Volume ONE

FINAL ENVIRONMENTAL IMPACT STATEMENT

Red Line Extension Harvard Square to Arlington Heights

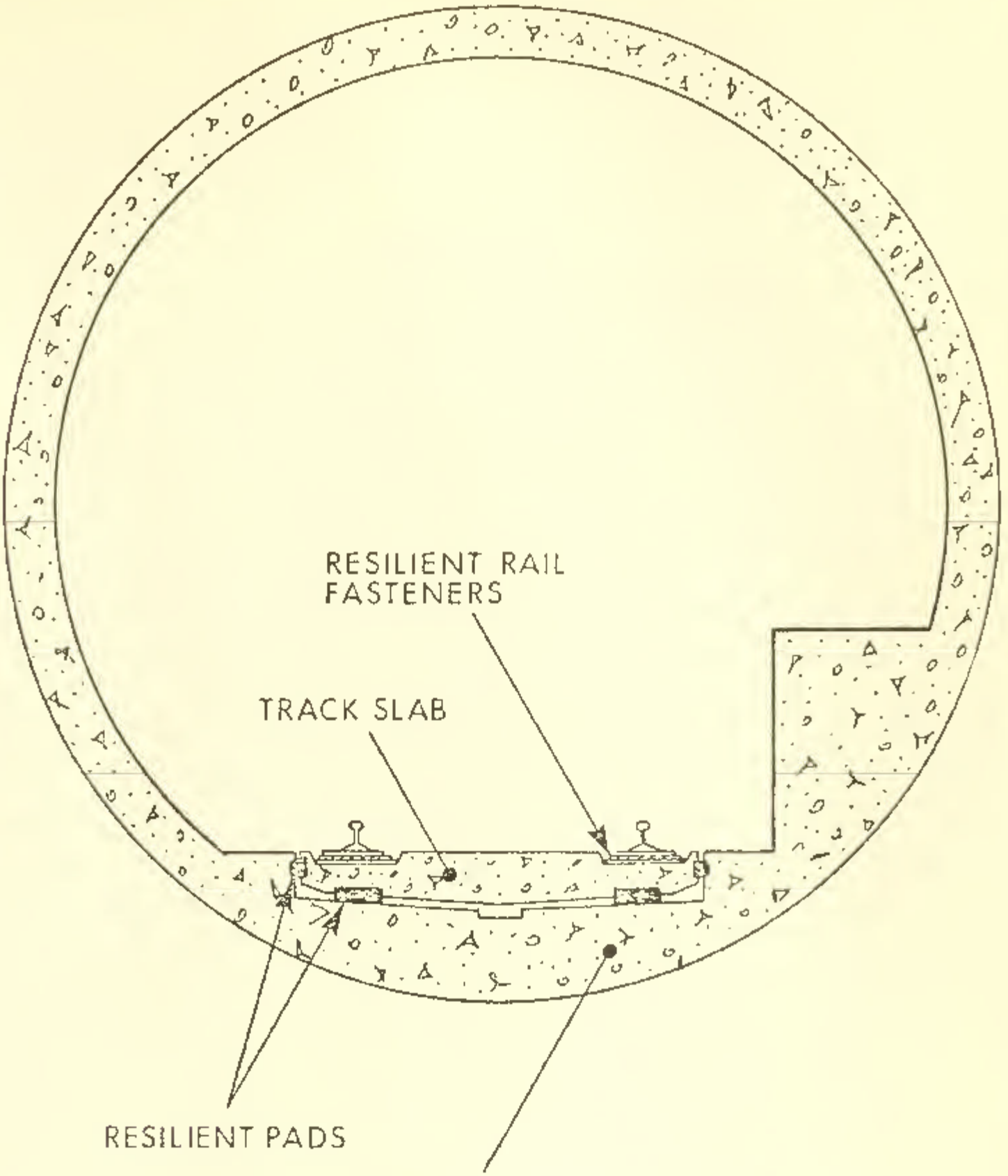
Boston, Massachusetts

U.M.T.A. Project Number

MA-23-9008

August 1977

U.S. Department of Transportation
Urban Mass Transportation Administration



RED LINE EXTENSION STUDY
Massachusetts Bay Transportation Authority

HARVARD SQUARE
FLOATING SLAB
TRACK BED
FIG III - 22

Chapter IV

HARVARD SQUARE TO PORTER SQUARE

Chapter IV

HARVARD SQUARE TO PORTER SQUARE

PROJECT DESCRIPTION

The alignment recommended for the Harvard Square-Porter Square Section of the proposed Red Line Extension consists of a 4,400-foot tunneled line segment and a station at Porter Square. Constructed primarily under Massachusetts Avenue, the segment would extend north from Harvard Square in a tunnel/deep bore (two 20-foot-diameter tubes) to the proposed location of the station below the commuter rail station in the Porter Square business district. The Porter Square station would be a deep station constructed by mining methods. Two ventilation and emergency shafts would be provided. The costs have been estimated at approximately $77,921,000 for the line segment and $44,640,000 for the station, for a combined cost of approximately $122,561,000.

The BTPR Study, which was conducted in 1973, suggested an alignment from Harvard Square to Porter Square but did not consider the Harvard Square Area. The alignment proposed in this report resulted from investigations to determine the optimum location for the new Harvard Square Station and, therefore, differs somewhat from that proposed by the BTPR. From about Waterhouse Street northward, however, the two alignments are quite similar.

Line Segment

From the Flagstaff Park end of the new Harvard Square Station, the extension would proceed northwardly on a slight "S" curve to about Everett Street. From that point until it reaches the Porter Square Station, the segment would be on a tangent to Lancaster Street. A slight "S" curve follows from this point to the Porter Station. The alignment crosses under Cambridge Common and North Little Common.

In Figure II-1 B & C, the centerline curves are shown. The actual curves of both the inbound and outbound tracks would, however, vary somewhat from this configuration.

At the Harvard Square Station, the center lines of the proposed inbound and outbound tracks are separated on the vertical profile and lie within 20 feet of each other horizontally. Proceeding north towards Porter Square, the horizontal distance between track center lines increase to 40 feet and tracks reach the same level below ground, just north of Flagstaff Park. From this point, the tracks descend at close to maximum allowable grade to enter rock as soon as possible. After entering rock the descending grade changes to minimum grade along the section leading to Porter Square Station.

A deep vertical alignment in rock was selected to avoid soft ground and mixed face soil conditions which would make tunnelling procedures difficult. Additional geotechnical investigation is planned to provide a basis for determining a final tunnel profile and avoiding the mixed face condition insofar as possible, while preserving the advantages of the deep alignment, i.e., reduce potential for damage to utilities, diminish impact of construction noise and minimize potential for settlement of nearby buildings.

Two ventilation and emergency shafts would be placed along the alignment between Harvard Square and Porter Square at approximately the following locations:

- Massachusetts Avenue, vicinity of Everett Street
- Massachusetts Avenue, vicinity of Garfield Street

An underground traction station is being considered for the area.

Station

The Porter Square Station would be the deepest station on the proposed Red Line Extension. The depth has been generated from the geotechnical criteria for rock excavation of a vaulted station section and the desire to maintain the tunnel excavation in rock from Porter to Davis Square. The station configuration has a split level center platform, 440' in length and 77' in width, with the outbound track 13'-6" below the inbound track elevation of 40.0', some 100' below the surface. The split level platform section allows a low vaulted side entry from the main escalators to the mezzanine, a section compatible with good rock excavation techniques.

The mezzanine would serve as the junction between the deep station platform and patron access from the MBTA Commuter Rail System and the surface headhouses at Porter Square. The mezzanine is located in plan between the MBTA Commuter

Rail line and Somerville Avenue approximately 40' below grade. This permits simple, direct escalator access to the commuter rail line and the surface. The mezzanine provides for the transition from the freely accessible public access of the station complex to the pay zone.

The mezzanine configuration allows for unpaid pedestrian connection under Massachusetts Avenue, a future headhouse connection under Somerville Avenue, and a new pay connection to the commuter rail. Provisions would be made to allow for a change in the commuter rail connection from the free zone to the paid zone of the mezzanine and thus allow a future free transfer between the Red Line and the commuter rail line. The mezzanine would also house, adjacent to the pay zone, public and employee rest rooms and associated program spaces related to the operation of the station.

Two street level entrances would provide pedestrian and bus transfer access to the station mezzanine from both the east and west sides of Massachusetts Avenue. The station entrances would be located so that the mezzanine could be reached without crossing Massachusetts Avenue with crossing to Somerville Avenue via a new surface pedestrian street crossing. Existing curb-side bus stops could be relocated in close proximity to the street entrances. Both street entrances would house two escalators and a stair.

The street entrance on the east side of Massachusetts Avenue located over the mezzanine would serve as the primary entry. A portion of the MBTA Railroad right-of-way would be decked to provide a public plaza giving access to the commuter rail line from the street and to the primary station entrance from the south. An elevator would provide barrier-free access from the plaza to the commuter rail line, and a second elevator would provide barrier-free access from the primary street entrance to the mezzanine and both levels of the station platform. The street entrance to the west of Massachusetts Avenue serves the local south-bound bus transfer and residents of the Upland Road and North Cambridge communities. The west side street entrance connected by tunnel to the mezzanine would provide for a vehicular-free pedestrian crossing of the avenue.

Access to the main station level from the paid zone of the mezzanine consists of three escalators and stairs. Two of the escalators would provide single directional movement for the 68 vertical foot rise with the third escalator providing movement in the peak direction and also serving as a replacement if one of the single directional escalators is out of service.

The station volume would continue approximately 50' beyond the station portals to accommodate mechanical equipment, the vent shaft to allow the dampering of the trains' "piston action", and emergency egress requirements. The chamber at the south end of the station will house emergency stairs, exhaust and supply mechanical equipment which will come to the surface behind the potential joint development site between the Commonwealth Lock Building and the MBTA Railroad right-of-way. The chamber at the north end of the station would also accommodate the air relief shaft required to reduce the "piston effect". This shaft would terminate in a surface grating in the parking lot of the Porter Square Shopping Center.

The existing commuter rail stop at Porter Square would be upgraded to accommodate the potentially significant transfer connection with the Red Line. As presently conceived, the station would be rebuilt as a center platform station of 550' in length with canopy cover for two train lengths. The rail would be lowered to provide the necessary clearances under the Massachusetts Avenue bridge to accommodate pentagraph equipped cars. A reversible escalator and a stair would provide access to the Red Line Station mezzanine while access to street level would be via a stair and elevator to the decked plaza.

Principal features of the proposed station are illustrated on Figures IV-3 and IV-4.

Right-of-Way

From the end of the proposed Harvard Square Station to the proposed Porter Square Station, the subway segment would be almost entirely within public right-of-way. The properties involved and the proposed project requirements are shown in Table IV-1.

Table IV-1

RIGHT-OF-WAY REQUIREMENTS
HARVARD SQUARE TO PORTER SQUARE

ADDRESS	TYPE	USE
1320-1324 Massachusetts Avenue	Commercial	Construction Easement
1326-1328 Massachusetts Avenue	Commercial	Construction Easement
1358-1362 Massachusetts Avenue	Commercial	Utility & Construction Easements
1350-1354 Massachusetts Avenue	Commercial	Utility & Construction Easements
1336-1346 Massachusetts Avenue	Commercial	Utility & Construction Easements
1372-1376 Massachusetts Avenue	Commercial	Construction Easement
1380-1392 Massachusetts Avenue	Commercial	Construction Easement
Harvard Yard	Institutional	Permanent, Utility & Construction Easements
Old Burying Ground	Historic	Construction Easement
1448-1454 Massachusetts Avenue	Commercial	Construction Easement
1416-1442 Massachusetts Avenue	Commercial	Construction Easement
1511 Massachusetts Avenue	Institutional	Partial Taking/ Construction Easement
Gannett House (Massachusetts Avenue)	Institutional	Partial Taking/ Construction Easement
Flagstaff Park	Public Park	Permanent & Construction Easements
Cambridge Common	Public Park	Permanent Easement
North Little Common	Public Park	Permanent Easement
1599 Massachusetts Avenue (Garage)	Institutional	Construction Easement
6-8 Everett Street (Garage)	Institutional	Construction Easement

Table IV-1 (continued)

ADDRESS	TYPE	USE
1601 Massachusetts Avenue (Garage)	Institutional	Partial Taking/ Construction Easement
1603 Massachusetts Avenue (Garage)	Institutional	Partial Taking/ Construction Easement
1699 Massachusetts Avenue (Midget Parking Lot)	Commercial	Partial Taking/Permanent & Construction Easements
1815-1843 Massachusetts Avenue (Sears)	Commercial	Partial Taking/Permanent, Construction & Utility Easements
1847-1853 Massachusetts Avenue (Commonwealth Lock)	Commercial	Permanent & Construction Easements
1855-1867 Massachusetts Avenue (Flag Store Group)	Commercial	Total taking of land and structures for station structures
835 Somerville Avenue (Professional Building)	Commercial	Total taking of land and structures for station structures
821-830 Somerville Avenue (Dodge Dealer)	Commercial	Permanent, Utility & Construction Easements
1-55 White Street (Porter Square Shopping Center)	Commercial	Partial Taking/Permanent, Utility & Construction Easements
1890-1906 Massachusetts Avenue (Corey Realty)	Commercial	Total Taking

Construction Considerations

Beginning at the northern end of the Harvard Square Station structure and continuing northerly under Massachusetts Avenue, shield driven, tunnel/deep bore method is anticipated to the interface of full face soft ground with rock, at a point south of Garfield Street. Based on present knowledge of the geology along the alignment, compressed air is not likely to be required.

Continuing to the North towards Porter Square from the rock/soft ground interface, there would be short segments of hand-mined tunnels to a point where the tunnels are under 10' of sound rock cover. From this point, the tunnels will be bored by Tunnel Boring Machine (TBM) or conventional methods through the Garfield Street Vent Shaft to a construction shaft just south of the Porter Square Station.

The location of a construction shaft just south of Porter Square Station is particularly desirable because of its proximity to the MBTA right-of-way. Railroad land could be made available for construction of an access road. Also, the railroad right-of-way could facilitate the supply of construction materials and disposal of excavated materials.

The Porter Square mezzanine and circulation to the station would be constructed by the cut-and-cover method except for a pedestrian tunnel under Massachusetts Avenue. This would be constructed by a combination of cut-and-cover and deep bore techniques. The main station platform volume would be constructed in rock by mining techniques with the relief shafts constructed using open surface excavation.

In addition to the actual station construction, some construction would be required to maintain existing services and structures. The Harvard Trust/Commonwealth Lock Building may require underpinning during the tunnel/deep bore operations.

Maintenance of vehicular traffic on Somerville Avenue, parking at Porter Square Shopping Center, and railroad operations along the

Fitchburg Division will be major factors during the construction period. Open construction work on Massachusetts Avenue should be minimal as the major station area would be east of the avenue. Traffic on Somerville Avenue could be maintained by temporary decking. It would also be necessary to provide support for the railroad tracks to allow uninterrupted rail operations.

The major utility requiring relocation or support within the excavation site is a 48-inch Metropolitan District Commission (MDC) water line along Somerville Avenue. Other utility lines in the immediate vicinity include a 16-inch MDC water line, a 12-inch gas line, one 17-inch by 21-inch sewer, an eight-inch sewer, a six-inch water main, and Cambridge Electric duct banks. Treatment of these utilities will require further study during the design phase of the project.

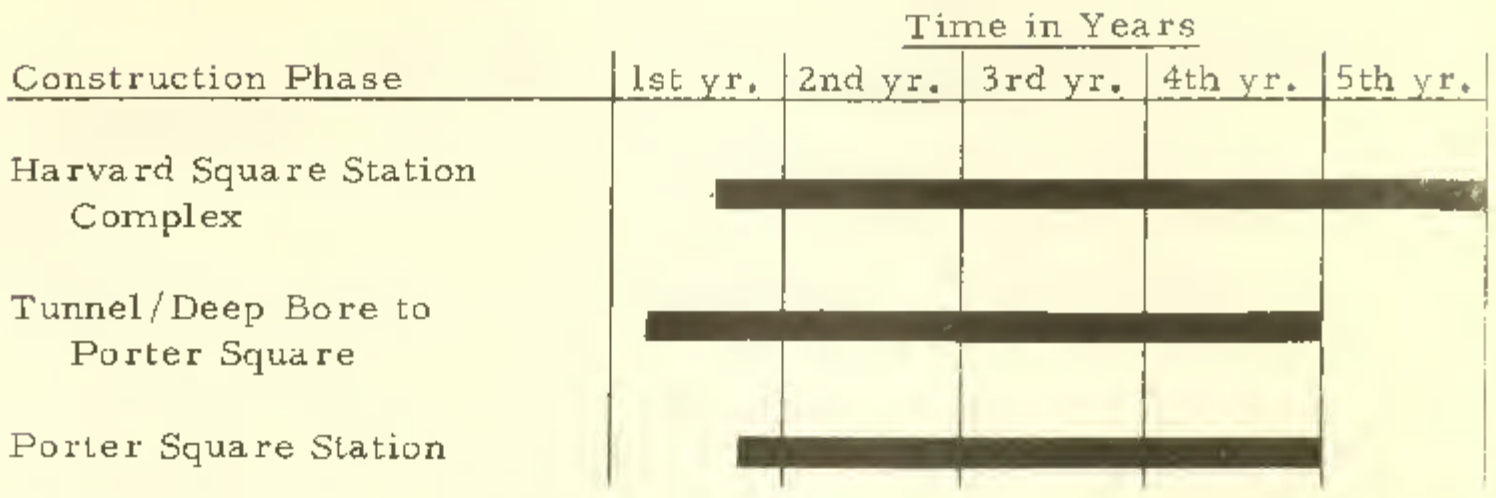
Along Massachusetts Avenue there are a number of utilities that would have to be considered. Of special concern are the effects of ground settlement on the 48-inch MDC water line, gas lines, and sewers.

Throughout the alignment, the groundwater table would be within the construction limits. Groundwater, in most areas, can be controlled by dewatering, but some recharging operations may be necessary. There is no indication that a compressible stratum exists below the bottom of the tunnel, nor does the void ratio of the granular material indicate that dewatering would cause a settlement problem. Other methods such as the grouting of appropriate soils and the construction of cutoff walls will be considered during the design stages.

The construction sequence that follows is based on the desirability of having various phases completed at appropriate times. For example, the tunnel/cut-and-cover work should be sufficiently completed to the interfaces of tunnel/deep bore segments to allow tunneling machines to be maneuvered.

Table IV-2

ESTIMATED CONSTRUCTION TIME



Costs

An itemized breakdown of estimated subway construction costs between Harvard Square and the Porter Square Station is presented below. For this segment, the estimate begins at the interface of tunnel/cut-and-cover and tunnel/deep bore construction near Harvard University's Hemenway Gym on Massachusetts Avenue and terminates at the North end of the Porter Square Station. The costs do not include project wide items such as floating slabs, trackwork, ventilation, electrification, signalization and communications. For these costs see Chapter II. The estimate is based on midpoint of construction costs.

Table IV-3

ESTIMATED CONSTRUCTION COSTS
HARVARD SQUARE TO PORTER SQUARE
(Does not include Project wide items)

Item		Cost	
Tunnel/Deep Bore to Porter Square			
MAC Code	Description	Amount	
15.13.20	Tunnel Structure	$59,242,000	
15.13.10.12	Utility Relocation	876,000	
15.10.00	Demolition	15,000	
15.13.00	Protection & Repair of Existing Structures	2,100,000	
			$62,233,000
15.06.10	Right-ofWay	1,890,000	
			1,890,000

Table IV-3 (continued)

15.08.01	Professional Services	3,111,000		
15.15.02	Field Inspection	1,920,500		
15.15.02	Force Account	622,500		
15.16.00	Project Administration	3,885,000		
			9,539,000	
	Subtotal			$73,662,000
32.00.00	Contingencies			6,224,000
	Total			$79,886,000

Porter Square Station

MAC Code	Description	Amount		
15.11.10	Station Structure	$33,935,000		
15.13.10.12	Utility Relocation	500,000		
15.13.10.11	Remove & Relocate RR Tracks	550,000		
15.13.00	Protection & Repair of Existing Structures	300,000		
15.10.00	Demolition	150,000		
			$35,435,000	
15.06.10	Right-of-Way	200,000		
31.00.00	Relocation	100,000		
			300,000	
15.08.01	Professional Services	2,480,000		
15.15.02	Field Inspection	1,096,000		
15.15.02	Force Account	689,000		
15.16.00	Project Administration	2,217,000		
			6,482,000	
	Subtotal			$ 42,217,000
32.00.00	Contingencies			3,544,000
	Total			$45,761,000
		Segment Total		$125,647,000

ALTERNATIVES

Line Segment Alternatives

The BTPR Red Book presented two construction alternatives--tunnel/cut-and-cover and tunnel/deep bore--for the proposed BTPR Alignment 3 along Massachusetts Avenue from Waterhouse Street to Porter Square. The tunnel/deep bore method was selected for this segment of the project. The various alternatives studied for the proposed Harvard Square Station area between Waterhouse Street and the existing Red Line have been discussed in Chapter III.

The cut-and-cover option along Massachusetts Avenue was developed in 1968. Although this option would save an estimated $10 million in construction costs, it met with significant community opposition. The disruption of Massachusetts Avenue traffic and interference with activities in adjacent business and residential areas were the principal concerns. Based on this opposition, the cut-and-cover alternative was eliminated. A Cambridge City Council, Harvard-Alewife resolution dated October 26, 1970 states in part:

"...AND BE IT FURTHER RESOLVED that this City Council hereby affirms a strong commitment to support the Massachusetts Bay Transportation Authority on a continuing basis in a joint effort to plan and construct a deep-bore Harvard-Alewife extension at the earliest possible date."

This feeling was reaffirmed by Council resolutions adopted April 30, 1973 and June 23, 1975, supporting as its official policy the extension of the Red Line from Harvard Square to Route 128 via Porter Square in Cambridge and Davis Square in Somerville. (See Appendix F for copies of these resolutions.)

Station Alternatives

The BTPR Study developed three alternative locations for the proposed Porter Square Station. These alternatives, designated as A, B and C, are illustrated in Figure I-3. After a review and analysis, a 1973 Cambridge City Council resolution recommended the selection of the B location, assuming the construction of a Davis Square Station.

Starting with this location, the Porter Square Transportation Advisory Group (TAG) discussed its merits and liabilities as they related to the needs and desires of the residential and business communities. It became apparent that this location would not entirely satisfy the community's desires as voiced by the TAG and particular concern was expressed relative to pedestrian connections to all sections of Porter Square.

As a result of these TAG discussions, three alternatives of the original location were developed, B.1, B.2 and B.4, with B.3 representing the original B location from the BTPR report. Figure IV-5 diagrams each of the alternatives considered. Discussions at TAG meetings and with neighborhood groups as well as business and city representatives resulted in a consensus that the B.4 alternative would be the most advantageous site for the Porter Square Station. This location would require the displacement of six businesses between the Harvard Trust/Commonwealth Lock Building and Somerville Avenue, as illustrated in Figure IV-2. Potential redevelopment opportunities available for the single displaced property owner will be reviewed and summarized in the Joint Development portion of the Land Use section of this chapter.

Although alternative B.4 met all TAG desires for a central location with easy pedestrian access throughout the Square and to the commuter rail station, four principal concerns remained:

1. Potential disruption of Harvard Trust and Commonwealth Lock daily business operations because of the difficulty involved in maintaining access during construction activities.

2. Potential disruption of traffic on Massachusetts Avenue, due to the major construction required for the south portion of the station.

3. Cost of underpinning the Harvard Trust/ Commonwealth Lock Building (approximately $100,000).

4. Difficulty in locating the elevator so that it would be convenient for handicapped riders on both the commuter rail and Red Line Extension.

Further study resulted in modifications that significantly reduced or eliminated these four factors. The B.4 (revised) station location has been previously described as the project station. The B.4 (revised) alternative relieved the four principal concerns by:

1. Shifting the station location approximately 175 feet further north. This would place major construction activities north of the Harvard Trust/Commonwealth Lock Building and reduce potential disruption to business and residential activities.

2. Placing major construction activities completely away from Massachusetts Avenue to eliminate the need to detour traffic. The possibility of blocking the Massachusetts Avenue entry to the Sears Roebuck and Co. parking lot would also be avoided.

3. Reducing the costs involved in underpinning the Harvard Trust/Commonwealth Lock Building or possibly, eliminating the need for this protection.

4. Providing a convenient location for the elevator adjacent to the east station entry.

The Cambridge City Council affirmed its support of the Revised B.4 station location by passing a Resolution on June 23, 1975 which, in part, read:

"...AND BE IT FURTHER RESOLVED that the location and design characteristics of the Porter Square Station should conform, in principle, to the alternative known as B-4, Second Revision, though not necessarily in specific location-details as shown on the plan; and that B-4, Second Revision, which is the consensus choice of the Porter Square Transportation Advisory Group, shall be understood to incorporate the following major features:

- A location which runs northeast, starting just north of the Harvard Trust Company building, beneath the MBTA Railroad right-of-way and Somerville Avenue to a point under the Porter Square Shopping Center parking lot, thereby minimizing disruption to Massachusetts Avenue;

- Free use of patron access tunnels for pedestrian circulation in and around Porter Square;

- Convenient access from both Porter Square and the transit station to the MBTA Railroad Station;

- Specific exclusion of transit-related automobile parking and off-street bus facilities from the station design; and

- Access to the south and north ends of the station from the vicinity of both sides of Massachusetts Avenue..."

TRAFFIC AND TRANSPORTATION

Existing Conditions

The proposed Porter Square Station would be served by Massachusetts Avenue from the north and south, by Somerville Avenue, which terminates at Porter Square, from the east, and by Upland Road from the southwest. The estimated 1975

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TRAFFIC AND TRANSPORTATION

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Average Daily Traffic (ADT) and forecasted 1980, 1985 and 2000 ADT are shown in Table IV-4.

Table IV-4*

AVERAGE DAILY TRAFFIC
(vehicles per day)

Route	1975	1980	1985	2000
Massachusetts Avenue (North of the Square)	39,300	39,800	40,300	41,800
Massachusetts Avenue (South of the Square)	20,200	20,400	20,700	21,500
Somerville Avenue	13,100	13,300	13,400	13,900
Upland Road	6,000	6,100	6,200	6,400

* Source: CTPS

Congestion often occurs at Porter Square as a result of traffic generated by the area's retail activities and the large traffic volumes on Massachusetts and Somerville Avenues. The termination of Somerville Avenue further contributes to the congestion. Direct vehicular access from the Porter Square Shopping Center to the intersection of Massachusetts and Somerville Avenues creates turning conflicts and obstructs through movements. Traffic control is accomplished by channelization and traffic signals at Somerville Avenue and at Upland Road. Although improvements are presently being considered, the Massachusetts Avenue bridge over the MBTA railroad tracks is a further operational constraint. Surrounding streets are residential in nature with low vehicular capacities.

In a letter dated June 27, 1977, James L. Sullivan, City Manager of Somerville, raised the question of the potential desirability of replacing the Massachusetts Avenue bridge at the same time as the proposed Porter Square Station is constructed. The MBTA is currently entering discussions with the MDPW to discuss the need and schedule of reconstructing the bridge.

Station Boardings

It is estimated that a Red Line Extension to Route 128, Arlington Heights, or Alewife would generate approximately 6,200 inbound boardings per day at the Porter Square Station. Table IV-5 shows estimated 1980 daily inbound boardings at the Porter Square Station by mode of access for each alternative terminus.

Table IV-5

ESTIMATED 1980 DAILY INBOUND BOARDINGS *
PORTER SQUARE STATION

	Mode of Access					
Alternative Terminus	Walk-In	Bus	Kiss-and-Ride	Commuter Rail	Park-and-Ride	Total
Route 128	1,660	2,780	1,190	560	-	6,190
Arlington Heights	1,660	2,780	1,190	560	-	6,190
Alewife	1.660	2,780	1,190	560	-	6,190

* Source: CTPS

Based on CTPS ridership demand estimates, the location of the Red Line Extension terminus is not expected to substantially influence ridership at the Porter Square Station since the potential patronage at this station would be largely local in nature. Table IV-6 shows the expected additional peak-hour auto arrivals at Porter Square Station by access route for each alternative terminus.

Table IV-7 gives the estimated feeder bus requirements and supply strategies to satisfy the expected peak-hour transit rider demand at the Porter Square Station.

Table IV-6

ESTIMATED 1980 PEAK HOUR VEHICLE ARRIVALS VIA AUTO*
PORTER SQUARE STATION

Access Route (D)[a] and Alternative Terminus	Mode of Access: Park-and-Ride	Mode of Access: Kiss-and-Ride	Total
Massachusetts Avenue (N)			
. Route 128	-	30	30
. Arlington Heights	-	30	30
. Alewife	-	30	30
Massachusetts Avenue (S)			
. Route 128	-	80	80
. Arlington Heights	-	80	80
. Alewife	-	80	80
Upland Road (SW)			
. Route 128	-	80	80
. Arlington Heights	-	80	80
. Alewife	-	80	80
Somerville Avenue (E)			
. Route 128	-	75	75
. Arlington Heights	-	75	75
. Alewife	-	75	75

(a) (D) - Denotes direction from which arrival originates (i. e., (N) = from the North).

* Source: CTPS

Table IV-7

ESTIMATED 1980 PEAK-HOUR FEEDER BUS REQUIREMENTS AND SUPPLY STRATEGIES PORTER SQUARE STATION*

Approach Direction	Requirements For Alternative Terminus			Supply Strategy		
		Arlington		1975	1980	
	Route 128	Heights	Alewife	Existing	Minimum	Maximum
North and West	21	21	21	57	16	17
South and East	5	5	5	66	16	17
Total	26	26	26	123	32	34

* Source: CTPS

As shown in Table IV-7, the number of existing peak-hour bus arrivals at Porter Square far exceeds the estimated number of feeder buses required to serve transit riders; this is largely because of the many Harvard-bound express buses which converge on Massachusetts Avenue. Under both the minimum and maximum bus supply strategies, which would modify existing bus service in response to the Red Line Extension, additional feeder bus service would be required from the north and west. By curtailing express bus service on Massachusetts Avenue and reorienting the routes to provide localized feeder service, bus traffic in the station area should be significantly reduced after Red Line Extension becomes operational.

Porter Square is intended to be a local Red Line Extension stop offering direct service between Cambridge and downtown Boston. Patronage is expected to be primarily local, with the station attracting only a limited number of residents from outlying communities; therefore, park-and-ride facilities would not be provided. Feeder bus and kiss-and-ride activities would occur at street level and no special provisions would be required for these operations. To accommodate the anticipated number of walk-in patrons, an entrance from the street to the station would be located on both the east and west sides of Massachusetts Avenue. These entrances would

provide pedestrians with access to the station area without requiring them to cross Massachusetts Avenue.

Impacts

The CTPS estimated that the demand for parking by Red Line Extension riders would be approximately 290 vehicles per day regardless of which terminus is selected. The lack of long-term parking facilities at the Porter Square Station would divert a portion of this demand to either kiss-and-ride or feeder bus. Nevertheless, park-and-ride demand would exceed the supply and it is conceivable that a large portion of this excess demand would elect to park-and-ride in spite of the limited parking available. The use of on-street parking spaces in the vicinity of the station by transit riders would be discouraged by the City's Resident Parking Sticker Program. However, unless this program is strictly enforced, the amount of parking available for community residents would be reduced. The use of on-street parking spaces by transit riders combined with the use of nearby commercial parking lots, would contribute to local traffic congestion and reduce the short-term parking supply. A portion of this excess park-and-ride demand would choose not to use the Red Line and would travel by automobile, thus limiting the potential ridership on the Extension.

The large number of expected kiss-and-ride passengers would constrict traffic flow during peak periods. Specifically, the lack of off-street loading and unloading areas at the station would encourage double parking and create through traffic delays, which would be particularly evident during the evening peak-hour as kiss-and-ride vehicles queue along the approach streets.

The amount of on-street space required for the estimated 26 peak-hour bus arrivals could also constrict traffic flow in the Square; however, since more than 120 buses currently arrive at Porter Square during the peak-hour it is expected that the substantial reduction in total volume would offset the effects of longer dwell times at the transit station.

A Red Line Station at Porter Square would result in a slight decrease in daily and peak-hour traffic volumes due to auto diversions; however, this would be offset by an increase in vehicular traffic induced by the station, primarily kiss-and-ride vehicles.

Table IV-8 shows the estimated daily and peak-hour net changes in traffic volumes at the Porter Square Station.

Table IV-8

NET CHANGE IN TRAFFIC VOLUMES AT PORTER SQUARE
(Vehicles)

Alternative Terminus	Daily	Peak-Hour
Route 128	-	-
Arlington Heights	+300	+ 50
Alewife	+900	+100

During construction of the station, traffic would be slowed on most major arterials leading into the Square. There would be little or no interruption of traffic on Massachusetts Avenue; however, traffic on Somerville Avenue would be slowed for approximately ten to 14 days while the temporary deck is placed. No detouring of traffic from major roadways is anticipated.

Mitigating Measures

Local enforcement of parking regulations would be required to restrict the use of on-street parking spaces by transit riders. Off-street commercial parking areas, such as the Porter Square Shopping Center and Sears Roebuck and Co. parking lots, may attract a small number of transit users if they are not controlled. Unauthorized parking by transit users could be controlled by:

1. Installation of short-term parking meters in conjunction with a towaway service contract. This service could be provided at a minimal cost to the businesses and would be most effective in controlling unauthorized parking.

2. Installation of manual or automatic entries and exits using authorized tokens or stamps.

3. Posting of parking restrictions and enforcement of limits.

Policies

The City Council of Cambridge has taken an official position on the Red Line Extension through the adoption of resolutions dated April 30, 1973 and June 23, 1975. Excerpts from the April 30, 1973 resolution most relevant to this particular section of the proposed extension are presented below.

- "Cambridge recommends that the Line Extension follow BTPR Alignment Alternative #3 (Via Davis Square, With a Station South of Porter Square) From Harvard Square to Alewife Brook,..."

- "In recommending Alignment #3 Via Davis Square, Cambridge Underscores its Intent that Should the Davis Square Route Prove Unacceptable to the Somerville City Government, the State, or the Federal Government, the Alternate to Be Substituted Will Be Alignment #1, The Garden Street Route."

The City of Cambridge supports a Porter Square station only if:

- "The station is constructed and operated without commuter automobile parking or off-street bus facilities;

- "A means is found for ensuring that people using the transit system do not park in the Sears or Porter Square Shopping Center lots, or on residential streets in the Porter Square area;

- "Traffic circulation on Massachusetts Avenus is not disrupted during the construction of the station;

- "Means are found to ensure that the pedestrian movements associated with the transit station do not conflict with the traffic circulation (such means to include, as a minimum, the construction of convenient, well-lighted pedestrian access ways to either platform (northbound and southbound) from both sides of Massachusetts Avenue);

- "There is an understanding that should detailed studies show that the above conditions cannot be met, the extension will be built to proceed directly from Harvard Square to Davis Square, without an intermediate station."

The Council recommended the selection of the Sears Roebuck and Co. station location (Alternative B in the BTPR Report) to serve the Porter Square area. This original B alternative has been described in the Station Alternatives section of this chapter. Excerpts from the June 23, 1975 resolution most relevant to this particular section of the proposed extension, in addition to those cited on page IV-10, are:

"...WHEREAS, on April 30, 1973, the Cambridge City Council unanimously adopted a resolution supporting as its official policy the extension of the Red Line from Harvard Square to Route 128 via Porter Square in Cambridge and Davis Square in Somerville; and

WHEREAS, the MBTA and its consultants have shown that stringent parking and traffic circulation conditions imposed on the Porter Square Station by the above-cited resolution have been or can be essentially satisfied by their current proposal; and

WHEREAS, the Porter Square Transportation Advisory Group, composed of people from the surrounding neighborhoods and the business community, has reached a consensus on station location and general design features for the Porter Square Station;

NOW THEREFORE BE IT RESOLVED that the Cambridge City Council hereby reaffirms its desire to have a rapid transit station located in Porter Square;

AND BE IT FURTHER RESOLVED that the City Council's reaffirmation of a station located at Porter Square is contingent upon finding a means for ensuring that the people using the transit system do not park in the Sears or Porter Square Shopping Center parking lots, as well as upon a finding that the Red Line Extension will be carried to Route 128, and that construction of the segment running northwest from Alewife Brook will begin no later than construction between Davis Square and Alewife Brook;

AND BE IT FURTHER RESOLVED that the Porter Square Station be designed so as to improve and optimize its impact on the visual and other amenities of Porter Square..."

Zoning

Areas above or immediately adjacent to this section of the project are subject entirely to the Cambridge Zoning Ordinance; however, because of Porter Square's proximity to the city boundary, the Somerville zoning applicable for that area should be considered in assessing the potential for future development. Existing zoning in the proposed station area (illustrated in Figure IV-1) would permit development of a continuous commercial strip starting on Massachusetts Avenue just north of Wendell Street and continuing north to Russell Street. The B-A Zone south of Arlington Street permits real estate developments for business activities up to a maximum height of 35 feet and for residential uses, up to 85 feet. The recently created B-C Zone with an FAR of 2.0 and a 55 foot height limit abuts residential zones on all sides.

Current Land Uses

The proposed route of the tunnel would be under Massachusetts Avenue to a point in Porter Square near the Sears Roebuck and Co. department store where it would pass under several private commercial properties: the Sears Roebuck and Co. building, the Harvard Trust/Commonwealth Lock Building and the Professional Building (the old Boston and Maine Railroad Station). The only residential activities along this line segment are several apartments on the upper floors of the Harvard Trust/Commonwealth Lock Building. Land use abutting the tunnel alignment and station area is predominantly commercial mixed with medium and high density residential.

A local commercial area providing retail goods and services surrounds the proposed site of the Porter Square Station with two centers of commercial activity grouped around the Sears Roebuck and Co. store to the south and the Porter Square Shopping Center

and an automobile dealer to the north. Surrounding the commercial areas, there are several established residential neighborhoods: the Spring Hill and Ward Two areas of Somerville; the Orchard Street and Walden Street areas of North Cambridge; the Upland Road portion of Neighborhood Nine, and the Oxford Street portion of the Agassiz Neighborhood.

The commercial area is physically divided into four quadrants as a result of the cross formed by the depressed Fitchburg Main Line and Massachusetts Avenue. Such strong physical barriers make circulation--particularly pedestrian activity--between neighborhoods and business areas difficult and dangerous. These physical barriers have also made it difficult to develop a centralized Porter Square commercial area such as Harvard Square or Central Square.

Development Trends

Current residential development in Cambridge's C-3 residential zone indicates a trend toward high-rise, high density construction. Pressure for such construction has been particularly noticeable in the areas near Harvard University and Lesley College.

Along the proposed route of the Red Line Extension, Porter Square is second only to Harvard Square as a viable commercial area according to the Cambridge Office of Economic Development and Manpower. Between 1967 and 1972, Porter Square was Cambridge's fastest growing retail area. In 1972, Porter Square's commercial area (approximately 24 stores) experienced a $35,311,000 increase in sales volume which, when considered with the total payroll, made it one of Cambridge's major retail centers. At present, this growth in sales has not significantly altered the size and type of business establishments in the Square, but it has increased parking demand.

Impacts

Property Takings

Station construction would displace two business property owners and require the relocation of six businesses, thus

creating a direct impact on present land uses. The six businesses are:

- H & R Block, 1865 Massachusetts Avenue
- Of Cabbages & Kings, 1859 Massachusetts Avenue
- Carmin's Modern Barber Shop, 1861 Massachusetts Avenue
- Mini Carpet Shop , 1863 Massachusetts Avenue
- Flag Center, 1865 Massachusetts Avenue
- Professional Building, Somerville Avenue

Small portions of other properties where no structures are involved would be taken for proposed station entrances.

Station Construction

No significant disruption or slowing of Massachusetts Avenue traffic is expected as a result of station construction activities. Construction of the entrance tunnel under Massachusetts Avenue by a combination of cut-and-cover and tunnel/deep bore techniques would significantly reduce the amount of affected roadway surface. Other traffic, transportation and construction considerations have been discussed earlier in this chapter.

A temporary narrowing of Somerville Avenue near the shopping center could cause some limited congestion. During this time a deck (temporary road surface) would be placed to carry Somerville Avenue traffic while construction continued. Truck traffic associated with station construction could possibly use a temporary road constructed in the MBTA Fitchburg Main Line right-of-way for hauling materials and waste to and from the construction area.

Commercial Activities

Both residential and business activities in Porter Square, North Cambridge and South Somerville would benefit from proximity to a rapid transit station. The estimated 6,190 daily boarders would have easy access to both major Porter Square shopping areas, and the proposed intermodal transfer between the Red Line station and the MBTA commuter rail service would further increase the commercial attractiveness of the proposed station. Construction activities in the station area should not significantly interrupt business activities or restrict customer access.

Other short-term impacts related to construction would be the temporary displacement of parking spaces in the Porter Square Shopping Center. Commuter rail service would not be disrupted as continuous service on the MBTA Fitchburg Main Line would be maintained.

Induced Development

High density development trends in the nearby residential and business zones of Cambridge and Somerville indicate that the increased accessibility of the Red Line Extension could accelerate land development and speculation in the Porter Square area. Likely areas for such development would be the C-2, C-3, B-A, and B-C zones in Cambridge and the RC, B-A and B-B zones in Somerville. However, depending on the site and type of adjoining structures, high-rise structures could be inconsistent with existing low density residential areas.

A potential joint development location for commuter-oriented retail establishments could be created around the station's east entrance as suggested in Figure IV-3. Based on the past growth of Porter Square sales, the long-term potential for increased commercial development seems promising. The Red Line Extension would reinforce existing businesses and create some new commercial opportunities. However, if the actual number of boarders stabilizes at a level similar to that projected, the amount of new commercial activity would be moderate.

Joint Development

Two opportunities for potential joint development exist in the area of the Porter Square Station. There is a potential for redevelopment of commercial spaces around the station area, as mentioned above. If future demand makes it economically feasible, there is a possibility of using the MBTA railroad air rights for either public or commercial uses.

Redevelopment above the station could be accomplished in several ways. The displaced property owner, by use of a permanent easement, could retain ownership of those portions of land not actually needed for station street level activities, or the property could be purchased by the MBTA and could be leased back to the former or a new owner after construction. In both cases, excluding MBTA improvements on the properties would be taxable.

Development of the MBTA Commuter Rail air rights, although at present too costly to be justified for parking or commercial use, could provide significant benefits for Porter Square in the future. Developing these air rights would also tend to eliminate the present barrier-like effect of the railroad. Possible uses for this development could include open space, parking, small shops and businesses, and pedestrian walkways.

Urban Design

The completed Porter Square Station, as proposed, would not significantly alter the physical appearance of Porter Square at street level. A significant improvement would be made in the esthetic appearance of the MBTA commuter rail station by the construction of new platforms and canopies.

The two entrance structures and the removal of the buildings between the Harvard Trust/Commonwealth Lock Building and Somerville Avenue would be the most noticeable street level changes. Note that the possible joint development of commercial activities is merely a suggestion and would not be included as a part of the proposed construction activities.

Mitigating Measures

Property Takings

MBTA procedures are in compliance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and Chapter 79A of the General Laws of Massachusetts.

The MBTA Right-of-Way and Relocation Department would compensate owners for acquired property by:

- Retaining two independent assessors to appraise the fair market value of each property or structure.
- Providing compensation for long-term lease terminations.

Owners would still have the right to appeal the established level of compensation and acceptance of this compensation would not prejudice the owners right to litigate for an adjustment.

In all business relocations, MBTA Right-of Way and Relocation Department staff would:

- Give a minimum of four months notice to vacate.
- Provide advisory services to the project area if economic injury is involved.
- Provide relocation payments, including:

  Actual moving expenses

  Payment for direct loss of property

  Payment in lieu of relocation and related expenses

  Expenses in searching for a new location

  Storage costs

  Property loss compensation

Redevelopment Opportunities

Joint commercial development could potentially be negotiated between the displaced property owner or other businessmen and the MBTA to provide for redevelopment of the land adjacent to the south-east station entrance. This could be accomplished by either of two methods: the present owner could retain ownership of the land and sell a subterranean easement, or the land could be sold to the MBTA and leased back to the former owner or other interested businessmen.

Subterranean Easements

Those properties under which the tunnel and station would be located would require a subterranean easement for which suitable compensation would be provided through negotiations between the owner and the MBTA. Compensation procedures would be similar to those outlined in the initial paragraphs of this section.

Station Construction

The principal adverse impact identified with station construction would be the temporary narrowing of Somerville Avenue during decking operations and the partial decking of Massachusetts Avenue for construction of the pedestrian passageway.

Possible mitigating measures include:

- Decking of Somerville and Massachusetts Avenues on weekends and after the evening peak hour to avoid disrupting traffic flow.

- Partial tunneling of the passageway to the west side of Massachusetts Avenue to further reduce traffic or utilities disruption.

- Provision of decking within the Porter Square Shopping Center area to enable re-utilization of parking space as soon as possible.

Induced Development

Recently, a Land Use Subcommittee of the Porter Square Tag examined the rezoning options available in Cambridge to control the scale and compatibility of future developments with existing residential areas. Porter Square's traditional role as a local business area and the desirability of continuing this type of activity was being discussed. The outcome of this study has been a successful rezoning petition to the Cambridge City Council. Porter Square, from Roseland Street to Russell Street was rezoned to a new district designation (B-C). This district has the same use regulations as the former B-B (General Business District). However, it has a lower density (FAR 2.0 instead of 4.0), a 55 foot height limit, and an off street parking requirement. Furthermore, buildings within 50 feet of a residential district must not exceed 35 feet in height. Thus, the Subcommittee work resulted in a strategy utilizing a number of techniques; rezoning, new regulations, and the tightening of existing regulations.

NEIGHBORHOOD AND COMMUNITY FACTORS

Consideration of the short- and long-term effects on the quality of life in adjacent neighborhoods has been a paramount factor in evaluating the proposed Red Line Extension. The Porter Square Transportation Advisory Group (TAG), representing neighborhood and business groups, provided the local input during the planning and assessment process for the section of the Red Line Extension which would include the proposed Porter Square Station. Following is a brief description of the three major neighborhood areas and the additional community considerations examined during the assessment process.

Existing Conditions

The Harvard Square-Porter Square section would pass through three major Cambridge areas--the Agassiz Neighborhood, Neighborhood Nine and the North Cambridge Neighborhood-- and through the Spring Hill and Ward Two Neighborhood areas in Somerville.

Neighborhoods

The Agassiz Neighborhood (also known as Neighborhood Eight) is bounded by Massachusetts Avenue on the west, Kirkland Street on the east and the Somerville-Cambridge boundary on the north. In addition to Harvard University, two distinct sub-neighborhoods, Shady Hill and the Oxford Street area, are located within the Agassiz area. The Oxford Street area, which is nearest to the proposed station, is composed of a few apartment buildings and one-, two- and three-family houses on small lots. Land use is dominated by Harvard University and Lesley College, with approximately half the land being used for institutional purposes. There is no industrial land use in these sub-neighborhoods and commercial activity is generally limited to an area along Massachusetts Avenue. Public open space is negligible.

Neighborhood Nine is bounded by Massachusetts Avenue, the Boston and Maine Fitchburg Main Line right-of-way, Concord Avenue, and Cambridge Common. Originally a part of the 1631 Cambridge community, this area--which has the highest amount of land devoted to residential use of any Cambridge neighborhood--has evolved into an interesting mixture of residential dwellings. Large multi-family buildings are intermixed with one-, two- and three-family houses. Several high density projects, such as the Harvard Student Housing on Linnaean Street, Bristol Arms, Lincoln Way, and Walden Square have been constructed. Massachusetts Avenue, Concord Avenue and areas north of the Common are characterized by large multi-family masonry apartment buildings, many over six stories high with some street level commercial activities.

Neighborhood Nine is fringed on the north by a thin industrial zone running along MBTA railroad right-of-way. This zone is anchored on the southwest by 52 vacant acres (a dump site) and the open spaces in St. Peter's Field. Industrial activities include a variety of research laboratories, scrap metal yards and warehousing. The Common provides open space in the southeast corner of this neighborhood.

The area known as North Cambridge, or Neighborhood 11, is bounded by Somerville on the north, Porter Square on the east, Arlington and Belmont on the west, and by the

MBTA Commuter Railroad on the south. North Cambridge would border on three sections of the Red Line Extension: the Harvard Square-Porter Square, Porter Square-Davis Square, and Davis Square-Alewife. The areas of this neighborhood immediately west of Massachusetts Avenue are closest to the Harvard Square-Porter Square section. North Cambridge is a mixture of residential, commercial and industrial uses, with most of the industrial area concentrated in the western section. Massachusetts Avenue provides a strip of commercial developments varying in intensity from one end of the neighborhood to the other. Two districts of unlimited height business development exist between Porter Square and Russell Street and also in the area of the MBTA storage yards. At present, the uses in these areas do not approach the allowable B-B zone development. Residential activities in North Cambridge are located in the Walden Street and Orchard Street sub-neighborhood areas. In the Walden Street area, two- and three-story multiple family residences, mixed with commercial and industrial activities are found east of Walden Street and south of Massachusetts Avenue. An area of single and multiple family residences is located in close proximity to the Cambridge City boundary and the Spring Hill-Ward Two areas in Somerville.

The Spring Hill-Ward Two areas of Somerville start at the city boundary and extend east to Cutter Street, generally north to Highland Avenue, and east toward School and Medford Streets. The physical appearance of the area is similar to the North Cambridge and Agassiz Neighborhoods, with two-, three- and four-story residential structures predominating. A mixture of commercial activity along the streets in the area is oriented to neighborhood consumers.

Land Use

Land use issues facing the Agassiz Neighborhood are: the expansion of Harvard University and Lesley College; specific institutional plans for the Sachs Estate and Sacramento Street; potential Porter Square redevelopment as part of the Red Line Extension; and the appropriateness of C-3 zoning for general institutional (and private development) activity.

The primary land use issues in Neighborhood Nine relate to: the future of the western industrial area; potential develop-

ment alternatives for the dump; development pressures in the Harvard-Radcliffe area; the future of commercial and residential development on Massachusetts Avenue; and the utilization or treatment of the MBTA Fitchburg Main Line railroad right-of-way.

Issues facing North Cambridge are; the potential acceleration of development resulting from the placement of two Red Line stations at either end of the neighborhood--Porter Square and Alewife; an acceptable method of integrating the Boston and Maine railway corridor into the neighborhood: and the future of the declining industrial areas. Chapter VI discusses the issues concerning the western end of the neighborhood near the Alewife Station.

Population

The Agassiz Neighborhood, has a population of 5,146, a decrease of 12.5 percent since 1960 as compared with the citywide decrease of 6.8 percent. It has experienced a decrease in household size not unlike the general trend for Cambridge as a whole. From 1950 to 1970 the segment of the population living in a family situation decreased by nearly one-half, while the population living in non-family households--individuals living by themselves or with non-related roommates -- morethan tripled during the same time. The population living in group or dormitory quarters has remained approximately constant in size, although as a percentage of thepopulation it has increased.

The population of Neighborhood Nine has also been declining, along with that of the city, over the past ten years. During the 1950's, families were replaced at a moderate rate by young immigrants; the elderly population tended to remain stable. Between 1950 and 1970, the number of families decreased to two-thirds its original number while the non-family population increased over 100 percent. This influx of young people decreased the number of persons per occupied unit and increased the number of occupied units.

North Cambridge population decreased one percent between 1960 and 1970, but the older areas, especially around Porter Square, are declining at a faster rate. Most new residents are

renters and are concentrated in Rindge Towers in the Alewife area. Out of 4,549 North Cambridge households in 1970, 29 percent (1,318) were students, young professionals and single people; in 1960, these single households were only 15 percent of the total and while the number of non-family households in North Cambridge has more than doubled, it is still lower than the city average. The most noticeable characteristic is the population stability, with almost 60 percent of the homeowners established in the neighborhood before 1959.

The Spring Hill and Ward Two Neighborhood areas in Somerville had populations of 13,059 and 11,554 respectively in 1960, for a combined total of 24,613. Approximately 7,730 persons, or 31 percent, were under the age of 18; 2,680 persons, or 11 percent, were over 65 years; and 436 or 4 percent were minorities.

Total population in 1970 for the areas of Cambridge and Somerville within one-half mile walking distance from the proposed Porter Square Station was approximately 11,177, of which 2,469 persons, about 22 percent, were under the age of 18. Approximately 1,865 persons, or 17 percent, were over 65.

Housing Units

The Agassiz Neighborhood has one of the highest proportions of renter- to owner-occupied housing units in Cambridge according to the 1970 census. In 1972 the City of Cambridge surveyed exterior conditions of structures in Agassiz and only 5.3 percent were in need of extensive rehabilitation.

Compared to other areas in Cambridge, Neighborhood Nine has a relatively moderate level of renter-occupied dwelling units. Neighborhood Nine's housing stock is in excellent condition. The conversion of dwelling units as well as the majority of new construction in this area has been for use as rental property.

North Cambridge in 1970 had a high level of owner-occupied dwelling units. During the 1950 to 1970 period, the total number of housing units increased by 22.5 percent; the number of renters increased by 36.8 percent; and ownership decreased two percent.

In 1960, Somerville's Spring Hill and Ward Two neighborhoods had high levels of owner-occupied units (33 percent), and renter-occupied units (64 percent). In 1970 there were a total of 4,531 dwelling units within a half mile walk of the proposed station. Of this total, 499 or 11 percent were single-family homes.

The following table shows the comparative characteristics relative to the ratio of homeowners to renters, and also compares the median property values and rents for the neighborhoods discussed in the previous paragraphs.

Table IV-9

HOUSING CHARACTERISTICS
(1970 Census)

Neighborhood	Owner-Occupied Single-Family Units (Percentage)	Median Value*	Rental Units (Percentage)	Median Rental**
Agassiz	12.7	$41,300	84.5	$143
Neighborhood Nine	19.8	45,325	80.0	140
North Cambridge	28.0	18,697	68.9	108
Spring Hill and Ward Two	24.0	30,300	74.0	139

* Cambridge Average - $24,700
** Cambridge Average Rental - $119

Family Income

The major employers in the Porter Square area are the Sears Roebuck and Co. department store and the Porter Square Shopping Center area. In 1972, a total of approximately 883 jobs[1] were provided in the Porter Square area, mostly by small businesses employing less than 50 persons. Work force breakdowns for

1 City of Cambridge, Office of Economic Development and Manpower

the Spring Hill and Ward Two areas of Somerville, although not available, are similar to those of the North Cambridge Neighborhood.

Unemployment for 1970 was 5.9 percent in Neighborhood Nine and 6.5 percent in North Cambridge, compared to the City of Cambridge average of 8.5 percent. In 1974, unemployment in the Agassiz Neighborhood was 6.3 percent.

In addition to comparing median family incomes for the three Cambridge neighborhoods that would fall within the sphere of influence of the Porter Square Station, the following table breaks the total work force down, by percentages, into three broad categories of workers: professional, white collar and blue collar.

Table IV-10

FAMILY INCOME
(1970 Census)

Neighborhood	Median Family Income*	Total Work Force	Professional (Percentage)	White Collar (Percentage)	Blue Collar (Percentage)
Agassiz	$ 11,525	2,701	51	35	14
Neighborhood Nine	12,217	5,547	43	39	18
North Cambridge	9,609	5,942	22	36	42

*Citywide Average - $9,815

Parking

Parking in all neighborhoods surrounding Porter Square is limited, due to the high level of urbanization in Cambridge and Somerville. Some portions of Neighborhood Nine and Agassiz have especially critical parking situations due to the concentration of educational and commercial facilities in the general Harvard Square area. In the residential areas near Harvard Square, a sticker program was recently instituted and will soon be expanded to include the entire city. Similar parking controls do not exist in Somerville,

but a residential sticker program is presently being studied.

Pedestrian Circulation

Over one-half of the residents in the Porter Square area use public transportation for travel to work. While they have reasonably good access to the buses and trackless trolleys in Porter Square, walking to the loading areas involves the crossing of major traffic routes such as Massachusetts and Somerville Avenues. The commuting habits of neighborhood residents, according to the 1970 census, were as follows:

Table IV-11

METHOD OF TRANSPORT TO WORK
(Percent)

Neighborhood	Walking	Automobile	Public Transport
Agassiz	22.2	37.6	33.6
Neighborhood Nine	28.5	46.9	18.6
North Cambridge	22.0	58.0	14.0
City of Cambridge	25.5	41.9	26.5

Over the years the localized commercial activities in the Porter Square area have developed a significant pedestrian-oriented group of consumers in adjacent neighborhoods. As the major commercial activites are separated by roads with heavy volume of traffic, it is difficult to shop in Porter Square without crossing Massachusetts Avenue, Somerville Avenue or Elm Street, the most hazardous vehicular-pedestrian conflict points in Porter Square.

Public Facilities and Services

The Agassiz Neighborhood has fewer public facilities than any of the Cambridge neighborhoods. There is no public open space in the area and the Agassiz Elementary School has the only recreation facility, a small playground. Although the Sachs Estate is a major open area, it is presently owned by Harvard University and is not accessible to the public. Sacramento Field, also owned by Harvard University is presently accessible to the public, but it may be developed in the future.

Neighborhood Nine, with a large amount of open space, has only a moderate amount of recreational development. Developed areas include St. Peter's Field, Corcoran Playground, the Peabody Elementary School Playground, and the Cambridge Common. However, a major opportunity for open space development exists at the site of the dump. The only public school facility in this neighborhood is the Peabody Elementary School.

North Cambridge has two large recreational areas--the 7.5 acre Rindge Field, and Russell Field with 9.8 acres. Three smaller areas include Cogswell Playground, 0.7 acres; Parkway Totlot, 0.1 acres; and the MDC swimming pool. Various indoor activities are available through the Community School Program. Although 18.6 acres are used for recreational purposes in North Cambridge, it is one of the city's more recreationally deficient neighborhoods.

Somerville's Spring Hill and Ward Two Neighborhoods have several recreational facilities, principally the Lincoln and Conway Athletic areas and Bailey Park. Area elementary schools, such as the John F. Kennedy Elementary School near Porter Square, provide playground areas.

Impacts

Neighborhoods

The Red Line Extension would have no adverse short-term effect on the physical appearance of adjacent neighborhoods. Construction activities would temporarily alter the appearance of the Porter Square commercial area, but no significant long-term change is expected as a result of surface station facilities.

Opening of the proposed station could accelerate the long-term commercial and high density residential development in Porter Square, as discussed in the Land Use section of this chapter. High density residential development, by providing additional rental units, would tend to increase the total population in the Porter Square area. Since those persons boarding the Red Line Extension at Porter Square are expected to be local people, there is little potential for significant changes in the type of local retail activity in the area.

Property values in the Porter Square area can be expected to increase following construction and opening of the Red Line Extension and average monthly rentals would also be adjusted upward. However, compared to areas adjacent to other stations on the Red Line Extension, the total increase is not expected to be great. This assumption is based on the lower number of boardings anticipated at the Porter Square Station, the local orientation of the station, and the desire of neighborhood groups to limit the scale of commercial and high density residential development in Porter Square.

Traffic and parking impacts and mitigating measures are discussed in detail in the Traffic and Transportation section. During the time parking spaces are displaced in the shopping centers, demands on existing residential and commercial parking areas could temporarily increase, but it would not be necessary to detour traffic.

Jobs Affected

Relocation of the six Porter Square businesses described in the Land Use section would involve approximately 10 to 20 employees. Employees of those businesses relocated within Porter Square would experience few, if any, adverse effects, but relocations outside of Porter Square could require greater travel time to work. A loss of jobs would, of course, result if any of the displaced businesses ceased operations.

Community Facilities

Community facilities in the area could benefit from the increased accessibilility provided by close proximity to a Red Line station. The potential service areas would be increased for many of these facilities and the line segment tunnels and station would not adversely affect existing service areas.

Mitigating Measures

Rezoning downward or height limitations could be considered as one method of reducing the potential for significant changes in the commercial activities and high-rise residential developments. This was discussed in the Land Use section.

Increased parking demand around the proposed station could be monitored by the expansion of the City of Cambridge resident sticker program and adequate police enforcement. The City of Somerville could also consider adopting similar resident parking restrictions to avoid the spillover of the commuter-oriented parkers forced out of Cambridge as a result of the parking sticker program.

HISTORIC RESOURCES

Existing Conditions

Eight buildings of historic significance have been identified in the immediate vicinity of the proposed alignment within this section. In a survey prepared by the Cambridge Historical Commission, the historic resources were classified in four categories according to their relative architectural and social value. The four categories are:

> Primary Importance: Generally those structures of outstanding value. They are considered worthy of nomination or are already included in the National Register of Historic Places.

Very Important: Structures of slightly less significance and age.

Important and Moderately Important: Buildings of local significance but not currently under consideration for submission to the National Register.

Determinations were based on architectural integrity as well as the significance, incidence, or scarcity of structures of a particular style or period, or designed by a specific architect.

The historic structures within the zone of potential influence of one or more of the transit alternatives between Cambridge Common and Porter Square include:

1. 1627 Massachusetts Avenue. This 1862 building on the east side of the avenue at the corner of Mellen Street is an example of Mansard style and has been classified Moderately Important. It is considered necessary to the retention of the avenue's domestic scale.

2. 1626 Massachusetts Avenue. Located on the west side of the avenue near Langdon Street, this 1868 building has also been classified Moderately Important as a good example of Mansard style. It is considered important to the domestic scale of this stretch of Massachusetts Avenue.

3. 1705 Massachusetts Avenue. Designed by Van Brunt and Howe and completed in 1889, this building is a good example of the Colonial Revival style. It has been classified as Moderately Important, and is considered important to the avenue's domestic scale.

4. 1734 Massachusetts Avenue. Located on the west side of Massachusetts Avenue just south of Linnaean Street, this 1885 example of Queen Anne style has been classified Moderately Important. Like its neighbors, it is considered important to the domestic scale of the avenue.

5. 1776 Massachusetts Avenue. Between Lancaster Street and Stone Court, this 1885 building is also of Queen Anne style. It has been classified Moderately Important and necessary to the scale of the avenue.

6. 1803 Massachusetts Avenue. The North Avenue Congregational Church on the east side of Massachusetts Avenue at Roseland Street is of Primary Importance and is expected to be a National Register nominee. Built in 1845 and designed by Architect Isaac Melvin, this handsome Egyptian-Greek Revival church is an essential visual focus and important landmark in North Cambridge.

7. 1815 Massachusetts Avenue. G.C. Nimmons' store for Sears Roebuck and Co. is located along the east side of Massachusetts Avenue between Roseland Street and Somerville Avenue. Constructed in 1928, it is an early example of Art Deco style, and provides visual focus for the avenue. It has been classified Moderately Important.

8. 1847-53 Massachusetts Avenue. This fine brick business block, completed in 1882, still has its original detailing. It defines the commercial district of Porter Square as an urban streetscape and has been classified Important.

Impacts

Construction by the tunnel/deep bore method well below the existing land surface is proposed for this section. As a result, no taking or destruction of historic resources is anticipated. The activities in a group of brick business buildings at 1847-53 Massachusetts Avenue may be disrupted for a short time due to station construction, but no structural or long-term impacts are expected. Vent and relief shafts would be located several hundred feet from any historic building and no impacts are expected.

There is a possibility that the historic buildings could experience settling and other structural impacts from foundation vibrations during construction in the tunnel below. In addition, noise and dust resulting from the construction could have a negative esthetic impact on the structures.

Mitigation

All historic structures will be closely monitored during the construction process and will be examined periodically following completion. In the event that damage appears, appropriate repairs would be made in keeping with the authentic character of the structure. Ongoing coordination with the Cambridge Historical Commission would be maintained throughout the construction process to assure an absolute minimum of disruption.

NOISE AND VIBRATION

Ambient Noise Conditions

Noise levels can be characterized as constant during the midday hours, with a gradual fall of 10 dBA during nightime hours. The diurnal noise pattern is similar to that at Davis Square as shown in Figure V-8. Short-term measurement in Porter Square at noon March 5, 1975 showed the high noise levels characteristic of heavy traffic in the city center (See Table IV-12). The results are summarized below:

Along Massachusetts Avenue: See Chapter III.

Porter Square: Diurnal pattern: See Figure V-8
Short-term: noontime L_{eq} = 71 dBA
L_{10} = 75 dBA
L_{50} = 69 dBA
L_{90} = 65 dBA

Table IV-12

SHORT-TERM NOISE MEASUREMENTS NEAR PORTER SQUARE

Site No.	Location	Time	Levels (d BA) L_{eq}	L_{10}	L_{50}	L_{90}
16	Lincoln School	13:30	53	57	51	45
17	Porter Square	12:00	71	75	69	65

See Figure II-1B & C for locations of noise measurement sites.

Future Noise From Transit Operations

Line Segment Operations

The line segment between Harvard Square and Porter Square will be in tunnel/deep bore. Problems associated with airborne noise will therefore be eliminated except during the construction of the ventilation and emergency shafts.

Stations

The Porter Square Station could affect the local noise levels through induced surface traffic in the vicinity of the station. Train noise is not expected to be a significant community problem since the proposed station is below grade.

Vibrations

Ground vibrations are expected to be similar in level to those reported in Chapter III for Harvard Square. With the use of welded rail and floating slabs, vibration levels in buildings along Massachusetts Avenue adjacent to the subway will be below the threshold of human perception. However, ground vibrations caused by the passage of trains in the subway tunnels may cause the walls of these buildings to radiate a rumbling noise. Therefore, special trackwork will be used throughout the section.

Assessments

Absolute Assessment

None of the surface criteria levels are expected to be exceeded by subway operations along this segment. Ventilation and emergency shafts should be designed for quiet operation and located at non-sensitive sites.

Changes in Noise Level

Existing noise levels should not be affected by train operations or by station activities in this section of the Red Line Extension.

Noise Control Techniques

Ventilation and emergency shafts will be designed to reduce the noise from passing trains which would otherwise reach the community through these openings.

AIR QUALITY

Areawide air quality impacts were discussed in Chapter II, and the following discussion is restricted to loclized CO effects in the vicinity of Porter Square Station. The details of the analytical methodology and the results are presented in Chapter III of Appendix H. The analytical method considered the effects of induced traffic at the station in making air quality projections.

The predicted levels of carbon monoxide in the vicinity of the Porter Square Station in the 1974 base year, 1980 no-build case, and the three build alternatives are given in Table IV-13. Note that there are no adverse air quality impacts for any of the build cases in comparison with the no-build case, and 1980 CO levels show a marked reduction over 1974 levels for all cases.

Table IV-13

PREDICTED CARBON MONOXIDE CONCENTRATIONS (PPM)
IN THE IMMEDIATE VICINITY OF THE PORTER SQUARE STATION

Meteorological Condition	Averaging Period	1974	1980: No Build Case	1980: Build Case Termination at: Route 128	Arlington Heights	Alewife
Worst Case	8 Hours	8.9	4.4	4.4	4.4	4.4
	1 Hour	14.4	7.1	7.1	7.1	7.1
Most Probable	8 Hours	1.9	1.0	1.0	1.0	1.0
	1 Hour	2.5	1.3	1.3	1.3	1.3

CONSTRUCTION IMPACTS

The major adverse impacts of construction would be air and noise pollution, traffic disruptions, maintenance or relocating of utilities, siltation and erosion, effect on existing structures, disposal of excavated materials, spillage, effects on groundwater table and possibility of encountering an underground stream. A discussion of the general construction impacts can be found in Chapter II. The remaining portion of this section discusses specific construction impacts applicable to this segment.

Traffic Disruption

Maintenance of vehicular traffic on Somerville Avenue, parking at Porter Square Shopping Center and railroad operations along the Fitchburg Division will be major factors during the construction period. It is anticipated that traffic could be maintained by decking and that the railroad tracks can be supported. For further discussions turn to Page IV-6 and IV-26.

It is proposed that a construction shaft for the tunnel deep bore portion of the project, be located adjacent to the Fitchburg Division tracks at Porter Square. It is anticipated that short haul roads might be built along the railroad tracks toward Alewife. The need and extent of the roads will be established in the pre-grant engineering phase. Roads should not interfere with railroad operations. For further discussion see Chapter II and Pages IV-26 and IV-30.

Effect on Existing Structures

It is anticipated that underpinning may be required of certain buildings at the Porter Square Station such as the Harvard Trust/Commonwealth Lock Building.

Utilities

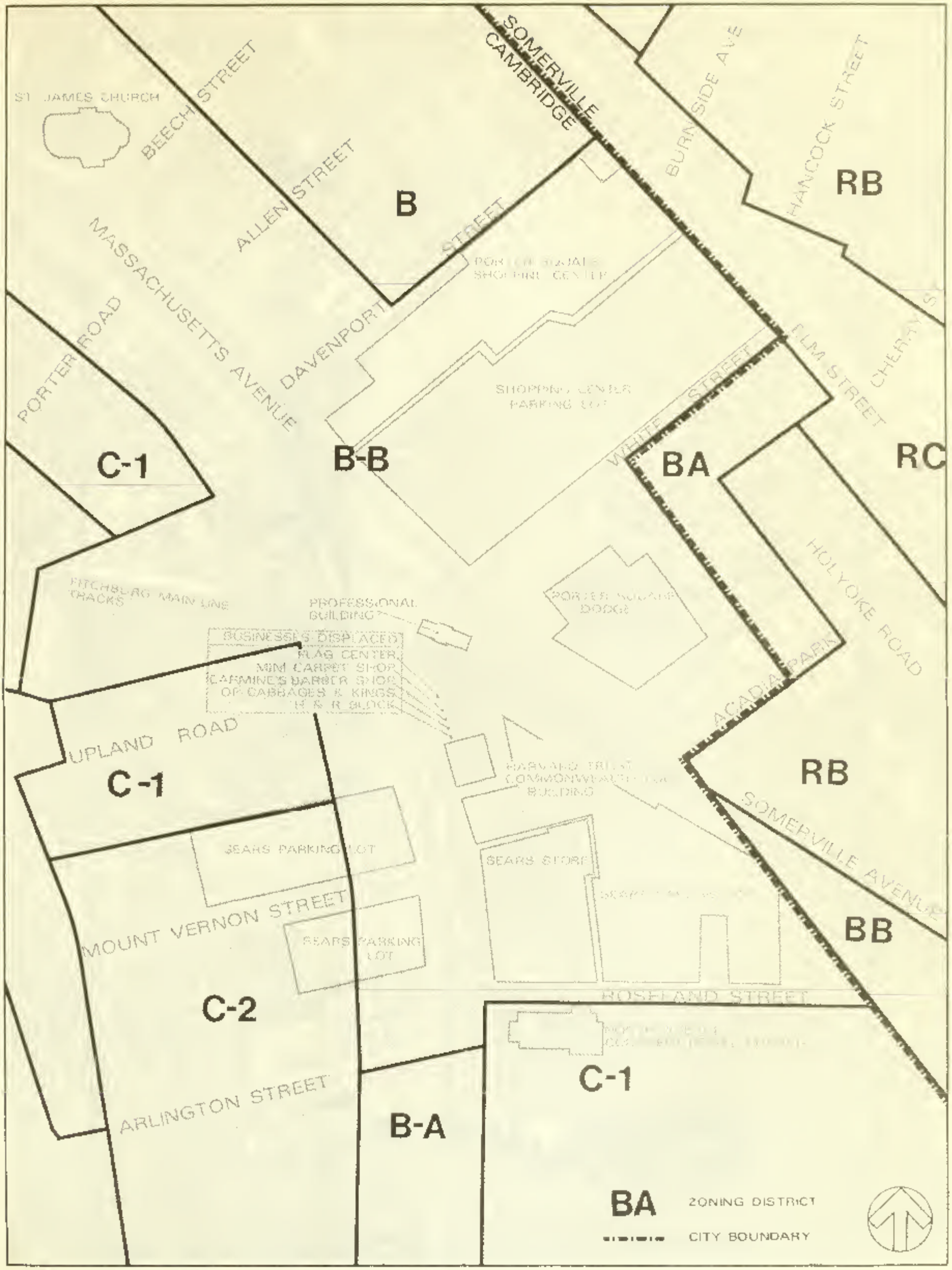
Several utilities will be relocated or maintained. Turn to Page IV-7 for further discussion.

Disposal of Excavated Materials

Excavated material amounting to 250,000 cubic yards is anticipated for the Harvard- Davis tunnel/deep bore.

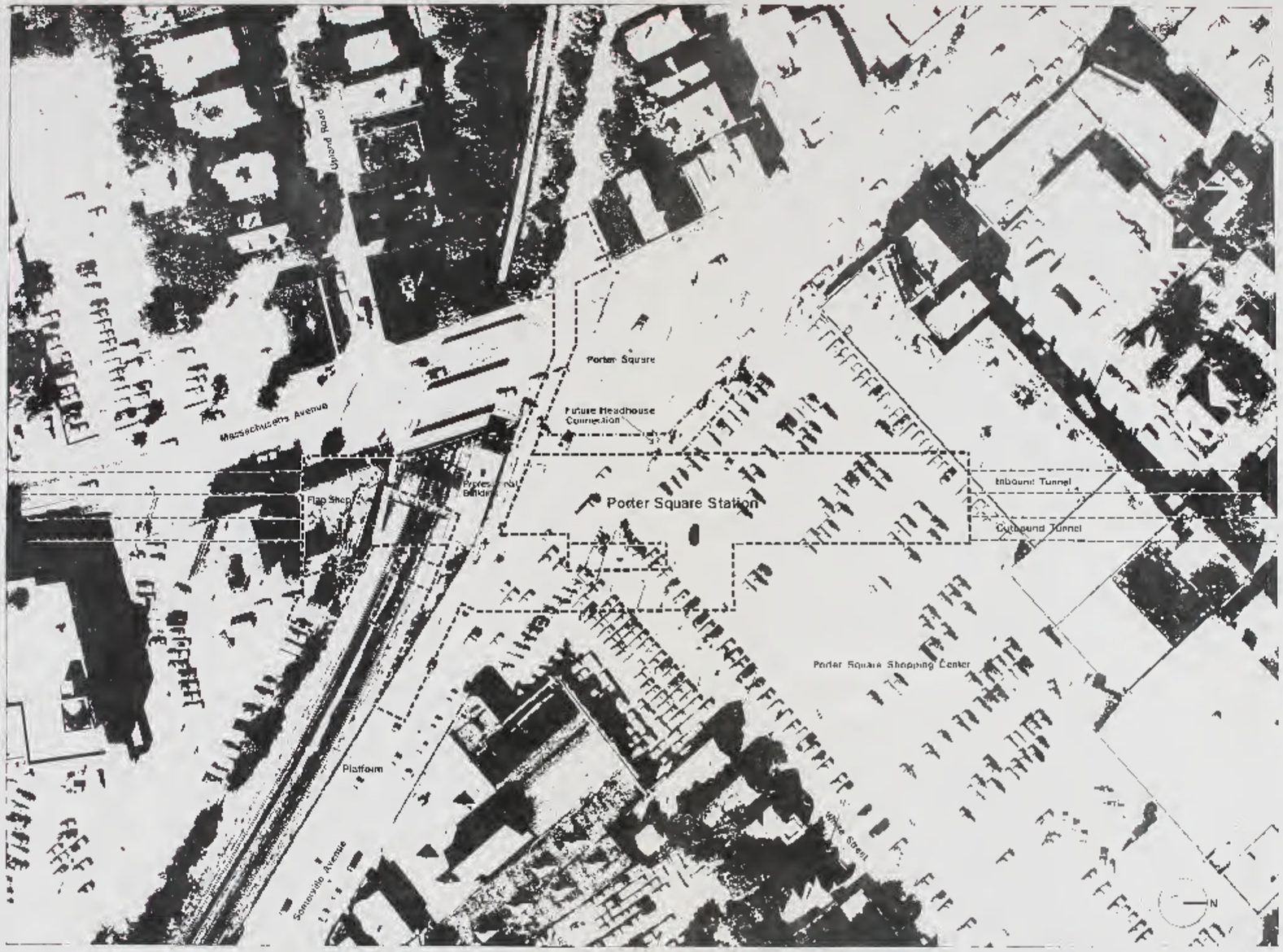
Historic Resources

No taking or destruction of historic resources is anticipated. For a discussion turn to Page IV-43 and IV-44, "Impacts" and "Mitigation" (Historic Resources).



RED LINE EXTENSION STUDY
Massachusetts Bay Transportation Authority

PORTER SQUARE
EXISTING CONDITIONS
FIG. IV-1



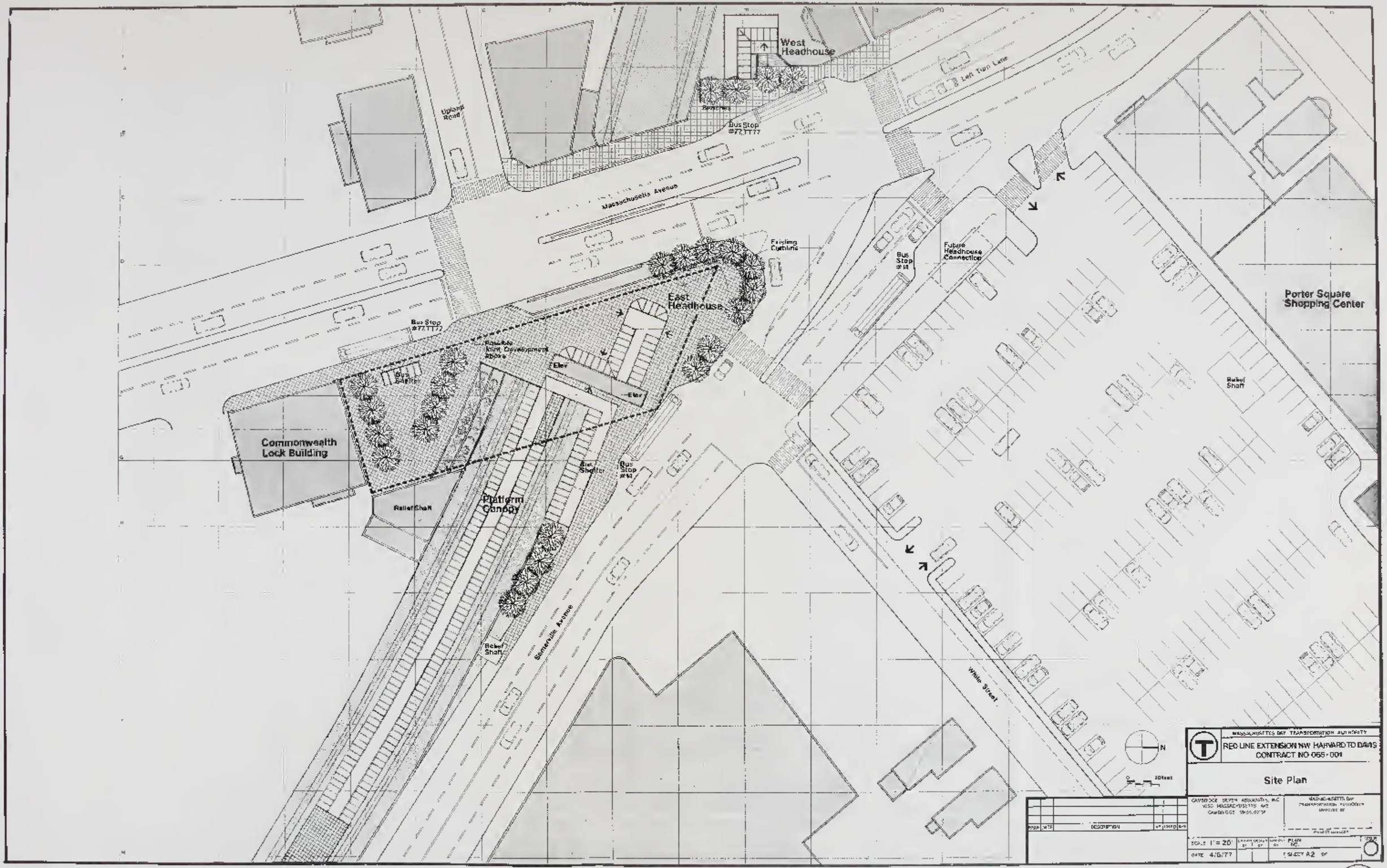
Porter Square Station

Schematic Design/Red Line Extension NW

Cambridge Seven Associates
6 April 1977

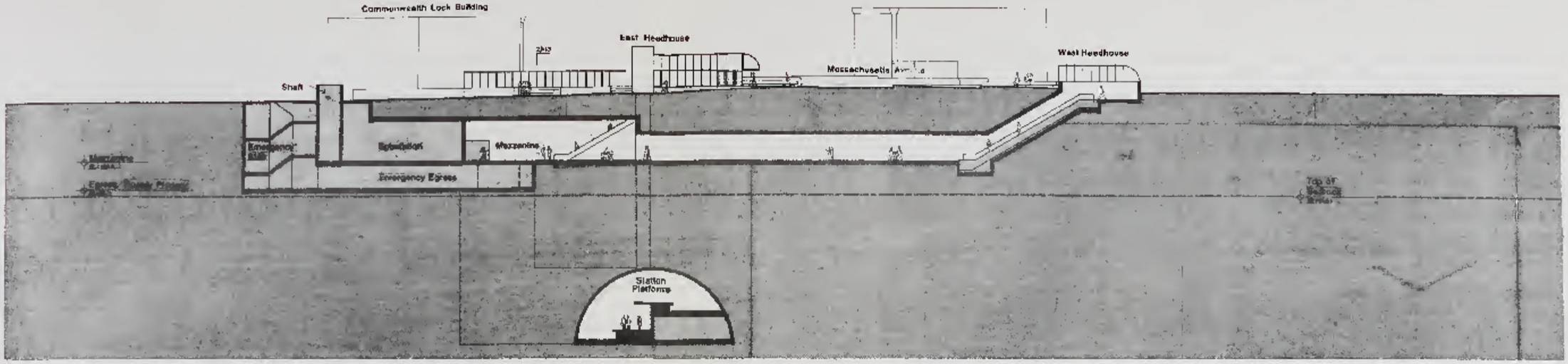
RED LINE EXTENSION STUDY
Massachusetts Bay Transportation Authority

PORTER SQUARE
AREA PLAN
FIG. IV–2

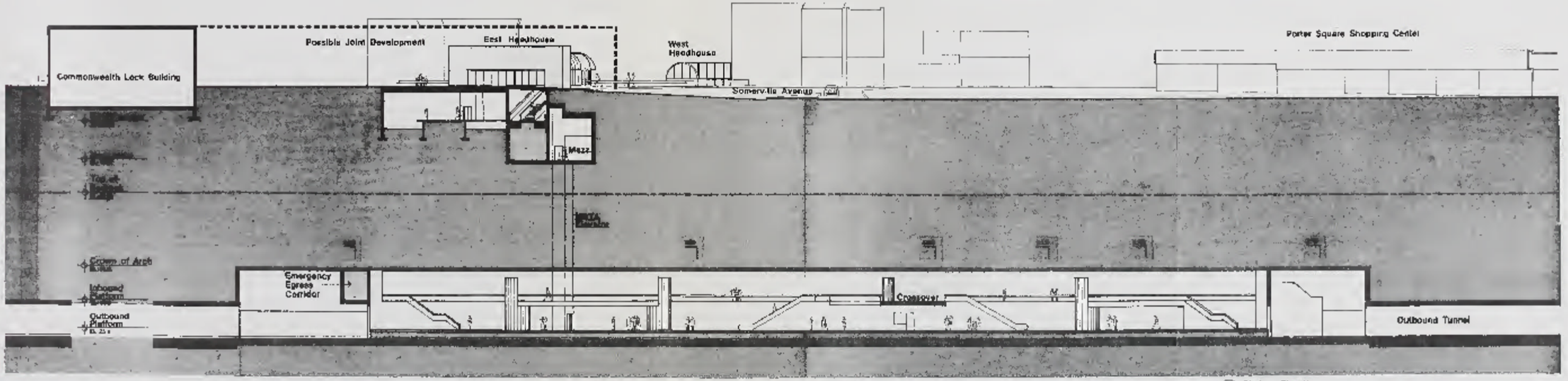


RED LINE EXTENSION STUDY
Massachusetts Bay Transportation Authority

PORTER SQUARE
SITE PLAN
FIG. IV-3



1 Transverse Section



2 Platform Elevation

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RED LINE EXTENSION NW: HARVARD TO DAVIS
CONTRACT NO. 065-001

Transverse Section
Platform Elevation

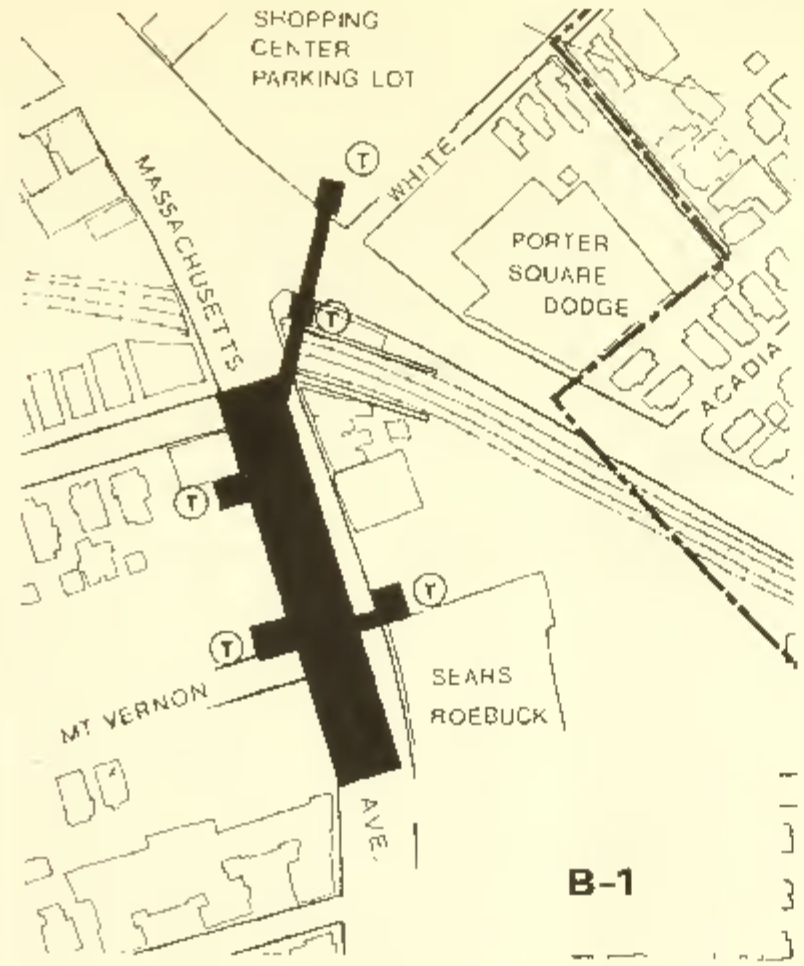
CAMBRIDGE SEVEN ASSOCIATES, INC.
1050 MASSACHUSETTS AVE.
CAMBRIDGE, MASS. 02138

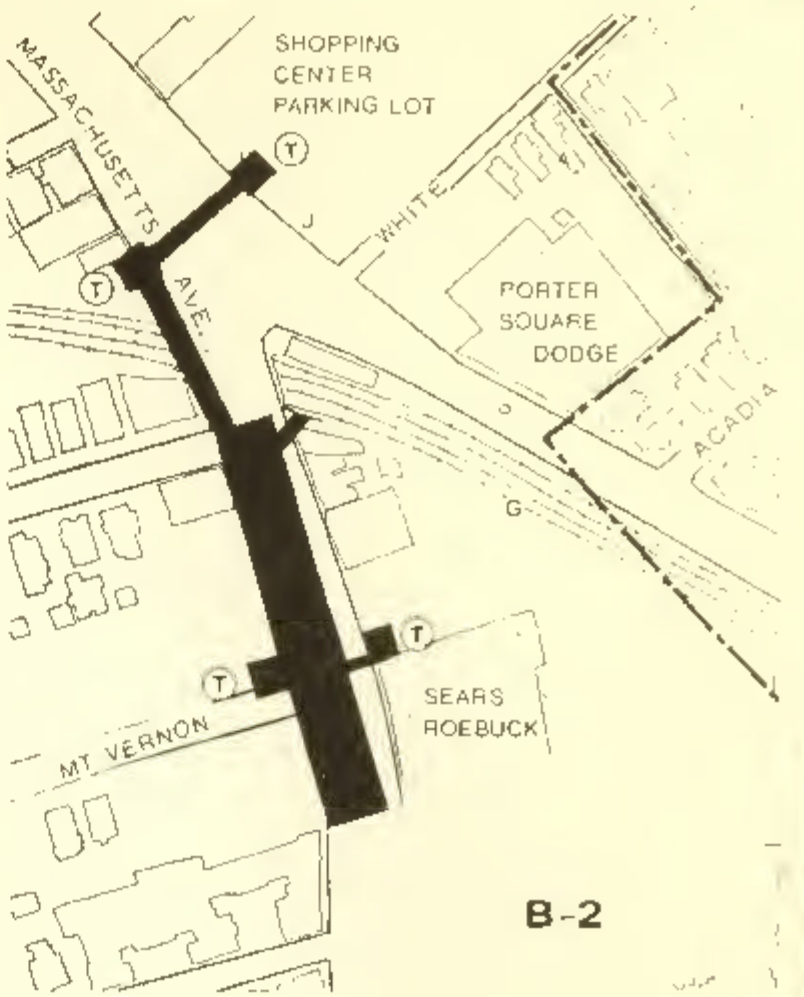
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

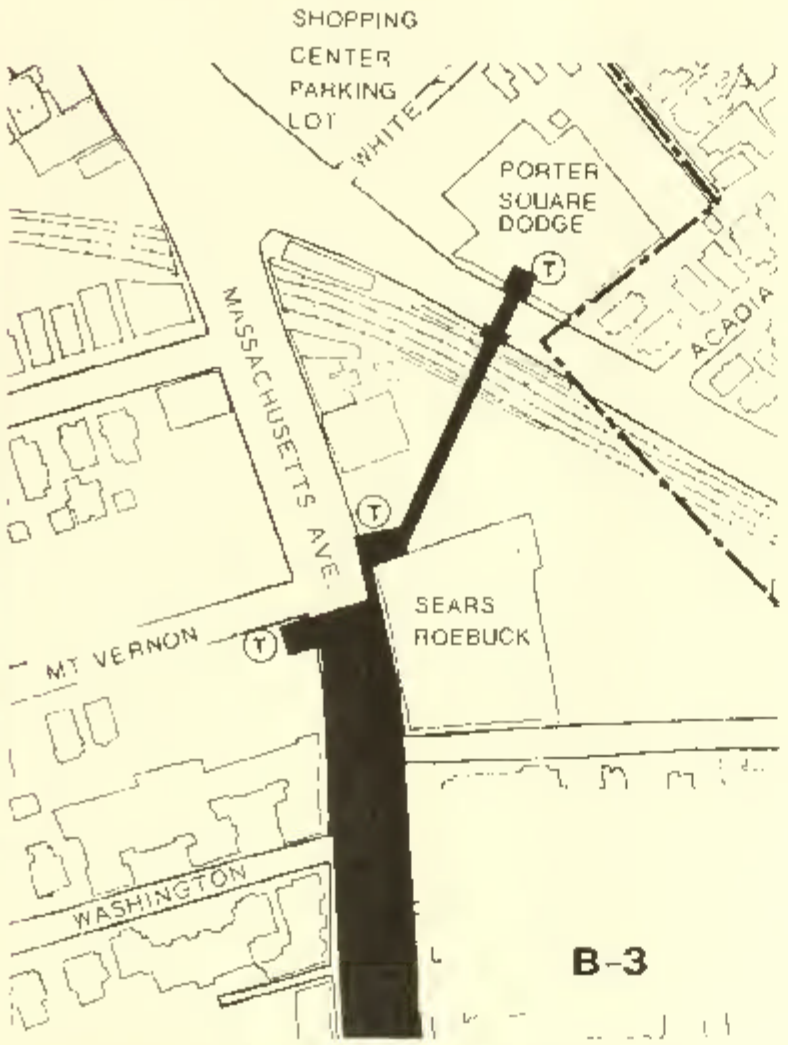
SCALE 1" = 20' | DRAWN BY | DESIGN BY | CHKD BY | PLAN NO.
DATE 4/6/77 | SHEET 47 OF

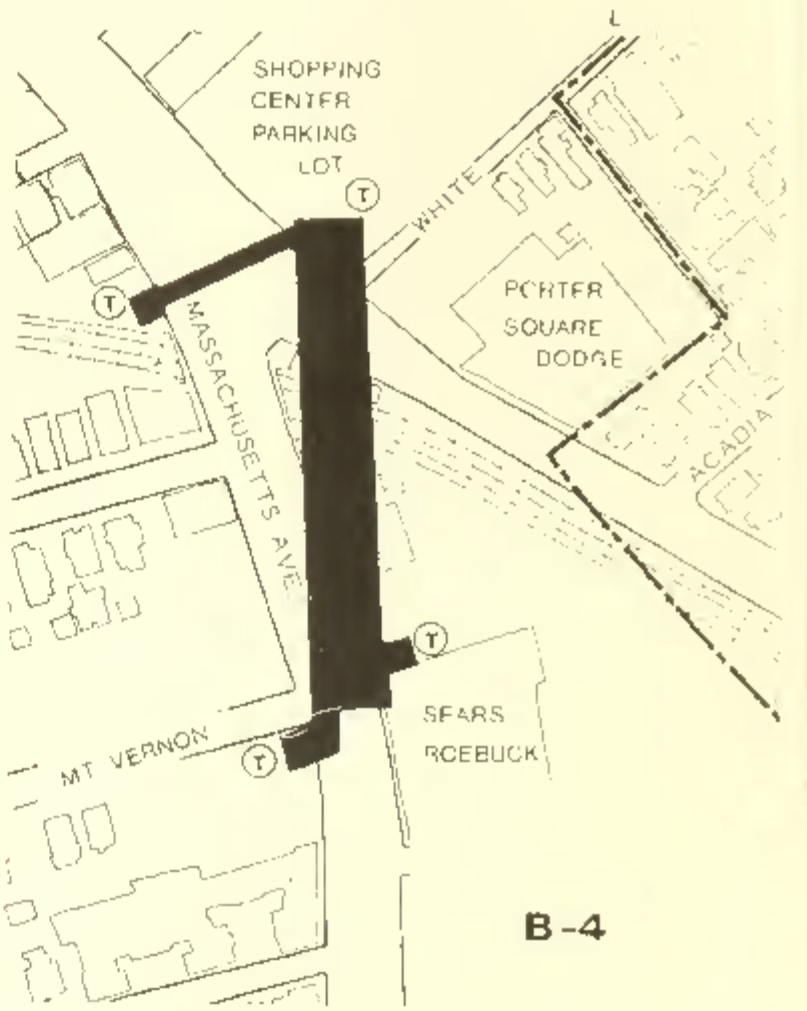
RED LINE EXTENSION STUDY
Massachusetts Bay Transportation Authority

PORTER SQUARE
SECTIONS
FIG. IV-4









STAT ON LOCA TION

ENTRANCE EXIT

RED LINE EXTENSION STUDY
Massachusetts Bay Transportation Authority

PORTER SQUARE
TAG STATION LOCATION ALTERNATIVES
FIG. IV – 5