACT

IV-B DESCRIPTION OF THE ENVIRONMENT

AIR QUALITY

A. PURPOSE

The objective of the Air Quality Analysis is to determine if the proposed CambridgePark development in Cambridge will interfere with the attainment or maintenance of Massachusetts and National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO). The standards, established by the Federal Clean Air Act, are designed to protect both public health and welfare. To demonstrate compliance, it is necessary to identify those areas of human activity (sensitive receptors) exposed to maximum air pollutant levels from motor vehicle emissions in the project area. Using air quality modeling techniques, CO levels are estimated at these sensitive receptors for all project alternatives for the present and horizon years. Comparison of projected pollutant levels to the NAAQS permits evaluation of whether motor vehicle emissions related to the proposed development will pose a threat to public health or welfare.

B. POLLUTANT SOURCES AND EFFECTS

The significant source of project-related air pollution is from motor vehicles visiting the project site. Of the six pollutants regulated by the NAAQS, four are emitted by motor vehicles or formed from their emissions: carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3), and lead (Pb). Carbon monoxide is used in this analysis as an indicator of roadway air pollution levels, since it is the most abundant and persistent pollutant emitted by motor vehicles. Further, its nonreactive properties allow pollutant transport and dispersion to be modeled.

The adverse health effects of carbon monoxide are a result of its combination with blood hemoglobin to form carboxyhemoglobin (COHb). This compound interferes with the life-sustaining transfer of oxygen from the lungs to the body tissues and the return of carbon dioxide from the tissues to the lungs. The presence of relatively small amounts of CO results in significant interference with essential cardiovascular-respiratory functions. Relatively brief exposure to high levels can impair time interval discrimination, visual acuity, and other psychomotor functions.

National Ambient Air Quality Standards (NAAQS) for carbon monoxide have been set by the U.S. Environmental Protection Agency (EPA); and are presented in Table IV-B-1. Standards for the Commonwealth of Massachusetts are identical to the Federal standards. The primary standards are intended to protect the public health, while secondary standards are designed to protect the public welfare from any known or anticipated effects. The target date for attainment of national primary and secondary standards was December 31, 1982. If states did not attain the carbon monoxide and ozone standards by this date through the use of all reasonably available control measures, an attainment date of December 31, 1987 applies. Identical for primary and secondary, the CO standards set a maximum concentration of 35 parts per million (ppm) for a 1-hour period and 9 ppm for 8 hours, each not to be exceeded more than once per year. The EPA is currently reviewing the scientific, technical, and medical basis for these standards.

TABLE IV-B-1
MASSACHUSETTS AND NATIONAL AMBIENT
AIR QUALITY STANDARDS (NAAQS)
FOR CARBON MONOXIDE (CO)

Pollutant	Averaging Time1/	Primary2/ Standards	Secondary3/ Standards
Carbon Monoxide (CO)	8 hours	9 ppm ($10\ mg/m^3$)	Same as Primary
	1 hour	35 ppm ($40\ mg/m^3$)	

1/ Not to be exceeded more than once per year.
2/ National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
3/ National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

C. AMBIENT AIR QUALITY

Ambient air quality is usually determined by monitoring, however, no state monitoring station exists proximate to the site. Background levels of CO for 1983 in the study area have been determined by the Massachusetts Department of Environmental Quality Engineering (DEQE)1/ to be 3.0 ppm (1-hour average) and 1.5 ppm

1/ Personal communication, Ms. Heidi O'Brien, Massachusetts Division of Air Quality Control, DEQE, Boston, MA, March 29 and April 5, 1983.

(8-hour average). These values are consistent with the levels assumed in the Arlington Office Park EIR (EOEA #4167) for the project area. Background levels for this project represent carbon monoxide emissions from all sources except the roadways that cross at the intersections that were analyzed.

D. METHODOLOGY FOR ESTIMATING AIR QUALITY

The technical approach used to predict ambient air quality was approved in advance by the Massachusetts DEQE.1/ The analysis calculated maximum 1-hour and 8-hour CO concentrations at a sensitive receptor near one key intersection in the project area for five cases:

Case No.	Year	Development Alternative
1	1983	Existing
2	1984	No Build
3	1984	Build Phase I
4	1987	No Build
5	1987	Build Phase II

In all cases, the EPA Indirect Source Guideline2/ technique was used to predict concentrations at the intersections, supplemented

1/ Personal communication, Ms. Heidi O'Brien, Massachusetts Division of Air Quality Control, DEQE, Boston, MA, March 29 and April 5, 1983.

2/ EPA, Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised): Evaluating Indirect Sources, Second Printing, EPA-450/4-78-001, Research Triangle Park, NC, September, 1978.

by a set of assumptions specified by the DEQE. These assumptions include an ambient air temperature (December) of 33°F, and worst case meterological conditions of Pasquill-Gifford Class D stability in conjunction with a 1.0 m/s wind speed (1-hour) and a 1.6 m/s wind speed (8-hour). The worst case wind direction was determined separately for each case. A wind direction persistence factor of 0.8 was used for 8-hour concentrations and an initial vertical dispersion of 5.0 m was assumed. Meteorological data are appropriate for a December afternoon corresponding to the expected time of peak traffic volumes in the project area.

The CO background levels assumed for 1984 and 1987 were obtained from 1983 values of 3.0 ppm (1-hour) and 1.5 ppm (8-hour) by scaling down for the reduction in motor vehicle emission rates and scaling up for the overall growth in project area traffic. CO emission rates, at the approach speeds used in this analysis, will decrease at least 6 percent from 1983 to 1984 and at least 25 percent from 1983 to 1987, without an Inspection and Maintenance (I&M) program (see Appendix B-1). Traffic growth from 1983 to 1984, and from 1983 to 1987, along Alewife Brook Parkway (without the development) is projected to be 7.5 percent and 15.5 percent, respectively. The additional traffic in 1987 from the CambridgePark development is not reflected in these figures since it is modeled explicitly in the analysis. Thus, the calculated 1984 background CO levels are 3.0 ppm (1-hour) and 1.5 ppm (8-hour). Calculated 1987 background CO levels are 2.6 ppm (1-hour) and 1.3 ppm (8-hour).

The analysis utilized peak 1-hour and 8-hour traffic volumes for the design day. The peak hour of the day generally occurs during the afternoon commuter rush hour for the intersection analyzed. Peak 8-hour volumes were estimated by applying reduction factors to the peak 1-hour volumes, listed in Table IV-B-2.

TABLE IV-B-2
PEAK 8-HOUR TRAFFIC VOLUME FACTORS
FOR THE PROJECT AREA

Intersection	Ratio of Average Hour of the Peak 8-Hour to the Peak 1-Hour
Alewife Brook Parkway at Rindge Avenue	0.77
Rindge Avenue at Alewife Brook Parkway	0.69

Traffic volume data for the intersection is presented in Section A and in the Technical Appendix to this report. Motor vehicle emissions were calculated with the EPA MOBILE2 computer program[1/] and are detailed in Appendix B-1. Emission calculations assumed national average values for motor vehicle mix by type and the national average percentage of cold and hot starts for the peak 8-hour period. A mix with a higher cold start percentage was used to represent the peak one-hour period (see Appendix B-1). In addition, the Massachusetts registration distribution for light duty vehicles was employed, along with actual travel speeds for

1/ EPA, User's Guide to MOBILE2: Mobile Source Emissions Model, EPA-460/3-81-006, Ann Arbor, MI, February, 1981.

project area roadways. Emission rates used in this analysis are conservative since no Inspection and Maintenance program for vehicles was assumed, even though Massachusetts started up a program on April 1, 1983. If the I&M program were factored in, emission rates would be lower.

For Case 5 (1987 Build option), the intersection is over capacity for the peak hour. Since the Indirect Source Guideline cannot simulate this situation, the 1-hour maximum CO value was calculated by dividing the 8-hour maximum CO concentration by a persistence factor of 0.65. In urban areas, the maximum 8-hour CO concentration is generally 0.6 to 0.7 times the maximum 1-hour CO concentration.1/ The persistence factor adjusts for the fact that the worst case wind direction, wind speed, stability class, and traffic levels for the peak hour do not persist for a full 8-hour period. DEQE2/ has endorsed the use of persistence factors in transportation air quality analysis, and for the Arlington Office Park EIR (EOEA #4167), DEQE approved the use of a value of 0.65 for a similar situation at the nearby Route 2/Alewife Brook Parkway rotary.3/ One other adjustment was made and this was for the differences in cold start assumptions between the 1- and 8-hour cases, as reflected in the higher emission rate for the 1-hour case. The 8-hour maximum was

---

1/ Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised), EPA-450/4-78-001, Research Triangle Park, NC, September 1978.

2/ Transportation Project Level of Guidelines, Division of Air Quality Control, DEQE, Boston, MA, December 29, 1980.

3/ Personal communication, Ms. Heidi O'Brien, Division of Air Quality Control, DEQE, Boston, MA, November 13, 1891.

multiplied by the ratio of 1-hour to 8-hour emission rates (0.0506/ 0.0192 = 2.64) to ensure the estimated 1-hour CO concentration is comparable to the other 1-hour results in this study.

E. SENSITIVE RECEPTORS AND ROADWAY GEOMETRY

The CambridgePark development is located west of Alewife Brook Parkway near the intersection of Rindge Avenue in Cambridge. Given the assumptions in the EOEA scope, the only access to the site will be through Rindge Avenue Extension. A review of existing and projected traffic volumes indicates that the maximum project impact will occur at the intersection of Alewife Brook Parkway and Rindge Avenue.

Since carbon monoxide emissions are greatest at roadway intersections due to vehicle idling, acceleration and deceleration, a sensitive receptor in close proximity was selected for the intersection. The receptor location was chosen to be consistent with the recommendations in the EPA Guidelines[1/] namely: 1) where maximum carbon monoxide concentrations are likely to occur (i.e., adjacent to intersection vehicle queues), and 2) where the general public is likely to have access. The location of this receptor was approved in advance by DEQE[2/] and is illustrated in Figures IV-B-1

1/ EPA, Guidelines for Air Quality Maintenance Planning and Analysis Volume 9, (Revised): Evaluating Indirect Sources, Second Printing, EPA-450/4-78-001, Research CambridgePark, NC, September, 1978.

2/ Personal communication, Ms. Heidi O'Brien, Massachusetts Divison of Air Quality Control, DEQE, Boston, MA, March 29 and April 5, 1983.

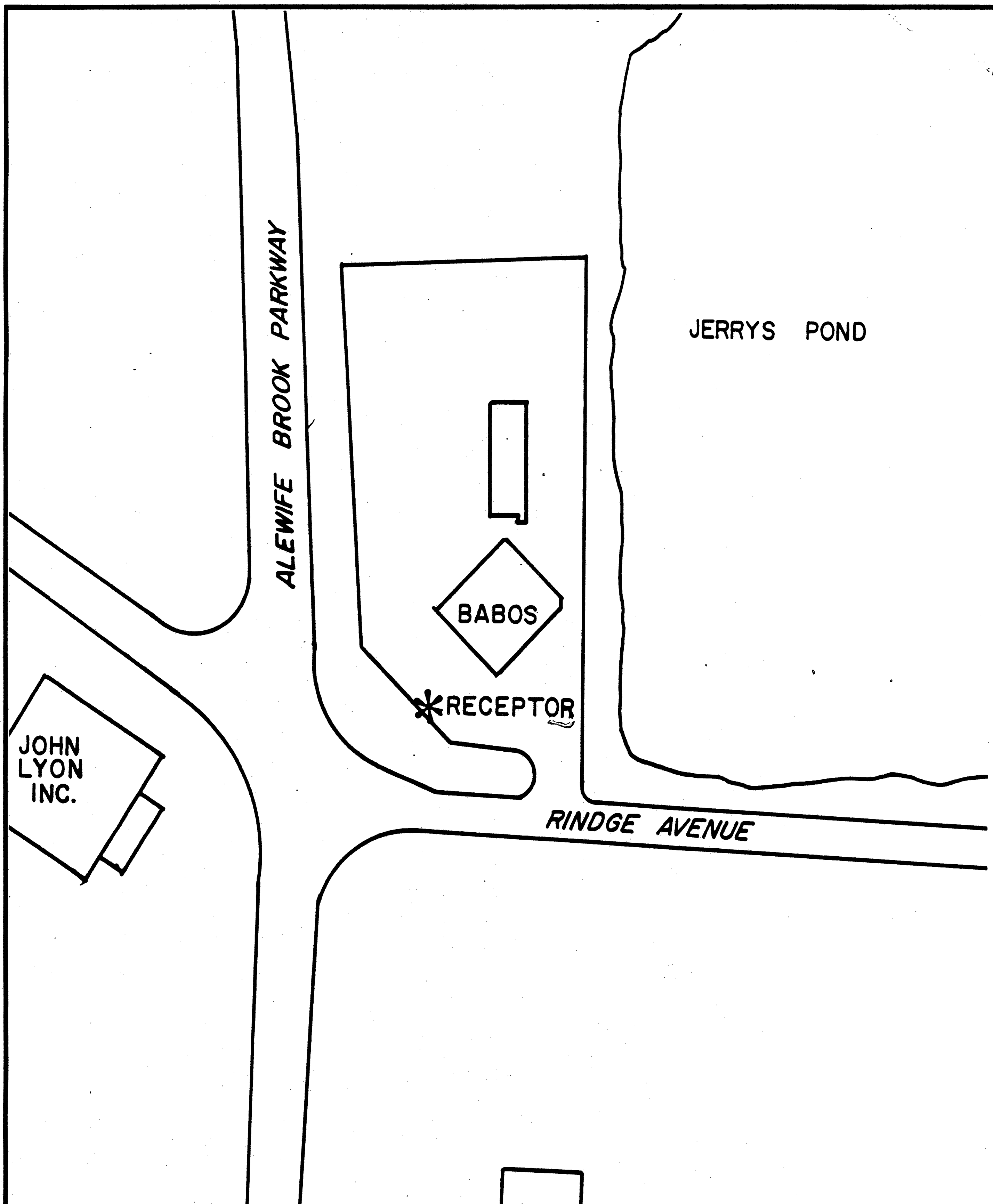
through IV-B-2. A description of the sensitive receptor is as follows: in the northeast corner of the intersection of Alewife Brook Parkway and Rindge Avenue in the parking lot for Babo's fast food restaurant.

Figures IV-B-1 and IV-B-2 are drawn approximately to scale and summarize the source-receptor geometry of the intersection analyzed for CO concentrations. The intersection is currently signalized and will remain so in the future.

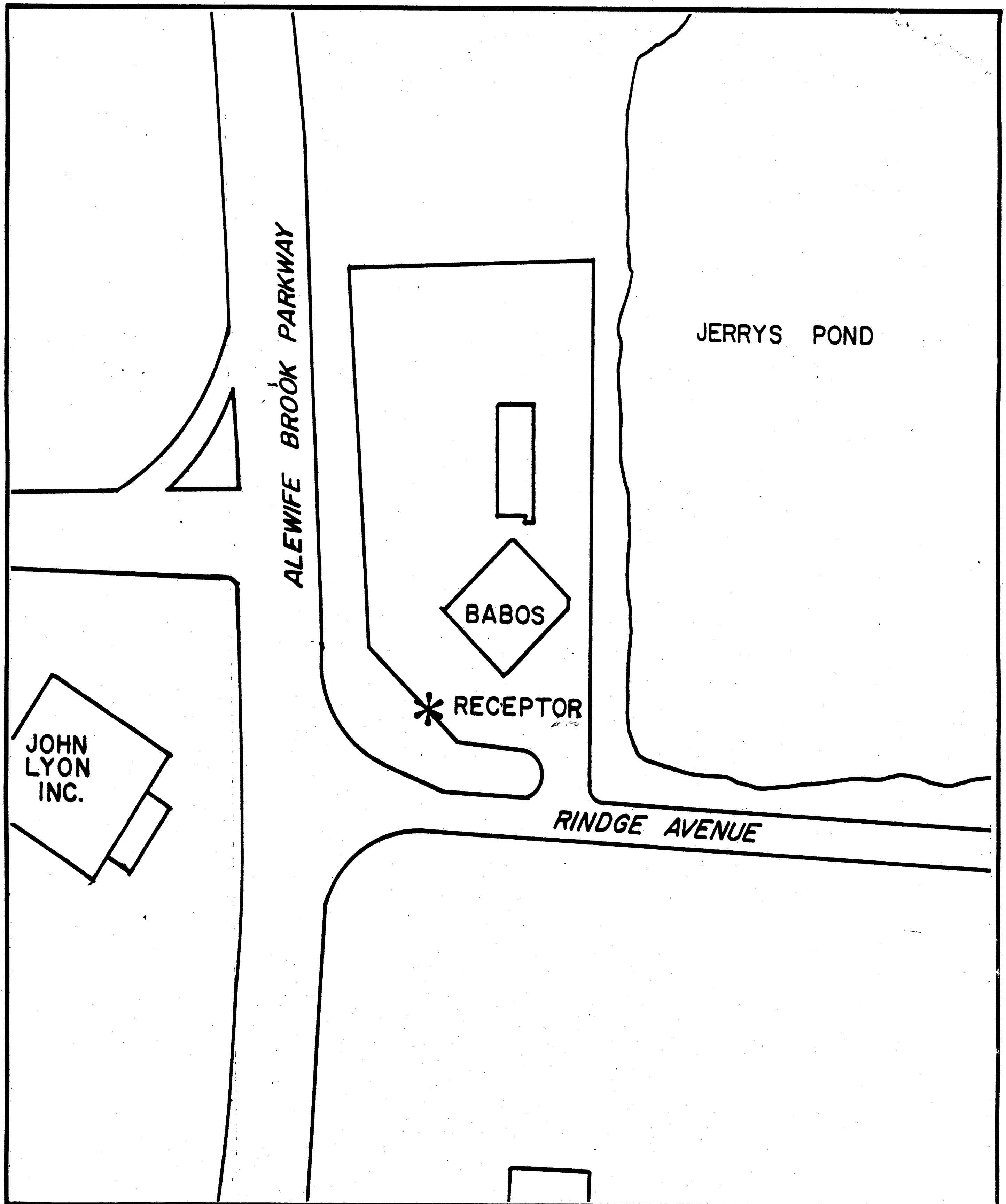
F. VALIDATION OF THE EPA INDIRECT SOURCE GUIDELINE

Two studies have been made of the performance of the EPA Indirect Source Guideline in predicting 1-hour CO concentrations near roadway intersections. The first study1/ was sponsored by EPA and involved a major roadway intersection at the Oak Brook Shopping Center in Oak Brook, Illinois. At this site during March and April, 1974, concurrent ambient CO, meteorological, and traffic data were collected. From these data, a set of 20 pairs of observed and predicted CO concentrations were obtained. The results show that 40 percent of the model predictions were within ±1 ppm and 90 percent were within ±2.5 ppm of measured values. On the average, the model was found to slightly overpredict CO concentrations.

1/ EPA, Guideline for Air Quality Maintenance Planning and Analysis Volume 9 (Revised): Evaluating Indirect Sources, Second Printing, EPA-450/4-78-001, Research Triangle Park, NC, September 1978.



Alewife Triangle Park **EIR**	**Air Quality Receptor Location Cases 1,2 and 3**	**Vanasse/Hangen Associates Boston, MA** Not To Scale FIG. IV-B-1



Alewife Triangle Park

EIR

Air Quality Receptor Location Cases 4 and 5

Vanasse/Hangen Associates
Boston, MA

Not To Scale

FIG. IV-B-2

The second study was conducted by the Massachusetts DEQE[1/] in the Boston area at Wellington Circle where five roadways meet at a signalized intersection. At this site in June 1978, concurrent ambient CO, traffic and meteorological data were collected for the peak evening rush hour. The model predicted a 1-hour CO concentration plus background of 18.7 ppm while the measured value was 19.0 ppm. Although this study only examined a single hour, the results show that the model is capable of predicting within 1 ppm for the peak hour.

G. CONSTRUCTION IMPACTS

Construction at the project site will release fugitive particulate emissions into the air. EPA[2/] has developed an emission factor of 1.2 tons per acre per month of activity from field measurements at construction sites. This value applies to a semi-arid climate, specifically one with a Thornthwaite Precipitation-Evaporation Index of PE=50. By contrast, eastern Massachusetts has a temperate rainy climate with an index of PE = 132[3/]. Since fugitive dust emissions are proportional to the inverse of the square of the PE index,[2/] the emission factor for

1/ Personal communication, Ms. Heidi O'Brien, Massachusetts Division of Air Quality Control, DEQE, Boston, MA, December 22, 1982.

2/ EPA, Compilation of Air Pollutant Emission Factors, Third Edition, Supplements 1-12, EPA Publication No. AP-42, Research CambridgePark, NC, April 1981.

3/ Thornthwaite, C.W., "Climates of North America According to a New Classification," Geogrh. Rev., 21: 633-655, 1931.

construction activities connected to the project site is 0.17 tons per acre per month or 11.3 lb. per acre per day.

Construction for Phase I involves 6.0 acres and construction for Phase II of CambridgePark will involve an additional 12.7 acres. Using the previous emission factor, potential fugitive dust emissions from the site could be 68 lb per day during Phase I construction and 144 lb per day during Phase II construction. Watering is the most effective control method for fugitive dust from construction sites. A daily watering program can reduce dust emissions by up to 50 percent.[1/] As a mitigation measure, areas subject to wind erosion will be watered daily during construction to prevent excessive emissions of particulate matter.

1/ EPA, Compilation of Air Pollutant Emission Factors, Third Edition, Supplements 1-12, EPA Publication No. AP-42, Research CambridgePark, NC, April 1981.

V-B. PROJECT ALTERNATIVES

AIR QUALITY

The principal factor that determines the air quality impact of the CambridgePark development is the increase in motor vehicle traffic on study area roadways. As pointed out in Section A of this report, the project alternatives are essentially limited to project Build and No Build. The Build alternative studied herein assumes maximum development of available space on the Alewife Triangle and hence worst case traffic increases.

VI-B PROJECT IMPACT

AIR QUALITY

A. FINDINGS AND CONCLUSIONS

The air quality analysis predicted maximum 1-hour and 8-hour CO concentrations at sensitive receptors, using the EPA Indirect Source Guideline1/ technique. Worksheets from the roadway analysis are included in Appendix B-2. The cumulative results of the air quality analysis including impacts from intersection traffic and background carbon monoxide are presented in Table VI-B-1. These results do not characterize typical air pollution levels in the project area. Rather, they represent the highest concentrations that could exist during the joint occurrence of worst case meteorology and peak traffic.

TABLE VI-B-1
PREDICTED MAXIMUM CO CONCENTRATIONS FROM INTERSECTION TRAFFIC PLUS BACKGROUND AT THE ALEWIFE BROOK PARKWAY/ RINDGE AVENUE RECEPTOR (PPM)

Case	Year	1-hour CO	8-hour CO
Existing	1983	52.3	10.1
2 No-Build	1984	46.2	9.5
3 Build	1984	46.2	10.2
4 No-Build	1987	37.8	8.1
5 Build	1987	35.9*	9.5

* Calculated from the 8-hour CO concentration (see text for details.

1/ EPA, Guildelines for Air Quality Maintenance Planning and Analysis Volume 9, (Revised): Evaluating Indirect Sources, Second Printing, EPA-450/4-78-001, Research Triangle Park, NC, September 1978.

Modeling results for both the existing (1983) and future cases (1984, 1987) show numerous violations of both the 1-hour and 8-hour CO standards. The highest predicted 1-hour CO concentration is for the existing case and is 52.3 ppm. The highest predicted 8-hour CO concentration is for the 1984 Build case and is 10.2 ppm. In general, CO concentrations are predicted to decline in the future.

Application of the mitigation measure of a statewide Inspection and Maintenance (I&M) program will reduce CO concentrations by 26 percent in 1987 (see Section VII-B). A revised set of results for 1987 that assumes I&M, is given in Table VI-B-2. With I&M, all 1-hour and 8-hour CO concentrations in 1987 are below the Massachusetts and National Ambient Air Quality Standards. It can be concluded that the proposed CambridgePark development will not interfere with the attainment and maintenance of the NAAQS for CO if the statewide I&M program is implemented as planned before 1987.

TABLE VI-B-2
PROJECTED MAXIMUM CO CONCENTRATIONS FROM INTERSECTION TRAFFIC PLUS BACKGROUND AT ALEWIFE BROOK PARKWAY/RINDGE AVENUE RECEPTOR (PPM) WITH AN I&M PROGRAM

Case	Year	1-hour CO	8-hour CO
4 No-Build	1987	28.0	6.0
5 Build	1987	26.6*	7.0

* Calculated from the 8-hour CO concentration (see text).

VII-B MEASURES TO MITIGATE ENVIRONMENTAL IMPACT

AIR QUALITY

The project's addition to CO levels increases already existing violations of the air quality standards. Some measures can be applied to mitigate the project impacts involved. In the case of motor vehicle air pollution, these include good traffic engineering design to reduce vehicle conflicts and idling, an Inspection and Maintenance (I&M) program to reduce emission rates, and increased use of alternative modes including carpooling and public or private transit service to reduce traffic volumes. The traffic related mitigation measures being planned are found in Section A of this report. The Commonwealth's I&M program started up on April 1, 1983. Based on emission estimates in Appendix B-1, the I&M program will reduce CO emissions in 1987 by an additional 26 percent over those reported. A similar reduction in predicted CO concentrations would be expected. The application of I&M will ensure no violations of the NAAQS for CO in 1987 for all cases.

Construction at the project site will release fugitive particulate emissions into the air. As a mitigation measure, areas subject to wind erosion will be watered daily during construction to prevent excessive emissions of particulate matter.

NOISE

C. NOISE

PART IV-C	DESCRIPTION OF THE ENVIRONMENT
PART V-C	PROJECT ALTERNATIVES
PART VI-C	PROJECT IMPACT
PART VII-C	MEASURES TO MITIGATE ENVIRONMENTAL IMPACT

IV-C. DESCRIPTION OF THE ENVIRONMENT

NOISE

A. PURPOSE

The objective of the Noise Impact Analysis was to quantify the effects of increased car and truck activity resulting from the CambridgePark development. To accomplish this, a representative set of sensitive receptors in Cambridge were chosen along roadways that project related traffic is expected to travel. The estimated increase in future noise levels can be compared to audible change criteria while the total traffic noise level can be compared to U.S. Environmental Protection Agency (EPA) guidelines for the prevention of hearing loss.

B. COMMON MEASURES OF COMMUNITY NOISE

Non-steady noise exposures in the community are commonly expressed in terms of an A-weighted sound level (dBA) that is exceeded for a percentage of the measured time period. The term "L_x" is used to describe the sound level value that is exceeded for x percent of the time period under consideration. For example, L_{10} is the noise level (dBA) that is exceeded 10 percent of the time. Another method of quantifying the noise environment is to determine the value of steady-state sound which has the same A-weighted sound energy as that contained in the time-varying sound. This is termed the Equivalent Sound Level (L_{eq}). The L_{eq} is a single value of sound level for any desired duration, which includes all of the time-varying sound energy in the measurement period. The major virtue of L_{eq} is that it correlates reasonably well with the effect of noise on people, even for wide variations in environmental sound levels and time patterns.

L_{eq} averaged over a 24-hour period is the noise value used by EPA in their guidelines[1/] to protect public hearing. These guidelines state that an acceptable level of noise is 70 dBA (L_{eq} 24) which will cause less than 5 dBA of hearing loss over 40 years exposure.

C. CHARACTERISTICS OF COMMUNITY NOISE

The noise environment of an urban community results from numerous sources. For receptors adjacent to a roadway, these levels are determined principally by cars and trucks on nearby roads. Sound ranges associated with various activities and environments are presented in Table IV-C-1.

D. SENSITIVE RECEPTORS

A survey of the project area was undertaken to identify representative sensitive receptors. The criteria were to select residences along roadways that carry high volumes of traffic and are expected to be impacted by project-related traffic. The

1/ EPA, Protective Noise Levels - Condensed Version of EPA Levels Document, EPA 550/9-79-100, Washington, D.C., November 1978.

TABLE IV-C-1
COMMON NOISE LEVELS

Sound Level (dBA)	Associated Activity
130	Threshold of Pain
120	Chipping on Metal
110	Rock Band
100	Jack Hammer
	Jet Take-off (1/2 mile)
90	Threshold of Hearing Damage
80	Busy Freeway
70	Downtown Traffic
	Electric Typewriter
60	Normal Conversation
	Urban Residential Area (Nearby Traffic)
50	Drafting Office
40	Suburban Neighborhood (Distant Traffic)
	Private Office
30	
20	Quiet Rural Area (No Traffic)
10	
0	Threshold of Audibility

1/ Source: Acoustical Seminar, Robin M. Towne & Associates, 1971.

following two receptors were selected and approved by DEQE for analysis.1/

(1) The entrance to the Fresh Pond Apartments Tower that faces Alewife Brook Parkway.

(2) The entrance to the residence at 350 Rindge Avenue, Cambridge.

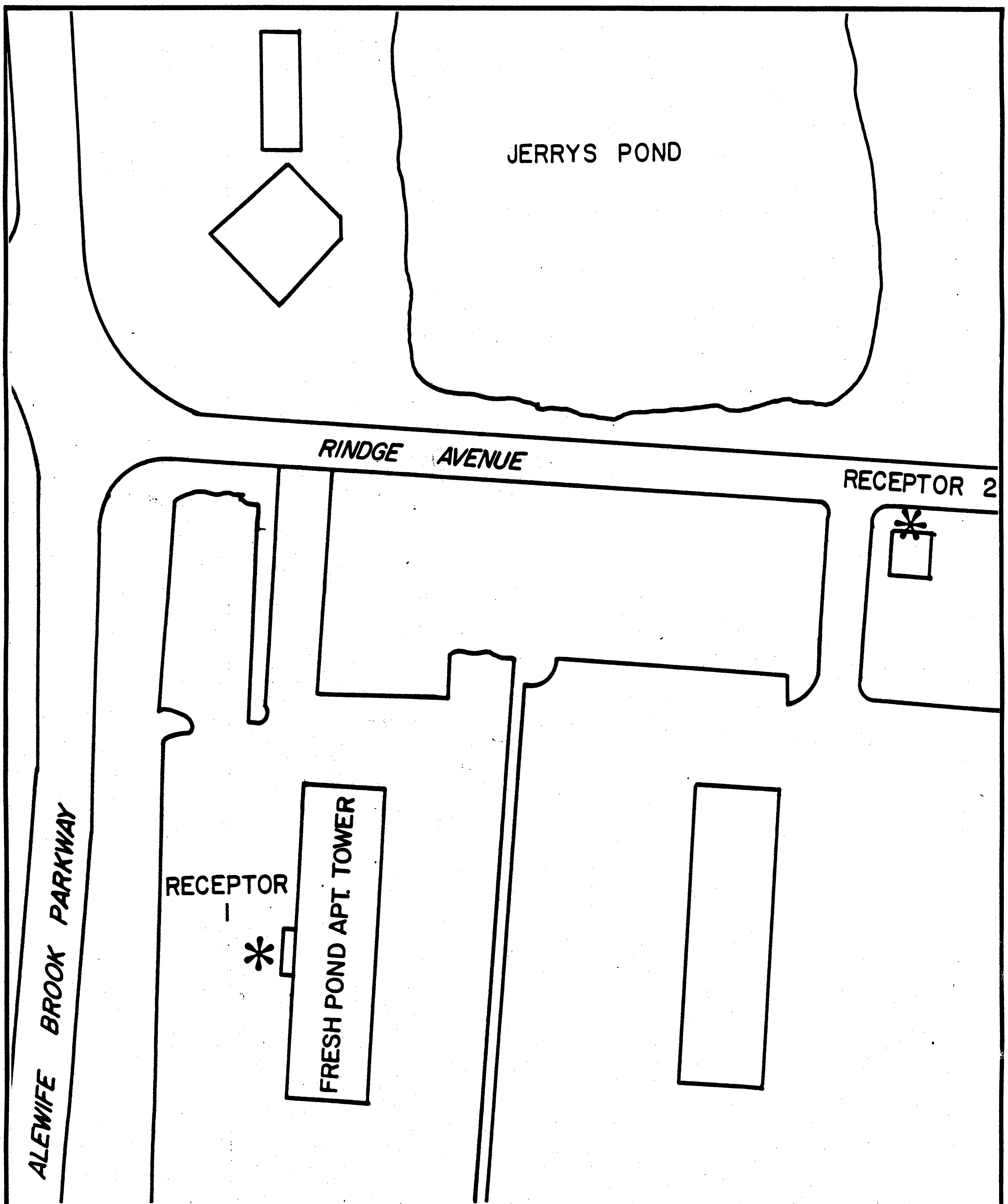
The locations of these receptors in the community are shown in Figure IV-C-1. Ambient noise levels at these sites have not been measured by any previous state or city noise monitoring programs. Therefore, existing noise levels were estimated using the FHWA Highway Traffic Noise Prediction Model.

E. METHODOLOGY FOR ESTIMATING NOISE LEVELS

The technical approach used to predict ambient noise levels was approved in advance by DEQE.1/ The analysis calculated maximum 1-hour and 24-hour L_{eq} noise levels (dBA) at the two sensitive receptors for the following five cases:

Case No.	Year	Build Development
1	1983	No
2	1984	No
3	1984	Yes
4	1987	No
5	1987	Yes

1/ Personal communication, Ms. Heidi O'Brien, DEQE, Boston, MA, March 29, 1983.



Alewife Triangle Park	**Noise Analysis Receptor Locations**	**Vanasse/Hangen Associates Boston, MA**
EIR		**Not To Scale**
		FIG. IV-C-1

In all cases, the FHWA Highway Traffic Noise Prediction Model1/ was used to estimate ambient noise levels from nearby car and truck traffic. The analysis utilized peak 1-hour traffic volumes for the design day and a typical diurnal variation for traffic in Cambridge residential areas developed from recent traffic counts (April 14 and 15, 1983) taken on Alewife Brook Parkway just north of Rindge Avenue during a typical weekday. Table IV-C-2 shows this assumed variation in traffic levels. Use of this diurnal pattern in assessing future year impacts probably overestimates noise levels since project-related traffic will more likely add to peak hour volumes than to volumes during other hours of the day. In applying the model, the following conservative assumptions were made:

- No sound attenuation due to vegetation or houses.
- No sound reduction for finite roadway lengths.
- A minimum speed of 50 km/hr (31 mph) was assumed. In general, vehicular noise is reduced for lower travel speeds.

In order to predict noise levels, the model requires information on a number of parameters. These include:

1) Roadway Links. Significant links for noise production were assumed to be the two principal roads that crossed in front of each receptor point.

1/ Federal Highway Administration, FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, Washington, DC, December 1978.

TABLE IV-C-2
DIURNAL VARIATION OF TRAFFIC IN A CAMBRIDGE RESIDENTIAL AREA FOR A TYPICAL WEEKDAY

Time (E.S.T.)	Hourly Traffic Volume as a Fraction of Peak 1-hour Volume
12- 1 AM	0.1550
1- 2 AM	0.0737
2- 3 AM	0.0468
3- 4 AM	0.0167
4- 5 AM	0.0214
5- 6 AM	0.0860
6- 7 AM	0.4299
7- 8 AM	0.8283
8- 9 AM	0.8761
9-10 AM	0.6696
10-11 AM	0.6044
11-12 Noon	0.5936
12- 1 PM	0.6438
1- 2 PM	0.6313
2- 3 PM	0.6847
3- 4 PM	0.8050
4- 5 PM	0.8704
5- 6 PM	1.0000
6- 7 PM	0.8143
7- 8 PM	0.6737
8- 9 PM	0.5000
9-10 PM	0.4468
10-11 PM	0.4214
11-12 Midnight	0.2882

2) Modal Split. The vehicle modal split between cars, medium trucks and heavy trucks is a key input. The percentage of trucks on Rindge Avenue were determined from field observations during the peak hour traffic counts. There are no trucks on Alewife Brook Parkway. The total truck count was assumed to split equally between the medium-duty and heavy-duty classes.

3) Perpendicular Distance. The perpendicular distance from the receptor to the centerline of each directional flow on each roadway link was measured.

4) Vehicle Speeds. Peak-hour vehicle speeds were estimated from field observations. Since the peak hour speeds along the roadways at each receptor do not exceed the model's assumed minimum value of 50 km/hour (31 mph), actual vehicle speeds did not enter the calculation.

5) Traffic Volumes. The traffic volumes for each roadway lane were taken from observed data which is summarized in the Transportation section and in the Technical Appendix.

Data for these parameters is summarized in Tables IV-C-3 and IV-C-4.

TABLE IV-C-3
NOISE MODEL INPUT DATA FOR RECEPTOR 1

	Link 1 Alewife Brook Parkway		Link 2 Rindge Avenue	
Modal Split				
Cars	97.0%			
Medium Trucks	1.5%			
Heavy Trucks	1.5%			
Direction	NB	SB	EB	WB
Distance (m)	43	49	101	105
Peak Hour Volume				
Case 1	2400	1800	300	590
Case 2	2474	2043	181	616
Case 3	2484	2104	181	620
Case 4	2589	2263	214	636
Case 5	2625	2486	214	651

TABLE IV-C-4
NOISE MODEL INPUT DATA FOR RECEPTOR 2

	Link 1 Alewife Brook Parkway		Link 2 Rindge Avenue	
Modal Split				
Cars	97.0%			
Medium Trucks	1.5%			
Heavy Trucks	1.5%			
Direction	NB	SB	EB	WB
Distance (m)	178	184	7	10
Peak Hour Volume				
Case 1	2400	1800	300	590
Case 2	2474	2043	181	616
Case 3	2484	2104	181	620
Case 4	2589	2263	214	636
Case 5	2625	2486	214	651

V-C. PROJECT ALTERNATIVES

NOISE

The principal factor that determines the noise impact of the CambridgePark development is the increase in motor vehicle traffic on study area roadways. As pointed out in Section A of this report, the project alternatives are limited to Build and No-Build. The Build alternative assumes maximum development of available space in the Alewife Triangle and hence worst case traffic increases. The No Build situation was also analyzed for noise to provide a basis for comparison with the Build conditions.

VI-C PROJECT IMPACT

NOISE

A. FINDINGS AND CONCLUSIONS

The noise impact analysis predicted maximum 1-hour and 24-hour L_{eq} levels (dBA) at two sensitive receptors. Model output is summarized in Tables VI-C-1 through VI-C-4. Existing peak hour L_{eq} ranges from 67.2 dBA at Receptor 1 to 68.1 dBA at Receptor 2. Existing 24-hour L_{eq} values are in the range of 62.6 to 64.1 dBA. These values are characteristic of an urban residential area.

Future (1984 and 1987) L_{eq} values for both the Build and No-Build cases are only slightly higher than the existing case for Receptor 1. For Receptor 2, future noise levels actually decrease slightly due to the reconstruction of the Alewife Parkway/Rindge Avenue intersection that will discourage travel eastbound on Rindge Avenue into the neighborhood areas. All future 24-hour L_{eq} noise levels are below the EPA guideline value of 70 dBA. The increase in residential noise levels in 1987 due to project-related traffic is no more than 0.21 dBA for the peak hour and no more than 0.19 dBA on a 24-hour basis. Since noise changes of 1 dBA or less are generally not perceptible, project-related traffic will have an imperceptible impact on future noise levels in the residential area of Cambridge near the project site.

TABLE VI-C-1
PREDICTED NOISE LEVELS
RECEPTOR 1
CASES 1, 2, 3

FHWA HIGHWAY NOISE PREDICTION MODEL

RECEPTOR # 1

LOCATION: FRESH POND APARTMENTS TOWER

MODAL SPLIT

CARS	97.00 %
MEDIUM TRUCKS	1.50 %
HEAVY TRUCKS	1.50 %

	ALEWIFE PKWY		RINDGE AVENUE	
	NB	SB	EB	WB
DISTANCE (M)	43	49	101	105
PEAK-HOUR VOLUME				
1983 EXISTING	2400	1800	300	590
1984 NO-BUILD	2474	2043	181	616
1984 BUILD	2484	2104	181	620

HOURLY LEQ(DBA)	1983 EXISTING	1984 NO-BUILD	1984 BUILD
0- 1	59.10	59.37	59.43
1- 2	56.05	56.30	56.36
2- 3	54.30	54.53	54.59
3- 4	51.98	52.04	52.05
4- 5	52.27	52.35	52.37
5- 6	56.66	56.92	56.97
6- 7	63.50	63.74	63.80
7- 8	66.35	66.59	66.65
8- 9	66.59	66.83	66.90
9-10	65.43	65.67	65.73
10-11	64.98	65.22	65.28
11-12	64.90	65.14	65.21
12-13	65.26	65.50	65.56
13-14	65.17	65.41	65.47
14-15	65.52	65.76	65.83
15-16	66.23	66.47	66.53
16-17	66.57	66.81	66.87
17-18	67.17	67.41	67.47
18-19	66.28	66.52	66.58
19-20	65.45	65.69	65.76
20-21	64.16	64.40	64.46
21-22	63.67	63.91	63.97
22-23	63.42	63.66	63.72
23-24	61.77	62.02	62.08

THE PEAK-HOUR IS 17-18 HOURS

24-HOUR LEQ(DBA)	62.62	62.84	62.90

TABLE VI-C-2
PREDICTED NOISE LEVELS
RECEPTOR 1
CASES 1, 4, 5

FHWA HIGHWAY NOISE PREDICTION MODEL

RECEPTOR # 1

LOCATION: FRESH POND APARTMENTS TOWER

MODAL SPLIT

CARS	97.00 %
MEDIUM TRUCKS	1.50 %
HEAVY TRUCKS	1.50 %

	ALEWIFE PKWY		RINDGE AVENUE	
	NB	SB	EB	WB
DISTANCE (M)	43	49	101	105
PEAK-HOUR VOLUME				
1983 EXISTING	2400	1800	300	590
1987 NO-BUILD	2589	2263	214	636
1987 BUILD	2625	2486	214	651

HOURLY LEQ(DBA)	1983 EXISTING	1987 NO-BUILD	1987 BUILD
0- 1	59.10	59.66	59.86
1- 2	56.05	56.58	56.77
2- 3	54.30	54.80	54.98
3- 4	51.98	52.12	52.18
4- 5	52.27	52.44	52.51
5- 6	56.66	57.20	57.39
6- 7	63.50	64.04	64.25
7- 8	66.35	66.89	67.10
8- 9	66.59	67.14	67.34
9-10	65.43	65.97	66.17
10-11	64.98	65.52	65.73
11-12	64.90	65.45	65.65
12-13	65.26	65.80	66.00
13-14	65.17	65.71	65.92
14-15	65.52	66.07	66.27
15-16	66.23	66.77	66.97
16-17	66.57	67.11	67.31
17-18	67.17	67.71	67.92
18-19	66.28	66.82	67.02
19-20	65.45	66.00	66.20
20-21	64.16	64.70	64.91
21-22	63.67	64.21	64.42
22-23	63.42	63.96	64.16
23-24	61.77	62.31	62.52

THE PEAK-HOUR IS 17-18 HOURS

24-HOUR LEQ(DBA)	62.62	63.12	63.31

TABLE VI-C-3
PREDICTED NOISE LEVELS
RECEPTOR 2
CASES 1, 2, 3

FHWA HIGHWAY NOISE PREDICTION MODEL

RECEPTOR # 2

LOCATION: 350 RINDGE AVENUE

MODAL SPLIT

CARS	97.00 %
MEDIUM TRUCKS	1.50 %
HEAVY TRUCKS	1.50 %

	ALEWIFE PKWY		RINDGE AVENUE	
	NB	SB	EB	WB
DISTANCE (M)	178	184	7	10
PEAK-HOUR VOLUME				
1983 EXISTING	2400	1800	300	590
1984 NO-BUILD	2474	2043	181	616
1984 BUILD	2484	2104	181	620

HOURLY LEQ(DBA)	1983 EXISTING	1984 NO-BUILD	1984 BUILD
0- 1	60.33	60.22	60.25
1- 2	58.57	58.45	58.47
2- 3	57.94	57.86	57.87
3- 4	57.19	57.15	57.15
4- 5	57.30	57.25	57.26
5- 6	58.82	58.70	58.72
6- 7	64.43	63.96	63.99
7- 8	67.28	66.81	66.84
8- 9	67.52	67.06	67.09
9-10	66.35	65.89	65.92
10-11	65.91	65.44	65.47
11-12	65.83	65.37	65.40
12-13	66.18	65.72	65.75
13-14	66.10	65.63	65.66
14-15	66.45	65.99	66.02
15-16	67.15	66.69	66.72
16-17	67.49	67.03	67.06
17-18	68.09	67.63	67.66
18-19	67.20	66.74	66.77
19-20	66.38	65.91	65.95
20-21	65.08	64.62	64.65
21-22	64.59	64.13	64.16
22-23	64.34	63.88	63.91
23-24	62.69	62.38	62.40

THE PEAK-HOUR IS 17-18 HOURS

24-HOUR LEQ(DBA)	64.13	63.77	63.80

TABLE VI-C-4
PREDICTED NOISE LEVELS
RECEPTOR 2
CASES 1, 4, 5

FHWA HIGHWAY NOISE PREDICTION MODEL

RECEPTOR # 2

LOCATION: 350 RINDGE AVENUE

MODAL SPLIT
CARS 97.00 %
MEDIUM TRUCKS 1.50 %
HEAVY TRUCKS 1.50 %

	ALEWIFE PKWY		RINDGE AVENUE	
	NB	SB	EB	WB
DISTANCE (M)	178	184	7	10
PEAK-HOUR VOLUME				
1983 EXISTING	2400	1800	300	590
1987 NO-BUILD	2589	2263	214	636
1987 BUILD	2625	2486	214	651

HOURLY LEQ(DBA)	1983 EXISTING	1987 NO-BUILD	1987 BUILD
0- 1	60.33	60.42	60.51
1- 2	58.57	58.57	58.61
2- 3	57.94	57.94	57.97
3- 4	57.19	57.18	57.19
4- 5	57.30	57.29	57.30
5- 6	58.82	58.83	58.88
6- 7	64.43	64.28	64.39
7- 8	67.28	67.13	67.23
8- 9	67.52	67.37	67.48
9-10	66.35	66.21	66.31
10-11	65.91	65.76	65.87
11-12	65.83	65.68	65.79
12-13	66.18	66.04	66.14
13-14	66.10	65.95	66.05
14-15	66.45	66.30	66.41
15-16	67.15	67.01	67.11
16-17	67.49	67.35	67.45
17-18	68.09	67.95	68.05
18-19	67.20	67.06	67.16
19-20	66.38	66.23	66.34
20-21	65.08	64.94	65.04
21-22	64.59	64.45	64.55
22-23	64.34	64.20	64.30
23-24	62.69	62.59	62.70

THE PEAK-HOUR IS 17-18 HOURS

24-HOUR LEQ(DBA)	64.13	64.03	64.12

VII-C MEASURES TO MITIGATE ENVIRONMENTAL IMPACT

NOISE

While the project's noise impact is not significant (i.e., perceptible) and total noise levels are expected to fall below the EPA guideline value, some measures can mitigate the small project impacts involved. In the case of noise, these are related to reducing the number of project related vehicle-trips through the residential area of Cambridge. Other measures designed to reduce vehicle-trips include increased vehicle occupancy rates through carpooling and the use of both public and private transit which are discussed in Section A.

CIRCULATION LIST

VIII CIRCULATION LIST

Copies of this Draft Environmental Impact Report have been transmitted to the following agencies, groups and individuals. Additional copies may be obtained by request from Vanasse/Hangen Associates.

Secretary James S. Hoyte
Executive Office of Environmental Affairs
Leverett Saltonstall Bldg. - 20th Floor
100 Cambridge Street
Boston, MA 02202
Attn: MEPA Unit
EOEA #4512

Secretary Frederick P. Salvucci
Executive Office of Transportation and Construction
One Ashburton Place, Room 1610
Boston, MA 02108

Mr. Kennedy Hagg, Director
Ms. Heidi O'Brien
Department of Environmental Quality Engineering
Division of Air Quality Control
One Winter Street
Boston, MA 02108

Mr. Robert Horigan
Massachusetts Department of Public Works
Environmental Section
100 Nashua Street
Boston, MA 02114

Division of Air and Hazardous Materials
Mobile Source Planning Branch
One Winter Street
Boston, MA 02108

Mr. Charles F. Mistretta, District Highway Engineer
Massachusetts Department of Public Works
District 4
100 Nashua Street
Boston, MA 02114

Mr. Edward J. Cox, District Highway Engiener
Massachusetts Department of Public Works
District 8
400 D Street
South Boston, MA 02114

Mr. William T. Geary
Ms. Julia O'Brien
Metropolitan District Commission
20 Somerset Street
Boston, MA 02108
Attn: Park Engineering Division
Environmental Planning Department

Department of Environmental Quality Engineering
323 New Boston Street
Woburn, MA 01801

Mr. Donald Kidston
Massachusetts Bay Transportation Authority
50 High Street
Boston, MA 02110

Mr. Alex Xaleski, Executive Director
Metropolitan Area Planning Council
110 Tremont Street
Boston, MA 02108

Secretary Amy S. Anthony
Executive Office of Communities and Development
100 Cambridge Street, 14th Floor
Boston, MA 02202

State Clearinghouse
One Ashburton Place
Boston, MA 02108

Massachusetts Department of Community Affairs
One Ashburton Place
Boston, MA 02108

Ms. Valerie Talmadge, Executive Director
Massachusetts Historical Commission
294 Washington Street
Boston, MA 02108

Mr. Bob Yaro
Office of Planning
Department of Environmental Management
100 Cambridge Street, Room 1903
Boston, MA 02202

Mr. Richard Easler
Community Development
57 Inman Street
Cambridge, MA 02139

Mr. Paul Healy
City Clerk Office
795 Massachusetts Avenue
Cambridge, MA 02139

North Cambridge Public Library
70 Rindge Avenue
Cambridge, MA 02140
Attn: Branch Librarian

Mr. Alan McClennen, Director
Department of Community Development and Planning
Arlington, MA 02174

Mr. Herbert Meyer
Mystic River Watershed Association
276 Massachusetts Avenue
Arlington, MA 02174

Mr. Charles Lyons
Board of Selectmen
730 Massachusetts Avenue
Arlington, MA 02174

Mr. Stephen Gilligan, Chairman
Arlington Conservation Commission
P.O. Box 128
Arlington, MA 02174

Ms. Christine M. Callahan
Town Office Clerk
730 Massachusetts Avenue
Arlington, MA 02174

Ms. Judith A. Quimby
East Arlington Citizen's Association
12 Edgarton Road
Arlington, MA 02174

Robbins Library
Town of Arlington
700 Massachusetts Avenue
Arlington, MA 02174
Attn: Town Librarian

Mr. William P. Monahan, Chairman
Board of Selectmen
455 Concord Avenue
Belmont, MA 02178

Mr. Thomas Callaghan
Winn Brook Association
17 Eliot Street
Belmont, MA 02178

Mr. James Livingston
Planning Board
Town of Belmont
90 Agassiz Avenue
Belmont, MA 02178

Belmont Library
366 Concord Avenue
Belmont, MA 02178
Attn: Town Librarian

Mr. Reid D. Weedon, Jr.
Senior Vice President
Arthur D. Little, Inc.
25 Acorn Park
Cambridge, MA 02140

State Representative Mary Jane Gibson
Room 446
State House
Boston, MA 02133

Mr. Albert Wilson
Alewife Businessmen Association
C/O A.O. Wilson Structural Company
40 Smith Place
Cambridge, MA 02138

Mr. A.T. Sawyer
Neighborhood Number 9 Association
14 Avon Place
Cambridge, MA 02138

Mr. Thomas Anninger
Neighborhood Number 10 Association
26 Healy Street
Cambridge, MA 02138

Ms. Carolyn Mieth
Neighborhood Number 11 Association
North Cambridge Citizens Group
15 Brookford Street
Cambridge, MA 02140

Mr. Richard Cahill
Neighborhood Number 12 Association
27 Normandy Terrace
Cambridge, MA 02138

S-297A

Comm. from Vanasse/Hangen Associates, Inc., transmitting in compliance with Chapter 30, Section 62 of the General Laws "Draft Environmental Impact Report - CambridgePark, Cambridge, MA, EOEA #4512, May, 1983".

May, 1983

(received June 2, 1983)