

## How this Edition is Organized

This special commemorative issue of *The Boston Print News* was written entirely by Dr. Eric J. Plosky, the former Director of the Metropolitan Boston Circumferential Transit Commission and the Kenneth E. Kruckemeyer Professor of Big Plans at the Massachusetts Institute of Technology. It is intended as an educational supplement suitable for university-level classes in large-scale planning and infrastructure development. The issue is organized into sections. The main article is a chronological narrative of the procedures that went into the Urban Ring's design and implementation. Sidebars go into greater detail on featured topics — public involvement, design alternatives, finance, and cost. And featured throughout are charts, photographs, diagrams, and tables illustrating some of the specifics. At the end of the issue is a detailed summary of Ring operations as well as a brief commentary on the success of the system and its future prospects.

This is the Cambridge edition of *The Boston Print News* Urban Ring special issue; it features a detailed description of the Cambridge segment of the Ring. The Somerville/Chelsea/Everett/East Boston edition and the Boston/Brookline edition are both available at your local newsstand.

# Metropolitan Boston Celebrates Five Years of the New Urban Ring

Today is the fifth anniversary of the opening of the New Urban Ring, a circumferential transit line around metropolitan Boston known as the "Ring Line." Service on the Ring Line was inaugurated on May 12, 2012, when Massachusetts Governor Kenneth E. Kruckemeyer drove the first trolley out of the reconstructed Airport T station in East Boston.

Conception, design, and implementation of the Ring Line took place in a time of incredible public-transit development in and around Boston. Since the turn of the century, in addition to the opening of the Ring Line, the Blue Line-Red Line connector at the Charles Street T station was built, Green Line trolley service was restored along the Arborway (E) line, the South Piers trackless-trolley transit project was completed, and long-planned Green and Orange Line extensions were constructed.

It is difficult to imagine a Boston without these crucial transportation links, but such was the condition of the city only fifteen years ago. Access to points served by the Ring Line was, in many cases, very difficult at best. Taking the T to the airport required a trip directly through congested downtown Boston at the least — Red Line riders had to switch trains twice, both in the center of downtown.

Part of the Boston region's current economic boom is due to the existence of the Ring Line. Until 2012, growth in the Urban Ring zone was limited by the inadequate public-transit infrastructure. After the Ring Line opened, thousands of new workers could commute to and live in the Urban Ring development area without further straining the inadequate road network. As a result, computer hardware and software companies, biotech firms, and other high-profit, cutting-edge in-

dustries located in the Ring — as well as more traditional companies located in the Ring — began to prosper as never before.

As is well known, transportation by automobile within metropolitan Boston is arduous under almost any circumstances, especially rush-hour. It was not expected that the Central Artery project by itself (the Big Dig was completed in mid-2010) would make navigation through downtown easier. However, as has been seen over the past five years, congestion in the downtown region has been reduced considerably. This reduction has been made possible both by the Central Artery depression (which increased capacity in the downtown region) and by the Ring Line, which finally made it possible to get from one side of Boston to the other without driving through downtown or taking the existing T lines through downtown.

In short, the vision of the Urban Ring was to reduce congestion in downtown Boston (on both the road network and the radial Red, Blue, Green, and Orange T lines), to improve transportation between points within the Urban Ring development zone, and to make sustained economic growth within the Urban Ring zone a possibility well into the twenty-first century.

This issue of *The Boston Print News* tells the story of the Ring Line — what went into it, how it was designed and implemented, and what has come of it. The Boston region is easily a better place to live and work than it was even five years ago — transportation has improved, the economy has improved, growth has increased, and congestion has been reduced. This publication tells how it happened — it tells the story behind the New Urban Ring.

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**NEW URBAN RING  
PROJECT TIMELINE  
1997 – 2000**

M.B.T.A. acquires federal ISTEA funding to cover preliminary costs of surveys, studies, administration, and organization.

Identification of Urban Ring development area complete — C-shaped loop through East Boston, Chelsea, Everett, Charlestown, Somerville, Cambridge, the Boston University area, the Longwood medical area, the South End/Northeastern University area, Roxbury, and Dorchester.

Initial Urban Ring development area studies complete — major employment and activity centers identified and possible transit corridors identified.

Separation of project from M.B.T.A. — Metropolitan Boston Circumferential Transit Commission established.

Initial work in setting up public committees complete.

Cooperative agreements with M.B.T.A. and with Massachusetts Secretary of Transportation complete.

Cooperative agreements with Boston, Brookline, Chelsea, Everett, Cambridge, and Somerville complete.

Cooperative agreements with neighborhoods of Charlestown, East Boston, Roxbury, Dorchester, Jamaica Plain, and South Boston complete.

Public committee structure complete.

Public relations procedures complete.

Project organizational structure complete.

M.B.C.T.C. (“the Commission”) formally recognized by the Commonwealth of Massachusetts, by the federal government, and by the municipalities involved. Governor appoints Eric Plosky Commission Director. The Commission holds its first press conference.

**The Story of the New Urban Ring:  
Project Organization and Public Involvement, 1997 – 2000**

The idea of circumferential transit around the downtown Boston region is an old one. In the mid-twentieth century, as part of the United States interstate highway system, a circumferential highway known as the Inner Belt was planned. There was widespread popular opposition to a circumferential highway (as well as to other highway projects around Boston). In response to this opposition, Massachusetts Governor Frank Sargent declared in 1970 a moratorium on highway construction within the loop created by Route 128, effectively cancelling the Inner Belt (even though some land had already been cleared for the project).

Real planning for what eventually became our familiar New Urban Ring, which was pitched as a transit alternative to the unpopular Inner Belt, did not begin until some time later. By 1995, the Massachusetts Bay Transportation Authority (the Boston area’s public transit agency) had formally identified the New Urban Ring development area, and, by 1998, had completed several initial stud-

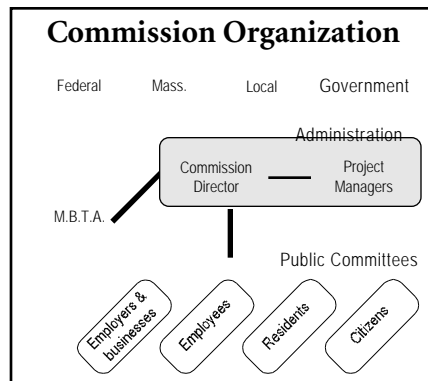
ies of the Urban Ring area.

By this time, it was clear that the M.B.T.A. did not have the land-use experience or organizational ability to handle the Urban Ring project by itself. For that reason, the M.B.T.A., working in conjunction with the Massachusetts Transportation Secretary, established the Metropolitan Boston Circumferential Transit Commission. The Commission would ultimately be responsible for the entire Urban Ring project.

Initially, however, the Commission operated within and under the auspices of the M.B.T.A. Since the Commission did not yet have any resources of its own, this cooperative arrangement meant that the funding so far obtained by the M.B.T.A. under the federal Intermodal Surface Transportation Efficiency Act of 1991 could be utilized by the Commission.

While operating under the M.B.T.A., the Commission began to solidify its organizational structure. Public committees (see sidebar below) and public-relations procedures were put in place. Cooperative agreements with the state agencies and municipalities involved were also signed to assure full public involvement.

By late 2000, initial studies were complete. The Commission had completed its internal organization and was ready to operate independently. At the first official project press conference, the governor of Massachusetts appointed Eric Plosky Commission Director. The groundwork had been laid; it was now time for the Commission to proceed with the project.



**Public Involvement**

In order for a project as big as the New Urban Ring to succeed, the public must be informed and involved at every step. From the initial stages to the running of the first trolley, the Ring Line project ensured public involvement by incorporating public representatives and commissions into the organizational structure.

Four public committees were created — for *employers and businesses* within the Urban Ring, for *non-resident employees* of those businesses (commuters), for *residents* of the Urban Ring, and for *citizens* of each of the affected towns.

The members of the public committees were determined by the respective groups. For example, the members of the “employers and businesses” committee were chosen by a coalition of Urban Ring universities, medical institutions, and businesses.

Consensus was not required of the public committees in order for work to proceed. Rather, the intent behind public involvement was to ensure that the public was fully informed and could easily communicate with the project administrators. So while the public did not have a formal veto power over project elements, the public could nevertheless exert some influence over, and could make its opinions directly known to, the project administrators.

1997

1998

1999

2000

# Designing the Ring Line: Alternatives, 2000–2004

The Commission immediately began survey work. The top priority was to complete a detailed analysis of existing street-level rail and rights-of-way in the Boston region. Information was received from the M.B.T.A., from the regional freight carrier Conrail, and from other operators. By mid-2002, a detailed study of freight operations in and around Boston was complete, and all grade-level rail and rights-of-way had been inspected. As a result of that study, the Commission determined, largely in the northern metropolitan area (Cambridge/Somerville/Chelsea/Everett/East Boston), that existing street-level rail could be useful to the Urban Ring — or at least that the existing rights-of-way could be useful.

Also, analysis was done of existing and planned M.B.T.A. transit lines, stations, rolling stock, maintenance yards, and other facilities. Ridership and capacity projections were carefully reviewed, as were the T's plans to expand service and introduce new vehicles. In addition, a population-growth analysis of the Boston region was completed, as was a detailed economic forecast.

These analyses were important because they helped to dictate where the Urban Ring should be located in order to be most effective. Also, they indicated where the Urban Ring might need to interface with the existing T lines, and furthermore *how* the interfaces might be accomplished.

By early 2003, almost all of the analyses had been completed, and the Urban Ring transit corridor — where the transit line would have to be located — was

formally and finally declared. A detailed analysis of the land along and around the transit corridor was then commenced so the Commission would have some sense of what development or redevelopment could be accomplished.

Meanwhile, ongoing since late 2001, teams were working on drawing up design plans for Urban Ring transit systems based on buses, trackless trolleys (“trolleybuses”), trolleys, and subways. The Commission retained two private firms, each of which were obliged to present four different designs, and also solicited input from Harvard University and the Massachusetts Institute of Technology. Also, some of the public committees, and indeed some non-Commission-affiliated civic groups, drew up their own plans — in some cases, they also retained private firms.

As analyses of the transit corridor were completed, one by one, the teams altered their designs to take the new information into account. Design was, therefore, a dynamic process — change and improvement was spurred both by new Commission data *and* inter-team rivalry, especially among the public committees.

The whole design process was made as public as possible. Thanks to the Commission's sharp public-relations division, the Urban Ring design phase was always perceived by the public as an open, competitive process, at the end of which the winning design would be selected on merit alone — not selected as a result of political or socioeconomic biases.

*(Design process continues, next page →)*

## NEW URBAN RING PROJECT TIMELINE 2001 – 2004

Survey of M.B.T.A.-owned street-level rail and rights-of-way complete.

Information from Conrail, Amtrak, and other surface-rail companies in the metropolitan area, regarding non-T-owned street-level rail and rights-of-way, received and processed.

Work begun on trolley-based, trackless trolley-based, bus-based, and subway-based Urban Ring solutions.

Visual inspection of existing rail and rights-of-way complete.

Analysis of current and pending T contracts for new vehicles (buses, subway cars, trolleys, trolleybuses) complete.

Analysis of existing T rail, rolling stock, stations, and maintenance facilities complete.

Analysis of Boston-area freight rail service complete.

Detailed survey of transit corridor complete. Survey and analysis of street-level rail in transit corridor complete.

Urban Ring transit corridor formally & finally identified.

T operating reports, ridership projections, and capacity projections to 2020 received and analyzed.

Analysis of land ownership along Urban Ring transit corridor complete.

Analysis of land use and land utilization along transit corridor complete.

Presentation of designs to Commission.

Commission hosts a series of sessions to debate the presented designs. Public committees, and the public in general, play a large and active part.

Commission selects trolley-based system for the New Urban Ring. Names transit project ‘Ring Line.’

2001

2002

2003

2004

### Design Alternatives

Although a trolley system was eventually determined to be the best Ring Line solution (see next page), the Project Commission carefully considered transit systems that have proven successful elsewhere:

#### Bus (diesel/natural gas).

Would have been cheaper and perhaps more flexible than the chosen trolley system. But buses pollute, are noisy, have to deal with traffic, couldn't provide free interchanges with the existing T lines, and are uncomfortable. Also, there is a social stigma about buses — they are perceived as ‘lower class.’

#### Trackless trolley.

Still operating near Harvard, trolleybuses are flexible, like buses, are cheaper than trolleys, and are clean and quiet. But they are in short supply and require special training & maintenance; the T was phasing them out at the turn of the century. They too are stigmatized and must cope with traffic.

#### Subway (deep bore).

A heavy rail system would have provided the greatest speed and capacity, but at staggering cost. In most areas, cut-and-cover construction would not have been possible; deep tunneling, as in North Cambridge, was inappropriate to the scale of the Urban Ring project.

## NEW URBAN RING PROJECT TIMELINE 2005 – 2008

The Commission, already engaged for some time in political lobbying, sends full-time representatives to Washington, D.C., to participate, in whatever way, in final legislative action regarding "ISTEA II" — a proposed sequel to the Intermodal Surface Transportation Efficiency Act of 1991. Both Massachusetts senators, and all Massachusetts congresspersons, are brought on board by the Commission's political-relations subcommittee.

Commission prepares analyses needed to begin competitive-bid process as a prequel to Ring Line groundbreaking.

The Intermodal Surface Transportation Efficiency Act of 2005 becomes law. The Metropolitan Boston Circumferential Transit Commission, representing the Commonwealth of Massachusetts, is awarded "ninety percent financing" for every year between 2007 and 2012, inclusive, to construct the New Urban Ring, eliminating the need to float bonds or levy taxes.

The competitive-bid process begins, starting with right-of-way renovation in Cambridge.

Negotiations with Conrail and the M.B.T.A., regarding street-level rail and right-of-way, complete. The M.B.T.A. agrees to use its "Grand Junction" line to transfer commuter rail equipment between North and Stations only during T non-operating hours; Conrail agrees to limit freight service on that line to those hours.

All construction bids awarded.

Groundbreaking (Cambridge).

Negotiations with the M.B.T.A., regarding Ring Line ownership and operation, complete. M.B.T.A. will be the sole owner and operator of the Ring Line following its opening.

Land development and re-development plans along the Ring Line solicited.

## Selecting the Trolley-Based System, 2004–2005

(Continued from previous page.)

In early 2004, after the Commission completed its land-use analyses, the design teams presented their plans. This was a highly public and publicized affair; all were encouraged to attend. Following the formal presentations of the Commission's own firms and the four public committees, outside public groups were invited to present their designs.

In all, presentations took two months. A nine-month debate period followed, during which time the Commission administration, the public committees, and the general public thoroughly investigated and questioned all the designs. The debates were extensively covered by the local media, and Boston-area politicians hailed the extent to which citizens became involved with the project.

## Securing Financing & Planning for Construction, 2005–2008

Before construction could begin — before the call for contractors could even be issued — the Commission had to be assured that Ring Line construction would be fully financed.

It was hoped that congressional lobbyists (one of whom was employed by the Commission itself) would succeed in getting a sequel to 1991's Intermodal Surface Transportation Efficiency Act passed by the end of 2004, but that did not happen. By January, 2005, the Commission was assured only of \$200 million in Massachusetts funds and \$30 million in privately-supplied funds.

Fortunately, and partly as a result of intense political lobbying by the Commission within Massachusetts, Congress

passed ISTEA II in 2005, and President Al Gore signed it in early 2006. By year's end, 2004, the Commission had selected a trolley-based system for the New Urban Ring. The Commission's final deliberations took place privately and did not proceed based on public consensus — though they were based largely upon the immense amount of information contributed by involved public groups.

The trolley-based system was determined to have a number of unique advantages that outweighed the advantages of bus, trolleybus, and subway-based systems. These advantages are summarized in the sidebar at the bottom of the page.

The Commission held public hearings following its decision to entertain questions and concerns. Friendly public relations were essential during this critical period and were expertly handled by the Commission's own P.R. team.

With the Commission now assured of ninety-percent financing by the federal government (much as the 1956 interstate-highway act provided for ninety-percent federal financing of interstate roadbuilding), the competitive-bid process could begin. Incentives were offered to companies that could complete their sections of the Ring Line ahead of schedule. Eventually, several large contractors (and many smaller firms) were brought aboard.

Groundbreaking took place in Cambridge in February, 2008. It was a mild winter, and by April several sections were under construction. The New Urban Ring was finally being built.

### Trolley Advantages

The winning trolley-based design was chosen over its bus, trolleybus, and subway-based competitors because:

*Trolleys are clean and quiet, are not perceived as "lower-class" transportation, and can serve as a symbol of civic pride.* It was important that the Ring Line be able to offer accessible, functional, and attractive inter-community transportation, and the trolley system was the only one that was able to meet these criteria. Noisy, fume-emitting, socially-stigmatized buses were rejected. A subway, which would have been too expensive in any case, still would not be able to penetrate the community, or serve

as a visible symbol of civic pride, as could the trolley. The trolley system makes passengers aware of the areas through which they are traveling, and gives the communities it serves a much-needed focal point and activity hub.

*Trolleys are compatible with the existing T network.* The T already operates the trolley-based Green Line, so maintenance yards, car order contracts, and trained personnel are already in place. Not so for the trolleybus system by 2004.

*Trolleys are compatible with existing surface conditions.* In Cambridge and Somerville, street-level rail already existed — regular freight operations could continue, as diesel freight trains running late at night could use the tracks used by trolleys during T operating hours.

2005

2006

2007

2008

# Construction and Implementation, 2009–2012

NOTE. As this is the *Cambridge* edition of *The Boston Print News* Urban Ring Special Edition, details of the construction in *Cambridge* are provided on Page 7.

Construction was in full swing by the end of 2009 all around the Ring Line. The general plan was to provide two trolley tracks along the entire length of the Ring, complete with switches, signals, and safety and emergency equipment. Stations, interchanges with the existing T lines, and as much street-intersection reconstruction as possible would take place later.

In some places, as in Cambridge, there already existed rail designed for heavy freight service. Most of that rail needed to be rebuilt, as it was in poor condition. Freight service was, in some cases, temporarily interrupted as track reconstruction produced two new tracks — one capable of carrying both the new trolleys and the old diesel freight trains.

Fortunately, much of the transit corridor consisted of vacant or underutilized rights-of-way. Land acquisition for construction purposes was therefore minimized. In some places, where either development or traffic was very heavy (mostly in Boston), the design called for tunnels (shallow or deep-bore depending on the situation) — in those situations, some surface disruption was unavoidable. The end result, at least, was that the trolleys, for the most part, were located in exclusive rights-of-way and had to deal with traffic only at intersections.

In places where construction across street intersections was required, traffic was negatively impacted. Although major intersections did sometimes have to

be closed for Ring Line construction, closures were minimized by working as rapidly as possible — at night whenever possible, and during the summer, when traffic was at its lowest levels. No street-intersection construction took place between the months of November and May.

Disruption in Boston, especially in and near the Longwood medical area, was particularly bad. The main weapon in battling citizen displeasure was the Commission’s public-relations committee, which attempted to placate protest by pointing out the benefits the Ring Line would bring once construction was complete. To some extent this worked, and undoubtedly Longwood-area workers are happier today than they were before the Ring Line existed, but some unrest could not be wished or educated away.

Once heavy construction, including connectors to the existing T rapid-transit lines, was nearing completion, an architectural competition was conducted to determine the form of the many trolley-stop shelters that would be located at stations throughout the system. The winning design incorporated new-technology weather- and vandal-resistant materials and was simple yet aesthetically pleasing.

Systemwide construction stopped early in the spring of 2012 — enough time for two months of extensive testing before the first trolley rode the rails on a revenue run on May 12. By that time, land redevelopment, particularly in Cambridge, was well under way. The Ring Line was operating; now it was time to revitalize the neighborhoods it served. *(More on costs and land development ↗)*

## NEW URBAN RING PROJECT TIMELINE 2009 – 2012

Commission holds press conference, declares construction to be “at full levels” in all participating municipalities.

Construction on new tunnels in Boston & Brookline commences.

Architectural bidding, for trolley-stop shelter designs, commences.

Cambridge track reconstruction complete. First tests of Green Line Type 7 streetcar on new line. Conrail freight service, temporarily interrupted, resumes.

Charles River railroad bridge reconstruction and refurbishment complete.

Testing of new-technology safety, switching, and emergency equipment on Cambridge line.

Heavy construction in areas east of Cambridge complete. Airport Station reconstruction complete; Blue Line-Ring Line connector complete.

Red Line-Ring Line connectors at Tech Square-Kendall Square/MIT & at JFK/UMass complete.

Design selected for trolley-stop shelters. Construction begins.

First land redevelopment project, in East Cambridge, commences.

Heavy construction complete. Orange Line-Ring Line connectors at Sullivan Square and Ruggles complete. Spur to Lechmere maintenance yard complete. Green Line-Ring Line connectors in Boston, Brookline complete.

Final testing complete.

Ring Line opens for service on May 12, 2012, nearly six months ahead of schedule. Over \$50 million in incentives are awarded to contractors. Massachusetts Governor Kenneth E. Kruckemeyer, Boston Mayor Vinit Mukhija, and Project Director Eric J. Plosky drive the first trolley out of East Boston.

2009

2010

2011

2012

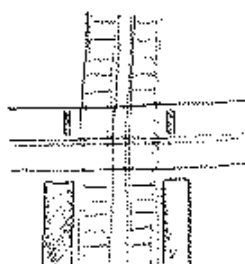
### Ring Line Perspective Views — As Constructed

Right-of-Way, Cross-Section



The Type 8 cars used on the Ring Line are low-floor loading; no high platforms or stairs are needed — reducing station dwell time and increasing wheelchair accessibility.

Right-of-Way, Aerial View



Traffic lights control intersections where the trolleys pass, easing road traffic. Both platforms are on one side; both trolleys can cross the road at once.

# Ring Line Project Summary and Cost Breakdown

## *Itemized Cost Chart.*

### **Rolling Stock.**

A total of 100 trolley cars were required to provide service at 2-minute intervals along the 15-mile length of the Ring Line. This accounts for extra capacity required during rush hours (two cars coupled together). Based on a 1997 contract with manufacturer Breda, 100 cars and a parts & maintenance agreement were purchased for **\$215 million**.

### **Stations.**

Each standard street-level shelter cost approximately **\$30,000**. At busier stations, however, larger units, with provision for toll collection, were ordered to speed up loading. Additionally, more elaborate stations were required underground in Boston and at interchanges with the existing T lines. The total station cost was, therefore, about **\$225 million**.

### **Rail (inc. rights-of-way & tunnels).**

Approximately three miles of tunneling, variously cut-and-cover and deep bore, were required, at a cost of **\$500 million**. Refurbishing grade-level rights-of-way, and (re)constructing grade-level track, as well as overpasses, underpasses, and the Charles River rail bridge, cost approximately **\$350 million**.

### **Other facilities.**

In Chelsea and Everett, several parking garages were constructed to give motorists convenient park-and-ride access, as at Alewife, at a cost of about **\$50 million**. Maintenance and storage facilities, as well as additional equipment, spare parts and labor, and miscellaneous construction, ran to about **\$75 million**.

**TOTAL COST: \$1,415,000,000.**  
**COST TO U.S.: \$1,273,500,000.**  
**COST TO MA: \$141,500,000.**

The New Urban Ring project was expensive, but not enormously so, and the cost to the Commonwealth of Massachusetts, thanks to the Intermodal Surface Transportation Efficiency Act of 2005, was really quite minimal, considering the benefits the state reaped.

Perhaps ISTE II's main benefit, however, is that the M.B.T.A., as a result of Ring Line construction, will not be saddled with interest from floated bonds. Similarly, taxpayers will not have to shoulder the burden of higher transportation taxes or higher T fares (though an unrelated fare increase was imposed by the M.B.T.A. in 2010).

And, because the Ring Line was designed with the expectation that ridership would be heavy from the beginning, its operating costs have largely been paid for out of passenger revenue. Undoubtedly the expensive interchanges with the existing Red, Green, Blue, and Orange Lines, as well as the commuter rail, were well worth their price.

It is too early, however, to gauge the effects the Ring Line has had on the use and utilization of abutting land. Many development and redevelopment projects were proposed during Ring Line construction, but few were brought to fruition, and none were spectacular successes in any case. The Metropolitan Boston Circumferential Transit Commission, which appointed a new director in late 2012 after Dr. Eric J. Plosky returned to teaching full-time at the Massachusetts Institute of Technology, now exists solely to continue the land development and redevelopment that was once one of the cornerstones of the entire New Urban Ring project.

Even with less new development than expected, however, the Ring Line remains an enormous success. Road traffic in the metropolitan Boston area has been appreciably reduced. The radial T lines are no longer approaching ridership capacity; the Ring Line has siphoned off tens of thousands of passengers. Overall travel time has been reduced. And, thankfully, the Ring Line did bring the economic boom critics long predicted would fail to materialize.

In other words, the major objectives of the New Urban Ring project have been achieved — however, the project did have its flaws and failures. Traffic disruption during construction, especially in Boston proper, was a sore point for several years, although motorists gradually conceded that the efforts had been worth it.

At the outset, the Ring Line was slower than it is today. The traffic signals at intersections where the trolleys crossed did not always work perfectly in the beginning, and indeed still are not perfect today. Trolleys sometimes had to wait for cars to move off the tracks. Also, elderly and disabled Ring Line riders complained bitterly about the fact that not all trolley cars were low-floor-loading; indeed, some 1980s-vintage Type 7 Green Line trolley cars served the Ring Line in significant numbers until 2015. (*More about operations, equipment, and facilities on Page 8.*)

And, of course, there remains room for future expansion, even beyond the development of adjacent land parcels. Since the Ring Line's final design was adopted in 2004, citizens had been clamoring for expansion of trolley service to Logan International Airport's passenger terminals and employee facilities. Although such a scheme remains worthy of consideration, it is unlikely, owing to extremely heavy traffic volume at the airport, that such an extension will be constructed in the near future.

Other proposals have called for Ring Line extensions into South Boston and North Cambridge, but, again, such plans are unlikely to be carried out soon. Remember that organization, formulation, design, and construction of the Ring Line project took almost twenty years — indeed, one can even say that planning began in 1970, when Governor Sargent declared his highway moratorium.

In any case, the Ring Line has made possible the creation of thousands of new jobs and has caused an economic boom beyond the expectations of even the most liberal thinkers. Truly a Big Plan in every sense, the New Urban Ring, thanks to careful forethought, design, and organization, was able to achieve success. ☞

# Case Study: Cambridge Construction & Operations

The design and construction of the Ring Line in Cambridge took full advantage of the existence of an underutilized Conrail freight line, the “Grand Junction” line between North and South Stations. In the late 1990s, it was being used by the M.B.T.A. only to transfer rolling stock between North and South Stations, but Conrail was still shipping freight through on almost a daily basis.

That Conrail was still using the line meant that freight service needed to continue uninterrupted during Ring Line construction, and this was the first challenge faced in Cambridge. The existing rail line was deemed inconvertible to trolley use — it needed replacement. Indeed, the whole right-of-way in Cambridge needed extensive renovation.

The Conrail line was left intact while the rest of the right-of-way was renovated. One track, a new heavy-rail track designed to support the weight of the Conrail freight trains, was installed next to the existing Conrail line; when installation was complete, the old Conrail line was dismantled and replaced with a new light-rail line, capable only of carrying the Ring Line’s trolleys. This construction pattern meant that Conrail service was interrupted only temporarily while new switching and safety systems were installed.

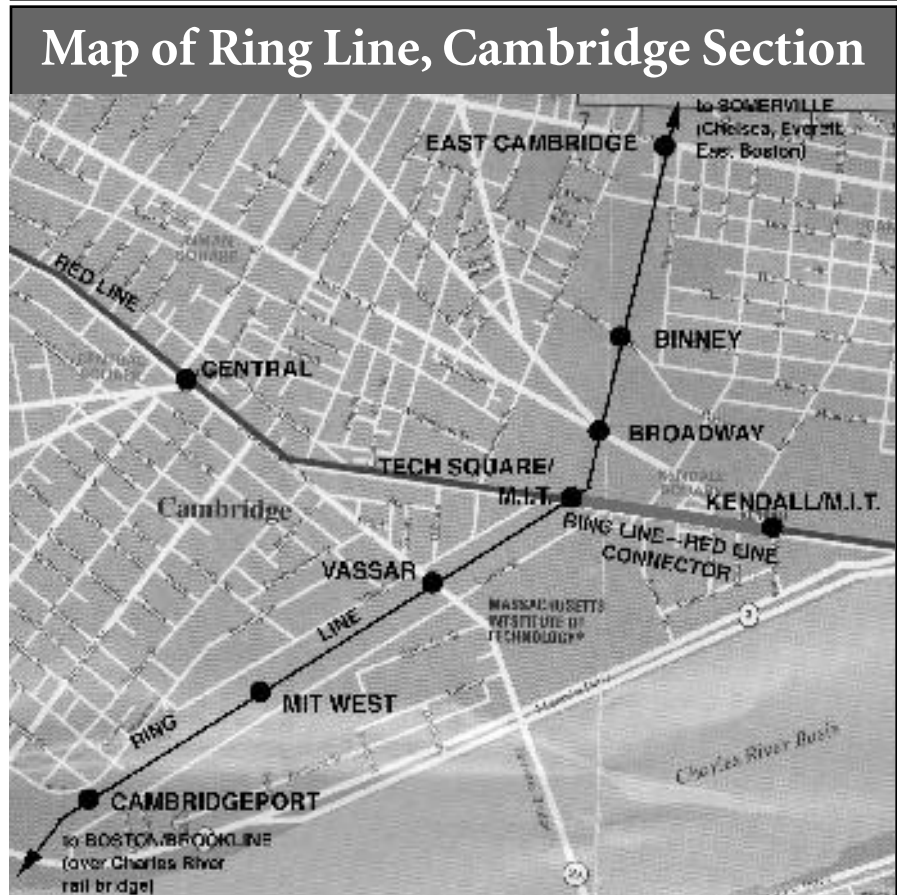
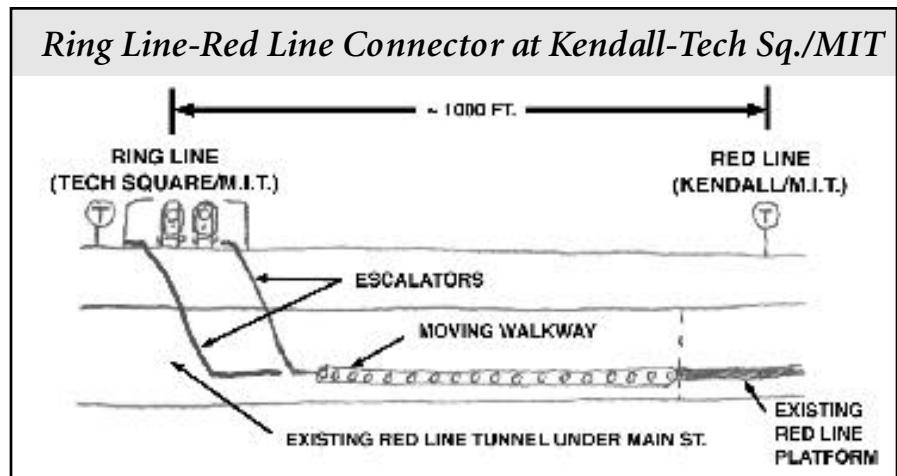
The second challenge in Cambridge was completing the street-intersection construction required at Massachusetts Avenue, Main Street, Broadway, Binney Street, and Cambridge Street. It was extremely fortunate that Cambridge only had these five intersections to worry about; nevertheless, a considerable amount of road disruption would need to occur.

All preparations, on either sides of the intersections, were completed without disturbing the intersections, minimizing the amount of time the intersections needed to be closed. When they were closed, they were closed during the summer, when traffic was at a minimum (local students, professors, and others being absent for the summer). Each intersection, therefore, needed only to be closed for several days.

The third challenge was the Cam-

bridge Red Line connector. This can perhaps be better explained by looking at the diagram below; the Red Line station at Kendall/MIT and the new Ring Line station at Tech Square/MIT were so far apart that a moving walkway was required to allow a free interchange. It was deemed impractical to submerge the Ring Line, as it would have to go beneath the existing Red Line tunnel; relocating the Ring Line to run along Main Street was also

rejected. The moving walkway, admittedly an imperfect solution, was nevertheless the one adopted. It required some widening of the Main Street tunnel and a special Ring Line station at Vassar Street so Ring Line patrons traveling in either direction could board the Red Line traveling in either direction. (This free interchange was possible because the Ring Line and Red Line, fortunately, crossed each other *orthogonally*.)



# Ring Line Operations — Equipment and Stations



The Ring Line has come a long way in only five years. Although when the line opened for revenue service in 2012, some old Type 7 cars, left over from the Green Line (above, left and center), were utilized, they were replaced as fast as the new Type 8 trolleys (above right) were acquired from Breda, the manufacturer. The Type 7s, which entered service on the Green Line in the 1980s, were high-loading and didn't permit easy wheelchair access. The Type 8, introduced on the Green Line in 1999 at a cost exceeding \$2 million per unit, was low-floor loading and could accommodate wheelchairs with ease while still retaining the ability to operate from a low platform. By 2020, it is expected that all-new Type 9 cars, which outclass the Type 8 in every way, will begin entering service with the M.B.T.A.

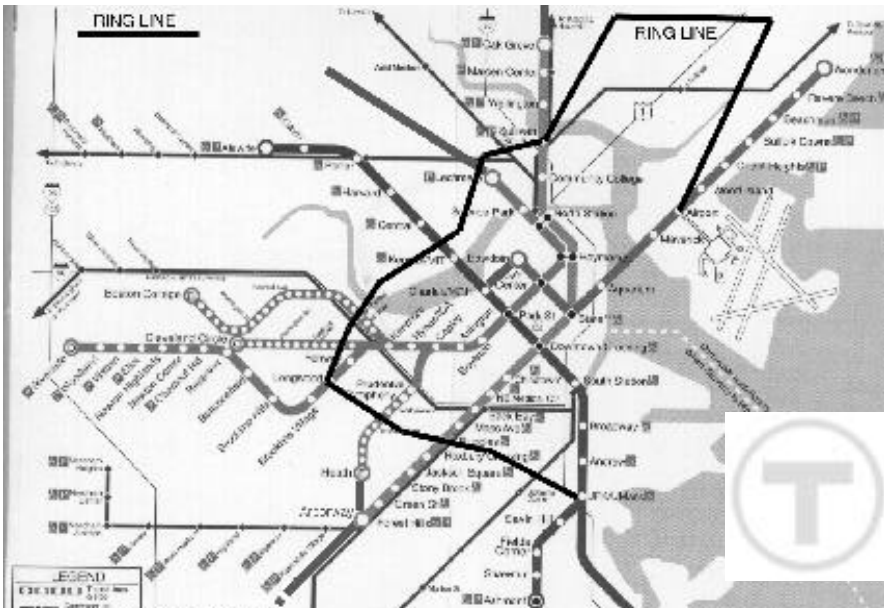
In 1999, the M.B.T.A. began introducing into revenue service, as the successor to its workhorse Type 7 trolley (above left and center), the new Breda Type 8 car, at a cost exceeding \$2 million per unit. The Type 8 was low-floor loading, which meant that a high platform was not required and that wheelchair accessibility on the Green Line was finally a reality.

The introduction of the Type 8, and the subsequent phasing out of the obsolete Boeing LRV streetcar of the 1970s, was a major factor in the Commission's decision for the trolley-based Ring Line. The Green Line would be acquiring Type 8s anyway, as the M.B.T.A. had a long-term contract with Breda to supply in

excess of 100 cars by 2002. By simply extending the contract, enough cars could be purchased to run the entire Ring Line as well, ensuring full accessibility at minimal cost.

To save money, however, the M.B.T.A. stretched its contract with Breda over a longer time period, and by 2012, the Ring Line could only operate about 70 Type 8 cars; the rest were old Type 7s. Nevertheless, by early 2016 all the Type 7s were gone — the initial cost savings was not that significant. The Ring Line, and the Green Line too, now await delivery of the new Type 9 car, rumored to be arriving by 2020.

*Below: A study map of the T, including the Ring Line, 2007 — note Green and Orange Line extensions under construction.*



## Credits

This publication was written and designed by Eric J. Plosky as the final paper for 11.123, Professor Kenneth E. Kruckemeyer's Big Plans course at the Massachusetts Institute of Technology, Spring 1997. (I am not a professor myself, nor am I a commission director, nor is Professor Kruckemeyer actually governor, nor does *The Boston Print News* actually exist — though it might in 20 years.) I hope you had as much fun reading it as I did writing it. Thanks must go to Professor Kruckemeyer, for reviewing this design concept with me and for helping me to pound out some of my ideas about the New Urban Ring; to George Sanborn at the M.B.T.A. library, for introducing me to a large pile of documents including a 1937 Massachusetts rail schedule; to Sarah Sohm, for independently arriving at the conclusion that a Blue Line-Red Line connector at Charles Street would be pretty nifty; to Kevin Doyle, for his witty input; and to Dana Spiegel, for helping me with the print-outs and the transparencies (although it's late now and he might not want to wake up). A Power Macintosh running Adobe PageMaker and Photoshop, in addition to my own whimsy and imagination, were responsible for the creation of this document, and a Hewlett-Packard LaserJet 5MP spewed it forth. Here's hoping that in 2017, the Ring Line actually exists, and we can switch for the airport at Charles...