

LRT v BUSES:

Why Portland chose light rail

Former TriMet Rail Corridor Development Manager Gerald Fox outlines the reasons why Portland re-adopted light rail, just 20 years after the last trams were replaced by buses.

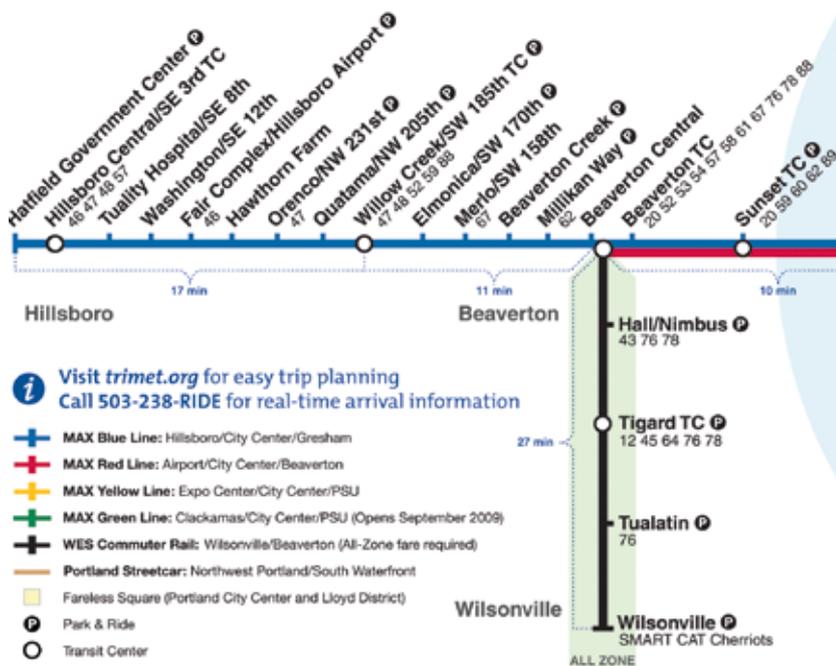


In the early 1970s the transportation policies of Portland, Oregon experienced a period of turmoil. A recently-approved plan to build a regional highways network floundered as the costs and impacts began to be fully understood. The idea of transit (represented then by a failing private bus company) as part of the solution had little credibility.

Oregon's Governor, Tom McCall, appointed a task force of prominent citizens who reported that it was not practical to build enough roads to satisfy demand for unrestricted highway use and that attempting to do so would place an immense burden on public finances, causing negative impacts to the community and environment.

The task force recommended future highway investment should be limited to completing projects already under construction, correcting safety problems and balancing capacity throughout the system. A network of bus or rail corridors was proposed to augment highway capacity and to provide a high-quality alternative mode of travel.

Fast forward 35 years and Portland has built five light rail corridors, a streetcar line and an aerial tramway – 105 rail cars and 635 buses attract over 300 000 boardings per day – with significant light rail developments still to come. No major highways have been built for 25 years, and despite population growth Portland's traffic congestion is no worse than in comparable cities that invested heavily in urban highways.



Rethinking the streetcar

When LRT was first proposed in Portland, it was less than 20 years since the last streetcar had run. So why bring them back if they didn't make sense before? At the time of their demise, the old streetcars and their tracks were worn out. Highways were the growth industry and most cities had neither the funding to improve public transit, nor the appreciation of the shortcomings of relying only on highways. Transit operators saw that if you had a vehicle the size of a bus, and ran it on-street, it was a lot cheaper to run a bus.

While the economic argument against trams was more or less valid everywhere, European cities came up with a different solution; their streetcars became bigger and could be coupled into trains with a single driver. Fare collection was reformed, boarding came through multiple doors and traffic priority was introduced. New tramcars and tracks led to greater comfort and quieter operation. The result was quiet efficiency, comfort, and public acclaim – the essence of modern light rail.

From bus to light rail

The 1973 'Transit Master Plan' for 1990 called for a fleet of 1000 buses, operating on streets and a network of busways. The Governor's task force also recommended bus transitways, but suggested that in some corridors, where railroads existed, light rail might be a feasible alternative. In 1977 detailed studies began. Initially proposing busways, these studies eventually led to the adoption of light rail as the preferred option.

Portland's first light rail line opened in 1986, with extensions and new lines opening subsequently. The decision to adopt LRT has been tested repeatedly under the critical eye of the Federal Transit Administration. In each corridor, LRT has emerged as the preferred option. There are now two systems: Portland MAX (segregated light rail) and street-based trams. Many of the reasons why Portland adopted light rail can be adapted to local conditions and priorities elsewhere and are, in general, widely applicable worldwide.

LIGHT RAIL'S BENEFITS FOR PORTLAND

1) LRT is efficient compared to buses

In Portland, each MAX railcar carries over 200 passengers and does the work of at least four buses; operating in two-car units, this equals the work of eight buses, still operated by one driver. It also moves about 25% faster through traffic due to faster loading and traffic priority.

LRVs on eight-minute headways can reasonably expect signal priority at intersections. The equivalent buses come every minute, rendering signal priority impractical. Likewise, as LRVs move as units, they pass through an intersection in about 12 seconds. The equivalent buses behave like a concertina. The first bus goes through the intersection, the second starts slightly later and follows it – and so on. The fifth or sixth bus starts much later, will miss the signal and delay buses following on the next signal cycle.

Much the same happens at stops. A Portland LRV has four double-width doors each side (two-car trains have eight),

Right: MAX cars 118 (Bombardier) and 219 (Siemens) are at Hatfield Government Center at the western end of the Blue line.
Vic Simons



Left: The pride of the fleet: prototype 10T tram was constructed under licence from Skoda of the Czech Republic.
Oregon Iron Works



so passengers get on and off through multiple points. When a group of buses pull up, the passengers run back and forth seeing which bus they want to board, creating delay. At peak times, bus dwell times can be twice LRT dwell times.

Although an LRV costs far more than a bus, its greater capacity and longer life result in similar lifecycle costs – TriMet in Portland retires its buses after 13-15 years; the first batch of railcars are still in daily service after 23 years.

In 2008, an LRV cost about USD4m; a bus about USD300 000, so, doing the work of four vehicles an LRV replaces USD1.2m worth of buses. But after about 14 years, these buses would need to be replaced and with 14 years of inflation would cost almost twice as much, say USD500 000 each, or USD2m in total. So the USD4m LRV could save USD3.2m in bus purchases over its 30-year life – and this doesn't even consider the operating cost savings.

2) The public prefers LRT to buses

Public preference for rail is frequently encountered. This is difficult to quantify using the common measures for performance and cost, so other factors need to be considered:

- Recent surveys in Portland have shown support for the light rail system approaching 80%. The eventual expansion to all the major transportation corridors has become the foundation of the region's transportation policies.
- One suburban community initially objected to having light rail 'forced on it' by the regional planning process. Defeated at the polls, the rail project was cancelled and alternative (bus-oriented) plans were presented. After two years studying the options, the community decided it preferred LRT after all.
- This preference is probably the cumulative effect of many small advantages: better waiting conditions; a smoother, faster and quieter ride; reliability; and the confidence derived from a fixed facility. This 'implied' preference translates into 'observed' ridership increases. After years of measuring the performance of new LRT lines, Portland has convinced the FTA there really is a 'rail preference factor' that can be legitimately used in projecting future rail ridership.
- Observation of rider patterns shows that passengers sometimes walk several blocks past a parallel bus route to reach a rail stop serving the same destination.
- Advertisements for homes often mention their proximity to the light rail system. Studies consistently show increased property values attributed to access to the light rail system.

3) Rail helps structure/restructure the community

Rail is often perceived as giving structure to a city; creating a sense of 'place'. The new generation of light rail is often seen as the catalyst for urban regeneration. Bus 'flexibility' is not necessarily an asset in these circumstances whereas LRT creates a permanent framework to support development and investment decisions. Consider:

- Attracted by redevelopment, and under pressure of rising fuel costs and congestion, populations are returning to centers of cities. In Portland, the *City* streetcar has attracted people who make little or no use of their cars each day, saving the car for the out-of-town or big-shop trip
- Since rail reappeared in the region in the 1980s, it has become a dominant consideration in the location of major new public and private facilities. Most of the major new public facilities in Portland (Convention Center, Sports Arena, government offices etc) are located within walking distance of a light rail stop.
- Although buses are more 'flexible', major urban corridors do not change, and their permanence is fundamental to many development decisions.
- A particularly unfortunate fiction is the concept of the 'convert-able busway', often touted to disarm rail protagonists. Advocates suggest that once it has built up ridership, a busway could be shut down and rebuilt as a rail line – at immense additional cost.
- Overlooked is the disruption riders would experience during the changeover, and the wasted investment such a plan implies. Unsurprisingly, convert-able busways are frequently proposed, yet seldom built.



Siemens 'Type 3' LRV in the revised all-white MAX livery waits at the Expo Center, the Northern terminus of the MAX Yellow Line.
Vic Simons

4) Light rail is a genuine 'green' option

Greenhouse gases, pollution, peak oil, sustainability and lifestyles are changing our world. Rail-borne transport is a key element in the drive to reduce greenhouse gases, while large fleets of buses create significant noise and air pollution, degrading street environments and the rider's experience.

In the 1970s, Portland concentrated its growing bus system on two transit mall streets downtown. Passengers enjoyed improved waiting amenities, and more convenient transfers, but this also demonstrated the negative environmental consequences of relying on buses alone as the number of riders and buses grew.

LRT uses electrical power, which is quieter, produces no pollution in the streets and is derived from a variety of sources, many of them renewable.

5) Light rail is a proven technology

In the early days of the transit revival, transit planners were confronted by a profusion of new modes that 'solved' the shortcomings of existing bus and rail systems: monorails, personal rapid transit, guided buses, maglev and proprietary automated systems. These systems shared common characteristics: they were new and untested, and the claims of their proponents could not be substantiated.

Typically they were proprietary technologies resulting in the customer being tied to the original supplier (which might, and often did, go out of business). Of the few 'new mode' systems built, few were built twice, and some have been abandoned or are now 'transit orphans'. By contrast, light rail is a package of well-proven components that can be configured to suit a variety of conditions. All of the components are available from multiple, competing suppliers, and life expectancy and long-term performance can be confidently predicted.

The development of the Portland Streetcar, as an adjunct to the MAX system, reaches in to the regeneration areas of the city allowing light rail to be built in places where an exclusive lane isn't feasible and bringing all the advantages of rail, but in a smaller package and tailored to local needs. This is true flexibility – and it is loved by its users.

Conclusion

This article summarises some of the reasons why Portland built a new light rail system and continues to expand it. It has often been claimed that many of the attributes of light rail can also be achieved with buses, at a lower initial cost. Buses can be electrified, longer buses can be built, and even provided with trailer buses (subject to traffic regulations).

Several concepts for guiding buses have been developed, and busways as permanent as a rail line have been built. But a city that wants these attributes will invariably find it more cost-effective, and less technically risky, to do so with a rail system. A conclusion seen today the world over. **TAUT**