

Vintage Trolleys in Portland

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As plans for a regional light rail transit (LRT) system began to gel in 1978, the local business community developed an interest in resurrecting vintage trolley service in downtown Portland, Oregon. Entrepreneurs envisioned streetcars shuttling between the older, established central downtown area and the Lloyd District, a "second downtown" office and shopping area across the Willamette River. This dream became a reality in late 1991 with a gala opening ceremony for the new/old trolley system. Four replica streetcars operate from the shared downtown terminal over 2 mi of line used jointly with LRT service. Facilities added to the basic system include a separate car barn and a trolley station at Lloyd Center. Vintage trolley service currently is provided only on weekends and holidays; but the Portland region has plans for expansion that will use streetcars as an easily identifiable, understandable, and entertaining downtown distribution system, complementing line-haul LRT and bus services.

The Metropolitan Area Express (MAX), a modern light rail transit (LRT) system, has operated successfully since 1986 from downtown Portland, Oregon, to Gresham. The 15.1-mi route is served by 26 six-axle articulated light rail vehicles (LRVs). Service operates at 15-min intervals from early morning to mid evening with 30-min headways continuing until about 1 a.m. every day of the week. Trains run more frequently during weekday morning and evening peaks. Average weekday ridership has grown from 19,000 initially to nearly 25,000 in 1992. Weekend riding is so strong, more riders are carried on some Saturdays than on weekdays.

PORTLAND VINTAGE TROLLEY PROJECT

The Banfield LRT project includes a vintage trolley (VT) element sharing the 2 mi of line from downtown to the Lloyd Center, effectively an east-of-the-Willamette River extension of downtown Portland incorporating a newly renovated and enclosed regional shopping center, the Oregon Convention Center (completed in 1990), several hotels, and a complex of office buildings. Though included as a component within the overall Banfield LRT project scope and budget, the running of replica streetcars trailed the start-up of the MAX trunk LRT service by 5 years.

A separate, nonprofit corporation, Vintage Trolley, Inc. (VTI), provides policy direction and coordinates funding support for the streetcars. VTI provides an entity in which public officials, the business community, and private individuals can work together in a coordinated fashion with each group contributing the type of funding and expertise of which it is most capable or qualified. Private-sector involvement is crucial,

because it was this part of the community that initiated the trolley idea. Public agency participation is equally crucial, because the public sector controls the right-of-way (city streets) and LRT/trolley infrastructure (i.e., the Tri-Met LRT system).

VINTAGE TROLLEY FACILITIES AND EQUIPMENT

Limited facilities, over and above those required by the basic MAX system, support the VT project. The only track added was at the Coliseum trolley barn and the one-block branch to the new Lloyd Center trolley station.

Vintage Trolley Cars

Vehicles were manufactured by Gomaco Trolley Company of Ida Grove, Iowa. This firm previously built several replica vintage streetcars, including those used at the Lowell, Massachusetts, National Historic Park. The four cars procured for Portland are replicas of Council Crest streetcars operated in the city until 1950. Only 10 of these cars actually were used on the steeply graded route to Council Crest, a picturesque area in the west hills and, in fact, the highest prominence in Portland. Nonetheless, local people consider this the most memorable and nostalgic trolley line that operated in Portland.

The original Council Crest cars, numbered in the 500 series, were semiconvertible cars manufactured by J.G. Brill. The first such cars were built in 1903. They were capable of operation on grades up to 13 percent and around tight-radius horizontal curves. Traditional trolley poles were used for power collection; the trolleys ran on 600 volts direct current (dc).

The Replica Council Crest (RCC) cars were manufactured to operate on a maximum grade of 7 percent (steepest grade on the MAX system) and a minimum horizontal curve radius of 50 ft. Braking requirements for the RCC cars are 3.0 mphps for service brake and an average of 5.0 mphps for emergency brake (25 mph entry speed). Normal service braking is provided by air-actuated tread brakes. Magnetic track brakes are provided for emergency use. These requirements were met by using rebuilt trucks and propulsion gear from retired Chicago President's Conference Committee (PCC) rapid transit cars.

The RCCs accommodate 40 seated passengers and a standing load of 31 people (8 per m²) for a total capacity of 71 passengers. "Walkover" type seats are used for 24 passengers, whereas the remaining 16 are side-facing design.

Because the VTs operate on the MAX system, intermixed with the modern Bombardier LRVs, full collision strength (two times the empty weight of the car) and LRV-compatible anticlimbers, as well as collision posts, were required. An interesting design of sacrificial cowling hides the anticlimbers and posts. It satisfies the somewhat conflicting requirements of structural strength, LRV collision compatibility, and vintage appearance. LAHT steel structure is used to further satisfy the structural requirements.

Wheel flange and tread design was required to interface with the combination of American Railway Engineering Association (AREA) and European trackwork that already exists on the LRT line. Unlike a typical streetcar profile, this required a minimum of 5-in. width tread design to ensure passage of the wheels through special trackwork without excessive pounding of the wheels and rails with its associated noise and wear.

The VT route also includes the section of the MAX system that crosses the Steel Bridge. This bridge, owned and operated by the Union Pacific Railroad (UP), is a double lift span design built in 1911. The lower deck serves railroad traffic. The upper deck carries automobile and LRT traffic. Tri-Met operates over the bridge by agreement with UP, which requires that an enforced signal system be used. This is provided through use of wayside-mounted electromagnetic devices and car-mounted antennae. VTs have automatic train stop (ATS) antennae integrated with the trolley controls that will place the trolley in a full service brake mode if a red wayside signal is passed.

A train-to-wayside communication (TWC) system has been installed to make more expedient moves of VTs on and off the MAX main line possible by controlling powered switch machines for route selection. In addition, the TWC system provides an effective way to preempt automobile traffic signals along most of the 2.1 mi of the system on which the vintage trolleys operate.

To present an image of authenticity, every reasonable step was taken to ensure that the appearance of the RCC cars was nearly identical to the original cars. Several original parts were removed from the two remaining Council Crest cars and loaned to Gomaco for replication. In addition, research at Portland area libraries, consultant libraries, and other resources across the United States was undertaken to provide photo and written documentation to the manufacturer.

Equipment and structure on RCC cars includes PCC trucks, GE-CP27 air compressors, new walkover seats with rattan cushions (an original was used as pattern), semiconvertible wall and window design, including carved wood moldings and K-controller housings (with new low-voltage relay controls). A modified trolley pole/pantograph design, similar to a bow collector (once common in Europe), is used for power collection. This arrangement avoided modifications to the overhead contact system that would have been required for traditional trolley poles.

Accessibility for elderly and disabled people is provided by a ramp at Lloyd Center and a mini-high platform at the downtown Yamhill District station. A wheelchair can be loaded in the rear vestibule of the trolley, and provisions are included to secure the chair with a belt. This concept was developed by Tri-Met prior to publication of Americans with Disabilities

Act (ADA) regulations and represents a reasonable approach to accessibility for the time period in which it was designed.

Vintage Trolley Car barn

A VT car barn is located at First Avenue and Holladay Street, adjacent to the MAX main line. The car barn is only 10 city blocks from the vintage trolley terminus at Lloyd Center, which minimizes deadhead operation when trolleys go in or out of service. The car barn is near the new convention center (diagonally across Holladay Street) and the Memorial Coliseum (two blocks away), the home of the Portland Trail Blazers. A bus transfer center is on the west side of the site.

Joint development of the car barn, Coliseum Transit Center, and adjacent Oregon Convention Center, as well as reorientation of automobile traffic, has created a focus for tourism and special events. In keeping with this focus, Tri-Met and VTI stressed the importance of building a people-oriented area around the car barn.

The shop accommodates maintenance activities and provides secure, inside storage for all four cars. The design includes brickwork that ties in some features of the MAX system's architectural elements, some features of the nearby convention center, and some features that give it an old-time identity. Large windows are provided on the south wall for viewing the vintage cars when they are stored at night and to accommodate "sidewalk supervisors" when maintenance is being performed.

The building is simple in design for maintenance features and capabilities. Daily routine maintenance and minor repairs are performed at this location. All heavy repairs are done at the MAX light rail maintenance and operations facility at Ruby Junction in Gresham. Major components will be trucked to and from Ruby Junction so MAX operations will not be interrupted by movements of vintage trolleys over the 11 mi of main line from Lloyd Center to Ruby Junction. When a vintage trolley deadheads to Ruby Junction, the movement is ordinarily made during night hours when MAX is not operating. With their "peppy" PCC running gear, the RCC cars can achieve speeds over 45 mph. This has prompted Tri-Met to allow deadheading and vintage trolley operator training between LRT trains during all periods of the day except commuting peaks.

Lloyd Center Station

Vintage trolleys now operate on 2.1 mi of the existing MAX system between downtown Portland and Lloyd Center, a major shopping mall near, but separate from, the downtown area. All trolley stops but one are shared with the MAX system. A single new stop is provided at Lloyd Center and serves as the trolley terminus.

Four hundred feet of new in-street exclusive trolley track is provided, and a new station platform and shelter were constructed. The station, adjacent to Holladay Park, includes a "vintage design" wood-framed shelter with ramps and a bridge plate for trolley access.

VINTAGE TROLLEY OPERATIONS ON EXISTING MAX EASTSIDE LINE

A gala event welcomed the "return" of Council Crest cars to Portland on the evening of November 23, 1991. Participants purchasing a \$100 ticket enjoyed an evening of riding on the first two trolleys, hors d'oeuvres, entertainment, art gallery hopping, wine tasting, and dancing along the route. Patrons who purchased a \$250 ticket rode the first trolley and were given commemorative models of the Council Crest car. All proceeds from the gala were used for initial operating expenses of the system.

Streetcars are operated by Tri-Met under contract to Vintage Trolley, Inc. During the first month of trolley service, two vintage cars were used and ridership exceeded 25,000. The cars ran from 10 a.m. to 3 p.m. daily and until 6 p.m. on Saturdays and Sundays. Trolley frequency was approximately every half hour, intermixed with regular MAX service.

The initial 1-month period featured free rides for all, sponsored by a local department store. Since that time, operation is limited to holidays and weekends. The third car in the VT fleet will be placed into service by April with the fourth and final car arriving in summer 1992.

Trolley operations are supported by fare donations, sponsors, and volunteers. The fare donation is \$1 for a round trip. Fares are collected by a volunteer host/hostess. When riders pay their fares, they are asked by the host if they will be taking a return trip on the trolley, or will reboard later in the day. A return ticket is issued by the host for use as proof-of-payment when reboarding. Courtesy tickets are provided by some merchants and vendors along the line for use by their patrons. The tickets are provided to the vendors and merchants by Vintage Trolley, Inc., in exchange for advertising at the merchants' places of business and in their publications. Courtesy tickets also are part of the sponsorship relationship discussed below.

COSTS OF THE INITIAL PORTLAND VINTAGE TROLLEY PROJECT

Capital cost of the initial downtown-Lloyd Center VT project was \$2.55 million, including two of the four RCC cars, the car barn, Lloyd Center trolley station, 11th Avenue track and overhead wire extension, signaling and TWC, and other costs as displayed in Table 1. These costs are covered by \$500,000 from the proceeds of a local improvement district (LID), encompassing properties fronting on the MAX/VT route, and \$2.05 million in federal mass transportation funds. Total cost of the VT component is less than 1 percent of the overall \$321 million Banfield LRT implementation and Interstate 84 freeway reconstruction project budget.

VTI raised an additional \$825,000 in private donations to pay for the two RCC cars not covered by federal mass transportation funds.

Part of the cost for the RCC cars was donated by car sponsors. In exchange for 5 years' exclusive use of the interior advertising panels and for placement of the sponsor's logo on the exterior of the trolley, VTI received \$100,000 from each car sponsor.

TABLE 1 Capital Budget for VT Portion of Tri-Met's Banfield Corridor LRT Project

<u>Cost Category</u>	<u>Estimated Cost</u>
Construction	\$ 682,500
Procurements	\$ 243,300
Replica Vintage Trolleys (Two Cars)	\$1,008,400
11th Av. Station (Lloyd Ctr.)	\$ 16,500
Tri-Met Staff and Consultants	\$ 451,800
Miscellaneous & Contingencies	\$ 147,500
Total Estimated Cost	\$2,550,000

Part of the cost of the stations was donated by station sponsors. VTI received \$30,000 from each sponsor in exchange for a 5-year agreement to name that station after the sponsoring company, placement of a bronze plaque on the platform, and signs along the route.

VINTAGE TROLLEY EXPANSION PLANS

VTI, the public-private, nonprofit corporation, is sponsoring studies by local consultants to plan an expanded VT network. Streetcars are seen as a more appropriate-size vehicle for the likely passenger loads and short-headway operation that will characterize downtown shuttle service. It is thought that VTs, with their fixed tracks, wires, and other facilities always visible, are more intelligible to casual users than buses, and that a system of VT circulators can meet several objectives:

- Improve accessibility to the regional transit system;
- Reduce congestion and air pollution created by short automobile trips;
- Link key destinations and attractions;
- Improve the mobility of shoppers, workers, tourists, and residents;
- Attract new visitors; and
- Support historical preservation.

A draft plan, Central City Trolley Alignment Analysis (1990), was prepared by consultants directed by the public-private Central City Trolley Advisory Committee (CCTAC).

First Priority: Extend VT Hours Downtown to Lloyd Center

To improve the effectiveness of LRT/VT shuttle service for short trips, a first-priority recommendation is to add weekday downtown Portland-to-Lloyd Center VT service during mid-day hours as soon as possible after starting weekend and holiday streetcar operations. VTI, its business community supporters and responsible public agency officials (Tri-Met and the city of Portland) must identify sources and sums of additional operating funding to implement this recommendation and negotiate a solution to the disparate VT and Tri-Met fare structures. Fare policy is particularly important as it relates to Fareless Square, Tri-Met's free-ride zone essentially encompassing all of downtown, but not Lloyd Center.

Expansion Plan for Three Lines Developed Incrementally

The alignment analysis recommends three additional vintage trolley lines of 1 to 5 mi each to be developed incrementally. As central area circulators, VTs would complement existing Tri-Met line-haul bus and MAX services. Streetcars would function initially as a distributor or "people mover" within the central business district (CBD) and later between the CBD and close-in activity nodes: Union Station, Riverplace, John's Landing, the Oregon Museum of Science and Industry, Nob Hill (the Northwest 21st/23rd Avenues commercial district), the Pearl District (the lofts and recycled warehouses at Northwest 13th Avenue), Portland State University, Central East-side Historic District, and so forth.

The CCTAC recommended that, as a short-term action, VTI and the city should immediately begin implementation planning on an initial segment of the central city trolley system connecting John's Landing and Riverplace through the downtown core and Northwest Triangle (Pearl District) areas with the Northwest 21st/23rd Avenue district. The goal is to build the first segment and begin operations in mid-1994. This would produce a one-way route of about 4.3 mi, crossing the MAX light rail alignment on Morrison and Yamhill Streets but otherwise completely separate from it.

Further evaluations after this finding was published in October 1990 have led to shortening the proposed initial VT line to the 1.7 mi between Riverplace and the north edge of the CBD at Stark Street. This line is expected to require five replica cars, four to provide a 15-min headway service plus a spare.

A small trolley storage barn is proposed for the southeast end of the line beneath the Marquam Bridge carrying the Interstate 5 freeway over the Willamette River, moving trolleys to the Coliseum VT shop for routine inspection and repairs and to the Ruby Junction LRT shop for heavy overhauls.

Design Standards, Estimated Costs, and Potential Funding for VT Extensions

Wherever VT alignments do not coincide with any future downtown LRT route, they can be built to less stringent designs than LRT lines. Standard tie and ballast track construction is envisaged throughout, paved with black-top where VT tracks are in street lanes on Columbia, Park, and Ninth. Stray currents are expected to be lower for trolleys than LRVs, allowing more expensive embedded in-street track construction techniques for LRT to be avoided. Acceptance of this approach by local utilities has not yet been confirmed.

This approach provides the basis for the modest estimated capital cost of \$21.5 million (1990 dollars) shown in Table 2.

Project capital and operating funding remains under development. Funding options being evaluated include a variety of user charge, fee, and tax-based alternatives:

- Farebox, advertising, and promotional revenues (estimated to cover less than 50 percent of operating and maintenance costs),
- Local improvement district (incremental property tax),

TABLE 2 Estimated Capital Costs for First Dedicated Central City VT Line from Riverplace to Park and Stark

<u>Cost Category</u>	<u>Estimated Cost</u>
Track and Civil	\$ 8.9 million
Power and Signals	\$ 4.4 million
Carbarn	\$ 0.6 million
Replica Vintage Trolleys	\$ 1.7 million
Engineering, Admin., Mobilization	\$ 2.3 million
Contingencies	<u>\$ 3.6 million</u>
Total Estimated Cost	\$21.5 million

- City transportation funds,
- Urban renewal tax increment funds,
- State transportation and economic development funds,
- Parking or other automobile-related surcharges,
- Development or other value capture mechanisms, and
- Federal energy conservation, environmental, or other grants.

It is anticipated that federal funds will not be available for more than 50 percent of project capital costs. Expansion of vintage trolley service beyond the initial downtown-Lloyd Center operation is not a regional transportation priority. Therefore one activity of VTI and its backers must be to build the public consensus needed to include vintage trolleys in the official transportation improvement program (TIP) as a precondition to qualifying projects for public funding.

WILLAMETTE SHORE TROLLEY

Limited excursion-type trolley service was begun in 1990 from Portland to Lake Oswego. The scenic 13-mi route follows the former Southern Pacific (SP) Jefferson Street Branch. The line, abandoned in 1982 upon the cessation of sporadic local freight switching service, was purchased by the city of Portland in the late 1980s. Built as a narrow-gauge steam road in the 1870s, this branch was one of the lines SP electrified just prior to World War I as part of its "Red Electric" interurban service linking Portland, its nascent western suburbs, and Corvallis. At its peak in the 1920s, the line to Lake Oswego saw the passage of 64 electric trains per day.

Today's Willamette Shore operation is much less intense and entirely leisure-oriented. Tuesdays through Saturdays from late spring through autumn, two antique trolley cars from Gales Creek Enterprises share a total of four round trips. Speeds do not exceed 15 mph in deference to track conditions and the limitations of a power-generator towed along on a four-wheel cart.

Interestingly, this operation's northern terminus is under the Marquam Bridge, exactly at the south terminus now proposed for the first dedicated line of the planned downtown vintage trolley system. More evaluation and negotiation will no doubt be necessary to determine if Willamette Shore cars will be allowed to run over the city system's tracks, or if they

will be cut back if and when city trolleys are extended to John's Landing.

In the meantime, this low-intensity operation effectively serves as a kind of place holder that keeps the line minimally active and preserved for some still-to-be-defined future VT or LRT role in the regional transportation system.

CONCLUSION

The new downtown-Lloyd Center vintage trolley and Willamette Shore trolley give Portland two "flavors" of heritage trolley operation:

- New replica trolleys built to be compatible with modern LRVs, and
- True heritage trolleys operating only on their own tracks.

Vintage trolleys on the MAX line are the result of initiatives by downtown business leaders, negotiated, developed, and funded in cooperation with public agencies: the city of Portland and Tri-Met. Similarly, the Willamette Shore trolley operates as a cooperative public-private venture, staffed by volunteers and sponsored by the city of Lake Oswego on a right-of-way owned by the public.

Will VTs become better coordinated and eventually integrated with other Tri-Met rail and bus services and fares? Will further central city vintage trolley circulator lines be built? And will any or all of these lines eventually be connected into a network? Only time, funding, and public advocacy will tell.