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The **Transportation Research Board** is one of six major divisions of the National Research Council, which serves as an independent adviser to the federal government and others on scientific and technical questions of national importance. The National Research Council is jointly administered by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal.
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LRT News is published intermittently by the Transportation Research Board to disseminate information on new developments in light rail transit planning, technology, and operations. The newsletter also reports on new studies, completed research, and current literature. The publication of *LRT News* is made possible through funding under the Technical Assistance Program of the Federal Transit Administration.

Jack W. Boorse, editor. John D. Wilkins, Chairman, TRB Committee on Light Rail Transit. Peter L. Shaw, TRB staff. Submit news items to *LRT News*, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, e-mail pshaw@nas.edu. ISSN 0162-8429.

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**From the Editor:
*LRT NEWS BRANCHES OUT***

LRT News has been one of the reliable “fruits” of the TRB Committee on Light Rail Transit’s labors since it was launched during our days as a subcommittee. Under the editorship of Don Eisele this newsletter has steadfastly kept committee members, friends, and many other readers informed, and it has evolved from a monochromatic, printed paper consisting of a few pages, to a present-day electronic journal with extensive articles and color graphics. As Don moves into his well-deserved retirement, it is my responsibility to continue the high standards he established, and I look forward to the challenge.

Since the first *LRT News* was published, rail transit has seen impressive growth in a number of North American metropolitan areas, and the predominant mode has been LRT. Nevertheless, some voids have been filled by other rail modes, including new, “heavy” rapid transit systems patterned after the continent’s pioneer subway and elevated lines in Boston, New York, and Philadelphia. Quite recently, there has been dramatic acceleration in the establishment of commuter or regional railroad service.

LRT News will now track the progress of all passenger rail transportation in U.S. and Canadian metropolitan areas and, from time to time, will publish reports and tabular data. Most issues of *LRT News* will have a “corner,” which will be devoted to one of the rail siblings of LRT. Reports of current events are welcome.

—*Jack W. Boorse, Editor*
Principal Professional Associate
Parsons Brinckerhoff
Emeritus Member, TRB Committee AP075, Light Rail Transit

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11th Joint Light Rail Transit Conference CALL FOR PAPERS

April 19–22, 2009
Los Angeles, California
Mark Your Calendars!

The Transportation Research Board and the American Public Transportation Association (APTA) have announced that the 11th Joint Light Rail Transit Conference will be held in Los Angeles from April 19 to April 22, 2009. The Los Angeles County Metropolitan Transportation Authority will be the host system.

The conference planning committee, chaired by John Wilkins, New Jersey Transit, and vice-chaired by Winston Simmonds, Port Authority of Allegheny County, has issued the conference call for papers. You are invited to consider the following topics:

- Streetcar Circulators and the New Urbanism;
- Light Rail as a Tool to Improve Regional Transit Ridership;
- Controlling Capital Costs Through Design and Delivery Innovations;
- Stations, Stops, and Art in Transit;
- Traffic Engineering Issues and Improved LRT Performance;
- Bus Rapid Transit and LRT and the Role for Each Mode;
- Energy, Environment, and Transit: Making Systems Greener and Energy Efficient;
- Vehicle Technology: The Next-Generation Vehicle;
- Infrastructure, Maintenance, Renewal and Refurbishment;
- Improved Security;
- Fare Enforcement and Collection and Current trends in Proof of Payment and Smart Media;
- Regulations and Standards, Grade Crossings, Crashworthiness, and More;
- Operations, Supervision, and Service Quality;
- Street Trackage Construction–Operation, and the Status of the American Railway Engineering and Maintenance-of-Way Association–APTA Joint Effort; and
- Operations Planning: Doing More with Less.

To propose a paper for presentation and publication, please visit the following web link for additional information:

www.trb.org/conferences/2009/LRT.

For an early review of your ideas, complete the one-page web form and submit it to TRB by **Friday, May 9, 2008**. Papers must be 7,500 words and follow TRB procedures for peer review and publication format.

Please send all questions and inquiries to Martin Schroeder, APTA, mschroeder@apta.com, or to Pete Shaw, TRB, pshaw@nas.edu.

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PORTLAND LRT: THE BEAT GOES ON

Despite almost continual rain, attendees of the November 2003 TRB–APTA Light Rail Transit Conference (http://trb.org/news/blurp_detail.asp?id=2283) enjoyed Portland's growing light rail Metropolitan Area Express (MAX) and streetcar systems. In 2003, MAX included the 52-kilometer (32.6-mile) Gresham–Portland–Hillsboro Blue line that opened in 1986 (east) and 1998 (west), as well as the 9-kilometer (5.6-mile) Airport MAX Red Line that opened in 2001, when the Portland Streetcar was running on its initial 3.9-kilometer (2.4-mile) line from Portland State University (PSU) to Northwest 23rd Avenue. In the four years since, the system has continued to thrive, and it is still growing.

2004: Interstate MAX

After negative suburban votes in late-1990s referenda killed a proposed 40-kilometer (25-mile) bi-state, north–south line, local officials regrouped and identified a 9.3-kilometer (5.8-mile) portion of the route through North Portland where residents had voted strongly in favor of LRT. This extension, opened in 2004, uses the median of Interstate Avenue, a local arterial whose former highway function as U.S. Route 99 had long since been taken over by the nearby, parallel Interstate 5. This made it possible to change the cross section of Interstate Avenue from four underutilized traffic lanes, to one traffic lane in each direction and a double-track LRT median.

Near its north end, the line vaults the Columbia Slough and bottomlands on a 1,220-meter (4,000-foot) viaduct, with a crossing-free surface and private right-of-way for the last 800 meters (half-mile) to the Multnomah County Expo Center—a large venue for meetings and trade shows. The outer two stations, Expo Center and Delta Park, also offer large park–ride lots for siphoning Interstate 5 drivers, mostly from Washington State.

The MAX weekday ridership in the Interstate Avenue corridor—operated as TriMet's Yellow line—is nearly double that of the bus line that previously served the street. Weekday ridership for the entire 71-kilometer (44-mile) MAX system is approximately 110,000—or a little over one third of the total TriMet boardings. After surveying the entire bus and LRT transit system, TriMet found that approximately 70 percent of its patrons are choice riders who have either a car available or have chosen not to own an automobile.

The largest portion (74 percent) of Interstate MAX funding came from the Federal Transit Administration, in contrast to the 100 percent non-federal, 77 percent local, and 23 percent private funding package used to build Airport MAX.

2005–2007: A Streetcar Extension Every Year, and an Aerial Tram, Too!

Little by little, the Portland streetcar system keeps growing, and a new extension has opened in each of the past three years. The first of these extensions

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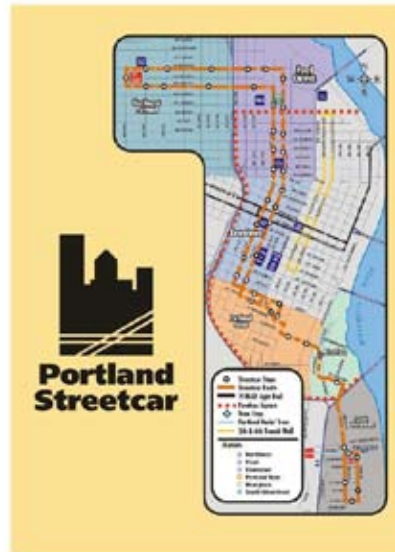
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carried the line from Portland State University (PSU) to River Place—a new neighborhood that has been steadily redeveloped since the late 1980s and is now nearly built out. The 2006 (Gibbs) and 2007 (Lowell) additions carried the line through much of the South Waterfront District—Portland’s latest urban “new town in town” recycling of moribund industrial acres being developed for new residential towers and expanded medical treatment and research facilities of the Oregon Health Sciences University (OHSU).

The South Waterfront’s streetcar line is connected to OHSU’s main campus on Marquam Hill by the Portland Aerial Tram: a \$57 million system of cable-supported gondolas that rises 152 meters (500 feet) over its 1-kilometer (3,300-foot) length (15 percent average gradient). The gondolas can reach speeds of 35 kilometers per hour (22 miles per hour) and departures from each terminal occur approximately every five minutes. Between 5,500 and 6,000 weekday riders are using the system—figures that are greater than predicted in the pre-opening forecast.

Portland’s streetcar investment for the initial line and three extensions totals \$102.2 million to date, and all of the funds come from non-federal sources, with the exception of Housing and Urban Development grants totaling \$1.3 million. During the summer of 2007, streetcar ridership was approximately 10,000 on weekdays; 9,400 on Saturdays; and 4,700 on Sundays.

2008: Beyond the Wires—Commuter Rail for Portland’s Western Suburbs

In September 2008, TriMet will open the 23.6-kilometer (14.7-mile) Washington County Commuter Rail Line, linking Wilsonville, Tualatin, and Tigard with MAX and bus service at the Beaverton Transit Center. Though another MAX extension might seem logical, this \$117.3-million project will be operated by FRA-compliant Colorado Railcar diesel multiple unit (DMU) cars, because it will share tracks with the Portland and Western Railroad (P&W).

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The P&W, to ensure its ability to offer customers a timely and reliable freight service, must retain its ability to run trains at any hour—making time separation of freight and LRT trains unworkable. Weekday commuter rail service initially will be every half hour and run in both directions during three-hour morning and evening peaks. Capital funding is 50 percent federal and 50 percent state–local.

2009: I-205 MAX and MAX on the Portland Mall—The Next Big Thing

Come downtown today, and you will find construction in progress on 5th and 6th Avenues; at the Portland Mall; and from Union Station on the north, through the 2.9-kilometer (1.8-mile) length of the central business district to PSU. Originally completed in 1977, and dedicated to pedestrians and buses with only limited auto access, the mall is being renovated to add a MAX track on each street, and to open a lane for auto traffic over the full length of both streets. The goal is to maintain the facility's ability to accommodate bus operations and its pedestrian-friendly atmosphere.

Key to the feasibility of this configuration is the location of all transit stops on the right side of the street. Light rail vehicles will weave into and out of their sidewalk platforms in a pattern successfully used by buses for the past 30 years. The pattern consists of groups of four bus stops—two in each block—repeating down the length of each street (A+B, C+D, A+B, etc.). The close stop spacing stresses pedestrian convenience, but makes bus movement down the street rather slow. Because Portland city blocks are only about 60 meters (200 feet) long, it is thought that altering the pattern to allow stops every five blocks will speed service by reducing the number of stops, as well as keeping walking distances acceptably short.



Portland MAX and Regional Rail

Also under construction is a 10.5-kilometer (6.5-mile) MAX extension south from the Gateway Transit Center to the Clackamas Town Center mall and nearby business complex. This line will make use of the reserved transitway within the Interstate 205 alignment—the southerly portion of the reservation created as an environmental mitigation measure for the freeway, and already used by Airport MAX between Gateway and its entry onto airport land.

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The Interstate 205–Portland Mall project is budgeted at \$575.7 million, and funding will be 60 percent federal and 40 percent state–local. Scheduled to open in September 2009, the Clackamas–downtown Portland MAX service will be known as the Green line. It will be joined on the Portland Mall by the Yellow line, leaving the Blue and Red lines on the original LRT alignment, along Morrison and Yamhill streets.

Will Portland's Rail Expansion Never End?

It seems that even more rail expansion is in Portland's future. Current projects under study include

- Streetcar eastside extension: 5.3 kilometers (3.3 miles), extending from the Pearl District to the Oregon Museum of Science and Industry (OMSI), via the Broadway Bridge and various streets—primarily Martin Luther King, Jr., Boulevard and Grand Avenue. This \$146-million project will require \$75 million in funding from the Federal Small Starts program, and has a target opening date of 2011.

- MAX to Milwaukie: 10.5 kilometers (6.5 miles), extending from PSU across a new bridge over the Willamette River and through southeast Portland to Milwaukie. If approved, this project is scheduled to begin as early as 2015; it is currently in the alternatives analysis phase, led by Metro Portland's regional government and designated metropolitan planning organization.

- Streetcar to Lake Oswego: approximately 11 kilometers (7 miles), extending from Lowell south to Lake Oswego—replacing the Willamette Shore tourist trolley. This project may be built in stages and it is unlikely for construction to commence before 2011. A Metro-led alternatives study comparing streetcar with bus rapid transit (BRT) is in progress

- MAX to Vancouver: An Interstate 5–Columbia River crossing is under study; the road's aging bridges are regularly congested and are periodically raised for water traffic. The study alternatives mix includes bridge space for transit, either as an extension of MAX light rail or a BRT service to Vancouver, Washington.

In true Portland fashion, the pros and cons of these and other projects will be studied and debated in the coming months and years, a consensus to proceed will emerge, decisions will be made, funding packages will be arranged, and projects will be built. In 1990, this writer participated in an alignment alternatives study for what became Interstate MAX. After four years of Eastside MAX service to Gresham, people knew what light rail meant, and their most frequent question was, "How soon will it open in my part of town?" Portlanders by and large still can't seem to get enough rail transit.

For more information, visit www.trimet.org, www.portlandstreetcar.org, and www.portlandtram.org.

—John Schumann

Senior Transportation Consultant

LTK Engineering Services, Portland, Oregon

Emeritus Member, TRB Committee AP075, Light Rail Transit

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LRT IN SEATTLE: 2007 UPDATE

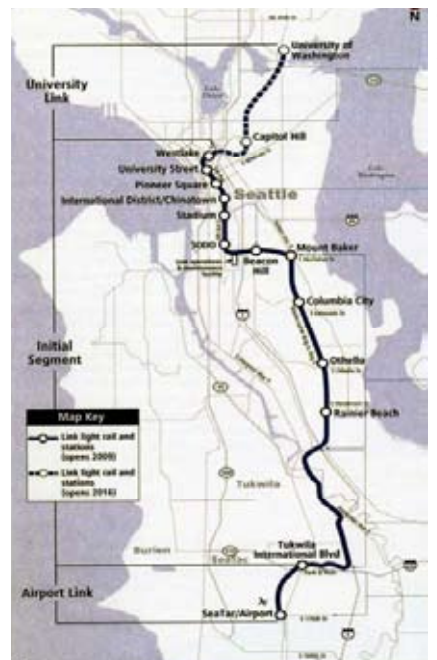
Central Link Light Rail Under Construction

The initial 30-kilometer (19-mile) light rail transit (LRT) line will extend from the University of Washington in the north to Seattle-Tacoma International (SeaTac) Airport in the south. The 22.5-kilometer (14-mile) segment from Westlake to Tukwila and the 2.7-kilometer (1.7-mile) extension to the airport are under construction and are scheduled to open in 2009. The University Link, 5 kilometers (3.15 miles) north from Westlake, is in the final stages of design.

The initial section of the line will connect downtown Seattle with the airport, but it is not intended primarily to serve airport users. The light rail line will serve intermediate communities that are bypassed by bus route 194 via the Interstate 5 freeway. The rail trip, consisting of 11 stops, will be 38 minutes in duration—slightly longer than the express bus service.

The line will use the existing 2.4-kilometer (1.5-mile) Transit Tunnel, and will have three stations under 3rd Avenue and Pine Street, which will be shared with diesel hybrid buses. From the south end of the tunnel, the line extends about 1.6 kilometers (1-mile) along an existing transitway—built on a former right-of-way of the Chicago, Milwaukee, Saint Paul, and Pacific Railway—that will include two stations and separate lanes for buses.

The line will extend southward, where the tracks will rise onto structure, curve east past the storage and maintenance facility, and descend into a tunnel to a deep station under Beacon Hill. Emerging from the tunnel, the tracks extend south along the median of Martin Luther King Way South, where there are four stations. Leaving the Rainier Beach station the line runs mostly on aerial structure, to Tukwila and SeaTac Airport stations.



*Initial Seattle
LRT System*

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South Lake Union Streetcar Route, Opening Day

As of November 2007, the structure north of Tukwila is complete, the installation of track and wire is proceeding, and the aerial structure is being erected on airport property. A two-year refurbishment of the Downtown Transit Tunnel was completed in September 2007, and weekday bus service in the tunnel has resumed. The installation of track and overhead wires between the maintenance facility and the north end of the tunnel is complete and the line segment is available for night and weekend testing. Six cars by Kinkisharyo have arrived and are being tested. An unusual feature of link light rail is electrification at 1500 volts rather than the customary 750.

South Lake Union Streetcar Service

A new streetcar service began operating on December 12, 2007. The service connects Westlake, at the north end of the Seattle Central Business District, with points along the east shore of Lake Union. The 2.1-kilometer (1.3-mile) line has 11 stops and the one-way travel time is about 10 minutes. Service at 15-minute intervals is planned, and fares are coordinated with King County bus service, including transfer privileges. Three cars of Czech design have been delivered; two cars are required to ensure a 15-minute interval service.



City of Seattle

South Lake Union Streetcar Route

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George Benson Waterfront Streetcar Service Suspended

Service remains suspended on Seattle's George Benson Waterfront Streetcar route, which began operation on May 29, 1982, and ceased operation on November 19, 2005. A new sculpture park constructed by the Seattle Art Museum required the demolition of a maintenance building on city property. The art facility is now open, but construction of a planned replacement car barn in the Pioneer Square area has not commenced. The historic Melbourne streetcars remain in storage and a free bus service covers the route.

—*John Aurelius*
Transit Planner and Auditor, Gannett Fleming, Inc.
Secretary, TRB Light Rail Transit Committee

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VOTERS SUPPORT MORE LRT FOR CHARLOTTE BEFORE FIRST LINE OPENS

70 Percent Vote to Keep Tax for Transit

Charlotte, North Carolina, has joined the growing list of cities that enjoy the benefits of light rail service. The Charlotte Area Transit System (CATS) opened its first LRT line, dubbed the LYNX Blue line, on November 26th, 2007.

The service, however, was not yet up and running on November 6th, when the voters of Mecklenburg County, North Carolina, went to the polls to vote for local offices and to answer a ballot question concerning whether voters wanted to repeal the one-half percent sales tax—dedicated to transit—that had been levied in the county for the previous nine years.

In 1998, a referendum on the then-proposed transit tax measure was approved by 58 percent of the voters. Since collection of the transit-dedicated tax began, approximately two thirds of it has been used to improve and expand the bus system. The other one third was used for the development of the region's pioneer light rail line.

In early 2007, a petition was circulated to repeal the transit tax. Construction delays and other issues related to the LRT project—real or perceived—were used to promote the campaign for repeal. Eventually, the signatures required for a referendum were gathered and a question was placed on the November ballot asking county residents if they wanted to retain or repeal the tax.

Voter turnout was approximately 24 percent—about average for county-wide and municipal elections—and a decisive 70 percent of those who voted chose to retain the tax and its benefits. Approximately 48,000 people had signed the petition calling for the referendum, but only about 38,000 actually voted to repeal the tax. In the same balloting, the incumbent mayor, Pat McCrory, a supporter of transit, was re-elected for a record seventh 2-year term. A post-referendum editorial in *The Charlotte Observer* commented that voters could distinguish between the big picture and construction-related problems with light rail line projects.

Now that the dedicated transit funding has been reaffirmed, the expanded and improved bus services are secure and CATS is moving ahead with studies for LRT in other corridors, as well as for possible commuter rail service.

—Dave E. Crawford
Professional Engineer (Retired)

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SEVEN NEW LRT LINES PLANNED FOR METROPOLITAN TORONTO

Funds Budgeted to Advance First Three Lines

The Toronto Transit Commission (TTC) has voted to use \$13 million of its capital budget to advance work on the first three of seven planned new LRT lines. All of these lines would be constructed along existing streets.

The 18-kilometer (11.2-mile) Etobicoke–Finch West line would be built on Finch Avenue, westward from the Finch station of the Yonge Street subway. From the Don Mills station of the Sheppard subway the Sheppard East line would extend eastward for 14 kilometers (8.7 miles) along Sheppard Avenue. From an eastern terminus at the Kennedy station of the Bloor–Danforth subway, the Eglinton Crosstown line would follow Eglinton Avenue to a western terminus at the Lester Pearson International Airport.

None of these three lines will connect with either of the other two or with any of the 11 existing LRT lines. However, these gaps would be filled through the completion of the other four new lines in the full plan. The Don Mills Line on its northward course from the Pape station of the Bloor–Danforth subway would provide connections with the Eglinton Crosstown line and the Sheppard East line as well as the Sheppard subway. The Scarborough Malvern line would be a northeastward extension of the Eglinton Crosstown line from the Kennedy subway station that would intercept the Sheppard East line.

From the Jane station of the Bloor–Danforth subway, the Jane line would extend northward and eastward to connect with the Etobicoke–Finch West line and line 512 of the existing network. The Waterfront West line would be a westward extension of line 510 that would also connect with and supplant the western end of line 501.

Implementation of the full 7-line plan, which includes replacement of the current fleet of 248 streetcars, would produce a regional LRT network comprising 18 lines, and possibly the largest light rail system in North America.

—*Toronto Transit Commission*

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STUDY SET FOR NEW LRT IN PHILADELPHIA

Port Authority to Explore Options for Expanded Rail Service

The Delaware River Port Authority (DRPA)—a New Jersey–Pennsylvania bi-state agency—and its subsidiary, the Port Authority Transit Corporation (PATCO), which operates a rapid-transit line in the metropolitan Philadelphia area, have commissioned two new transit studies. The studies, which will be conducted concurrently and have a common goal of expanding the service provided by the line, are currently in the alternative analysis phase—the first step in the process required to obtain federal funding.

Since the first segment opened in 1936 to serve two subway stations in Philadelphia and two in Camden, New Jersey, the line has been extended twice: In 1953, the completion of a dormant subway line under Locust Street, along the south fringe of the downtown Philadelphia district, added a western extension to 16th and Locust Streets with three new stations. In 1969, an eastern extension from Camden to Lindenwold included six new stations, later joined by a seventh. During the ensuing 38 years, the line's service area has remained essentially unchanged.

Now, DRPA and PATCO are seeking ways to expand rail services into more communities and districts on both sides of the Delaware River. In the New Jersey suburbs, the focus will be on extending rail service into Gloucester County. Three different, basic routings and one combination, plus a diesel shuttle are being vetted. Currently under study are four heavy-rail alternatives and one LRT alternative.

The study on the Philadelphia side of the river will examine a variety of LRT lines and possibly other modes, depending on the results of public involvement and screening processes. The LRT options would include routings that offer direct connections with an existing PATCO station and potentially with Southeastern Pennsylvania Transportation Authority rail lines. All lines would include a segment along Columbus Boulevard, which serves Philadelphia's growing array of waterfront attractions. Where these lines might best connect with other transit facilities will be an element of the study.

One possible location would be at the Franklin Square Station—one of four stations that were part of the original 1936 line. Until recently, the Franklin Square area was beyond the busy part of downtown Philadelphia, saw little use, and was closed and mothballed before World War II. Since then, it has been reopened and closed twice. Now that the district is emerging as a residential and tourist area, DRPA is contemplating a third reopening in conjunction with the expansion of service to the waterfront.

Also part of the study will be an assessment of an eastward extension of the existing LRT subway from its current terminus at city hall. Five

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different lines use the downtown end of this subway. At their outer ends these lines operate on streetcar trackage through the university district and various neighborhoods in West Philadelphia and eastern Delaware County. At present, PATCO passengers with destinations on any of these lines have to use either the Market Street Subway or local bus routes to connect. Extending the LRT subway lines eastward to a PATCO station would significantly enhance both services. Integration of these lines with new lines on Columbus Boulevard will also be studied.

*—Robert A. Box
General Manager
Port Authority Transit Corp.
Lindenwold, New Jersey*

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LIGHT RAIL TRANSIT PROJECT PROGRESS REPORT TABLE
(As of February 2008)

FOCUS CITY¹	IN CONCEPTUAL PLANNING	IN FINAL DESIGN	UNDER CONSTRUCTION	IN REVENUE OPERATION
BALTIMORE	E	-	-	S
BOSTON	E	-	U	S
BUFFALO	E	-	-	I
CALGARY	E	U	E/U	S
CHARLOTTE	E	-	-	I
COLUMBUS	I	-	-	-
CLEVELAND	-	-	-	S
DALLAS	E	-	E	S
DENVER	E	E	E	S
LITTLE ROCK ²	E	-	-	I
EDMONTON	E	-	E	S
HOUSTON	E	-	-	I
JERSEY CITY	E	E	-	S
LOS ANGELES	E	E	E	S
MEMPHIS ²	E	-	-	S
MIAMI	I	-	-	-
MINNEAPOLIS	E	-	-	I
MONTREAL	I	-	-	-
NEW ORLEANS	E	-	-	S
NEWARK	-	-	-	S
NORFOLK	-	-	I	-
PHILADELPHIA	E	-	-	S
PHOENIX	E	-	S	-
PITTSBURGH	E	E	E	S
PORTLAND	E	E	E	S
SACRAMENTO	E	-	-	S
ST. LOUIS	E	-	-	S
SALT LAKE CITY	E	E	E	S
SAN DIEGO	E	-	-	S
SAN FRANCISCO	E	-	-	S
SAN JOSE	E	-	-	S
SEATTLE	E	E	E	I
TACOMA	-	-	-	I
TORONTO	E	-	U	S
VANCOUVER	I	-	-	-
WASHINGTON	I	I	-	-
TOTALS	32	8	13	29

Legend: E = Expansion of existing facilities (extension, new route, added trackage, etc.)
 I = Initial or basic one-corridor line
 S = System (more than one corridor)
 U = Upgrading of existing facilities (same basic route)

¹ The corridor or system may extend well beyond the boundaries of the named city into other cities or counties.

² Heritage streetcar lines, built as tourist attractions, that have evolved to serve local passengers as well.

This progress table is published periodically as a part of *LRT News*. The content was reviewed and updated shortly before publication. Readers who have fresh information or who wish to comment on the table, please contact the editor (boorse@pbworld.com).

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