CHAPTER I SUMMARY OF FINDINGS

I.A

Purpose

This report is a preliminary overview of engineering and environmental impact studies completed for the Central Area of Boston's proposed Central Artery project and is the basis for detailed future engineering, environmental and related studies for the South Area. In the report, the Central Area is described in terms of existing facilities, system characteristics, traffic characteristics, and environmental conditions. Then, alternatives for improvement are presented both in terms of possible construction external to the Central Artery Corridor and in terms of potential actions solely within the Central Area of the Artery Corridor. Subsequently, non Central Artery Corridor options are eliminated from further consideration because of construction, traffic, and/or environmental problems. Attention is then devoted to construction alternatives solely within the Central Area of the Central Artery Corridor.[1] Nine construction options are described and evaluated, and seven are proposed for further study. Finally, general conclusions and recommendations are reached regarding potential construction in the Central Area. Throughout this report, results are utilized from various analyses performed by the Massachusetts Department of Public Works (D.P.W.) and other organizations.

I.B

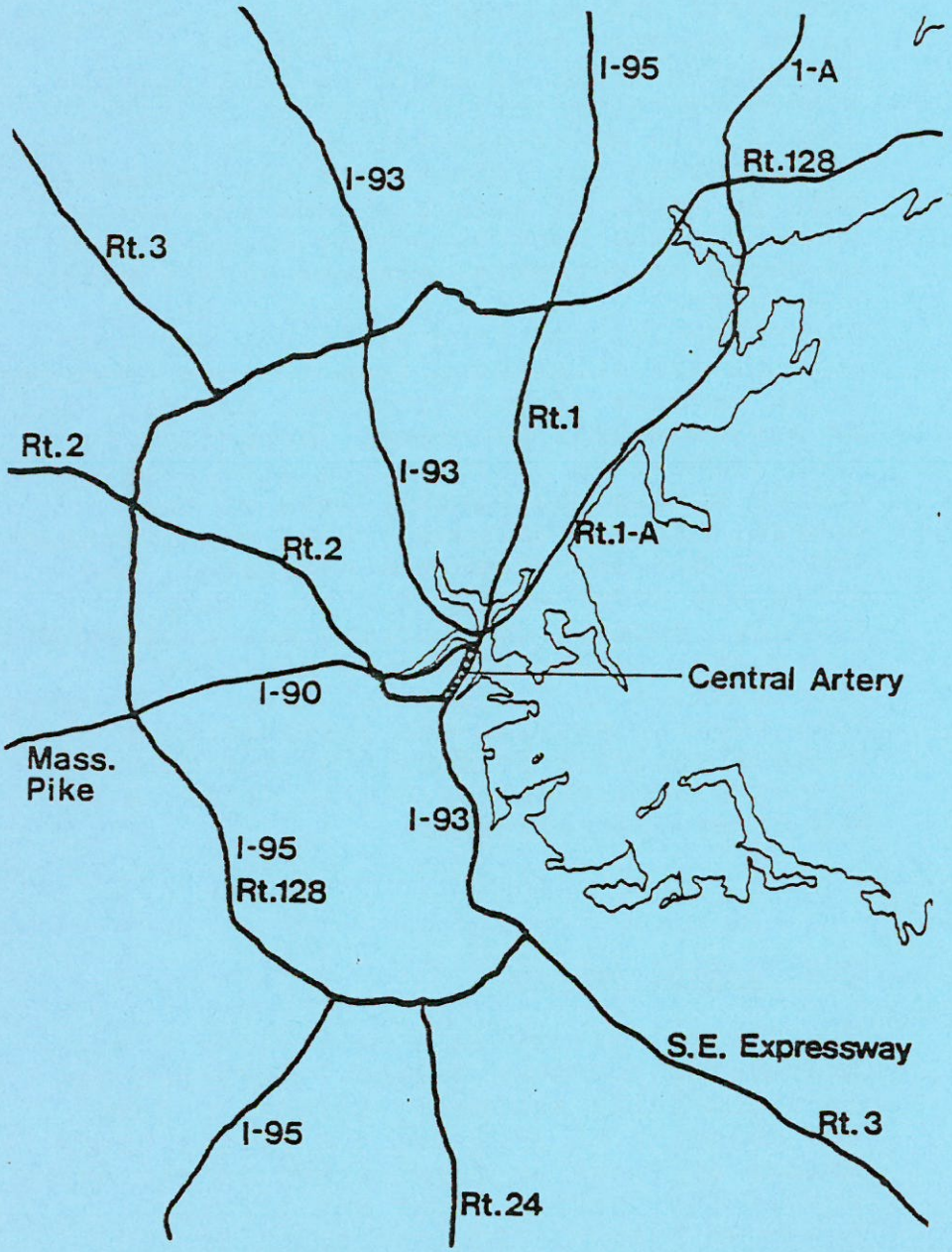
The Central Artery

The Central Artery is a multi-lane freeway traversing Downtown Boston. It stretches in a generally southerly direction from the junction of I-93 and the Mystic River Bridge approach in Charlestown on the north across the Charles River and through Downtown Boston, and then south to and including the Massachusetts Avenue and

[1] Construction options for the South and North sections of the Central Artery Corridor are taken up in separate reports.

the Southeast Expressway interchange which is just south of Boston's central business district. The highway is about three miles long, and is an integral part of I-93. Figure 1 shows the Central Artery in the context of the regional Boston express highway system.

Along its length the Central Artery connects with a number of arterial highways. Just south of the Charles River, Monseigneur O'Brien Highway and Storrow Drive join it,



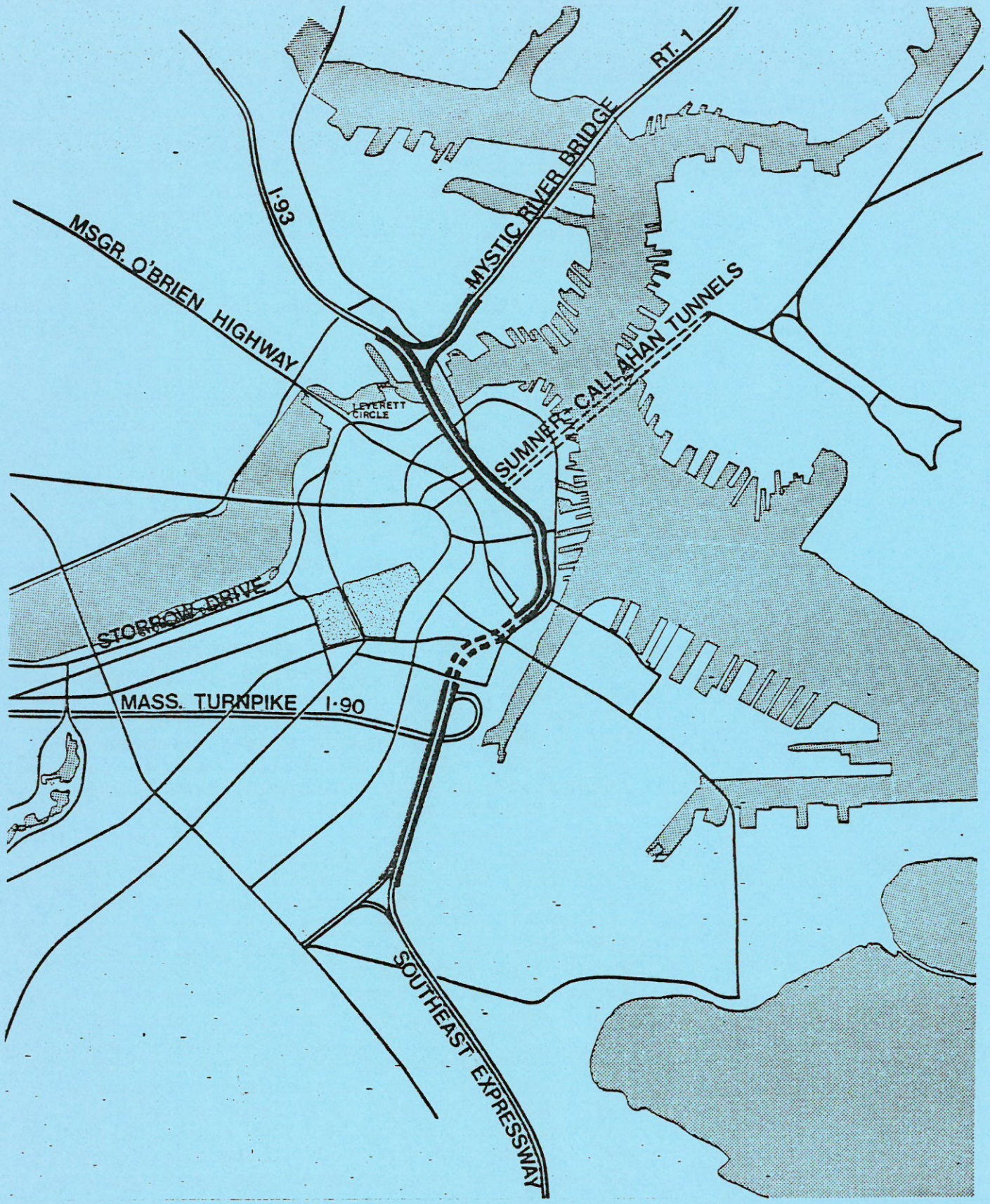
REGIONAL NETWORK Figure 1

as seen in Figure 2, and provide services respectively to the northwest and west. In the downtown area itself, the Central Artery connects with the Callahan and Sumner tunnels which carry traffic to and from East Boston and Logan Airport. In Downtown Boston, the Central Artery connects with numerous downtown streets. To the south of Downtown, there is a large interchange with the eastern terminus of the Massachusetts Turnpike.

Through its various interconnections, the Central Artery provides access to a number of specific districts of Downtown Boston. These include the financial district, the retail shopping area, the office district, the Government Center, the industrial and seaport areas in South Boston and Charlestown, the industrial area of East Cambridge and Charlestown, the North End, the North Station area, the Waterfront, Chinatown, the South End, West End, South Cove and South Boston residential areas.

When the Central Artery was constructed in the 1950's, it was conceived as the most important link of the full expressway network proposed in the 1948 Master Highway Plan for the Boston area. Because the Central Artery was built before Federal funds were available from Interstate highway programs, the highway's original capacity and design were restricted. Its insufficient capacity - generally the Central Artery is a six lane facility - creates a bottleneck at both its north and south ends. At its northern terminus, the five lanes from I-93 merge with five lanes from the Mystic River Bridge to form a facility of only six lanes across the Charles River. At the south end of the Central Artery, six lanes from the Southeast Expressway and six lanes from the Massachusetts Turnpike also merge together in a facility providing only six lanes. Traffic moving from and to other major roads along the Central Artery simply exacerbates the problems caused by the Artery's insufficient capacity.

From a design point of view, the Central Artery is also inadequate by modern standards. Throughout its three mile length, there are no breakdown lanes. It also has a total of 40 ramps, 26 for local



CENTRAL ARTERY

Figure 2

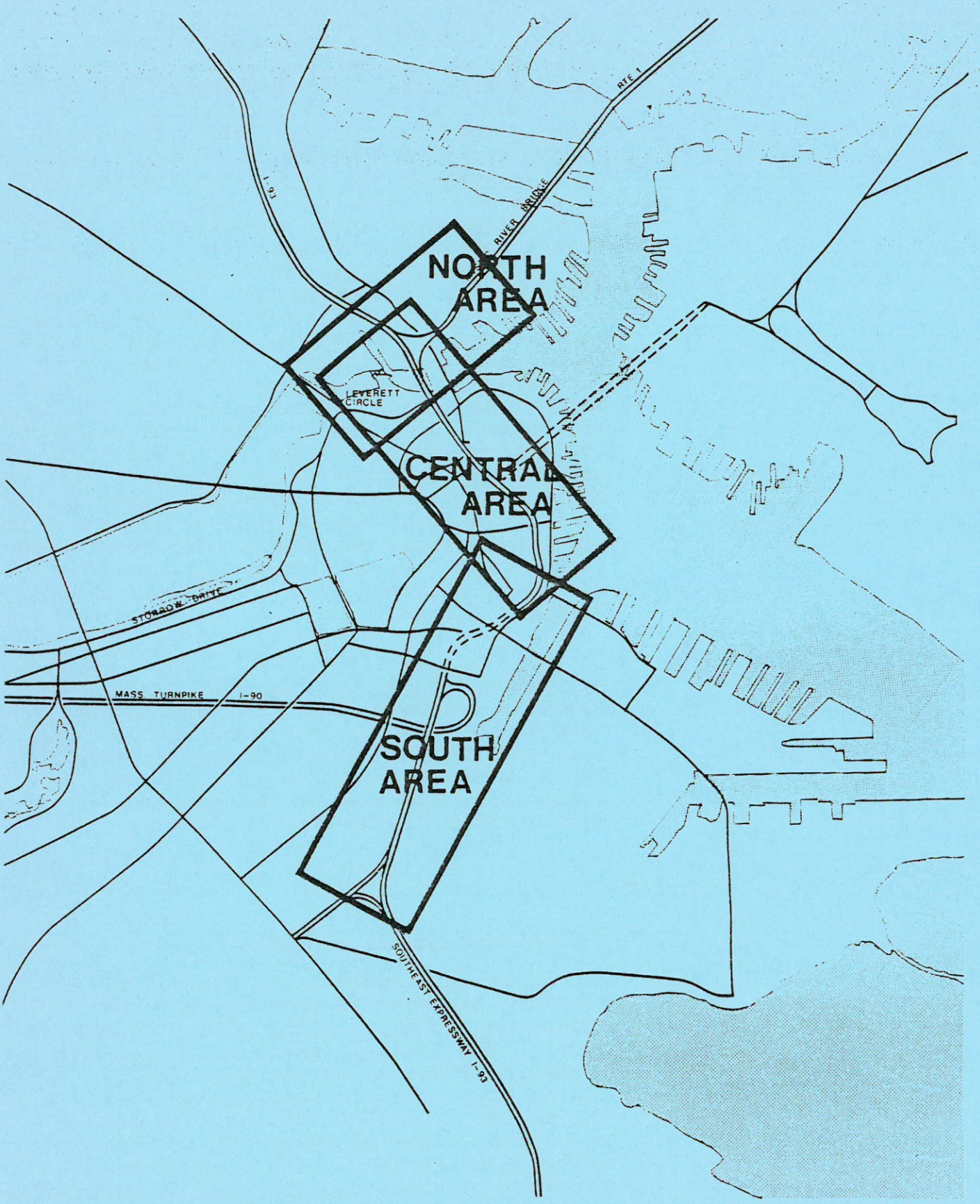
service, 7 for connections to expressways, the Mystic Bridge and the tunnels and 7 which serve both expressway and local connections. In the Central Area alone there are 15 ramps, 2 of which serve only expressway connections, 4 which serve both expressway and local connections and 9 which serve only local traffic. These ramps were designed to serve the estimated 85% of traffic wanting downtown access. Because of the lack of breakdown lanes, any traffic incident--even a stall--reduces effective capacity in the direction affected to one-third, or two lanes. Because of the original design, the ramps have insufficient sightlines and no acceleration or deceleration lanes. The restrictions create severe safety hazards and effectively diminish the practical capacity of the Central Artery roadway. In addition, the closely spaced ramps cause conflicts with local surface vehicular and pedestrian traffic. Finally, much of the Central Artery is an unsightly elevated structure. Its severe aesthetic and other environmental impacts are generally regarded as a blighting influence on Downtown Boston.

For years, it has been apparent that the numerous problems of the Central Artery need to be solved. This need has led to past and present Central Artery studies, which were all developed as a part of determining how best to address the deficiencies of the Central Artery.

I.C

The Central Artery Corridor

For planning purposes, the Central Artery Corridor has been defined as the area stretching roughly half a mile on either side of the Central Artery roadway, and a similar distance beyond each end of the Artery. The Corridor encompasses the entire area that is likely to be physically affected by potential Central Artery construction. The area of the Corridor includes a small area of Cambridge, about half of Charlestown, most of Downtown Boston, and substantial portions of the South End and the industrial area of South Boston. The Central Artery Corridor is shown in Figure 3. (A variant of the present Figure 2.)



ARTERY CORRIDOR STUDY AREAS

Figure 3

Also shown in Figure 3 are three designated sub-areas of the Central Artery Corridor: North, Central, and South. The Artery naturally divides into the three areas which have largely separable functions and physical features. Similarly, contemplated improvements to the different sections, while having the ability to fit together in a unified series of projects which nonetheless have individual benefits and can be constructed essentially independently of one another. This division of the whole Corridor into three parts helps in planning Central Artery improvements which are both analytically manageable and implementable. This division into subareas is analytically helpful because of the greater focus on construction alternatives, their impacts and the way in which each performs required transportation functions. From an implementation standpoint, area designation also provides a basis for realistic assessment of the probable sequencing of funding and construction timing for potential project elements. It also allows planning of alternative improvements on a varying scale of expenditure to maximize benefits and to direct project elements toward solutions to individual problems.

I.D

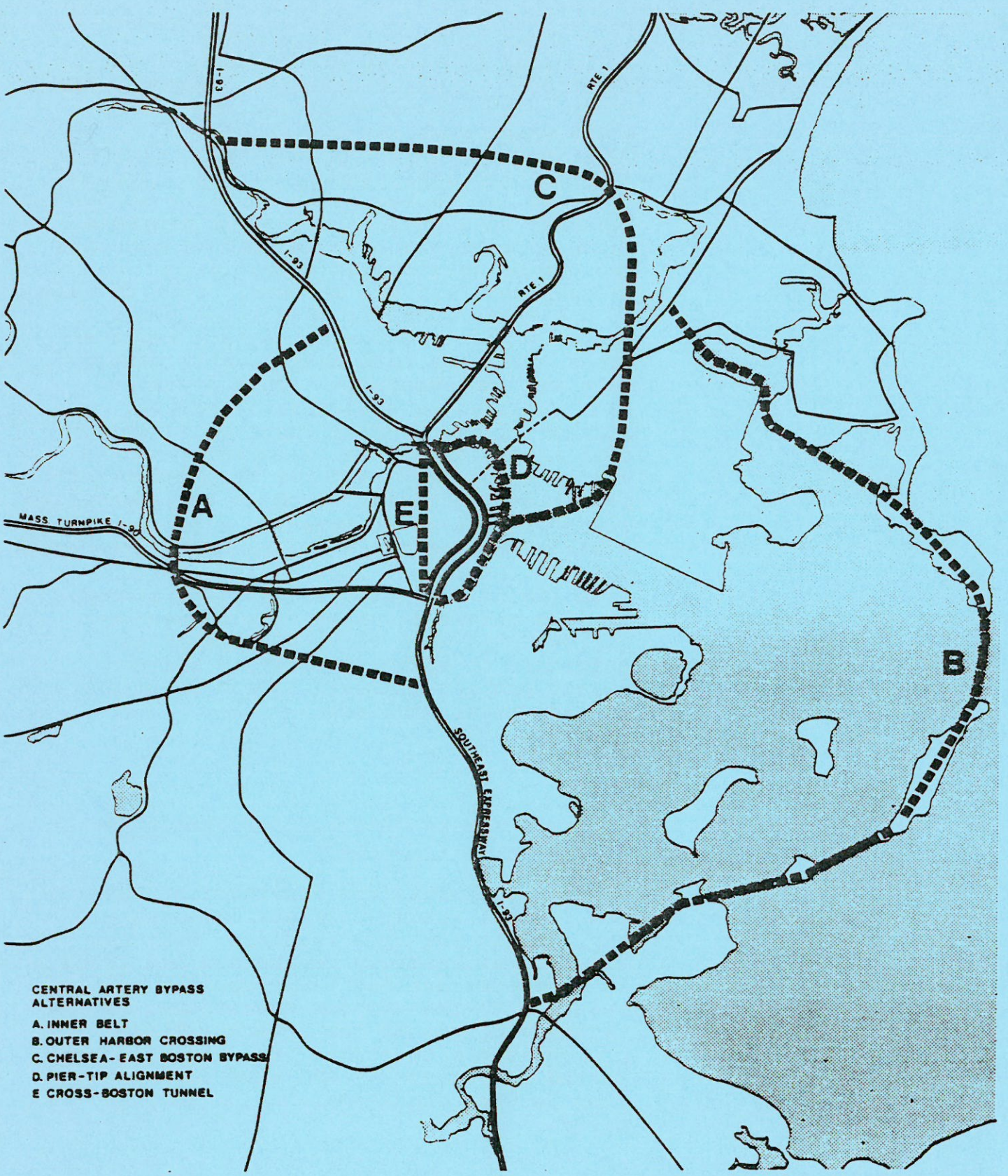
Alternatives to Construction Within the Central Artery Corridor

Several proposals for construction outside the Central Artery Corridor have been explored in previous studies. Each one has been extensively reexamined and found to be inadequate and inappropriate as a solution to the various operational and safety problems of the Artery. These proposals are described below and illustrated in Figure 4. All have been dropped from further consideration for reasons cited.

I.D.1

Alignments Outside the Corridor

A. The Inner Belt - This option was ruled out by Governor Sargeant in 1971 for these reasons: residential takings and relocation requirements, community



ALTERNATIVES TO THE ARTERY CORRIDOR

Figure 4

disruption, community protest, technical questions regarding ability to accommodate projected traffic volumes, and generation of additional traffic for the Boston core area.

B. Outer Harbor Crossings - This proposal for a highway from Quincy to Winthrop via the harbor islands and a combination of bridges and causeways was ruled out because of impacts to public open space, intrusion into the flight paths of Logan Airport, inadequate provisions for connections to other expressways, and lack of downtown collection/distribution relief.

C. Chelsea/East Boston Bypass - This option from I-93 North via Chelsea and East Boston to a tunnel under the harbor was ruled out, among other reasons, because of residential takings and relocation requirements, community disruption, impacts on shipping in Chelsea Creek, the necessity of a tunnel under East Boston, and partial dependence on I-95 in Lynn (dropped in 1972) and the proposed I-95 relocated in Revere (dropped in 1972). The tunnel under the harbor is the proposed Third Harbor Crossing, a part of the long-range regional expressway network. This report considers the crossing in relation to Central Area alternatives.

D. Pier Tip Bypass - This alternative would consist of a highway from Charlestown to South Boston via a harbor tunnel along the tips of the downtown piers. It has been ruled out from further consideration because of lack of necessary connections with the Sumner-Callahan tunnels, steep grades, and difficult design and engineering problems such as ventilation and interconnections with other expressways.

E. Cross Boston Tunnel - This option would involve a tunnel from Charlestown to South Station under Beacon Hill, the Boston Common, and the downtown Boston retail area. It was ruled out because of technical infeasibility, questions of grades

and ventilation, lack of interconnections with expressways, failure to connect with the Sumner-Callahan tunnels, and lack of collection/distribution services.

I.D.2

Analysis of Alignments Outside the Corridor

Analysis of the potential of construction outside the Corridor to solve problems of the Central Artery resulted in several major conclusions. First, technically and and socially feasible alternative alignments which provide for Central Artery functions cannot be found outside of the Corridor. Second, alignments within the Corridor are the only ones that can reasonably and effectively connect to all expressways and tunnels and also serve downtown collection/distribution needs. Third, costs are high for construction in all alternative corridors. As a result, it is appropriate that specific alternative improvement projects be developed for the Central Artery Corridor. In accordance with normal highway planning practice, the alternatives should include the "no build" option, which would, at least, provide for necessary bridge deck repair and renewal.

I.E

Alternatives Within the Present Corridor

I.E.1

Alternative Reduction

The present Artery facility passes through the highest valued real estate in the State, in an area of extensive urban renewal activity and land undergoing significant changes in use. The present surroundings of the Artery form major constraints on the development of alternatives, and have resulted in the dropping of several possibilities. These include:

1. Double-decking of the present elevated facility. This option has been dropped because of: impacts on adjacent areas, including buildings which are very close

to the Artery; difficult design and engineering problems of connecting the upper roadway to other expressways (local street connections are virtually impossible to provide without extensive land damages); a second double deck bridge over the Charles River; additional lanes may not be necessary if all the expressway connections cannot be provided and may be in conflict with regional transit and air quality control plans.

2. Widening the Artery. This option has been dropped as a permanent solution because of: impacts on adjacent areas and buildings; difficult design and engineering problems at ramp areas and for connections to expressways. Partial widening of the Artery has been retained as a possibility for minimal improvements to the Artery, and for temporary measures to reduce traffic disruption during reconstruction of the decks (See No Build Option).

3. Tunneling for one directional movement. This option has been dropped because: it produces significant disruption and costs while retaining the existing structure permanently for the return movement; difficult engineering and design questions emerge in connecting to existing expressways and surface streets; an additional six lanes may conflict with regional transit and air quality control plans; substandard alignment and design will remain, at least in one direction; the decks on the existing facility may also need replacement, despite other new construction.

The remaining options have been extensively examined in conjunction with other possible projects in or connecting to the Corridor. In all instances, it has been assumed that the North Area Project will be undertaken; without it, the proposed alternatives for the Central Area cannot be undertaken.

The remaining possible projects which seriously influence decisions in the Central Area of the Artery Corridor are:

1. The proposed improvements in the South Area of the Artery Corridor.

2. The proposed Third Harbor Tunnel between Downtown and Logan Airport: if constructed this project would connect only to Logan Airport. It has two possible forms of services:

   a. A special purpose tunnel, serving only buses, trucks, taxis and emergency vehicles to and from the Airport.

   b. A general purpose tunnel serving all types of vehicles to and from the Airport.

3. The proposed transitway between North Station and South Station. This proposal is included in all alternatives for reconstruction of the Central Area of the Artery Corridor.

I.E.2

Alternatives for Examination

The alternatives which result from combining the options for the Central Area of the Artery Corridor are illustrated in the following figure:

Figure 5: Central Area Alternatives

	Without 3rd Harbor Tunnel	With 3rd Harbor Tunnel	
		Special Purpose	General Purpose
No Build	Alt. 1	Alt. 2	Alt. 3
Reconstruction Without South Area With Transitway	Alt. 4	Alt. 5	Alt. 6
Reconstruction With South Area With Transitway	Alt. 7	Alt. 8	Alt. 9

Each of these alternatives is described briefly below.

Alternative 1 - The No Build Alternative

The No Build Alternative has been developed to explore the possibility of retaining the existing elevated facility, with some modifications to it, to improve its functioning and its useful life. The existing structure was erected in 1954-9, and may be in need of major repair prior to 1984-9. The decks of the existing structure will be replaced to remedy deck deterioration from the combined effects of 30 years of heavy traffic and the annual applications of calcium for snow removal. There are three methods of undertaking this work:

a. Rebuilding of one lane of the deck at a time;

b. Selective ramp rebuilding, replacement or addition prior to rebuilding of one lane of the decks at a time;

c. Temporary widening of the Artery, to allow rebuilding of two lanes of the decks at a time, without loss of existing capacity.

Any of these No Build Options can be constructed with or without the proposed South or North projects in the Artery Corridor, with minor changes in design.

Alternative 2 - The No Build Alternative With a Special Purpose Third Harbor Tunnel

Alternative 2 is similar to Alternative 1 in all respects except its relation to the South Area of the Artery Corridor. In the South Area, with a Special Purpose Tunnel, there are two variations of tunnel approaches which are possible:

a. Fort Point Channel two-way approaches to the tunnel.

b. Fort Point Channel one-way approach to the tunnel and return via Dewey Square Tunnel.

Alternative 3 - The No Build Alternative With a General Purpose Third Harbor Tunnel

Alternative 3 is identical to Alternative 2 in all respects except its ability to divert traffic from the Central Area of the Artery. Through construction of a general purpose tunnel to the Airport, a larger proportion of the traffic now using the Central Area of the Artery Corridor may be diverted. The options are similar to Alternative 2:

a. Construction of the Third Harbor Tunnel entirely within the Fort Point Channel, with no change in the Artery's Dewey Square Tunnel.

b. Construction of the Northbound approach to the Tunnel in the Fort Point Channel, with the return using the existing Dewey Square Tunnel of the Artery.

Alternative 4 - Reconstruction of the Central Area of the Artery With No Other Major Improvements

Reconstruction of the Central Area of the Artery Corridor may be desirable to maximize the transportation and environmental improvements which are needed in the Corridor.

Two major construction techniques have been analyzed:

a. Reconstruction by erecting temporary oneway facilities that allow removal of half the Artery lanes and structure and construction of half of the replacement tunnel at a time;

b. The tunnel is constructed beneath the existing elevated Artery structure, and the existing facility is maintained for traffic until sufficient tunnel construction is completed to allow diversion of traffic from the elevated facility to the new tunnel. With traffic in the new tunnel, the existing structure is demolished, and the new tunnel is widened to full width and completed.

Both of these options are feasible; however, Option (b) provides for less disruption to existing traffic during the construction period. It also offers the lesser construction period and affords fewer disruptions not only to traffic but to the adjacent areas.

The transitway between North and South Stations is a principal component in all reconstruction options. In Option (a) above, it is added when construction of the Artery tunnel is completed. In Option (b) above, the transitway tunnel is in the median of the new highway tunnel and therefore forms an integral portion of the proposed facility.

Alternative 5 - Reconstruction of the Central Area of the Artery Without the South Area Project With the Special Purpose Third Harbor Tunnel

Alternative 5 is similar to Alternative 4, with the exception that the Third Harbor Tunnel would be constructed in the Fort Point Channel as a unit having no reference to the South Area of the Artery Corridor. If constructed in this manner, the Third Harbor Tunnel would preclude subsequent improvements to the South Area of the Corridor.

Alternative 6 - Reconstruction of the Central Area of the Artery Without the South Area Project With the General Purpose Third Harbor Tunnel

Alternative 6 is identical to Alternative 5, with the exception that the Third Harbor Tunnel would be constructed as a general purpose facility.

Alternative 7 - Reconstruction of the Central Area of the Artery With the South Area Project

Alternative 7 is similar to Alternative 4 except that the transition area in the vicinity of the Dewey Square Tunnel at Congress Street would not be subject to major

disruption during the construction period. The construction of a new Fort Point Channel Tunnel as part of South Area improvements would alleviate the transition of traffic into the new facilities during the construction period.

Alternative 8 - Reconstruction of the Central Area of the Artery With the South Area Project and With the Special Purpose Third Harbor Tunnel

Alternative 8 is similar to Alternative 7, with the addition of the Special Purpose Harbor Tunnel to the Airport. The connection between the Third Harbor Tunnel and the South Area Project would take place in the vicinity of Northern Avenue.

Alternative 9 - Reconstruction of the Central Area of the Artery With the South Area Project and With the General Purpose Third Harbor Tunnel

Alternative 9 is identical to Alternative 8, with the addition of the General Purpose Harbor Tunnel to the Airport. As in Alternative 8, the connection between the Third Harbor Tunnel and the South Area Project would take place in the vicinity of Northern Avenue.

Conclusions

1. Work may have to be done on the Central Area of the Artery Corridor within the next 10 years, to replace the existing decks in order that the Artery can continue to function.

2. Given the scale of disruption which may accompany the replacement of the decks in the Central Area of the Artery, consideration must be given to alternatives which may address the functional problems of the Artery as well as the potential disruption from construction.

3. There are no feasible alternatives to the present Artery Corridor which can solve the problems of disruption during deck rebuilding or which are suitable corridors for permanent new facilities.

4. A series of alternatives within the Artery Corridor have been examined. A number are not feasible: double-decking the present elevated Artery facility; widening the Artery; tunneling for one directional movement.

5. A number of alternatives appear to be feasible. (See Figure 1). Of these alternatives, some appear to offer substantially greater potential than others to address the transportation and construction problems of the Artery.

6. Alternatives 1, 4, 7, 8 and 9 should be studied in detail.

7. Alternatives which should not receive any further examination are Alternatives 2a, 3a, 5 and 6, all of which share the common deficiencies of requiring major construction without addressing any of the basic transportation problems of the Artery, and precluding any future improvements in the South Area of the Artery Corridor.

8. The Third Harbor Tunnel serves purposes and has benefits that are different from reconstruction of the Central Artery. All Central Area alternatives - other than the No Build (Alternative 1) - should be designed to accommodate the Harbor Tunnel as a future project, and it should be retained as part of the long-range plan. It is feasible to proceed with the reconstruction of the South Area of the Artery Corridor in advance of the Central Area project. Detailed study of design, costs and impacts of the Third Harbor Tunnel should proceed separately from the Artery project. Future network analyses of the Artery project should include both build and no build options of the Third Harbor Tunnel.

9. Questions which should receive special attention during analysis of remaining alternatives are as follows:

   a. All alternatives require detailed analysis of:

      - construction techniques and phasing
      - traffic control during construction
      - transportation service
      - demand/capacity analysis
      - surface street impacts
      - relation to harbor crossing demand and airport service
      - safety during and after construction
      - air, noise, and water quality impacts
      - economic impacts (regional and local) during and after construction
      - social impacts to adjacent neighborhoods and the region, during and after construction
      - land use and urban design considerations
      - detailed cost estimates
      - employment generation

   b. Reconstruction alternatives require, in addition, detailed analysis of:

      - ventilation requirements
      - joint development and overbuilding opportunities
      - decking requirements
      - tunneling requirements
      - dangerous cargo handling
      - joint rail line construction
      - rail line service, space requirements