Hine

Project: **165 Cambridgepark Drive**
Cambridge, Massachusetts

Residential Building
Planning Board Special Permit Submission
Volume 1 August 15, 2012

Di la Shaffer
Architecture | Interior Design | Planning

Landscape Architect:
Halvorson Design Partnership, Inc.

Civil and Environmental Engineer:
Horsley Witten Group, Inc

Traffic Engineer:
Vanasse & Associates, Inc.

Structural Engineer:
L.A. Fuess Partners, Inc.

MEP Engineer:
Wozny/ Barbar & Associates, Inc.

CITY OF CAMBRIDGE, MASSACHUSETTS

PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

SPECIAL PERMIT APPLICATION • COVER SHEET

In accordance with the requirements of the City of Cambridge Zoning Ordinance, the undersigned hereby petitions the Planning Board for one or more Special Permits for the premises indicated below.

Location of Premises:	165 Cambridgepark Drive
Zoning District:	Alewife Overlay District 6/Office 2A
Applicant Name:	Hines Interests Limited Partnership
Applicant Address:	1 International Place, 11th Floor, Boston, MA 02110
Contact Information:	(617) 492-4100 jrafferty@adamsrafferty.com (617) 492-3131
	Telephone # Email Address Fax #

List all requested special permit(s) (with reference to zoning section numbers) below. *Note that the Applicant is responsible for seeking all necessary special permits for the project. A special permit cannot be granted if it is not specifically requested in the Application.*

Article 19.20 (Project Review)
Article 20.95.34 (Yard Requirements)
Article 20.97.3 (Parking GFA Waiver)
Article 20.70 (Flood Plain Overlay)
Article 6.35.1 (Reduction in Required Parking)

List all submitted materials (include document titles and volume numbers where applicable) below.

Survey; Proposed Site Plan; Floor Plans; Elevations; Landscape Plan; Photographs; Ownership Certificate; and Project Narrative. Traffic Study has been submitted separately.

Signature of Applicant:

For the Planning Board, this application has been received by the Community Development Department (CDD) on the date specified below:

Date Signature of CDD Staff

b. SPECIAL PERMIT APPLICATION – SUMMARY OF APPLICATION

Project Name:
Address of Site: 165 Cambridge Park Drive
Applicant: Hines Interests Limited Partnership
Planning Board Project Number: (CDD)

Hearing Timeline (CDD)

Application Date:
Planning Board 1st Hearing Date: _____ *
(*PUD Development Proposal, other special permit*)
Planning Board Preliminary Determination: _____ *
(*PUD Development Proposal*)
Second Submission Date: _____ *
(*PUD Final Development Plan*)
Planning Board 2nd Hearing Date: _____ *
(*PUD Final Development Plan*)
Final Planning Board Action Date: _____ *
(*PUD Final Development Plan, other special permit*)
Deadline for Filing Decision: _____ *
**Subject to extension by mutual agreement of the Applicant and the Planning Board*

Requested Relief: (include other boards and commissions)

- Special Permit; Project Review (19.20); Alewife Overlay District (20.90 et seqs);
- Flood Plain Overlay (20.70); Reduction in Required Parking (6.35.1); Conservation Commission

Project Description

Brief Narrative: Petitioner seeks to construct 280,000 sf multifamily building containing 244 dwelling units, 232 automobile parking spaces and 244 bicycle parking spaces.

Project Size: 280,000 sf

- Total GFA: 280,000 SF
- Non-residential uses GFA: N/A
- Site Area (acres and SF): 119,274 sf (2.5 acres)
- # of Parking Spaces: 232

Proposed Uses:

- # of Dwelling Units: 244
- Other Uses N/A
- Open Space (% of the site and SF) 24% (28,626 sf)

Proposed Dimensions:

- Height: 69' 11"
- FAR: 2.35

OWNERSHIP CERTIFICATE

Project Address: 165 Cambridgepark Drive **Application Date:**

This form is to be completed by the property owner, signed, and submitted with the Special Permit Application:

I hereby authorize the following Applicant: Hines Interests Limited Partnership
at the following address: 1 International Place, 11th Fl Boston, MA 02110
to apply for a special permit for: Project Review (Alewife Overlay District)
on premises located at: 165 Cambridgepark Drive
for which the record title stands in the name of: J&M Realty Trust
whose address is: 165 Cambridgepark Drive

by a deed duly recorded in the:
Registry of Deeds of County: Middlesex Book: 17669 Page: 282
OR Registry District of the Land Court, Certificate No.: Book: Page:

Debbie L. Dodge, Manager J & M Realty Trust LLC
Signature of Land Owner (If authorized Trustee, Officer or Agent, so identify)

To be completed by Notary Public:

Commonwealth of Massachusetts, County of Middlesex

The above named Debbie L Dodge personally appeared before me,

on the month, day and year Aug 9, 2012 and made oath that the above statement is true.

Notary: Katherine A Watkins

My Commission expires: September 7, 2018

Please see attached Massachusetts Jurat

MASSACHUSETTS JURAT

Gov. Exec. Ord. #455 (03-13), §5(e)

Commonwealth of Massachusetts
County of Middlesex } ss.

On this the 9th day of August, 2012 before me,
(Day) (Month) (Year)

Katherine A Watkins, the undersigned Notary Public,
(Name of Notary Public)

personally appeared Debbie L. Dodge,
(Name(s) of Signer(s))

proved to me through satisfactory evidence of identity, which was/were

personal knowledge,
(Description of Evidence of Identity)

to be the person(s) whose name(s) was/were signed on the preceding or attached document in my presence, and who swore or affirmed to me that the contents of the document are truthful and accurate to the best of his/her/their knowledge and belief.

KATHERINE R. WATKINS NOTARY PUBLIC COMMONWEALTH OF MASSACHUSETTS MY COMM. EXPIRES SEPTEMBER 7, 2018

Katherine A Watkins
Signature of Notary Public

KATHERINE R. WATKINS
Printed Name of Notary

Place Notary Seal and/or Any Stamp Above

My Commission Expires Sept 7, 2018

OPTIONAL

Although the information in this section is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Ownership Certificate

Document Date: 8/9/12 Number of Pages: 1

Signer(s) Other Than Named Above: none

Right Thumbprint of Signer
Top of thumb here

DIMENSIONAL FORM

Project Address: 165 Cambridgepark Drive **Application Date:** August 15, 2011

	Existing	Allowed or Required (max/min)	Proposed	Permitted
Lot Area (sq ft)	119,274 sf	5,000 sf	119,274 sf	
Lot Width (ft)	503.60 feet	50 feet	503.60 feet	
Total Gross Floor Area (sq ft)	75,585 sf	310,112 sf	280,000 sf	
Residential Base	N/A	238,548 sf	238,548 sf	
Non-Residential Base	N/A	N/A	N/A	
Inclusionary Housing Bonus	N/A	71,564 sf	41,452 sf	
Total Floor Area Ratio	N/A	2.6	2.35	
Residential Base	N/A	2.0	2.0	
Non-Residential Base	N/A	N/A	N/A	
Inclusionary Housing Bonus	N/A	0.6	.35	
Total Dwelling Units	0	258	244	
Base Units	N/A	198	188	
Inclusionary Bonus Units	N/A	30bonus/30Affd	28bonus/28Affd	
Base Lot Area / Unit (sq ft)	N/A	600	634	
Total Lot Area / Unit (sq ft)	N/A	462	489	
Building Height(s) (ft)	34 ft	85 ft / 105 ft	69 ft 11 in	
Front Yard Setback (ft)	0 ft	15 ft *	15 ft	
Side Yard Setback – Side? (ft)	63 ft	0 ft *	25 ft	
Side Yard Setback – Side? (ft)	14 ft	0 ft *	25 ft	
Rear Yard Setback (ft)	6 ft	0 ft *	20 ft	
Open Space (% of Lot Area)	5%	15%	24%	
Private Open Space	N/A	N/A	N/A	
Permeable Open Space	5%	25%	34%	
Other Open Space (Specify)	N/A	N/A	N/A	
Off-Street Parking Spaces	38	1 per 1 D.U.	232	
Bicycle Parking Spaces	N/A	1 per 2 D.U.	244	
Loading Bays	6	N/A	1	

Use space below and/or attached pages for additional notes:

* Special Permit (20.95.34)

Project Narrative

This is an application by Hines Interests Limited Partnership for a Special Permit to allow for the construction of a multifamily residential building at 165 Cambridgepark Drive containing 244 dwelling units (the Project), including an on-grade courtyard, a large vegetated elevated courtyard, a landscaped pool deck, and an at-grade vehicular and bicycle parking facility under the building. The property is situated along the Alewife Brook Reservation and lies within Alewife Overlay District 6 (the Triangle).

The Project will consist of redeveloping an existing industrial/warehouse site into a multifamily residential property. The proposed structure will be a single building with six stories totalling approximately 280,000 square feet. Vehicular access to the property will be exclusively from Cambridgepark Drive with separate driveways servicing two on-grade garages containing parking for 232 vehicles and 244 bicycles, and a perimeter access road.

The Project will significantly reduce the site's near total impervious ground cover and includes several stormwater best management practices (BMPs) which will reduce the rates of stormwater runoff from the site as well as improve runoff water quality.

The planting strategy for the three courtyards creates a diverse plant palette comprised mainly of herbaceous ornamental grasses, perennials and ground covers. These colorful and dramatic herbaceous plants will be punctuated by grouping of flowering deciduous and evergreen shrubs to define views, shape spaces, and provide pedestrian circulation cues. The front entry and streetscape planting provides large shade trees along the public sidewalk to define the public realm while a series of flowering shrubs and perennials enliven this sunny corridor.

The Project includes many design elements that advance the goals outlined in the Concord-Alewife plan, including developing housing close to the Alewife "T" Station. The Project is a short walk from the Alewife "T" Station and the pedestrian and bicycle friendly amenities of the Alewife Brook Reservation. Further, the Project also meets the goal of creating a variety of housing opportunities. The proposed building contains a selection of housing options ranging from studio apartments (44), one bedroom units (117), two bedroom units (74), and three bedroom units (9).

Included with this application is a Traffic Impact Study (TIS) certified by the Traffic, Parking, and Transportation Department.

I. Supporting Statement - Section 10.43 General Special Permit Criteria.

Special permits will normally be granted where specific provisions of the ordinance are met, except when particulars of the location or use, not generally true of the district or of the uses permitted in it, would cause granting of such permit to be the detriment of the public interest.

(1) The requirements of the Zoning Ordinance can or will be met.

With the relief granted by this Special Permit the requirements of the Zoning Ordinance will have been met.

(2) Traffic generated or patterns of access or egress would not cause congestion hazard, or substantial change in established neighborhood character for the following reasons:

As set forth in the Traffic Impact Statement submitted with this application, the proposed construction of a residential project in this area will not create additional traffic congestion in the area, since a residential development's traffic patterns run counter to the existing commercial and workplace traffic patterns in the surrounding area. In addition, the project's location near the Alewife Red Line station and the Fitchburg Cutoff and other area bike paths is expected to encourage alternative transportation modes by residents.

(3) The continued operation of or the development of adjacent uses as permitted in the Zoning Ordinance will not be adversely affected by the nature of the proposed uses for the following reasons.

Adjacent uses will not be adversely affected. A new multi-family building has recently been issued a Special Permit by the Planning Board across the street at 160 Cambridgepark Drive. The addition of another residential use will further enhance the mixed use nature of Cambridgepark Drive and is in agreement with the Alewife Overlay District's goals for introducing additional housing close to Alewife Station. The increased residential use will enhance the district's vibrancy, creating a safe and active environment throughout the day and evening.

(4) Nuisance of hazard would not be created to the detriment of the health, safety and/or welfare of the occupants of the proposed use or the citizens of the City.

There will be no general nuisance or hazard created. On the contrary, locating a high quality residential building in this location will enhance the streetscape along Cambridgepark Drive and enhance public safety by increasing utilization of the Alewife Brook Reservation. The Project redevelops an existing industrial site and turns it into a vibrant residential building that adds appeal to the surrounding neighborhood.

(5) For other reasons, the proposed use would not impair the integrity of the district or adjoining district or otherwise derogate from the intent or purpose of this Ordinance for the following reasons.

The Project is fully in compliance with the provisions of the Concord-Alewife Overlay District and advances several of the goals outlined in the Concord-Alewife Plan.

As set forth in the Plan, the Project is a response to the desire for residential focus closer to the Alewife T Station. Parking and services are screened from public view, further enhancing the pedestrian oriented streetscape.

The Project will offer open space amenities, which include a large entry courtyard facing

Cambridgepark Drive containing seating and landscaping, and two private landscaped courtyards. One landscaped courtyard on the north is located at-grade adjacent to the building lobby and provides views of the Reservation through the building from Cambridgepark Drive. The other courtyard incorporates a large vegetated green roof above the parking facility. A swimming pool amenity area open to the residents provides additional open space and outdoor recreational opportunities.

II. Project Review Special Permit - Conformance with Citywide Urban Design Objectives (Section 19.30)

Section 19.31: New projects should be responsive to the existing or anticipated pattern of development. Indicators include:

(1) Heights and setbacks provide suitable transitions to abutting or nearby residential zoning districts that are generally developed to low scale residential uses.

The area surrounding the project consists largely of industrial and office buildings. There are no residential uses directly abutting the site and the other residential uses in the area are similar apartment style buildings. The heights and setbacks of the project improve and enhance the pedestrian experience along Cambridgepark Drive. The project's height is approximately 47' at the setback and 70' further back, thirty feet below the 105' height permitted by special permit in the Alewife Overlay District 6. The Project is set back 15' from Cambridgepark Drive along the street edge and approximately 40 to 50' at the entry courtyard.

(2) New buildings are designed and oriented on the lot so as to be consistent with the established streetscape on those streets on which the project lot abuts. Streetscape is meant to refer to the pattern of building setbacks and heights in relationship to public streets.

The building facing Cambridgepark Drive will establish a friendly and active streetscape and will greatly improve the existing street edge. The ground level will include active residential building support and amenity spaces such as a leasing office, reception area and cyber cafe, accessed from a central entry courtyard. The building and outdoor spaces will be designed to complement and improve the streetscape with landscaping, open resident balcony areas overlooking the street, and a large two-story transparent lobby area containing seating areas, reception areas, and building support spaces. This transitional space connects to the at-grade courtyard facing the Alewife Brook Reservation and the level two amenity and pool deck area. The parking will be located below the residences to reduce the impact on Cambridgepark Drive, and will be screened to prevent views into the parking area.

(3) In mixed use projects, uses are to be located carefully to respect context.

This is not a mixed use project.

(4) Where relevant, historical context are respected, e.g. special considerations should be given to buildings on the site or neighboring buildings that are preferably preserved.

There are no historic structures on the site or abutting the site.

Section 19.32: Development should be pedestrian and bicycle-friendly, with a positive relationship to its surroundings.

(1) Ground floors, particularly where they face public streets, public parks, and publicly accessible pathways consist of spaces that are actively inhabited by people.

The design will complement the City's planning for the Concord-Alewife neighborhood. The project will create 244 residential units near the Alewife Station, an area specifically targeted for further residential development. The residential uses of the building will be actively inhabited by people both along Cambridgepark Drive and along the Alewife Brook Reservation.

The residential use of the building and the ground level spaces facing Cambridgepark Drive, the Alewife Brook Reservation, and the Fitchburg Cutoff Bike Path will activate and enhance the pedestrian experience along both the street and the Reservation sides of the building.

(2) Covered parking on the lower floors of a building and on-grade open parking, particularly where located in front of a building, is discouraged where a building faces a public street or public park, and publicly accessible pathways.

The Project will include 232 parking spaces, which will be located within an at-grade parking facility located below the residential building. The portion of the garage facing the street will not be visible, with bicycle storage and the entry lobby occupying most of the south face along the street. The parking facility is set back and is fronted by a landscaped buffer to further reinforce the pedestrian nature of the street edge.

(3) Ground floors should be generally 25-50% transparent. The greatest amounts of glass would be expected for retail uses with lesser amounts for office, institutional or residential use.

The ground floor will include a glazed two-story lobby, reception area and cyber cafe, and a leasing office. The building lobby is designed to be largely transparent with common use functions and fronts both Cambridgepark Drive and the Alewife Reservation, allowing a visual connection to the reservation from the street. A significant portion of the ground floor along Cambridgepark Drive will be occupied by bicycle storage located behind glazed enclosure.

(4) Entries to buildings are located so as to ensure safe pedestrian movement across streets, encourage walking as a preferred mode of travel within the city and to encourage the use of public transit for employment and other trips.

The building has been designed to encourage pedestrian access along the street edge in front of the building. A generous walkway leads out of the building to the sidewalk on Cambridgepark Drive, which then leads directly to the Alewife "T" Station located approximately 500 yards away. The main entrance of the building is setback more than 40' from Cambridgepark Drive and is fronted by a courtyard with permeable paving and landscaped areas. Careful thought has been given to pedestrian movement through the site.

(5) Pedestrians and bicyclists are able to access the site safely and conveniently; bicyclist should have secure storage facilities conveniently located on-site and out of the weather.

Pedestrians and bicyclists will have safe access to and from the site by means of convenient entry points and paths to the building from Cambridgepark Drive. The building orients itself both to Cambridgepark Drive and toward the Reservation and to the extensive bicycle and pedestrian trails in Cambridge, connecting to the Alewife Linear Park Trail, the Somerville Community Path, and the Minuteman Trail. Bicyclist will have access to the Fitchburg Cutoff Bike Path to the north through the at-grade courtyard and access points from the bicycle storage areas. There will be enclosed, secure, storage space for 244 bicycles in the at-grade parking garage. To encourage non-automotive transportation, four separate bike storage areas are located at convenient locations near Cambridgepark Drive and the Alewife Brook Reservation. Additional visitor bike storage spaces are provided adjacent to the main lobby entrance for visitors.

Section 19.33: The building and site design should mitigate adverse environmental impacts of a development upon its neighbors

(1) Mechanical equipment that is carefully designed well organized or visually screened from its surroundings and is acoustically buffered from neighbors.

The Project is designed to mitigate the impact of any mechanical equipment on its surroundings and enhance the overall appearance of the existing streetscape and skyline. Mechanical equipment that is located on the roof will be positioned away from the edge of the building and out of the sight line. Each residential unit's HVAC system is comprised of individual mechanical equipment located within each unit, with low-profile rooftop condensing units located at the center of the building roof away for the street and adjacent open spaces. Mechanical equipment is also located in enclosed spaces out of view in the at-grade parking facility, and wall mounted gas meters are located on the north and east sides of the building out of view from Cambridgepark Drive. Screening will be provided for electrical transformers required for the project.

(2) Trash that is handled to avoid impacts (noise, odor, and visual quality) on neighbors, e.g. use of trash compactors or containment of all trash storage within a building is encouraged.

Trash and recycling access will be provided for residents throughout the building and will be directed to a central location in the garage area, to prevent any odors or noises, and these facilities will not be visible to or impact neighbors or residents.

(3) Loading docks that are located and designed to minimize impacts (visual and operational) on neighbors.

The loading dock will be located off of the access driveway and will be hidden from view from Cambridgepark Drive. The loading dock will serve as the trash pick-up area and also for resident move-ins, keeping this traffic off Cambridgepark Drive. There will be very little impact on the neighbors due to the location of the loading dock, which is on the east side and set into the building.

(4) Stormwater Best Management Practices and other measures to minimize runoff and improve water quality are implemented.

The drainage design and stormwater management plan address both the quality and flow rates of stormwater runoff from the site and conforms to the standards outlined by the Massachusetts Department of Environmental Protection Stormwater Management Policy and the City of Cambridge Department of Public Works Concord-Alewife Stormwater Management Guidelines.

(5) Landscaped areas and required Green Area Open Space, in addition to serving as visual amenities, are employed to reduce the rate and volume of stormwater runoff compared to pre-development conditions.

The existing site, covered almost entirely by either building area or pavement, is over 96% impervious. The project includes an at-grade landscaped courtyard, a permeable emergency access drive and landscaped areas along all four sides of the site's perimeter. In aggregate, these site features result in a 20,000+ square foot increase in the site's permeable ground cover.

(6) The structure is designed and sited to minimize shadow impacts on neighboring lots, especially shadows that would have a significant impact on the use and enjoyments of adjacent open spaces.

The Project is bordered by 125 Cambridgepark Drive, a 6 story office building to the east, 200 Cambridgepark Drive, a 7 story life science building to the west, and the Alewife Reservation to the north. The residential building will vary and be no more than six stories in height. Along the street edge the building will be four stories with the six story portion further set back. A shadow analysis

indicates shadows from the project will not impact on the use and enjoyment of adjacent open spaces.

(7) Changes in grade across the lot are designed in ways that minimize the need for structural retaining walls close to the property line.

The Project has no retaining walls and minimizes changes in grade.

(8) Building scale and wall treatment, including provisions of windows, are sensitive to existing residential uses on adjacent lots.

Currently there are no existing residential uses on adjacent lots, however, Special Permit was recently issued by the Planning Board for a multifamily residential building across the street at 160 Cambridgepark Drive. The Project's four story massing along Cambridgepark Drive responds to a residential scale and is sensitive to the pedestrian experience by setting back the six story height. The composition of windows and balconies along the street edge, and the wall treatment and adjacent ground treatment have been carefully considered in relation to the existing context to make certain that those elements are in harmony with the intended residential and adjacent office building uses, while also creating interest in support of an architecturally diverse district.

(9) Outdoor lighting is designed to provide minimum lighting necessary to ensure adequate safety, night vision, and comfort, while minimizing light pollution.

The Project will be designed to provide the required lighting necessary to ensure adequate safety, night vision, and comfort, while minimizing light pollution. The south-facing entrance will be very transparent and is set back from Cambridgepark Drive, which will allow ambient light to enhance the experience of the entry courtyard in the evening hours. It also will be supplemented with accent and safety lighting along the pedestrian access points and perimeter of the building. The parking garage wall treatment and screening will minimize interior lighting from spilling out of the garage.

(10) The creation of a Tree Protection Plan that identifies important trees on site, encourages their protection, or provides for adequate replacement of trees lost to development on the site.

A tree survey plan was submitted to the City of Cambridge Arborist on June 28th, 2012. The project will remove existing trees which amount to a combined total of 177" DBH (8 trees with a DBH of 8" and greater) on the existing property , and an approximate combined total of 184" DBH of new trees (but not less than 177" (approximately 46 trees with 4" DBH)) will be planted as illustrated in the Landscape Plan.

Section 19.34; Projects should not overburden the City infrastructure services, including neighborhood roads, city water supply system, or sewer system.

(1) The building and site design are designed to make use of water-conserving plumbing and minimize the amount of stormwater run-off through the use of best management practices for stormwater management.

In addition to a reduction in the site's impervious ground cover, as discussed in item 19.33(5), the project includes several stormwater best management practices (BMPs) which will further reduce the rates of stormwater runoff from the site as well as improve runoff water quality. Along the northerly and easterly perimeter of the site, a large underground detention basin is proposed to temporarily store runoff and release it at a controlled, reduced rate. A green roof, which doubles as an elevated courtyard, will provide additional stormwater flow rate attenuation by containing up to 3.5" of stormwater above the courtyard surface, allowing the water to slowly percolate through the soil medium before being collected by subdrains and discharged from the site. Runoff from the proposed

entry courtyard area at the main building entrance is to drain into a bioretention area which will filter runoff before it is discharged from the site. The stormwater management system has been designed so that the project's peak rate of runoff for the 25-year storm (5.7" of rainfall) is less than the peak rate of runoff generated by the existing site during the 2-year storm (3.3" of rainfall).

For additional information on the proposed stormwater BMPs, please refer to the Notice of Intent and associated Stormwater Drainage Report prepared by Horsley Witten Group which are on-file with the Cambridge Conservation Commission.

The building will include the installation of water-conserving low flow plumbing fixtures and aerators that will reduce the water demand of each one bathroom unit by as much as 55 gallons per day when compared with code mandated fixtures. The building systems will be designed to meet the stretch code and LEED standards.

(2) The capacity and condition of drinking water and wastewater infrastructure systems are shown to be adequate, or steps necessary to bring them up to an acceptable level are identified.

The Project will have a higher demand for domestic water and will generate more wastewater flow than the industrial facility which currently operates at the site.

In order to mitigate impact on the municipal sewer system, the project design incorporates a wastewater system equipped with a storage tank to allow wastewater to be temporarily stored on-site in order to avoid discharging to the City system during periods of peak flow (approximately 5 am to 10 am and 5 pm to 10 pm on a daily basis, or during storm events when combined sewers must convey rainwater in addition to sewage). The tank will be drained by pumps which can be timed to discharge to the City sewer only during off-peak flow hours.

Based on discussions with the Cambridge Water Department, water to the site is provided by a 10" main in Cambridgepark Drive that is in poor condition. Prior to construction, Hines will coordinate with the Water Department to determine if the project will necessitate upgrading portions of the main or other mitigation measures.

(3) Buildings are designed to use natural resources and energy resources efficiently in construction, maintenance, and long-term operation of the building, including supporting mechanical systems that reduce the need for mechanical equipment generally and it location on the roof of a building specifically. The buildings are sited on the lot to allow construction on the adjacent lots to do the same. Compliance with Leadership in Energy and Environmental Design (LEED) certification standards and other evolving environment efficiency standards is encouraged.

The Project will be designed to minimize any negative impact on the environment and its performance will be measured using the Leadership in Energy and Environmental Design (LEED) standards. A description of the sustainable design approach for the project is contained in the LEED Narrative and LEED Checklist submitted with this Application. Mechanical systems will be of high efficiency and insulated, minimizing impact on the water, electrical, and gas service.

Section 19.35: New construction should reinforce and enhance the complex urban aspects of Cambridge as it has developed historically.

The Project will provide residential activities along the public streetscape, which will contribute to the overall character of the neighborhood. Introduction of residential activity by the Project will create a diverse neighborhood and continues the tradition of successful mixed uses in the City of Cambridge. By proving a complementary use to the existing commercial and retail uses that exist, the urban aspects of the area will be strengthened and improved. The introduction of an additional residential use offers

employees of the nearby office buildings a convenient option of a walking commute, while also giving surrounding retailers and services in the neighborhood additional foot traffic. The project will also create additional residential opportunities in close proximity to the public transportation offered by Alewife Station.

Section 19.36: Expansion of the inventory of housing in the city is encouraged.

When completed, the Project will provide up to 244 new residential units, including 28 affordable housing units, in an area of Cambridge that the City has targeted for future residential development. A variety of unit types are provided, from studios, one-bedroom, two-bedroom, and three-bedroom units.

As described further above, the units will be located and designed to improve the Cambridgepark Drive streetscape by means of wall fenestration and balconies, and thus improve the relationship to the adjoining properties.

Section 19.37 Enhancement and expansion of open space amenities in the city should be incorporated into new development in the city.

The Project enhances and expands open space amenities in the neighborhood. A ground level courtyard directly adjacent to and facing the Alewife Brook Reservation further strengthens the experience along Cambridgepark Drive through a visual connection to the reservation. Vegetated courtyard spaces and a pool area will provide outdoor recreational areas for the residents with visual connection to and from the Reservation. Landscaping at the entrance court and along the front yard of the building further enhances Cambridgepark Drive by providing a landscape buffer along the building while creating an active pedestrian court at the building entrance. The planting along the front entry court consisting of perennials and seasonally planted annuals are designed to provide seasonal color, while vines along the building face provide additional texture to create an inviting front entry sequence. The front entry and streetscape planting provides large shade trees along the public sidewalk to define the public realm while a series of flowering shrubs and perennials enliven this sunny corridor.

III. Alewife Overlay District - Section 20.93.2

1. Special Permit Criteria

In issuing a Special Permit for any relief within the Alewife Overlay Districts, the special permit granting authority is to be guided by the purposes of the Overlay Districts (Section 20.92), the objectives and design guidelines for development contained in the Concord-Alewife Plan, and the general standards for issuance of a special permit (Section 10.43). The project is located within the Triangle of the Alewife Overlay District.

Purposes of the Alewife Overlay Districts:

(a) Encourage forms of development, mix of uses, and range of improvements that will facilitate and encourage walking, biking and transit use;

The project will introduce a significant component of residential use in an area that is emerging as a mixed use neighborhood. The frontage along Cambridgepark Drive will be improved for pedestrians and is a short walk to the Alewife "T" Station. The property also has direct access to the Fitchburg Cutoff Bike Path to the north, along with its associated bike trail network, and has storage space for 244 bicycles.

(b) Preserve and enhance the capacity to store floodwater, recharge ground water and manage the collection and disposal of storm water in ways that add to the quality and visual appeal of the built environment;

The development will meet all of the new, enhanced requirements for storm water management on the site as well as flood water storage.

(c) Minimize the negative impact of new development on the adjacent Cambridge Highlands residential neighborhood;

The site is well removed from the Highlands neighborhood thus no negative impacts are anticipated.

(d) Integrate the entire area through the creation of new pedestrian paths, roadways, green spaces and bridges that will facilitate movement within the several Districts;

The Project's adjacency to the Fitchburg Cutoff Bike Path and Alewife "T" Station will provide residents with convenient access to alternate modes of transportation.

(e) Introduce a significant component of residential living and support retail services to enhance the area's appeal for all persons who come to work, shop as well as live within the Districts;

The Project will create 244 new dwelling units which will create demand for the retail uses located in North Cambridge, and provide a housing alternative to employees of office tenants in North Cambridge who would prefer to walk to work.

(f) Create an identity and sense of place for all Alewife Districts that parallels the development of the historic urban centers that characterize much of Cambridge;

Replacing the existing industrial/warehouse structure on the site with a residential building containing 244 apartments will further advance the creation of a mixed use district. The Project is consistent with the pattern of development that has occurred throughout other light industrial areas in the City over the past several decades. The creation of residences with green area along the Alewife Brook Reservation will also serve to create a new identity and sense of place consistent with other successful, mixed-use neighborhoods in Cambridge.

2. Consistency with the Goals for the Triangle District in the Concord-Alewife Plan

The Project is consistent with the goals of the Concord-Alewife Plan for the Triangle District: encouraging more transit oriented development, encouraging housing close to the T station, and improving bicycle and pedestrian access to the Alewife Brook Reservation and existing bike and pedestrian trail networks.

The Building has been designed and is consistent with the Concord-Alewife Design Guidelines, providing interest and animation at the street edge. The massing of the building is setback from the property line 15 feet, with two four story portions that breakdown the length of the front yard into three zones. The two portions of the building that flank the entry courtyard feature glazed storefronts, bicycle storage, a landscaped buffer, elevator and stair entry doors, overhead resident balconies, and overlooking units with large windows. The central entry courtyard is set further back with ornamental landscaping and climbing vines, pedestrian walkways and seating areas, a bio-retention element, additional visitor bicycle parking, and a expansive two-story glazed entrance lobby, which visually connects Cambridgepark Drive to the Alewife Brook Reservation. Placement of public amenity spaces like a leasing office, reception areas, seating areas, and bicycle storage activate the ground level to further enhance the experience along Cambridgepark Drive.

The Concord-Alewife goals and guidelines for the Triangle District include:

1. *Break large blocks into smaller blocks, of size similar to those in surrounding Cambridge neighborhoods, to improve circulation and to be compatible with surrounding neighborhoods.*

The Project redevelops an existing industrial/warehouse site and turns it into a multi-family residential property, similar in scale to residential buildings found in the area, and will complement the surrounding commercial uses, keeping with the direction of development in the neighborhood, of a vibrant mixed-use community. The Building will activate Cambridgepark Drive with more pedestrian oriented activities, promoting use of the public transportation system and the bicycle trails and public green spaces in the area. The massing of the building breaks down the scale of the surrounding neighborhood, which is currently dominated by large scale commercial and office buildings. The Building's transparent wall treatments and open outdoor spaces on the north and south sides of the building create a pleasant experience along the Reservation side and an active street edge that maintains a pedestrian friendly experience along Cambridgepark Drive.

2. *Vary the design of individual buildings to create an architecturally diverse district.*

The Building incorporates varied setbacks and building heights along the street edge, the south facing front yard, and north side of the building facing the Reservation. The building will create interest by varying the massing and the colors and fenestrations of the façade will be carefully considered based on adjacent uses and views, so as to reinforce the pedestrian experience and help the building integrate with its surroundings.

3. *Street-level facades should include active uses such as frequent residential entrances, with setbacks for stoops and porches; neighborhood serving retail including shops, restaurants, cafes; services for the public or for commercial offices such as fitness centers, cafeterias, day care centers; community spaces such as exhibit or meeting spaces; and commercial lobbies and front entrances.*

The site and ground floor of the building have been designed to include open landscaped areas with benches between the sidewalk and the building, an entrance lobby, leasing office, cyber café, bicycle parking, and multiple entrances and access from the lobby, elevators, and stairs, to activate the street as much as possible. It also provides a combination of active and quiet outdoor spaces with a variety of planting, native and ornamental, that enhances the environment. The ground level parking is not visible from the street, with only the two vehicular entrances hinting that there is parking on either side of the transparent two story glazed lobby, and is screened behind the solid and glazed perimeter wall and bicycle storage areas fronting the street.

4. *Encourage awnings/canopies to provide shelter and enliven ground-floor facades.*

A recessed two story lobby entrance at the front of the building features a continuous canopy that identifies the main entrance of the building and enhances the pedestrian experience of the space. Secondary entrances to bicycle storage areas along Cambridgepark Drive will also be provided with canopies for resident shelter.

5. *Design residential buildings with individual units and front doors facing street, including row-house units on the lower levels of multifamily residences. Create a pedestrian-friendly environment along Cambridgepark Drive.*

The Project will take advantage of it's proximatey to the Alewife "T" Station and create a pedestrian-friendly environment along Cambridgepark Drive by encouraging residents to use the pedestrian and bicycle friendly amenities of the Alewife Brook Reservation by way of access to the Fitchburg Cutoff Bike Path directly adjacent to the property. The design of the residential building will include

connecting paths to bicycle storage and other resident oriented activities.

6. Encourage sustainable and green building design and site planning.

Energy efficiency and environmental sensitivity will be an integral feature of the Project, by employing Low Impact Development (LID) principals and practices into the overall stormwater management design, by incorporating sustainable building strategies to achieve a LEED Silver standard meeting the United States Green Building Council's LEED NC rating system, and by meeting the requirements of the stretch code.

7. Use low-impact-development principals in building and site design as a way to meet city, state, and federal stormwater requirements.

The Project employs Low Impact Development (LID) and conventional stormwater management practices to control rates of stormwater runoff and to improve water quality. The project includes a natural landscaped courtyard between the lobby and Alewife Brook Reservation, perimeter landscaping and an emergency access road with porous surfacing to reduce the amount of impervious ground cover at the site; an upper courtyard level which functions as a green roof; a bioretention area and an underground stormwater detention area.

8. Use site design that preserves future rights-of-way identified in the Circulation Concept Plan.

The project is consistent with the Circulation Concept Plan. Due to its location, the Project does not present an opportunity to preserve right-of-way for future crossing of the railroad tracks to connect the Triangle and Quadrangle.

9. Improve existing streets to meet City standards, including streetscape improvements.

The Project will improve the existing streetscape by providing at-grade front yard landscaping along the entire length of the building and it's entry courtyard, and improve existing streets to meet City standards, including replacing city streets trees along Cambridgepark Drive.

10. Strengthen bicycle and pedestrian links to adjacent areas. Provide links that strengthen physical and visual connections to open space resources.

The Project will strengthen pedestrian and bicycle links to the Alewife Brook Reservation by way of increased utilization. Bicycle storage areas and a repair facility will be provided at the ground level of the residential building. The two story glazed lobby will provide a visually connection from Cambridgepark Drive to Alewife Brook Reservation.

11. Screen service areas from Cambridgepark Drive.

The residential building will screen service areas from Cambridgepark Drive. A transparent two story entrance lobby, bicycle storage, and associated storefront treatment and landscaping features have been placed along the street edge to keep building services from view. A loading dock to accommodate trash, move-in, and delivery service is accessed by a perimeter road and is hidden from Cambridgepark Drive.

12. Parking Below grade is preferred. If above grade parking is to be provided, design it so it is not visible from nearby residential neighborhoods, from public streets, or from pathways. Line above-grade structured parking with active uses (shops, cafes, lobbies) along important public ways; use parking structures to provide visual and acoustical screening.

The site's location in a flood plain precludes below-grade parking. At-grade parking is provided under the residential building and is designed so it is not visible from the neighboring properties, from public streets, or from pathways. The at-grade parking facility is fronted with an active lobby and bicycle storage and provides a visual and acoustical buffer with a variation of storefront, landscaping, and architectural screening.

13. Design and locate lighting and signage to support the district's pedestrian-friendly quality.

The lighting will be designed to provide a safe and friendly quality to the district, will minimize light spilling onto adjacent properties, and will improve the street lighting along Cambridgepark Drive. All building entrances and facades, and the landscaping in the building entry courtyard, will include lighting that will enhance the nighttime streetscape and create a pedestrian friendly environment.

IV. Flood Plain Overlay District - Section 20.70

According to the FEMA Flood Insurance Rate Map, Community Panel 25017C0419E (effective June 4, 2010), portions of the site fall within Zone AE, a "special flood hazard area subject to inundation by the 1% annual chance flood with base flood elevations determined" (referred to herein as "the 100-year floodplain"). A review of the Alewife Brook/Little River Flood Profile published in the June 4, 2010 Flood Insurance Study prepared by FEMA, indicates that the elevation of the 100-year floodplain is 6.8 feet (North American Vertical Datum 1988, NAVD 88).

To determine the extent of floodplain at the site, survey data gathered from an on-the-ground topographic survey was used, in lieu of the less accurate aerial survey data utilized by FEMA in the preparation of Flood Insurance Rate Maps. Elevation 6.8 feet (NAVD 88) equals elevation 18.46 feet on the City of Cambridge datum upon which the topographic survey of the site is based.

Site grading has been designed so that there is no net loss in the site's capacity to store floodwaters and subsequently no increase in 100-year flood depth. Under existing conditions, the site provides storage for the 100-year flood from the site's lowest ground elevation (17.28 feet) to the 100-year flood elevation (18.46 feet). At each one-foot elevation increment, the proposed site conditions will provide as much flood storage capacity as existing conditions. A comparison of existing and proposed flood storage volumes is tabulated below.

Table 1. Comparison of existing and proposed 100-year flood storage capacity.

Elevation (feet)	Existing Storage Capacity (cubic feet, CF)	Proposed Storage Capacity (CF)
17.28 to 18.28	10,089	10,258
18.28 to 18.46	4,248	4,447

The 100-year floodplain is considered Bordering Land Subject to Flooding (BLSF), an area jurisdictional under the Massachusetts Wetlands Protection regulations. The regulation's BLSF performance standards (310 CMR 10.57(4)) require that there be no net loss in the site's flood storage capacity and that the 100-year flood level not be increased. The Notice of Intent, on file with the Cambridge Conservation Commission, is signed by a Professional Engineer and states that these performance standards are met.

V. Reduction of Required Parking (Section 6.35.1)

Parking for 232 automobiles will be located in two garages at the ground floor of the building. This garage will provide .95 spaces per dwelling unit, which is slightly less than the one parking space per dwelling unit required in the Zoning Ordinance.

Parking for 244 bicycles will be provided in the two garages. The project is located within 500 yards of the Alewife Station and thus meets the criteria of Section 6.35.1 for the requested relief. Moreover, if the parking garages were expanded to allow for the twelve (12) additional parking spaces necessary to meet the one space per dwelling unit requirement, the size of the on-grade courtyard would need to be significantly reduced. Section 6.35.1 favors the parking reduction requested where, as in this case, the impact of the parking would adversely affect the physical environment of the lot by reducing the amount of green space.

Based on parking space demands at comparable properties in Cambridge with convenient access to public transit and bicycle path networks, there should be ample parking to accommodate tenants and visitors.

VI. Sewer Service Infrastructure Narrative

The project will generate more wastewater flow than the industrial facility which currently operates at the site, requiring the project proponent to mitigate inflow/infiltration (I/I) into the existing sewer system and/or to provide on-site wastewater storage. For this project, an underground wastewater storage tank is proposed to alleviate impacts on the City sewer system. The tank will allow wastewater to be retained on-site during times when the municipal system is near capacity (e.g. during daily periods of peak wastewater flow (approximately 5 am to 10 am and 5 pm to 10 pm), or during rainfall events when stormwater flows inundate the City's combined sewers).

According to the DPW's Wastewater and Stormwater Management Guidance document, the wastewater storage tank must be sized to store flow from the property for a period of eight hours multiplied by a storage factor of 1.5. Per 310 CMR 15.203, wastewater flow for residential uses is based upon 110 gallons per day (gpd) per bedroom. As tabulated below, the proposed building will have a total of 336 bedrooms , resulting in an anticipated wastewater flow of 36,960 gpd.

UNIT TYPE	NO.	BEDROOMS
Studio Units	44	44
1 Bedroom Units	104	104
1+ Bedroom Units	13	13
2 Bedroom Units	74	148
3 Bedroom Units	9	27
TOTAL BEDROOMS		336

For this project, a wastewater storage tank with a capacity of at least 18,500 gallons will be provided in order to meet the City's storage requirements* . The tank will be drained by a pump system discharging to the municipal sewer main in Cambridgepark Drive. Prior to construction, the Applicant will be coordinating with the DPW to determine design requirements for the pump controls and other elements of the system.

*Eight hours of flow, or 1/3 of the daily flow, is approximately 12,209 gallons. Multiplying 12,209 gallons by a safety factor of 1.5 yields a required tank storage capacity of 18,313 gallons.

VII. Water Service Infrastructure Narrative

Domestic water demand for the project will approximate the daily wastewater flow for the project. Per 310 CMR 15.203, wastewater flow for residential uses is based upon 110 gallons per day (gpd) per bedroom. As tabulated below, the proposed building will have a total of 336 bedrooms, resulting in an anticipated domestic water flow of 36,960 gpd.

UNIT TYPE	NO.	BEDROOMS
Studio Units	44	44
1 Bedroom Units	104	104
1+ Bedroom Units	13	13
2 Bedroom Units	74	148
3 Bedroom Units	9	27
TOTAL BEDROOMS		336

Based on discussions with the Cambridge Water Department, water to the site is provided by a 10" main in Cambridgepark Drive that is in poor condition. Prior to construction, the project's plumbing and fire protection consultant will coordinate with the Water Department and will perform hydrant flow tests at Cambridgepark Drive to determine if the municipal water main is able to provide adequate flow and pressure for the building's sprinkler system. Once the data have been reviewed, the Applicant will coordinate with the Water Department to determine if the project will necessitate upgrading portions of the existing main or other mitigation measures.

VIII. Noise Mitigation Narrative

The Project shall conform to the requirements of the Cambridge Noise Ordinance (Title 8-HEALTH AND SAFETY, Chapter 8.16 -NOISE CONTROL).

The Project consists of residential uses located in a mixed-use area, and careful consideration will be given to potential exposure of the residents to any noise which causes or results in a noise level, measured at any lot line, in excess of the levels indicated in subsection E of the Cambridge Noise Ordinance. An analysis of the building wall and window assemblies will be performed by an acoustical engineer to ensure they meet the area noise standards.

Due to the residential use of the Project, noise disturbances to abutting properties are not anticipated. All rooftop equipment for the building will be designed to mitigate any noise from transmitting into the residential units below by locating them over the corridors.

The Project will conform to all local, state and federal requirements for controlling noise emitted from the site during construction.

IX. Leadership in Energy and Environmental Design (LEED) Narrative

The U.S. Green Building Council (USGBC) has developed several LEED rating systems since its inception, almost 20 years ago, in an effort to provide a standardized system for defining and measuring sustainable building practices.

There are many LEED rating systems available. As technology and innovation in the building industry continue to advance, the USGBC has developed and refined several rating systems specifically designed for various building types. Due to the size and use of 165 Cambridgepark Drive, it is our recommendation to pursue LEED for New Construction to meet the sustainability requirements of the Cambridge Zoning Code.

LEED for New Construction rates the sustainability and performance of a building in five base categories with two additional categories allowing a project to earn bonus points for innovation in design and regional priority credits. The five base categories of this LEED path are listed as follows:

1. Sustainable Sites- this section rates a project on environmental issues relating to the site, landscape and hardscape.

2. Water Efficiency- this section rates a project based on efficient water use. Projects are awarded for conserving water and reducing the waste of potable water.

3. Energy and Atmosphere- this section relates to heating, cooling, ventilation, refrigerants and lighting. Projects are awarded for reducing energy consumption required for building operation and therefore, reducing greenhouse gas emissions and the negative environmental effects derived from burning fossil fuels.

4. Materials and Resources-this section rates projects on waste reduction and awards projects that specify materials and/or building components that are re-used, reclaimed or contain recycled content.

5. Indoor Environmental Quality- this section awards projects for creating healthy indoor environments that promote occupant control of lighting, heating and cooling to enhance building system efficiencies.

The checklist for LEED for New Construction identifies 110 possible points, ranging in LEED classifications from Certified to Platinum as follows:

- Certified = 40-49 points
- Silver = 50-59 points
- Gold = 60-79 points
- Platinum = 80-110 points

Since we need to apply for a special permit per Article 19.20 (change of use), and since the Project is over 25,000 s.f., we are required to design in accordance with Article 22.0. Section 22.23 requires construction of 50,000 square feet or more of gross floor area to meet the requirements of the most current applicable LEED building rating system at the level 'Silver' or better.

The following evaluation is preliminary and is subject to change as the design progresses from the conceptual phase into design development. Many credits are likely attainable and others are not feasible for this project, due to either site constraints or cost implications. Specific credits used to meet the requirement of LEED Silver, or better, will evolve with the design. If credits are later determined to be unachievable for this project, other credits will be used to meet the requirement. Following is our preliminary assessment identifying how we intend to meet the requirements of LEED Silver (see also the LEED checklist, attached):

1. Sustainable Sites (Max. 26 points) Possible Credits:

- SScr.2- The project site is located on a previously developed site and in a densely populated area. There are many basic services within walking distance to the project site.
- SScr4.1- The project is located in close proximity (0 .3 miles) to Alewife Station, which will reduce the demand for automobile use.
- SScr4.2- Bike storage will be provided for more than 15% of building occupants, currently bike storage has been provided for each unit.
- SScr4.3- Implementation of a low-emitting or fuel-efficient vehicle-sharing program is under consideration.
- SScr4.4- Parking has been sized to meet (without exceeding) zoning requirements, which require one parking spot per dwelling unit, totaling 230 parking spots.
- SScr6.1- Surface paving covered most of the previous development. The project is providing more permeable cover than previous development by introducing permeable paving and landscaped courtyards.
- SScr6.2- The project will reduce the volume of storm water runoff by incorporating a bio-retention area and permeable cover where feasible.
- SScr7.1- All of the parking provided is located under the building, which will qualify the project for an Innovation in Design credit for exemplary performance.
- SScr7.2- The project will reduce solar heat gain by specifying roofing materials to render an SRI index of at least 78. The project is also incorporating a green roof which will reduce solar generated cooling loads.

Not Feasible:
- SScr1- The site is located within 100' of wetlands.
- SScr3- The site has not been documented as a Brownfield.
- SScr5.2- The site has very limited open space available. Exceeding local zoning requirements for open space by 25% is not likely.

2. Water Efficiency (Max. 10 points) Possible Credits:

- WEcr1- The project will utilize an automatic irrigation system to reduce water consumption for irrigation.
- WEcr3- The project will reduce water consumption by at least 30% by utilizing low-flow and high-efficiency fixtures.

Not Feasible:
- WEcr2- Innovative Wastewater Technologies

3. Energy and Atmosphere (Max. 35 points) Possible Credits:

- EAcr1- A whole building energy model complying with the Cambridge Stretch Energy Code will demonstrate improvement in the building performance.
- EAcr2- Implementation of Enhanced Commissioning to provide third party review of building systems.
- EAcr5- Implementation of a measurement and verification plan showing building energy consumption over time.

Not Feasible:
- EAcr2- On Site-Renewable Energy

4. Materials and Resources (Max. 14 points) Possible Credits:

- MRcr2- Construction Waste Management- Divert at least 50% of construction demo debris from landfills.
- MRcr4- Recycled Content- Specify materials with recycled content
- MRcr5- Specify local materials where possible.
- MRcr7- Specify wood based materials certified in accordance with the FSC's principles and criteria.

Not Feasible:
- MRcr1- It is not feasible for this project to re-use existing building components.
- MRcr3- It is not feasible for this project to reuse the required percentage of salvaged materials.

5. Indoor Environmental Quality (Max. 15 points) Possible Credits:

- IEQcr1- Install permanent CO2 monitoring systems within naturally ventilated spaces.
- IEQcr3- Implement an indoor air quality plan for the construction phase to reduce indoor air quality problems.
- IEQcr4- Specify low emitting materials and products with no added urea-formaldehyde resins.
- IEQcr6- Each dwelling unit will have individual lighting controls. A lighting control system will be provided for common spaces.
- IEQcr7.1- Meet ASHRAE Standard 55-2004.
- IEQcr8- Regularly occupied spaces of the building have direct access to day lighting and views.

Not Feasible:
- IEQcr7.2- Residential projects are not eligible for this credit.

6. Innovation in Design (bonus category, Max. 6 points) Possible Credits:

- IDcr1.1- Exemplary performance of SScr7.1 (all parking located under cover).
- IDcr2- LEED Accredited Professional

7. Regional Priority Credits (bonus category, Max. 4 points)
Not Feasible:

- Based on the project location, there are two credits available for regional priority credits: EAcr2 (1% renewable Energy) and MRcr1.1 (building reuse = 55%). Unless credits EAcr2 (On-Site Renewable Energy) and MRcr1.1 (Building Reuse) are met, these regional priority credits are not achievable.

The above narrative identifies how we intend to meet the Green Building requirements of the Cambridge Zoning Ordinance. The required goal for this project is to meet the requirements of LEED Silver, or 50 points, at a minimum. As the design continues to develop, specific credits used to achieve the Silver rating will continue to evolve. Based on our preliminary review of LEED NC and our current design, we are confident that we will be able to meet the requirements of LEED Silver.

LEED 2009 for New Construction and Major Renovations

Project Checklist

165 Cambridgepark Drive - Hines Development

10 August, 2012

Sustainable Sites — Possible Points: 26

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
		1	Credit 1	Site Selection	1
	5		Credit 2	Development Density and Community Connectivity	5
		1	Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
	3		Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
		1	Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
	1		Credit 6.2	Stormwater Design—Quality Control	1
	1		Credit 7.1	Heat Island Effect—Non-roof	1
	1		Credit 7.2	Heat Island Effect—Roof	1
		1	Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 10

Y					
Y			Prereq 1	Water Use Reduction—20% Reduction	
	2		Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
2	1	1	Credit 3	Water Use Reduction	2 to 4

Energy and Atmosphere — Possible Points: 35

Y					
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
4	2		Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
	2		Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
	1	2	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

Materials and Resources — Possible Points: 14

Y					
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
	1		Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Materials and Resources, Continued

Y	?	N			
	1	1	Credit 4	Recycled Content	1 to 2
	1	1	Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
	1		Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 15

Y					
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
	1		Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
	1		Credit 3.1	Construction IAQ Management Plan—During Construction	1
	1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		1	Credit 5	Indoor Chemical and Pollutant Source Control	1
	1		Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
			Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
	1		Credit 8.2	Daylight and Views—Views	1

Innovation and Design Process — Possible Points: 6

1			Credit 1.1	Innovation in Design: Specific Title	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
			Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

Regional Priority Credits — Possible Points: 4

			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

24	29	32

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

DiMella Shaffer
281 Summer Street Tel 617.426.5004
Boston, MA 02210 Fax 617.426.0046 www.dimellashaffer.com

LEED AFFIDAVIT

Cambridge Community Development Department
344 Broadway
Cambridge, MA. 02139

To the City of Cambridge Planning Board:

In accordance with Section 22 of the City of Cambridge Zoning Ordinance, I, Sarah Johnson, LEED Accredited Professional, hereby certify that to the best of my knowledge the proposed residential development located at 165 Cambridgepark Drive is on track to meet the green building requirements of the City of Cambridge and to achieve a LEED rating of Silver with a minimum of 50 points as indicated on the attached LEED 2009 Checklist dated August 10, 2012. The certification is based on the LEED for New Construction rating system.

Sarah Johnson
Print Name

Sarah Johnson 08.10.12
Signature/ Date

10096998
GBCI #

DiMella Shaffer
Company

281 Summer St., Boston MA. 02210
Address

617.426.5004
Phone

CITY OF CAMBRIDGE
Traffic, Parking and Transportation
344 Broadway
Cambridge, Massachusetts 02139

www.cambridgema.gov/traffic

Susan E. Clippinger, Director
Brad Gerratt, Deputy Director

Phone: (617) 349-4700
Fax: (617) 349-4747

June 21, 2012

Mr. Scott Thornton
Vanasse and Associates, Inc.
10 New England Business Center Drive
Suite 314
Andover, MA 01810

RE: 165 Cambridgepark Drive

Dear Scott,

We have reviewed your Traffic Impact Study (TIS) dated June, 2012 for 165 Cambridgepark Drive residential project and based on staff review we certify the TIS as complete and reliable.

Please call Adam Shulman at 617-349-4745 if you have any questions.

Sincerely,

Susan E. Clippinger
Director

cc: Adam Shulman, TPT
Brian Murphy, CDD
Stuart Dash, CDD
Liza Paden, CDD
Susanne Rasmussen, CDD

Vanasse & Associates, Inc.
Transportation Engineers & Planners

10 New England Business Center Drive
Suite 314
Andover, MA 01810-1066
Office 978-474-8800
Fax 978-688-6508

Ref: 6149

August 14, 2012

Ms. Susan Clippinger
Department of Traffic, Parking, and Transportation
City of Cambridge
344 Broadway
Cambridge, MA 02139

Re: Unit Count Change
165 Cambridgepark Drive

Dear Sue:

Vanasse & Associates, Inc. (VAI) has prepared a summary of changes to the Transportation Impact Study (TIS) analysis based on the proposed change at the above-referenced site from 230 units to 244 units. It is our opinion that, after accounting for adjustments to vehicle trip generation as part of the standard TIS methodology, the proposed additional 14 units will not have a noticeable effect on transportation facilities beyond that identified in the TIS. Accordingly, we have revised the TIS analyses as appropriate, and I have attached updated summary sheets as well. It is important to note that the additional units are expected to account for 3 additional vehicle trips during the weekday morning peak hour, and 4 additional vehicle trips during the weekday evening peak hour. As shown below in Table 1, no additional Indicators of Impact were exceeded by the additional trips.

Table 1
SPECIAL PERMIT CRITERIA COMPARISON
230 UNITS VS. 244 UNITS

	Number of Exceedences	
Category	Previous Development[a]	Current Development[b]
Project Vehicle Trip Generation	0	0
Vehicle Level-of-Service	1	1
Traffic on Residential Streets	0	0
Lane Queue	0	0
Pedestrian and Bicycle Facilities	8	8
TOTAL	9	9

[a]Based on 230 units.
[b]Based on 244 units.

The certified TIS remains a reasonable analysis of the Project's impact on area transportation facilities. Applying trips from the additional units result in Level-of-Service (LOS) remaining unchanged and overall intersection delay increases of less than one second. Attached as an Appendix are an updated trip generation table, the updated intersection and queue analyses sheets, and the updated TIS and Planning Board Criteria Performance Summary Sheets. Please feel free to contact me should you have any questions.

Sincerely,

VANASSE & ASSOCIATES, INC.

Scott W. Thornton, P.E.
Associate

Attachments

cc: A. Shulman – Cambridge TPT
D. Perry, J. Connor – Hines
J. Rafferty – Adams & Rafferty
FGH, File

TRIP GENERATION SUMMARY

Time Period/Direction	ITE Vehicle Trips	Person Trips[a]							Automobile Trips
	Residential Development[b]	Total[c]	Drive Alone Trips[d]	Ridesharing Trips[e]	Transit Trips[f]	Pedestrian Trips[g]	Bicycle Trips[h]	Other Trips[i]	Proposed Automobile Trips[j]
Average Weekday Daily:									
Entering	801	865	367	72	319	66	30	14	400
Exiting	801	865	367	72	319	66	30	14	400
Total	1,602	1,730	734	144	638	132	60	28	800
Weekday Morning Peak Hour:									
Entering	25	27	11	2	10	2	1	0	12
Exiting	98	106	45	9	39	8	4	2	49
Total	123	133	56	11	49	10	5	2	61
Weekday Evening Peak Hour:									
Entering	99	107	45	9	39	8	4	2	49
Exiting	53	57	24	5	21	4	1	1	26
Total	152	164	69	14	60	12	5	3	75

[a]Mode splits based on 2000 U.S. Census Data and Statistics for Tracts No. 3549 published by the CTPS and reanalyzed by the Cambridge Community Development Department, 2005.
[b]Based on ITE LUC 220, Residential Apartments and 244 units.
[c]Multiply ITE vehicle trips by vehicle occupancy ratio of 1.08 persons/vehicle per national census data.
[d]Assume 42 percent of total person trips.
[e]Assume 8 percent of total person trips.
[f]Assume 37 percent of total person trips.
[g]Assume 8 percent of total person trips.
[h]Assume 3 percent of total person trips.
[i]Include working at home, assume 2 percent of total person trips.
[j]Drive-alone plus rideshare person trips divided by vehicle occupancy ratio of 1.10 persons per vehicle per local census data.

CITY OF CAMBRIDGE

Special Permit Transportation Impact Study (TIS) — Summary Sheet

Planning Board Permit Number: _____

Project Name: 165 Cambridgepark Drive

Address: 165 Cambridgepark Drive

Owner/Developer Name: Hines, Inc.

Contact Person: Mr. David Perry

Contact Address: One International Place, 11th Floor

Boston, MA 02110

Contact Phone: 617-261-2260

ITE sq. ft.: 244 units

Zoning sq. ft.: _____

Land Use Type: Residential Apartments

Existing Parking Spaces: 36 Use: Employee

New Parking Spaces: 232 Use: Resident

Date of Parking Registration Approval: _____

Trip Generation:

	Daily	AM Peak Hour	PM Peak Hour
Total Trips	1,730	133	164
Vehicle	800	61	75
Transit	638	49	60
Pedestrian	132	10	13
Bicycle	60	5	5
Work at Home	28	2	3

Mode Split (person trips):

Vehicle: 50 %

Transit: 37 %

Pedestrian: 8 %

Bicycle: 3 %

Work at Home 2 %

Transportation Consultant: Vanasse and Associates, Inc.

Contact Name: Scott W. Thornton, P.E.

Phone: 978-474-8800

Date of Building Permit Approval: _____

CITY OF CAMBRIDGE — Planning Board Criteria Performance Summary

Special Permit Transportation Impact Study (TIS)

Planning Board Permit Number: _____

Project Name: 165 Cambridgepark Drive

Total Data Entries = 95 Total Number of Criteria Exceedences = 9

1. Project Vehicle Trip Generation

Weekday = 800 AM Peak Hour = 61 PM Peak Hour = 75 | Meets Criteria? [Y/N] | Y/Y/Y

2. Level of Service (LOS)

Intersection	A.M. Peak Hour			P.M. Peak Hour		
	Existing	With Project	Meets Criteria?	Existing	With Project	Meets Criteria?
Cambridgepark Drive at Alewife Brook Pkwy	C	C	Y	F	F	Y
Alewife Brook Pkwy at Rindge Avenue	D	E	N	F	F	Y
Route 2 WB Ramps at Alewife Brook Pkwy	F	F	Y	F	F	Y
Route 2 at Alewife Brook Pkwy	F	F	Y	F	F	Y
Route 2 EB Ramps at Alewife Brook Pkwy	B	B	Y	B	B	Y
Alewife Brook Pkwy at Alewife Station Exit Ramp	C	C	Y	C	C	Y
Cambridgepark Drive at Alewife Station Access Road	C	C	Y	D	D	Y
Alewife Station Access Road at Route 2 Off-Ramp and Alewife Station Exit Ramp	A	A	Y	A	A	Y
Site Driveway at Cambridgepark Drive	A	A	Y	A	A	Y

3. Traffic on Residential Streets – None.

4. Lane Queue

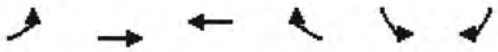
Intersection	A.M. Peak Hour			P.M. Peak Hour		
	Existing	With Project	Meets Criteria?	Existing	With Project	Meets Criteria?
Cambridgepark Drive at Alewife Brook Parkway:						
Cambridgepark Drive EB LT/RT	9	10	Y	23	23	Y
Alewife Brook Parkway NB LT	5	5	Y	1	2	Y
Alewife Brook Parkway NB TH	5	6	Y	34	34	Y
Alewife Brook Parkway SB TH	24	25	Y	18	18	Y
Alewife Brook Parkway SB RT	0	0	Y	0	0	Y
Alewife Brook Parkway at Rindge Avenue:						
Rindge Avenue WB LT	10	10	Y	5	5	Y
Rindge Avenue WB RT	7	7	Y	2	3	Y
Alewife Brook Parkway NB TH/RT	22	25	Y	50	50	Y
Alewife Brook Parkway SB TH	33	35	Y	43	43	Y
Route 2 Westbound Ramps at Alewife Brook Parkway (North Location):						
Route 2 WB TH	13	14	Y	47	47	Y
Alewife Brook Parkway SB RT	43	43	Y	42	42	Y
Route 2 at Alewife Brook Parkway:						
Route 2 EB LT	9	9	Y	9	9	Y
Alewife Station Off-Ramp WB TH	8	8	Y	19	19	Y
Alewife Brook Parkway SB LT	4	4	Y	7	7	Y
Alewife Brook Parkway NB LT	29	30	Y	49	49	Y
Route 2 Eastbound Ramps at Alewife Brook Parkway (South Location):						
Route 2 EB RT	10	10	Y	4	4	Y
Alewife Brook Parkway SB TH	1	1	Y	2	2	Y
Alewife Brook Parkway at Alewife Station Exit Ramp:						
Alewife Station Off-Ramp WB TH	5	5	Y	16	16	Y
Alewife Station Off-Ramp WB RT	0	0	Y	6	6	Y
Alewife Brook Parkway NB TH	2	2	Y	6	6	Y
Cambridgepark Drive at Alewife Station Access Road/Cambridgepark Place:						
Cambridgepark Drive EB LT/TH/RT	1	2	Y	6	6	Y
Cambridgepark Drive WB LT/TH	4	4	Y	2	3	Y
Cambridgepark Drive WB RT	0	0	Y	0	0	Y
Cambridgepark Place NB LT/TH/RT	1	1	Y	1	1	Y
Access Road SB LT	7	7	Y	10	10	Y
Access Road SB LT/TH/RT	5	5	Y	9	9	Y

5. Pedestrian and Bicycle Facilities (Pedestrian LOS)

Intersection	A.M. Peak Hour			P.M. Peak Hour		
	Existing PLOS	With Project	Meets Criteria?	Existing PLOS	With Project	Meets Criteria?
Alewife Brook Pky at Alewife Station Exit Ramp						
Crossing Alewife Station Access Road (East)	A	A	Y	A	A	Y
Alewife Brook Parkway at Cambridgepark Drive/ Rindge Avenue						
Crossing Rindge Avenue (East)	E	E	N	E	E	N
Crossing Alewife Brook Parkway (South)	E	E	N	E	E	N
Cambridgepark Drive at Cambridgepark Place/Alewife Station Access Road						
Crossing Cambridgepark Drive (East)	C	C	Y	C	C	Y
Crossing Cambridgepark Drive (West)	C	C	Y	C	C	Y
Crossing Cambridgepark Place (South)	D	D	Y	D	D	Y
Crossing Alewife Station Access Road (North)	D	D	Y	D	D	Y
Alewife Station Access Road at Route 2 Ramp						
Crossing Route 2 off-ramp (north)	F	F	N	F	F	N
Crossing Alewife Station Exit Ramp (east)	F	F	N	F	F	N
Crossing MBTA Garage driveway (west)	A	A	Y	A	A	Y

Pedestrian and Bicycle Facilities (Safe Pedestrian and Bicycle Facilities)

Adjacent Street or Public Right-of-Way	Sidewalks or Walkways Present?	Meets Criteria?	Bicycle Facilities or Right-of-Ways Present?	Meets Criteria?
Cambridgepark Drive	Yes	Y	Yes	Y



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	41	92	12	49	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.85	0.79	0.50	0.50	0.50
Hourly flow rate (vph)	0	48	116	24	98	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	140				177	128
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	140				177	128
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	100
cM capacity (veh/h)	1443				813	921

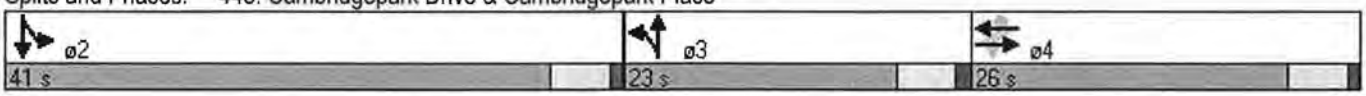
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	48	140	98
Volume Left	0	0	98
Volume Right	0	24	0
cSH	1443	1700	813
Volume to Capacity	0.00	0.08	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.0	0.0	10.0
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.0
Approach LOS			B

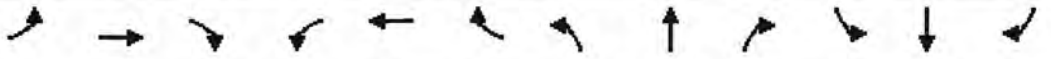
Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations		↔		↰	↱	↔	↰	↔
Volume (vph)	19	72	22	136	120	14	377	67
Lane Group Flow (vph)	0	127	0	208	158	52	359	345
Turn Type	Perm		Perm		Perm		Split	
Protected Phases		4		4		3	2	2
Permitted Phases	4		4		4			
Minimum Split (s)	26.0	26.0	26.0	26.0	26.0	23.0	31.0	31.0
Total Split (s)	26.0	26.0	26.0	26.0	26.0	23.0	41.0	41.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	25.6%	45.6%	45.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	2.0	-4.0
Total Lost Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	7.0	1.0
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		
v/c Ratio		0.29		0.44	0.30	0.12	0.56	0.47
Control Delay		27.9		30.2	6.0	14.1	26.2	16.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		27.9		30.2	6.0	14.1	26.2	16.6
Queue Length 50th (ft)		57		97	0	8	166	112
Queue Length 95th (ft)		81		133	27	29	227	165
Internal Link Dist (ft)		717		395		322		442
Turn Bay Length (ft)								
Base Capacity (vph)		431		477	527	450	641	735
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.29		0.44	0.30	0.12	0.56	0.47

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBWB, Start of Green
Natural Cycle: 80
Control Type: Pretimed

Splits and Phases: 443: Cambridgepark Drive & Cambridgepark Place





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↗		↕		↖	↕	
Volume (vph)	19	72	1	22	136	120	0	14	26	377	67	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	11	11	12	14	12	12	12	12
Total Lost time (s)		1.0			1.0	1.0		1.0		7.0	1.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		0.95	0.95	
Frpb, ped/bikes		1.00			1.00	0.97		0.97		1.00	0.96	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		1.00			1.00	0.85		0.91		1.00	0.93	
Flt Protected		0.99			0.99	1.00		1.00		0.95	0.99	
Satd. Flow (prot)		1666			1788	1486		1737		1698	1572	
Flt Permitted		0.92			0.95	1.00		1.00		0.95	0.99	
Satd. Flow (perm)		1554			1717	1486		1737		1698	1572	
Peak-hour factor, PHF	0.72	0.72	0.72	0.76	0.76	0.76	0.77	0.77	0.77	0.82	0.82	0.82
Adj. Flow (vph)	26	100	1	29	179	158	0	18	34	460	82	162
RTOR Reduction (vph)	0	0	0	0	0	114	0	26	0	0	36	0
Lane Group Flow (vph)	0	127	0	0	208	44	0	26	0	359	309	0
Confl. Peds. (#/hr)							31		23	23		31
Confl. Bikes (#/hr)			1			7			1			13
Heavy Vehicles (%)	9%	9%	9%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Turn Type	Perm			Perm		Perm	Split			Split		
Protected Phases		4			4		3	3		2	2	
Permitted Phases	4			4		4						
Actuated Green, G (s)		21.0			21.0	21.0		18.0		36.0	36.0	
Effective Green, g (s)		25.0			25.0	25.0		22.0		34.0	40.0	
Actuated g/C Ratio		0.28			0.28	0.28		0.24		0.38	0.44	
Clearance Time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Grp Cap (vph)		432			477	413		425		641	699	
v/s Ratio Prot								c0.02		c0.21	0.20	
v/s Ratio Perm		0.08			c0.12	0.03						
v/c Ratio		0.29			0.44	0.11		0.06		0.56	0.44	
Uniform Delay, d1		25.6			26.7	24.2		26.1		22.1	17.3	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.7			2.9	0.5		0.3		3.5	2.0	
Delay (s)		27.3			29.6	24.7		26.4		25.6	19.3	
Level of Service		C			C	C		C		C	B	
Approach Delay (s)		27.3			27.5			26.4			22.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR	ø3	ø4
Lane Configurations							
Volume (vph)	36	212	1378	1477	89		
Lane Group Flow (vph)	632	228	1482	1588	96		
Turn Type		D.P+P			Free		
Protected Phases	3 4	2	1 2	1		3	4
Permitted Phases		1			Free		
Detector Phase	3 4	2	1 2	1			
Switch Phase							
Minimum Initial (s)		4.0		6.0		5.0	4.0
Minimum Split (s)		10.0		11.0		10.0	29.0
Total Split (s)	49.0	19.0	71.0	52.0	0.0	20.0	29.0
Total Split (%)	40.8%	15.8%	59.2%	43.3%	0.0%	17%	24%
Yellow Time (s)		4.0		4.0		4.0	4.0
All-Red Time (s)		1.0		1.0		1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0		
Lead/Lag		Lag		Lead		Lead	Lag
Lead-Lag Optimize?		Yes		Yes		Yes	Yes
Recall Mode		Min		C-Max		None	Min
v/c Ratio	0.77	0.81	0.64	1.01	0.07		
Control Delay	28.8	33.5	7.1	57.9	0.1		
Queue Delay	1.7	9.1	32.0	53.7	0.0		
Total Delay	30.5	42.6	39.0	111.6	0.1		
Queue Length 50th (ft)	251	113	134	~645	0		
Queue Length 95th (ft)	228	m110	m141	#931	0		
Internal Link Dist (ft)	395		156	383			
Turn Bay Length (ft)					50		
Base Capacity (vph)	1003	283	2330	1565	1355		
Starvation Cap Reductn	0	34	931	0	0		
Spillback Cap Reductn	213	0	0	183	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.80	0.92	1.06	1.15	0.07		

Intersection Summary

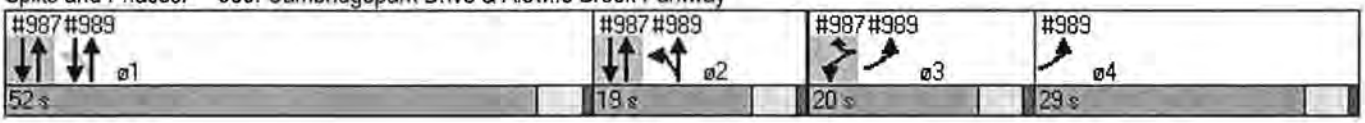
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 989: Cambridgepark Drive & Alewife Brook Parkway



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	36	438	212	1378	1477	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	12	11	8
Total Lost time (s)	4.0		4.0	4.0	4.0	3.0
Lane Util. Factor	*0.55		1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.86		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	1.00	1.00
Satd. Flow (prot)	2252		1770	3600	3200	1355
Flt Permitted	1.00		0.07	1.00	1.00	1.00
Satd. Flow (perm)	2252		127	3600	3200	1355
Peak-hour factor, PHF	0.75	0.75	0.93	0.93	0.93	0.93
Adj. Flow (vph)	48	584	228	1482	1588	96
RTOR Reduction (vph)	181	0	0	0	0	0
Lane Group Flow (vph)	451	0	228	1482	1588	96
Confl. Peds. (#/hr)	3					
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	2%	2%	2%	2%
Turn Type			D.P+P			Free
Protected Phases	3 4		2	1 2	1	
Permitted Phases			1			Free
Actuated Green, G (s)	33.3		71.7	76.7	57.7	120.0
Effective Green, g (s)	34.3		73.7	77.7	58.7	120.0
Actuated g/C Ratio	0.29		0.61	0.65	0.49	1.00
Clearance Time (s)			5.0		5.0	
Vehicle Extension (s)			3.0		3.0	
Lane Grp Cap (vph)	644		283	2331	1565	1355
v/s Ratio Prot	c0.20		c0.10	0.41	c0.50	
v/s Ratio Perm			0.39			0.07
v/c Ratio	0.70		0.81	0.64	1.01	0.07
Uniform Delay, d1	38.3		45.0	12.7	30.6	0.0
Progression Factor	1.00		0.74	0.49	1.00	1.00
Incremental Delay, d2	3.3		1.6	0.1	26.5	0.1
Delay (s)	41.6		35.1	6.3	57.1	0.1
Level of Service	D		D	A	E	A
Approach Delay (s)	41.6			10.2	53.9	
Approach LOS	D			B	D	

Intersection Summary			
HCM Average Control Delay	33.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	SBT	ø1	ø2	ø4
Lane Configurations							
Volume (vph)	241	433	1157	1915			
Lane Group Flow (vph)	262	471	1385	1974			
Turn Type		Prot					
Protected Phases	3	3	1 2	1 2	1	2	4
Permitted Phases							
Detector Phase	3	3	1 2	1 2			
Switch Phase							
Minimum Initial (s)	5.0	5.0			6.0	4.0	4.0
Minimum Split (s)	10.0	10.0			11.0	10.0	29.0
Total Split (s)	20.0	20.0	71.0	71.0	52.0	19.0	29.0
Total Split (%)	16.7%	16.7%	59.2%	59.2%	43%	16%	24%
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0			
Total Lost Time (s)	4.0	4.0	4.0	4.0			
Lead/Lag	Lead	Lead			Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None			C-Max	Min	Min
v/c Ratio	1.12	1.05	1.07	0.95			
Control Delay	143.7	72.8	67.5	20.9			
Queue Delay	0.0	14.9	17.6	72.5			
Total Delay	143.7	87.7	85.1	93.3			
Queue Length 50th (ft)	~235	~173	~621	857			
Queue Length 95th (ft)	#404	#384	#833	m#953			
Internal Link Dist (ft)	628		2121	156			
Turn Bay Length (ft)		100					
Base Capacity (vph)	233	450	1299	2071			
Starvation Cap Reductn	0	0	0	378			
Spillback Cap Reductn	0	17	50	0			
Storage Cap Reductn	0	0	0	0			
Reduced v/c Ratio	1.12	1.09	1.11	1.17			

Intersection Summary

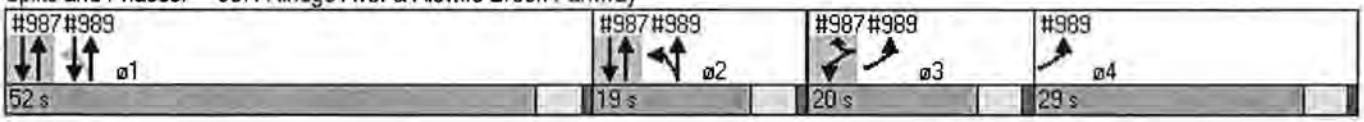
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

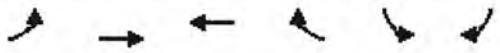
Splits and Phases: 987: Rindge Ave. & Alewife Brook Parkway



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	241	433	1157	89	0	1915
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1900
Lane Width	10	9	11	12	12	11
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.99			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1747	1350	2000			3200
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1747	1350	2000			3200
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.97	0.97
Adj. Flow (vph)	262	471	1286	99	0	1974
RTOR Reduction (vph)	0	270	4	0	0	0
Lane Group Flow (vph)	262	201	1381	0	0	1974
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	2%	2%	3%	3%	2%	2%
Turn Type		Prot				
Protected Phases	3	3	1 2			1 2
Permitted Phases						
Actuated Green, G (s)	15.0	15.0	76.7			76.7
Effective Green, g (s)	16.0	16.0	77.7			77.7
Actuated g/C Ratio	0.13	0.13	0.65			0.65
Clearance Time (s)	5.0	5.0				
Vehicle Extension (s)	3.0	3.0				
Lane Grp Cap (vph)	233	180	1295			2072
v/s Ratio Prot	c0.15	0.15	c0.69			0.62
v/s Ratio Perm						
v/c Ratio	1.12	1.12	1.07			0.95
Uniform Delay, d1	52.0	52.0	21.1			19.5
Progression Factor	1.00	1.00	1.00			0.67
Incremental Delay, d2	96.5	102.7	44.8			5.1
Delay (s)	148.5	154.7	66.0			18.1
Level of Service	F	F	E			B
Approach Delay (s)	152.5		66.0			18.1
Approach LOS	F		E			B

Intersection Summary			
HCM Average Control Delay	58.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	26.3
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	50	14	49	26	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.89	0.75	0.92	0.67	0.67
Hourly flow rate (vph)	0	56	19	53	39	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			776			
pX, platoon unblocked						
vC, conflicting volume	72				101	45
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	72				101	45
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1528				897	1024

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	56	72	39
Volume Left	0	0	39
Volume Right	0	53	0
cSH	1528	1700	897
Volume to Capacity	0.00	0.04	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

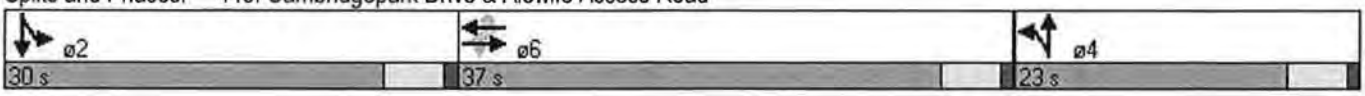
Intersection Summary			
Average Delay		2.1	
Intersection Capacity Utilization		13.8%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations		↔		↰	↱	↔	↖	↔
Volume (vph)	30	253	38	82	50	7	666	30
Lane Group Flow (vph)	0	362	0	162	68	72	404	396
Turn Type	Perm		Perm		Perm		Split	
Protected Phases		6		6		4	2	2
Permitted Phases	6		6		6			
Minimum Split (s)	26.0	26.0	26.0	26.0	26.0	23.0	30.0	30.0
Total Split (s)	37.0	37.0	37.0	37.0	37.0	23.0	30.0	30.0
Total Split (%)	41.1%	41.1%	41.1%	41.1%	41.1%	25.6%	33.3%	33.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	2.0	-4.0
Total Lost Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	7.0	1.0
Lead/Lag								
Lead-Lag Optimize?								
v/c Ratio		0.52		0.27	0.11	0.15	0.94	0.73
Control Delay		23.6		19.8	5.0	10.6	65.4	36.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		23.6		19.8	5.0	10.6	65.4	36.1
Queue Length 50th (ft)		151		61	0	5	236	206
Queue Length 95th (ft)		200		85	16	29	#416	315
Internal Link Dist (ft)		696		395		322		523
Turn Bay Length (ft)								
Base Capacity (vph)		697		597	633	465	430	543
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.52		0.27	0.11	0.15	0.94	0.73

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green
Natural Cycle: 80
Control Type: Pretimed
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 443: Cambridgepark Drive & Alewife Access Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	253	6	38	82	50	2	7	47	666	30	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	11	11	12	14	12	12	12	12
Total Lost time (s)		1.0			1.0	1.0		1.0		7.0	1.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		0.95	0.95	
Frpb, ped/bikes		1.00			1.00	0.98		0.96		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		1.00			1.00	0.85		0.89		1.00	0.99	
Flt Protected		0.99			0.98	1.00		1.00		0.95	0.96	
Satd. Flow (prot)		1803			1756	1480		1716		1681	1680	
Flt Permitted		0.96			0.84	1.00		1.00		0.95	0.96	
Satd. Flow (perm)		1740			1492	1480		1716		1681	1680	
Peak-hour factor, PHF	0.80	0.80	0.80	0.74	0.74	0.74	0.78	0.78	0.78	0.89	0.89	0.89
Adj. Flow (vph)	38	316	8	51	111	68	3	9	60	748	34	18
RTOR Reduction (vph)	0	1	0	0	0	41	0	45	0	0	2	0
Lane Group Flow (vph)	0	361	0	0	162	27	0	27	0	404	394	0
Confl. Peds. (#/hr)							20		26	26		20
Confl. Bikes (#/hr)			6			4						3
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	0%	0%	0%	2%	2%	2%
Turn Type	Perm			Perm		Perm	Split			Split		
Protected Phases		6			6		4	4		2	2	
Permitted Phases	6			6		6						
Actuated Green, G (s)		32.0			32.0	32.0		18.0		25.0	25.0	
Effective Green, g (s)		36.0			36.0	36.0		22.0		23.0	29.0	
Actuated g/C Ratio		0.40			0.40	0.40		0.24		0.26	0.32	
Clearance Time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Grp Cap (vph)		696			597	592		419		430	541	
v/s Ratio Prot								c0.02		c0.24	0.23	
v/s Ratio Perm		c0.21			0.11	0.02						
v/c Ratio		0.52			0.27	0.05		0.06		0.94	0.73	
Uniform Delay, d1		20.4			18.2	16.5		26.1		32.8	27.0	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		2.7			1.1	0.1		0.3		30.6	8.3	
Delay (s)		23.2			19.3	16.6		26.4		63.4	35.4	
Level of Service		C			B	B		C		E	D	
Approach Delay (s)		23.2			18.5			26.4			49.5	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	37.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	0	487	351	721	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.87	0.87
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	524	382	829	0
Pedestrians		1			288							
Lane Width (ft)		0.0			0.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked												
vC, conflicting volume	1855	1881	830	1880	1881	288	830			288		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1855	1881	830	1880	1881	288	830			288		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			70		
cM capacity (veh/h)	43	50	370	42	50	751	802			1268		

Direction, Lane #	NB 1	SB 1
Volume Total	524	1210
Volume Left	0	382
Volume Right	524	0
cSH	1700	1268
Volume to Capacity	0.31	0.30
Queue Length 95th (ft)	0	32
Control Delay (s)	0.0	6.5
Lane LOS		A
Approach Delay (s)	0.0	6.5
Approach LOS		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	102.7%	ICU Level of Service	G
Analysis Period (min)	15		

Lane Group	EBL	NBL	NBT	SBT	SBR	ø3	ø4
Lane Configurations							
Volume (vph)	400	141	1813	1174	62		
Lane Group Flow (vph)	1148	144	1850	1223	65		
Turn Type		D.P+P			Free		
Protected Phases	3 4	2	1 2	1		3	4
Permitted Phases		1			Free		
Detector Phase	3 4	2	1 2	1			
Switch Phase							
Minimum Initial (s)		4.0		6.0		5.0	4.0
Minimum Split (s)		10.0		11.0		10.0	29.0
Total Split (s)	58.0	10.0	62.0	52.0	0.0	29.0	29.0
Total Split (%)	48.3%	8.3%	51.7%	43.3%	0.0%	24%	24%
Yellow Time (s)		4.0		4.0		4.0	4.0
All-Red Time (s)		1.0		1.0		1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0		
Lead/Lag		Lag		Lead		Lead	Lag
Lead-Lag Optimize?		Yes		Yes		Yes	Yes
Recall Mode		Min		C-Max		None	Min
v/c Ratio	1.33	0.95	1.13	0.85	0.05		
Control Delay	183.2	42.2	74.5	39.6	0.1		
Queue Delay	203.7	1.3	279.3	0.8	0.0		
Total Delay	386.8	43.5	353.8	40.5	0.1		
Queue Length 50th (ft)	~570	55	~854	446	0		
Queue Length 95th (ft)	#705	m19	m126	542	0		
Internal Link Dist (ft)	395		156	383			
Turn Bay Length (ft)					50		
Base Capacity (vph)	864	152	1643	1440	1386		
Starvation Cap Reductn	0	1	586	0	0		
Spillback Cap Reductn	220	0	0	60	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	1.78	0.95	1.75	0.89	0.05		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 140
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 989: Cambridgepark Drive & Alewife Brook Parkway

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	400	656	141	1813	1174	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	12	11	8
Total Lost time (s)	4.0		4.0	4.0	4.0	3.0
Lane Util. Factor	0.97		1.00	0.95	0.95	1.00
Frt	0.91		1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1774		1787	3400	3600	1386
Flt Permitted	0.98		0.08	1.00	1.00	1.00
Satd. Flow (perm)	1774		157	3400	3600	1386
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.96	0.96
Adj. Flow (vph)	435	713	144	1850	1223	65
RTOR Reduction (vph)	66	0	0	0	0	0
Lane Group Flow (vph)	1082	0	144	1850	1223	65
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%
Turn Type			D.P+P			Free
Protected Phases	3 4		2	1 2	1	
Permitted Phases			1			Free
Actuated Green, G (s)	53.0		52.0	57.0	47.0	120.0
Effective Green, g (s)	54.0		54.0	58.0	48.0	120.0
Actuated g/C Ratio	0.45		0.45	0.48	0.40	1.00
Clearance Time (s)			5.0		5.0	
Vehicle Extension (s)			3.0		3.0	
Lane Grp Cap (vph)	798		152	1643	1440	1386
v/s Ratio Prot	c0.61		0.05	c0.54	0.34	
v/s Ratio Perm			0.38			0.05
v/c Ratio	1.36		0.95	1.13	0.85	0.05
Uniform Delay, d1	33.0		49.9	31.0	32.7	0.0
Progression Factor	1.00		0.59	0.44	1.00	1.00
Incremental Delay, d2	168.3		11.6	57.6	6.4	0.1
Delay (s)	201.3		41.3	71.1	39.1	0.1
Level of Service	F		D	E	D	A
Approach Delay (s)	201.3			68.9	37.2	
Approach LOS	F			E	D	

Intersection Summary			
HCM Average Control Delay	94.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	SBT	ø1	ø2	ø4
Lane Configurations							
Volume (vph)	162	417	1537	1830			
Lane Group Flow (vph)	176	453	1867	2056			
Turn Type		Prot					
Protected Phases	3	3	1 2	1 2	1	2	4
Permitted Phases							
Detector Phase	3	3	1 2	1 2			
Switch Phase							
Minimum Initial (s)	5.0	5.0			6.0	4.0	4.0
Minimum Split (s)	10.0	10.0			11.0	10.0	29.0
Total Split (s)	29.0	29.0	62.0	62.0	52.0	10.0	29.0
Total Split (%)	24.2%	24.2%	51.7%	51.7%	43%	8%	24%
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0			
Total Lost Time (s)	4.0	4.0	4.0	4.0			
Lead/Lag	Lead	Lead			Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None			C-Max	Min	Min
v/c Ratio	0.48	0.78	1.91	1.23			
Control Delay	47.0	21.3	437.0	128.9			
Queue Delay	0.0	14.6	60.3	44.1			
Total Delay	47.0	35.9	497.3	173.0			
Queue Length 50th (ft)	121	70	~1243	~1067			
Queue Length 95th (ft)	194	#217	#1391	m#992			
Internal Link Dist (ft)	628		2121	156			
Turn Bay Length (ft)		100					
Base Capacity (vph)	364	578	977	1670			
Starvation Cap Reductn	0	0	0	124			
Spillback Cap Reductn	0	114	64	0			
Storage Cap Reductn	0	0	0	0			
Reduced v/c Ratio	0.48	0.98	2.04	1.33			

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 140
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 987: Rindge Ave. & Alewife Brook Parkway

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	162	417	1537	255	0	1830
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	9	11	12	12	11
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	1.00	1.00	*0.90			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.98			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1747	1439	2000			3455
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1747	1439	2000			3455
Peak-hour factor, PHF	0.92	0.92	0.96	0.96	0.89	0.89
Adj. Flow (vph)	176	453	1601	266	0	2056
RTOR Reduction (vph)	0	279	10	0	0	0
Lane Group Flow (vph)	176	174	1857	0	0	2056
Confl. Bikes (#/hr)		2		6		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type		Prot				
Protected Phases	3	3	1 2			1 2
Permitted Phases						
Actuated Green, G (s)	24.0	24.0	57.0			57.0
Effective Green, g (s)	25.0	25.0	58.0			58.0
Actuated g/C Ratio	0.21	0.21	0.48			0.48
Clearance Time (s)	5.0	5.0				
Vehicle Extension (s)	3.0	3.0				
Lane Grp Cap (vph)	364	300	967			1670
v/s Ratio Prot	0.10	c0.12	c0.93			0.60
v/s Ratio Perm						
v/c Ratio	0.48	0.58	1.92			1.23
Uniform Delay, d1	41.8	42.8	31.0			31.0
Progression Factor	1.00	1.00	1.00			0.69
Incremental Delay, d2	1.0	2.9	417.9			105.7
Delay (s)	42.8	45.6	448.9			127.0
Level of Service	D	D	F			F
Approach Delay (s)	44.9		448.9			127.0
Approach LOS	D		F			F

Intersection Summary			
HCM Average Control Delay	247.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	37.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group