



Making New Connections: Airport Rail Links in the United States

Kenneth Lin

Joining a worldwide trend, there are now 15 airports in the USA that have rail links. Table 1 lists these airports, the number of airline terminals at each airport, the opening date of the rail link and the type of rail link. As can be seen, these links are varied—encompassing intercity rail, commuter railways, subways/metro, automated people movers, monorails and light rail. Airports that rely upon a shuttle bus to access a rail link are not shown in Table 1 because they do not provide a direct rail connection to the airport terminal. Two such airports are Boston’s Logan Airport (which requires an airport-operated shuttle bus to the nearby Blue Line subway) and Los Angeles International Airport (which requires a transit agency-operated airport shuttle bus to the Green Line light rail). Providing airport rail links in the USA is a relatively recent phenomenon. The first North American rail link opened in 1968. Foretelling a trend, Hopkins International Airport was linked to downtown Cleveland, Ohio, via an extension of the

Regional Transit Authority’s Red Line subway. It would not be until a decade later—in 1977—that the second airport rail link would open, this time to Washington DC’s Reagan National Airport.

Since then, the pace of creating new airport rail links has quickened considerably with 13 of the 15 airport rail links opening within the past 20 years. Table 2 lists the number of new airport rail links opened in each decade.

Why the recent interest and increase in airport rail links? There are several contributing factors, including:

- Increased use of public transport in cities that have good public transport.
- Increased highway congestion, and a need for reliable transportation links to the airport.
- Greater expectations for low-cost transport from the airport to city centres (especially by those airport customers who have become accustomed to good airport rail links in Europe).
- Greater availability of public transport

construction funding (particularly compared to the 1960s).

- Recognition by civic officials and the business community that reliable, quick, reasonably priced rail links are good for economic development. Airports create jobs and are a major source of employment in many cities.
- Need to reduce environmental impacts created by ever-busier airports—such as increased road vehicular traffic and emissions.

Table 2 Opening Years for US Airport Rail Links

	Number of new airport rail links opened
1960–69	1
1970–79	1
1980–89	3
1990–99	5
2000–04	5
Total	15

Table 1 US Airports with Rail Links

IATA Code	City	Airport name	Number of airline terminals	Opening date	Intercity rail	Commuter rail	Subway or metro	People mover	Monorail	Light rail
ANC	Anchorage	Ted Stevens Anchorage International	2	2003	¹⁾					
ATL	Atlanta	Hartsfield-Jackson Atlanta International	1	1988			○			
BWI	Baltimore	Baltimore/Washington International	1	1997						○
BUR	Burbank	Bob Hope ²⁾	1	1995	○	○				
MDW	Chicago	O’Hare International	4	1984			○			
ORD	Chicago	Midway International	1	1993			○			
CLE	Cleveland	Cleveland Hopkins International	1	1968			○			
JFK	New York	John F. Kennedy International	9	2003				○		
EWB	Newark	Newark Liberty International	3	2001					○	
PHL	Philadelphia	Philadelphia International	5	1985		○				
PDX	Portland	Portland International	1	2001						○
STL	Saint Louis	Lambert-St. Louis	2	1994						○
SFO	San Francisco	San Francisco International	4	2003			○			
SBN	South Bend	South Bend Regional	1	1992		○				
DCA	Washington DC	Ronald Reagan Washington National	2	1977			○			
Totals by mode type					1	3	6	1	1	3

1) Although this airport has a train station, there is currently no regularly scheduled rail service serving the airport.
 2) A joint intercity rail and commuter rail airport train station is located within walking distance from the terminal. A shuttle bus connection is available.

- Need for landside transportation capacity to keep pace with airside expansion and capacity.

As Table 1 indicates, there is no one modal approach used by all US cities to provide their rail links, although subway/metro extensions are the most common numerically, followed by light-rail connections. While long-distance, intercity (main line) trains providing direct service to the airport terminal are common in Germany, Switzerland, and France, such links are almost non-existent in the USA. The newly constructed railway terminal at Ted Stevens Anchorage International Airport in Alaska could provide such service, but Alaska Railroad is not currently providing any scheduled passenger train service to that airport. Apparently opening a new on-airport train station is no guarantee that it will actually be served by trains! The joint Amtrak (intercity rail) and Metrolink commuter rail station serving the airport at Burbank, California (just north of Los Angeles) comes closest to the European model, although this station has no physical connection to the airport terminal.

Since 2001, four new airport rail links have opened (plus the inactive link in Anchorage). Each of the four active links uses different people-moving technology and is discussed in greater detail below.

John F Kennedy International Airport: AirTrain JFK

AirTrain JFK is the newest US airport rail link; it opened in December 2003, just in time to serve the busy December holiday season. AirTrain JFK uses Bombardier's Mark II railcar with linear induction motor, driverless, automated people-mover technology to serve a 13.2-km on-airport and off-airport railway network. The inauguration of this automated rail system represents the first permanent use of driverless technology in New York City.

AirTrain JFK has three routes:

- A 2.9-km elevated, airport terminal loop with six stations serving JFK's nine airline terminals within the Central Terminal Area (CTA). A complete circuit takes 8 minutes. This replaces a former shuttle bus service that was subject to road traffic delays during peak periods. There is no charge to ride this loop.
- A 5.7-km mostly elevated route to New York City Transit's (NYCT) Howard Beach subway station, stopping en route at Federal Circle Station (for rental car facilities) and a station serving both the long-term parking and employee parking lot. At Howard Beach, customers can change to the legendary A train (immortalized by jazz musician Duke Ellington) for subway service to Brooklyn and downtown Manhattan. Travel time from the last stop within the CTA (Terminal 8/9) to Howard Beach Station is 8 minutes. The journey on the A train to downtown Manhattan takes about another 40 minutes.

AirTrain JFK replaces three former, free-of-charge, shuttle bus routes that used to link Howard Beach Station and the CTA. It is free for the on-airport portion, but a \$5.00 fare is charged for connecting to the subway at Howard Beach (an additional \$2.00 fare is charged for the subway ride). Both AirTrain JFK and subway fares can be paid using the subway *MetroCard*, a stored-fare, magnetic-stripe card. These fares can be reduced by approximately 17% if multiple fares are purchased at once.

- A 5.3-km route serving the Long Island Rail Road's (LIRR) Jamaica Station, and also stopping en route at Federal Circle. The travel time to Jamaica Station is also 8 minutes and the station is an important hub for the LIRR, serving as an interchange for 10 of their 11 branch lines. Many JFK Airport passengers and airport employees live on Long Island, east of the airport, so Jamaica Station provides a convenient transfer point for such customers. At Jamaica,



AirTrain JFK vehicle

(Author)

AirTrain JFK customers can also transfer to NYCT’s E train for service to Queens and midtown Manhattan or to the J and Z trains for service to Brooklyn and downtown Manhattan. The journey on the E train to midtown Manhattan takes about another 30 minutes. Jamaica Station is also an important hub for 17 bus routes.

As with the Howard Beach route, a \$5.00 fare is charged at Jamaica Station. LIRR fares between Jamaica and New York Penn Station in Manhattan range from \$2.50 to \$6.75, depending upon time of day and day of week. Consequently, a combined AirTrain JFK plus LIRR fare ranges from \$7.50 to \$11.75. (In response to public comments, a joint ticket useable on both the subway and LIRR is finally now available.) By comparison, a taxi from JFK to midtown Manhattan costs about \$55 (including tolls and tip). The time by taxi can range from 30 minutes during the times when there is little traffic to over 90 minutes during peak rush hours. Table 3 lists the cost of using the rail link versus taxi in the four US cities where airport rail links have opened since 2001.

LIRR tickets can be purchased at Jamaica Station from staffed ticket windows or via ticket vending machines. A potential source of confusion for those unfamiliar

with LIRR ticket vending machine is that neither New York nor Manhattan is listed as a ticket destination; rather the ticket destination for Manhattan is Penn Station. Downtown Jamaica (part of New York City) is a commercial district that has sought to revitalize itself and create new economic opportunities during the past few decades. Elected and civic officials have long anticipated the opening of AirTrain JFK. They expect the 8-minute link to the airport will make Jamaica an increasingly attractive place to do business and provide a new economic boost. A new downtown redevelopment plan has proposed creating airport-related uses, such as back-office corporate space, meeting facilities, hotels for airline crews, etc. Since AirTrain JFK does not provide a direct, ‘one-seat’ ride to Manhattan (the primary destination of many visitors), but instead relies upon customers to connect to either the subway or the LIRR, the interchanges at Howard Beach and Jamaica are being completely rebuilt to provide an airport-type ambience. The Port Authority’s (owner of JFK, La Guardia and Newark airports) design intent is for these two stations to serve as a virtual extension of JFK Airport, so that departing airline travellers will feel as if they have already set foot at JFK Airport. To reinforce that impression, Jamaica Station has airline check-in counters to process

checked luggage. Alas, these facilities are currently unused, because no airline has inaugurated check-in services at this location. This may be partially explained by the general downturn and cost cutting affecting the airline industry. Another factor is that many airlines have been encouraging customers to use self-service Internet check-in (from home or office) and self-service check-in kiosks at airport terminals.

During airport peak periods, AirTrain JFK operates as often as every 2 minutes within the CTA and every 4 minutes on the Howard Beach and Jamaica routes. Trains consist of either one- or two-car sets, although the stations can physically accommodate train sets of up to four cars for future expansion.

With short travel times, each car has been fitted to provide copious standing room with 26 longitudinal seats arrayed along the sides. Luggage racks are provided near the two wide doors on each side of the car, enabling multiple streams of passengers to board and alight simultaneously. For safety, platform doors are fitted at each station, helping to keep each station climate controlled—heated in winter and air conditioned in summer. An unusual policy is the ability to take airport luggage carts on board trains. This customer-friendly feature is found at very few airport rail links, and is much appreciated by customers burdened with luggage.

JFK has a unique arrangement whereby major airlines ‘own’ their airline terminal under long-term lease. This gave each owner considerable latitude during the design stage about how each AirTrain JFK station would physically connect to their terminal—with varying results. One of the best examples is at the recently opened Terminal 4 where station design was coordinated with Terminal 4 design efforts. Another good example of design integration is at Terminal 1 where the station is between the parking garage and the airline terminal road. The enclosed

Table 3 Distance and Cost of Transport to Four Case-study Airports

Airport	Distance from city centre (km)	Typical cost to city centre via taxi (including tolls and tips)	Cost to city centre via rail link
John F. Kennedy International	24	\$55.00	\$7.00 via AirTrain + subway
			\$7.50 to \$11.75 via AirTrain + Long Island Rail Road train
Newark Liberty International	26	\$55.00–\$60.00	\$11.55 via New Jersey Transit
			\$26.00 + via Amtrak
San Francisco International	24	\$43.00	\$4.95
Portland International	16	\$30.00	\$1.60

walkway connecting the garage, station and Terminal 1 thus serves double duty both as a climate-controlled pathway to the station and to the garage.

At the Terminal 2/3 Station, Delta Airlines did not want a direct connection between their two airline terminals and AirTrain JFK so passengers for Terminals 2 and 3 face an indirect walk with a portion exposed to the elements. Generally speaking, the newer airline terminals at JFK (i.e. Terminals 1, 4, 8) have the most customer-convenient connections as they were designed to accommodate AirTrain JFK. An oft-cited comment is that AirTrain JFK does not provide a one-seat ride to Manhattan. In response, the Port Authority specified that AirTrain should be equipment-compatible with either the LIRR or the subway to eventually allow through operation. As a consequence, the guideway, third-rail voltage and loading gauge are compatible with both the LIRR and subway system and either AirTrain JFK, the LIRR or the subway could someday provide the one-seat ride from JFK to Manhattan. For the moment, jurisdictional, funding, institutional, regulatory and LIRR track-capacity issues preclude such service.

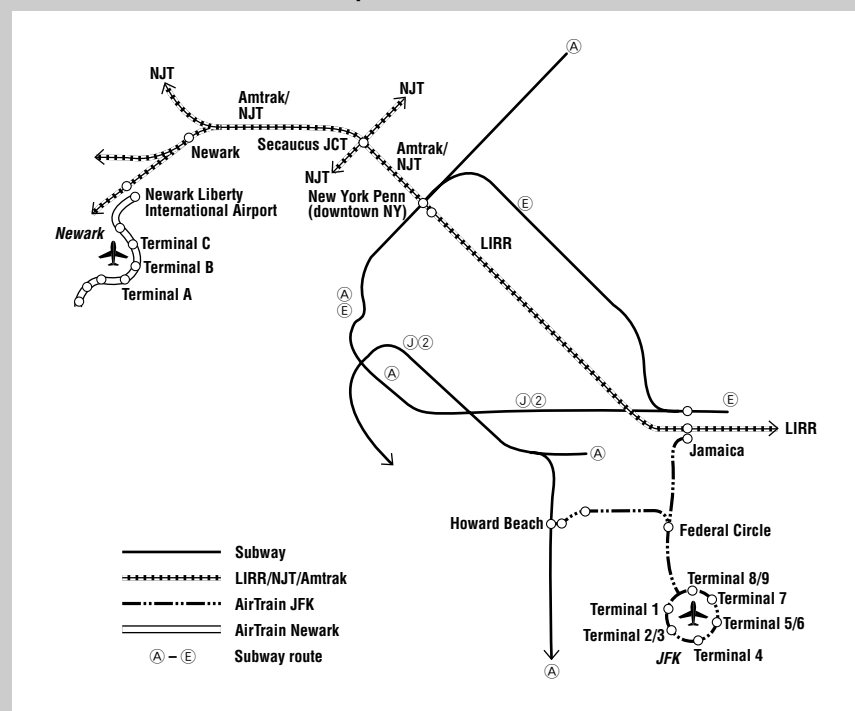
Ironically, American Airlines is a new supporter for the one-seat ride. Ironic, because American was initially part of an airline industry group that filed a lawsuit seeking to prevent construction of AirTrain JFK. One possible reason for American's reversal is the rapid growth of rival Continental Airlines at Newark Liberty International Airport where it is the predominant carrier. Unlike American, Continental was quick to realize the marketing value of a rail link to its hub airport and embraced the concept. AirTrain Newark (the counterpart rail link serving Newark Liberty Airport) has helped reshape New Yorker's perceptions that Newark Liberty is no longer a distant airport. American Airlines is currently constructing a new terminal at JFK to



AirTrain JFK at Howard Beach Station

(Author)

Rail Links to Newark and JFK Airports



- 1) Map not to scale
- 2) Not all subway and railway lines are shown



AirTrain Newark monorail

(Author)

replace Terminals 8 and 9, and they do not want JFK to be at a competitive rail-link disadvantage.

Newark Liberty International Airport: AirTrain Newark

AirTrain Newark uses an automated, driverless, straddle-type monorail to connect the airport's three airline terminals and several long-term parking lots in what airport officials call a 'pinched loop' (shaped like the letter C). At the end of 2001, this elevated monorail was extended about 1.6 km to a new interchange station constructed on Amtrak's busy Northeast Corridor (NEC) and adjacent to the airport.

Stretching from Boston to New York to Washington DC, the NEC forms the spine of Amtrak's route system and accounts for about half of Amtrak's ridership. The NEC is also home to Amtrak's fastest trains—the *Acela Express*. The new interchange, dubbed the Rail Link Station (also referred to as Newark International Airport Station) serves both Amtrak and New Jersey Transit (NJT) commuter trains. Space has been set aside at this station for a proposed new light-rail line to link the cities of Newark and Elizabeth in the future.

As with AirTrain JFK, the Port Authority sought to bring the airport ambience to the Rail Link Station, again to give travellers the impression that they have arrived at the airport once they've reached the station. The station is brightly lit by skylights by day, features attractive architectural finishes and artwork, and has airline check-in counters and luggage check-in facilities. Originally staffed by both Continental Airlines and Amtrak, Continental has since withdrawn their staff.

Airline flight information display screens are installed on the monorail platform to enable travellers to know which gate their flight is departing from before boarding the monorail.

Like AirTrain JFK, platform doors have been installed for safety and to provide a climate-controlled environment at each station. While AirTrain JFK stations must mesh with a variety of airline terminal configurations, the configurations of the three Newark airline terminals are more consistent. This allows the AirTrain Newark stations to open directly into their respective terminal, providing a completely climate-controlled travel environment. Consequently, once a customer arrives by either Amtrak or NJT during winter and

enters the Rail Link Station, he or she can remove winter jackets and travel to the gate comfortably.

For passengers landing at Newark Liberty Airport, and travelling via either Amtrak or NJT, train departure monitors showing both railway services, and NJT ticket vending machines have been installed at the entrance to the monorail stations serving each airline terminal.

Like JFK, AirTrain Newark is free between airline terminals or between the terminals and the various parking lots. However, customers transferring from both Amtrak and NJT to the monorail pass through a turnstile at the Rail Link Station where they must pay a \$5.00 surcharge. If an Amtrak or NJT customer has a through ticket, it can be used on the train as well to pass through the turnstiles.

To travel between New York Penn Station and Newark Airport by train, customers can choose between Amtrak and NJT. The Amtrak through fare starts at \$26 (or more depending upon the time of travel), while NJT's through fare is \$11.55. The higher Amtrak fare reflects Amtrak's desire to encourage shorter-distance passengers to use NJT so as to reserve its seating capacity for longer-distance passengers. The travel time from New York to the Rail Link Station is 22 minutes on Amtrak versus 21 minutes on NJT. The journey from the Rail Link Station to Terminal C (the first of the three airline terminals) takes another 7 or 8 minutes.

Although the monorail consists of six-car train sets, the cars are of much smaller capacity than the Tokyo Monorail serving Tokyo's Haneda Airport, or the monorails in the Japanese cities of Kokura or Chiba. Each six-car train set has a seated capacity of 24, and a total seated and standing capacity of 76 people. During airport peak periods, these trains can be quite crowded. When the airport monorail first opened, airport luggage carts were prohibited on trains but, in response to public comment, luggage

carts are now allowed on board, further reducing the already limited capacity. The public's desire to bring luggage carts on board influenced the design of the newer AirTrain JFK system, and shaped both carriage and station designs at JFK. In terms of intercity and commuter rolling stock, neither Amtrak nor NJT has made any special provisions to accommodate airport travellers by creating additional luggage storage space since NEC trains are often at capacity during peak periods.

Service-wise, NJT operates 3 or 4 trains every hour between New York City and Newark International Airport during railway peak periods. Trains typically stop at Secaucus Junction and Newark with both stations acting as hubs to provide connections to other NJT rail lines. During off-peak periods (middle of the day, late at night and weekends), NJT operates two or three trains every hour. However, service headways are irregular because 'fleets' of NJT trains follow in close sequence after one another. For example, the current timetable (at 15 February 2004) lists weekend trains departing Newark International Airport for New York City at 13:07, 13:15, and 13:24, then leaving a large gap of 43 minutes until the next batch of trains depart at the same time points in the following hour. For travellers landing at Newark and connecting to NJT trains, these irregular gaps can create a long wait if an arriving monorail should happen to miss the last of the three connecting NJT trains—not a customer-friendly situation. If the NJT services were more evenly spread such waiting times could be reduced.

Amtrak typically schedules one train every hour to New York and Washington DC, and most Amtrak customers using AirTrain Newark are travelling to/from longer, intercity destinations along the NEC. Peculiarly, Amtrak's faster *Acela Express* trains stop at the smaller Baltimore-Washington Airport (which requires a shuttle bus link to the airport), but not at

the busier Newark Liberty International Airport, which is served by Amtrak's slower Regional trains.

Continental Airlines has been one of the most ardent supporters of this rail link. It has been very aggressive in promoting AirTrain Newark to its customers via special mailings to frequent fliers, promotional materials in its in-flight magazine, and distribution of special timetables providing step-by-step information on how to get to the airport by train. Just as Lufthansa has elected to curtail flights between Frankfurt Airport and Köln Bonn Airport, and to shift customers to the recently opened high-speed line via a code-sharing operation featuring through air-rail ticketing, so too has Continental. Continental has partnered with Amtrak to eliminate certain short-haul flights in favour of an air-rail link. Continental customers using these air-rail code-sharing flights can obtain through tickets, receive frequent flier miles for all segments travelled (including the rail portion), and first-class travellers can even use Amtrak's Club Acela (first class) lounge at Penn Station in New York.

Extending the convenience of the airport into Manhattan, Continental has opened a new ticket window at Penn Station, located between the NJT and Amtrak ticket windows. Continental has also installed a self-service check-in kiosk and dedicated AirTrain departure board to clearly indicate the times of the next trains to Newark Airport. Thus, rather than viewing intercity rail as a competitor, Continental has integrated services for the mutual benefit of both rail and plane.

San Francisco International Airport: BART

A hybrid between a traditional metro and commuter rail, Bay Area Rapid Transit (called BART) trains provide rapid regional rail services in the San Francisco Bay Area. Although heavily automated,

each BART train has one train operator on-board to monitor train performance. The 14.1-km BART extension to San Francisco International Airport (SFO) opened in 2003.

The BART extension actually consists of a trunk route that splits into three branches (forming a triangle shape) as it approaches SFO to serve three different functions described below:

- The main route and branch is an extension from Colma Station via San Bruno Station to a stub end BART station at SFO's International Terminal. This route provides a one-seat ride to SFO from downtown San Francisco and Oakland. Travel time from downtown San Francisco to SFO takes approximately 30 minutes and there are several stations serving downtown San Francisco. The extension alignment is mostly underground to avoid environmental impacts. However, such construction has added considerably to construction costs. To reduce costs, the portion near SFO is elevated. This branch forms the northern leg of the triangle. SFO has four terminals and BART passengers can either walk to the nearby terminals or transfer to AirTrain—a free, rubber-tyred, automated, on-airport people-mover system. Built by Bombardier (the manufacturer of AirTrain JFK), AirTrain links each airport terminal, various airport parking garages and a consolidated car rental facility.
- A second branch from San Bruno Station to Millbrae forms the western leg of the triangle. A major, new intermodal station has been built at Millbrae to allow connections to various local bus routes and to CalTrain, a commuter railway operating between San Francisco, San Jose and Gilroy. Millbrae is the only interchange between BART and CalTrain and is an important transfer point.



Former BART shuttle train between SFO and Millbrae at SFO soon after extension opening in 2003. This lightly used shuttle has since been replaced with recast train services. Note the confusing sign implying that CalTrain provides service between SFO and Millbrae! (Author)

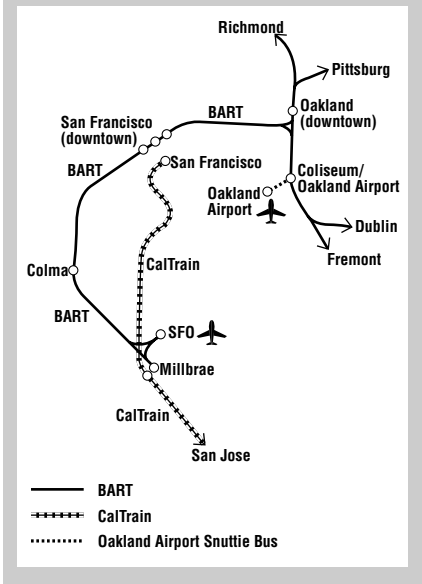
This branch was built because SFO officials did not want their on-airport BART station to attract commuter car traffic, commuter demand for parking (competing for airport parking spaces), or ‘kiss and ride’ customer drop-off traffic. The travel time from downtown San Francisco to Millbrae is about 30 minutes.

- A third branch connects Millbrae Station to the International Terminal at SFO—a short 5-minute elevated BART ride with no intermediate stations. This southern branch of the triangle of BART tracks near the airport provides an important link for CalTrain customers destined for SFO, and replaced a formerly free-of-charge shuttle bus that used to connect the CalTrain Millbrae Station with all four SFO terminals. A \$1.50 fare is charged to ride this branch. Since there is no joint ticketing between CalTrain and BART, transferring customers must purchase a separate BART ticket either at Millbrae or SFO—a transaction that impedes the transfer when rushing to reach the airport or transfer to CalTrain.

From its 2003 opening to February 2004, this branch was operated using a single BART train providing a shuttle service every 20 minutes. Unfortunately, the infrequent BART shuttles did not coordinate well with CalTrain’s main-line service. CalTrain’s off-peak service operates every 30 to 60 minutes, so a missed connection to CalTrain could mean a lengthy wait until the next train. The prospect of missed connections and potentially lengthy transfer times has reduced the attractiveness of this service and ridership has been very light.

BART has eliminated the shuttle since February 2004. To provide service over this branch during peak hours, BART extended its San Francisco to Millbrae trains to continue onward into SFO at 15-minute intervals—an increase of one train every peak hour. During off-peak hours, a different service pattern is operated between Millbrae and SFO. BART has rerouted San Francisco-to-SFO trains to continue past the airport to serve Millbrae and trains run every 15 to 20 minutes. Both revised routes

BART and CalTrain in San Francisco Bay Area



require BART trains to reverse directions at one intermediate station, increasing station dwell and travel times at the penultimate stations.

As with the commuter trains serving the New York City airports, BART trains do not provide additional luggage storage racks, although customers on BART and in New York are welcome to place their luggage in the spacious wheelchair tie-down areas when those areas are not in use. With the opening of BART’s SFO extension, Bay Area travel and trade professionals have actively promoted the new airport rail link in an effort to make the region more competitive nationally in attracting conventions, large group meetings and tourists. Indeed, many US cities with airport rail links are increasingly promoting them to attract new business and leisure travellers and to provide a viable public-transport alternative to road-based travel.

Portland International Airport: MAX

In September 2001, Portland’s highly

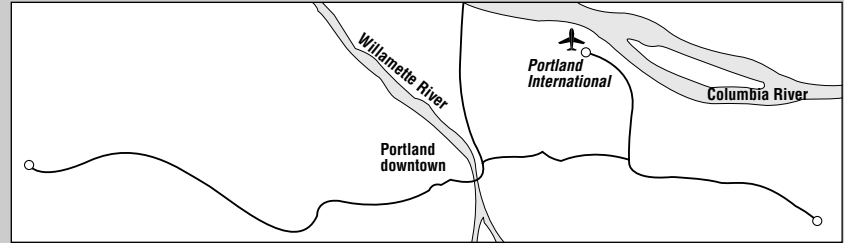
popular MAX light-rail trains were extended about 9 km from the Gateway Transit Center to serve Portland International Airport (PDX). Operated by Tri-Met, MAX is the marketing name for a 61-km regional light-rail network and is an acronym for Metropolitan Area eXpress. Each MAX train has one operator and is composed of either one or two light-rail vehicles (LRVs). Low-floor LRVs are used for the airport service. No special luggage racks are provided but passengers can put their luggage in the bicycle or wheelchair tie-down areas.

To serve the airport, Tri-Met established a new Red Line service that operates every 15 minutes during the MAX service times (05:30 to 23:30). Serving four new intermediate stations, the Red Line service provides a reliable, consistent travel time of about 40 minutes between PDX and downtown Portland.

Standard MAX fares of \$1.60 are charged to ride the airport service but the fare can be reduced by purchasing either multiple rides or a variety of time-based passes.

An interesting aspect of the airport extension has been the proactive involvement of a private developer (Bechtel Enterprises/CascadeStation Development Company, LLC) to help fund the extension. Bechtel Enterprises approached Portland officials and offered to help pay for the airport link in exchange for property development rights to 48.6 ha of land at the entrance to the airport. Bechtel contributed about 20% of the cost of the airport extension and is planning a 15-year build out of a new high-density, transit-oriented, mixed-use development called CascadeStation. This development aims to create new offices, hotels, conference facilities, retail outlets, entertainment facilities (eventually creating approximately 11,000 jobs) utilizing its proximity to PDX to attract new businesses and customers while feeding new customers to the Red Line.

MAX Network



MAX Light-rail train at Portland Airport

(Author)

Looking Ahead

Today, the desire for additional airport rail links has brought forth proposals for several new links. They span the country and range from a new light-rail line to serve SEA-TAC airport in Seattle, Washington, to a high-speed rail line connecting Orlando International Airport

in Florida to Disney World and on to Tampa. The continued interest in constructing new airport rail links stems from the recognition that airports should be served by high-quality, rapid, reliable public transportation and that airports should also be integrated into the ground transportation network. ■



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