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Potemkin Transit:

An Analysis of the Airport Light Rail Proposal in Portland, Oregon

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Executive Summary

In January, 1998, the Bechtel Corporation proposed to build a 5.5 mile extension of the Portland, Oregon light rail system to the Portland Airport. This $182.9 million project is being considered by several public agencies in the region: the Port of Portland, Tri-Met, Metro, and the City of Portland. This report analyzes the cost projections, ridership projections, and environmental impacts of the proposal and considers alternative policies.

The project is estimated to cost approximately $25 per passenger round trip, assuming ridership reaches forecast levels. An analysis of ridership at other airports suggests that Tri-Met's ridership forecasts appear to be greatly overstated. The environmental benefits and congestion relief benefits of the project appear minimal, and depending upon the system-wide ridership impacts, possibly negative. Alternative strategies, including increased investment in buses, congestion pricing, and high occupancy travel lanes, offer greater benefits and the potential for reduced taxpayer costs as well.

I. Introduction

In January, 1998, the Bechtel Corporation proposed to build an extension of the Portland, Oregon light rail system (MAX) to the Portland Airport. The transit agency in the Portland area, Tri-Met, currently operates an east-west light rail line from Gresham to Hillsboro, Oregon, and is currently proposing a north-south line from North Portland to Clackamas County. The Airport MAX project would be a branch off the east-west line connecting downtown Portland to the Airport. This $182.9 million project has been approved or will be considered by several public agencies in the region providing funding: Tri-Met, the Port of Portland, which operates the airport, the City of Portland, and Metro, the regional government.

The cost estimate for the project, $182.9 million, includes: $125.0 million for engineering, design, and rail construction; $39.2 million for six light-rail vehicles, terminal improvements, and an overpass; and $18.7 million for infrastructure improvements to Port District property, including station construction, wetland mitigation, and facility relocation, most of which are necessitated by the project (Tri-Met, 1998c, p. B-1).

Public officials promoting this project have frequently cited the $125.0 million figure, however this understates the true cost of the project since vehicles and stations are integral to the operation of the system (Katz, 1998). Indeed, other important costs such as land acquisition and parking garages were left out of the analysis. Throughout this report, we will use the $182.9 million figure, although recognizing that even this amount understates the true cost of the project.

II. Project Funding

Proponents of the project describe this as a "public/private partnership" with no additional tax funds required. For example, Mayor Vera Katz of Portland calls Bechtel's payment a "contribution of $28.2 million toward the cost of building the $125 million, 5.5-mile light-rail extension," (Katz, 1998). In fact, unlike previous light-rail projects, this project has no federal funds component, and local taxpayers will pay all the costs. Thus, rather than being a "no-tax" proposal or a federal matching funds proposal that would reduce local taxpayer burdens (as with previous projects like the Westside Light Rail project), the Airport MAX project is the first 100% locally tax-funded light-rail proposal in the Portland region. And while each agency providing funding for the project is managing to do this within current budgets, this reflects rapid rises in local tax revenues from a healthy economy. In each case, the dollars for this project could be used for other purposes.

Of the $182.9 million, $41.3 million comes from an 85-year lease on 120 acres of commercial property to the Bechtel and Trammel Crow corporations. This land was purchased by the Port in the 1960's using federal grant money and is effectively the sale of a public asset, the proceeds of which belong to local taxpayers. An additional $30 million comes from City of Portland urban renewal district funds, which is a dedication of property taxes to light-rail that the city could spend on other projects. $49.1 million comes from the Port's airline ticket tax on departures, which could be used for other purposes. $15 million comes from Metro's light-rail Capital Reserve Account which was funded by property taxes, and $47.5 million comes from Tri-Met's general fund, which comes from the region's payroll tax and could normally be used to pay for bus and rail operations (Tri-Met, 1998c, p. B-2). What is unusual about the Airport MAX proposal isn't the lack of tax subsidies but the slick way in which they are hidden.

A. Comparison to Previous Rail Projects

This transit project has a number of unique features that deserve special attention. First, unlike previous light rail projects which received substantial capital investment from the federal government, this project is the first 100% locally-funded light rail proposal. As a result, there is no direct economic development benefit from the federal government. Instead, all project construction spending represents a diversion of funds and resources from other local activities. And since local taxpayers are paying all the capital costs, we must compare this project against both the capital and operating costs of the alternatives.

Second, the inclusion of capital costs is a particular problem for rail transit projects as compared to bus investments. Because of the heavy capital investment, rail transit projects tend to be irreversible and therefore create greater fiscal risks than bus investments.

Third, rail transit projects, both in Portland and nationally, have a history of inflated ridership projections that fail to come true when the line becomes operational (Pickrell, 1992; Richmond, 1998). In the past, such errors could be explained by the fact that local planners were trying to make an exaggerated case to win federal dollars. Since there will be no

Source of Funds for Project

Apparent Source of Revenue	Amount	Ultimate Source of Revenue
Bechtel/Trammell Crow	$41.3 m	Sale or Lease of Public Asset
Portland Urban Renewal Funds	$30.0 m	Dedication of Property Taxes
Port of Portland Ticket Taxes	$49.1 m	Local Tax on Airport Departures
Metro Capital Reserve	$15 m	Property Tax Bond Revenue
Tri-Met General Fund	$47.5 m	Regional Payroll Tax

federal dollars in this project, the cost of local planning errors will be paid locally.

Fourth, this project was proposed by a private construction company and has been adopted by local government without consideration of significant alternatives. In fact, the proposal is being approved before the Alternative Mode Study is being released to the public for review.

B. Public-Private "Partnership"

As part of this project, the Bechtel Corporation, a California-based construction company and contractor has developed a partnership with Trammel Crow, a leading real estate developer. Bechtel approached Portland officials about acquiring a 120-acre parcel of prime commercially-zoned land. In numerous statements about the Airport MAX project, public officials have labeled this a "public-private" partnership, implying that private investors are contributing to the expense of the transportation project.

However, the private "investors" are not investing in a light rail project at all, but are building part of the light rail line to gain access to a prime development site near Portland Airport and two major interstate highways. They have no financial risk in whether the rail line meets its project ridership, no stake in its operating performance, and no stake in its effect on congestion. Bechtel is taking a risk that the construction contract will not exceed a certain dollar value, however this is simply to say that they have not received a cost-plus contract.

Ultimately, Bechtel is a profit-making enterprise, and the $41.3 million is their calculation of the value of that site. Or as Portland City Commissioner Jim Francesconi put it, "The contribution by Bechtel is really the advance payment on their land lease," (Francesconi, 1998).

Related to how the project was conceived is that both the land acquisition and the light rail construction contract are being negotiated under no-bid clauses. As a result, knowing whether the public is getting the right price for the lease and the construction contract depends upon the analytical and negotiating skills of local officials.

Officials have also argued that the lease value of the land should be enhanced by the coincidental development of the adjacent rail line. However, this possibility seems unlikely. Only 5.4% of Portland area residents use mass transit to get to work, even less in suburban areas (US Department of Transportation, 1994). Therefore, transit access seems like a small margin to drive up the value of land. Instead, the convenient highway access and airport access would seem to contribute much, much more to the value of the site, and Bechtel's project is not doing anything to contribute to that. Indeed, one of the main cost items within the proposal is a $10.5 million cloverleaf and overpass that will bring highway travelers to the development on Airport Way that Bechtel is proposing to build, called the Portland International Center.

The situation with the Bechtel project can be compared to the recent proposal by Fred Meyer, Inc. to redesign a city park on Powell and 26th so that the company could build a shopping center with access to Powell Boulevard. No one thought of Fred Meyer's proposal to build a new ball field or add lights as a new private sector park investment, but rather as Fred Meyer's cost of acquiring the parcel. Instead of cheering the amenity impact of the company's donation, the public complained about the congestion cost impact of adding a new retail outlet on a busy corridor, and the proposal was rejected.

By comparison, Bechtel is proposing the Portland International Center development, which will host 10,000 employees, of which Tri-Met forecasts 600 to be transit users and over 9,000 to be auto users. Thus, the net effects of the combined real estate development and the light rail line extension will be to worsen traffic conditions along Airport Way, not improve them.

An additional cost of the no-bid aspect of the Airport MAX project is that construction of the line will also be done by Bechtel without the rigor of public bidding. Thus, they are acquiring a real estate site without a bidding process, and winning a transit construction contract without a bidding process.

III. Ridership and Cost

A crucial question for any transportation project is the estimated cost per rider, which can then be used to compare with alternatives. However, this task is made more difficult because despite seeking several agency funding approvals where ridership has been cited, Tri-Met has yet to release the study on which its ridership forecast is made. Between February and July, Tri-Met's estimated ridership in the year 2015 has miraculously grown from 5,000 to 7,500 riders per weekday. For the sake of this analysis, I am working with the official Tri-Met estimate of 7,500 riders per weekday.

To convert this daily figure into an annual ridership estimate, standard modeling procedure requires estimating the reduction in ridership on weekends. System-wide, Tri-Met's weekend daily ridership is 45% weekday ridership, ranging from 40% on the bus lines to 71% on the MAX line (Tri-Met, 1998d). The MAX line ridership remains high because MAX service levels are kept high on weekends relative to bus service levels and because of entertainment demand and high parking costs in downtown Portland, even on weekends.

For this analysis, I have assumed a weekend ridership on Airport MAX to be 50% of weekday ridership. For Tri-Met's analysis, they have assumed Airport MAX keeping 67% of its weekday ridership on a given weekend day. Because airport ridership is tied to business travelers and congestion on freeways, weekend ridership is anticipated to fall since freeway congestion is minimal and business travel takes place primarily on weekdays. This assumption yields an annual ridership of 2.34 million, whereas using Tri-Met's more optimistic methods yields a ridership of 2.50 million.

To amortize a capital cost figure into a per rider figure, we need to calculate the annual payment required to pay off the capital costs of the project. Even if the project is paid with current income, we must use an amortization calculation to account for the opportunity cost of money.

To pay off $182.9 million of bonds at 10% interest over 20 years requires a payment of $21.5 million per year, resulting in a capital cost of $9.18 per individual ride or more than $18 per round-trip. This figure slightly overstates the effective cost to local taxpayers because financing the project with municipal tax-exempt bonds pushes some of the cost to federal and state taxpayers. This figure is still important because at least some of the national income tax burden is

paid by Oregon taxpayers, and a federal agency, the Federal Aviation Administration (FAA) will be considering approval of this project. A decision by the FAA to approve using airline ticket taxes for a light rail line to Portland's airport will likely influence FAA approval of airport rail access projects in other cities, which in turn will increase more widespread tax exempt borrowing.

Even setting this issue aside leaves a significant borrowing cost for airport light rail. Using a tax exempt borrowing rate of 6.0% leaves the system's cost per ride at $13 per round trip to local taxpayers.

A. Opening Day Ridership

All of the cost estimates so far reflect the estimated ridership in the year 2015. Since Tri-Met anticipates only 3,000 to 4,000 daily riders in the opening year of 2001-02, the true cost per rider will initially be much higher before settling in at $13 per round trip. Using Tri-Met's low opening year ridership estimate increases the average costs per rider by an extra $9 to $22 per round trip to a range of $22 to $28 per round trip.

Having made this calculation, we simply note that the opening year forecast and the 2015 ridership forecast are inconsistent. These two forecasts imply that ridership will grow annually by 4.6% to 6.8%. This scenario is either very pessimistic about opening year numbers or very optimistic about year 2015 numbers. Over its history, MAX has averaged only 4.2% ridership growth, and no airport rail system has seen this level of growth.

B. The Amortization Assumption

In the section above, I have calculated the annual payment required to retire a 20-year bond. Tri-Met officials have questioned this assumption because many municipal bonds are 30 years in length (Tri-Met, 1998a) However, the general principle for government borrowing is that the bond issue should not exceed the useful life of the project, and Tri-Met will face substantial future costs to replace cars and make other capital improvements.

Using 40-year bonds to finance a project, for example, may reduce the annual carrying cost, but it does not cause trains or track to last longer or depreciate less. In fact, much of Tri-Met's capital plant will need to be replaced during this time period. Tri-Met establishes 25 years as the optimal replacement period for its existing light rail trains and uses more rapid replacement schedules for other capital items associated with light rail (Tri-Met, 1998b, p. CR-5). The only capital item with an indefinite life span is land, but the opportunity cost of land is not included in Tri-Met's $182.9 cost estimate.

Mortgage Constant Formula

$MC = i/(1-(1/1+i)^n)$

Term (in years)	Interest Rate	Mortgage Constant
20	10%	11.7%
20	8%	10.2%
20	6%	8.6%
30	10%	10.6%
30	8%	8.9%
30	6%	7.3%

Second, the effect of longer repayment periods is small due to the higher interest costs that accompany the longer time period. Using the Mortgage Constant Formula, which estimates the ratio of annual payments to the capital cost, we can calculate the net impact of changes in either the interest rate assumption or the time period of borrowing (Kau and Cirmans, 1985, p. 557). Using a 30-year borrowing period would reduce my estimates by only 15%, a small amount given the magnitude of the costs involved.

C. Taxable and Tax- Exempt Borrowing Rates

Tri-Met officials have also been concerned about the use of a taxable borrowing rate as the beginning point for discussing the costs of building the light rail system (Tri-Met, 1998a). However, there are several good reasons for considering taxable interest rates with this analysis.

First, public investment displaces private investment, so the true opportunity cost is the rate of return on private investment. Admittedly, some of that investment might take place in other states and localities. Second, all local residents are federal taxpayers, so the federal and state income tax subsidy is paid (in part) by them. Finally, this project will be reviewed by the Federal Aviation Administration, which represents citizens throughout the United States, most of whom will never travel to Portland, much less use Portland's transit system. Moreover, current practice within the federal government requires applying a 10% discount rate to evaluate future and current costs and benefits, (Musgrave and Musgrave, 1989, p. 159). By comparison, I used a lower discounting factor 8.6% and in response to my public testimony, Tri-Met proposed using 6.0% (Tri-Met, 1998d).

D. Operating Costs

Given the costs of feeder buses and maintenance, light rail tends to be more expensive to operate than bus service, and this will either require new local tax subsidies or reductions in bus service. In July, a Tri-Met official told *The Oregonian* that the line would increase operating costs by $4 million while generating $1 million in revenue, yielding a very poor 25% operating cost recovery ratio (Oliver, 1998a). By comparison, the existing MAX rail system has a 44% operating cost recovery ratio (Jarigise, 1998). On a per passenger basis, the operating deficit of the Airport MAX system yields an additional cost of $4 per round trip for the opening year.

In its September response to my testimony, Tri-Met released new numbers indicating that operating costs would only be $2.9 million and revenues would be $1.66 million (Tri-Met, 1998d, p. 10). The increase in operating revenue comes from using the 2015 ridership rather than the opening year ridership figure. The cost reduction comes from a policy decision to operate Airport trains only from downtown Portland, rather than from Beaverton and Hillsboro, thereby forcing many airport travelers (carrying luggage, remember) to change trains downtown.

However, this drastic change in operating assumption has done nothing to change Tri-Met's ridership projections. Given the rapid employment growth in the Washington County region, it seems strange to reduce service to this area and expect no ridership impact. Since a reduction in service levels is likely to lead to a commensurate reduction in ridership, absent additional information, I believe it is best to work with the original Tri-Met assumptions.

E. New Riders vs. Diverted Riders

To appropriately estimate the net effect of a new transit investment, figures on the average cost per ride on the system are not sufficient. An even better test of the efficiency of a new investment is to remove from consideration any prospective riders that would still be using mass transit, even if the project were not built. A truer measure of efficiency of the investment is the average cost per *additional* rider to the transit system.

In their formal calculation of costs per rider, Tri-Met implicitly assumes that all users of Airport MAX are new riders (Tri-Met, 1998c, p. 3-12). To support this argument, they point to the low ridership figures of the 12-Sandy line that runs to the airport, stating, "the vast majority [of riders] would in fact be new riders, since there is very little airline passenger use of the Line 12-Sandy bus that currently uses the Airport." However in other oral presentations before public bodies, the same Tri-Met officials estimate that over one-third of the Airport MAX riders will be existing transit customers. For example, many of the "new" riders in their model are really downtown-bound transit users from Multnomah and Clark County who are expected to find the Parkrose/Sandy station a better place to catch the train than at Gateway.

Previous studies of new rail projects in the United States indicate that a large percentage of rail riders would have been bus riders had the new rail line not been built. For example, Tri-Met admits that 56% of the riders on the Eastside MAX line were really bus riders diverted to the new rail line (Richmond, 1998, p. 34). Using a conservative assumption of 20% of the riders being diverted results in an additional $4 per round trip. Tri-Met's stated estimate of 33% would drive up the cost even more.

When considering the net effect of the Bechtel project, the true rate of diversion is probably even higher than 33%. Employees at the airport and the Portland International Center represent 43% of the anticipated ridership on the Airport MAX line. By the year 2015, the mode share of airport workers and Portland International Center workers is expected to be 5% and 4% respectively.

However, Census data for the Portland region indicates that 5.4% of all employees in the Portland region use mass transit to get to work. Since the workers at the Portland International Center represent jobs drawn from elsewhere in the metropolitan region, a substantial number of projected riders, perhaps all of them, would be transit riders elsewhere if the project were not built.

IV. Hidden Costs

Having made several calculation using publicly-available data, there are a number of critical issues of cost and distribution of burdens that cannot be answered without further data and investigation. Yet the size of the impacts are enormous.

A. Displacement of Gresham and East Portland Riders

A major unstated cost of the Airport MAX project will be the loss of service experienced by transit riders in East Portland and Gresham. Tri-Met has not presented detailed information on planned operations, but they have indicated that Airport light rail trains will operate from downtown Portland to the Airport. However, the Banfield light rail line has a critical operational weakness that needs to be considered.

Due to congestion in downtown Portland, the Banfield line has a maximum effective capacity of one train every 6 minutes operating through downtown. Attempting to operate more than 6 minute headways during the Interstate 5 Bridge closure earlier this year led to trains "bunching up" before they could reach downtown. Tri-Met stopped this experiment and has never successfully operated more than 10 trains per hour. In effect, the MAX light rail line is experiencing its own form of congestion.

However, in all its presentations, Tri-Met has promised to operate trains every 15 minutes from downtown Portland to the airport using the existing Banfield line. By definition, this operational change will reduce train service available for East Burnside and Gresham to one every 15 minutes. As an alternative, assuming tight signalling, Tri-Met might operate the two "branches" of the Banfield line on 12 minute frequencies.

This creates a problem because current service to Gresham is one train every 6 minutes during rush hour and 10 minutes during off-peak. Therefore, riders on this line will experience deterioration of service which will lead to deterioration of ridership. This cost has been hidden because Tri-Met officials have reassured residents in the East Portland and Gresham corridor that their service will not be reduced. The other possibility is that Tri-Met will incur additional costs to either pre-empt downtown Portland traffic signals to accommodate light rail or build a new downtown distribution system.

At some level, this mistake is an extreme form of the ridership forecast problem. Given scarce resources, devoting some light rail service to the Airport diminishes transit service to other communities. And given that the Gresham corridor line represents a substantial portion of the 32,000 daily riders on the Banfield line, this dramatic loss of service suggests that the net system ridership forecast is likely to be *negative*.

B. The Value of Leased Land

A major unknown cost in the Airport MAX project comes from the Port's no-bid lease of 120 acres of prime commercial property. Without a competitive bidding process, the site may be worth much more than the amount received. There are only a handful of equivalent sites in the region, much less any that are fully serviced and have freeway access. Any failure to capture the full market value of this site would hide an additional subsidy to light rail. To assume that the correct price is paid one must rely upon the Port's ability to negotiate a good contract and price. The magnitude of this cost is unknown.

C. The Cost of Parking Garages

Tri-Met's plan for Airport MAX has no allowance for the cost of building new parking garages. Parking supply along the proposed line between the Airport and downtown Portland is extremely limited. Moreover, current rules at park and ride stations such as Gateway do not allow for overnight parking. Any significant use by airport travelers will require new overnight parking lots.

According to Tri-Met's Draft Environmental Assessment, the park and ride lot near the proposed Parkrose station contains 273 spaces, and two parking lots at the Gateway Transit Station contain 826 spaces. There are no other free public parking spaces at other

stations along the proposed line. The Draft Environmental Impact Statement points out that parking demand at Gateway is currently exceeding supply and would not be available for airport travelers. The Parkrose park and ride lots have significant capacity, estimated at 232 vacant spaces at peak hours (Tri-Met, 1998c, p. 3-8).

The increased demand for spaces near the light rail line could be substantial should ridership forecasts come true. Unfortunately, no publicly released estimate of the potential demand for parking spaces exists. Therefore, we need to make an educated guess.

Of the 7,500 riders per day using Airport MAX, 57%, or about 4,275 are expected to be airport passengers, and assuming an average party of two, that amounts to 2,137 cars. Assuming that only half choose to use a park and ride and that they need a space for, say, 2.5 days on average, that represents over 2,670 spaces. Recently built garages built by Tri-Met in Gresham, Hillsboro, and Sunset Transit Centers cost between $3.8 million and $4.0 million, or about $10,000 per space to construct (Jarigise, 1998). Thus, to provide capacity for a demand of 2,570 parking spaces could cost over $25 million.

D. The Value of Right of Way

In all public presentations and documents, Tri-Met has made no valuation for the cost of the Port, Tri-Met, and Oregon Department of Transportation (ODOT) right of way that the MAX line will occupy. This land was set aside during the construction of Interstate 205 for the provision of a transit line or for constructing high occupancy vehicle (HOV) lanes. Using this right of way for light rail will preclude ODOT from developing a fast route for high occupancy vehicles to link with a proposed HOV lane in Clark County on I-205. Since those options will be precluded by this project, the value of the site for those uses must be included as an opportunity cost.

V. Ridership Estimates

Most importantly, Tri-Met's ridership number seems greatly inflated. For Tri-Met's rail line to reach the forecasted ridership, the airline passenger use is critical since it amounts to 57% of all passengers on the line. As part of this study, I conducted a peer airport comparison similar to the one that Tri-Met conducted for this project. In this comparison, I look at both mode share ridership rates and control factors, such as frequency, number of stops, time duration to downtown, and the cost of parking. Both this study and evidence from the Port's "Peer Airport Analysis" suggest that Tri-Met's ridership estimate is high and unsubstantiated (Coogan, 1997).

Airport Rail Mode Share

Airport	Rail Mode Share	Source
Washington (DCA)	9.0%	FAA survey, Port study
Chicago (MDW)	6.3%**	Terminal survey
Chicago (ORD)	4.2%	In-flight survey
Atlanta	5.0%	Port study
Baltimore	2.6%	Ridership count
Cleveland	2.8%	FAA study, Port study
Philadelphia	2.0%	FAA study, Port study
St. Louis	5.0%	Port study, no empirical survey
Average	**4.6%**	
Portland (forecast)		**7.0% Tri-Met forecast**

**includes bus

A. Peer Airport Comparison

Tri-Met estimates that 7% of airport passengers and 6% of airport workers will use the light-rail line. Yet looking at data from eight US airports with direct rail access, only one, Washington National, has a rail mode share among passengers above 6%, and that reflects National's very high level of transit service, its downtown-oriented demand, and its high parking costs.

National is one of three airports serving the Washington area, and is the airport of choice for travelers heading downtown. Two high-speed subway lines serve National, offering service every 5 minutes during rush hour, reaching downtown in 13 minutes. By comparison, Portland's proposed light rail train operates at an average speed of 20 miles per hour, will offer service every 15 minutes at most, and will take 33 minutes to reach downtown.

Since National Airport is so different, a comparison of Portland airport to a composite of the other eight airports served with direct rail service would be more appropriate. Among the eight airports with rail connections, 4.6% of travelers use rail service to reach or depart from the airport. By comparison Portland airport is forecast to serve 7.0% of air passengers, over 50% more than all the other airports combined.

To test whether this forecast might be explained by local conditions, I examined a number of control factors. A first important control factor to look at is whether residents in the Portland region are more likely to use transit and rail service as compared residents to other locations. Yet data from the US Census finds that the other metropolitan areas with rail service to their airport have a higher overall transit mode share. Transit use in regions served by the other eight airports averages 8.9%, which is 65% higher than the Portland region's 5.4%. (US Department of Transportation, 1994). And in comparison with these regions, Portland residents also have a higher rate of car ownership, one of the best predictors of transit usage.

Another set of control variables that might explain Tri-Met's high ridership forecast might be better service to the central business district, as compared to other cities. However the table below demonstrates that on the key ways in which we measure rail service, number of stops, frequency of service, and travel time, Tri-Met's proposed service to downtown is far worse than the average of the eight other airports. Portland will have 15 stops to downtown compared to 9.1 for the peer airports, that is, 65%

Metropolitan Transit Share Overall, 1990
(Source: US Dept. of Transportation, 1994)

Airport	Transit Mode Share
Washington (DCA)	13.7%
Chicago (MDW)	13.7%
Chicago (ORD)	13.7%
Atlanta	4.7%
Baltimore	7.7%
Cleveland	4.6%
Philadelphia	10.2%
St. Louis	3.0%
Average	**8.9%**
Portland (actual)	**5.4%**

more stops. On frequency of service, even when averaging in off-peak frequencies, the other eight airports average slightly more frequent service. During peak hours, the other airports average one train every 12.6 minutes, while Tri-Met plans for 15 minute service, 19% less frequent. And on travel time to the downtown, the eight airports average 25.3 minutes compared to Tri-Met's 33 minutes, representing a 30% longer travel time in Portland.

The comparison with respect to service frequency is even more extreme when one ignores the very infrequent rail service provided at Philadelphia and Baltimore airports. The remaining six airports have rush hour service frequency of 6.2 minutes and off-peak service of 11.7 minutes, substantially below Tri-Met's projected 15 minutes service. In fact, due to Portland's congestion downtown, the light rail line cannot allow service frequency of less than 12 minutes to the Airport without major changes in signals and other operating characteristics.

Finally, local residents using Portland's airport might be persuaded to use light rail to save on the cost of airport parking, which we can also compare to parking rates in the other cities. However, the table below demonstrates that Portland parking rates are significantly cheaper than the comparison airports. The comparison airports are 12% more expensive on an hourly basis and 29% more expensive on a daily basis. And factoring in Portland airport's 30 minute grace period of free parking for picking up passengers suggests that the parking cost factor works even more against high rail usage.

Airport Rail Characteristics
(Source: Interviews with airport officials)

Airport	Rail Stops to CBD	Frequency (min.)	Time to CBD (min.)
Washington (DCA)	8	5-10	13-17
Chicago (MDW)	8	6-15	25-35
Chicago (ORD)	15	5	35-40
Atlanta	7	8-15	16
Baltimore	11	34	30
Cleveland	9	6-15	22-25
Philadelphia	3	30	25-30
St. Louis	13	7-10	25
Average	**9.1**	**14.72**	**5.3**
Portland (forecast)	**15**	**15**	**33**

The results of the peer airport analysis are unambiguous. The peer airports have a lower mode share than that forecasted by Tri-Met, yet have better overall transit use, better rail service access, more frequent service, and high parking charges. If the comparison airports have found it so difficult to draw passengers to rail service under more favorable conditions, why should rail to the airport work better here?

VI. Approaching an Alternative

Much of the report indicates that the Airport MAX light rail project is a poor public investment. To understand what kind of public policies might be more effective, we need to understand a few issues regarding travel behavior and transportation systems.

A. The Inefficiency of Light Rail

Supporters of light rail systems argue that only by developing a dense rail network will sufficient economies of operation and usage appear that will guarantee high ridership. Certainly, a bus line or rail line built in isolation is not worth very much. In building an integrated transit system, Tri-Met has chosen some sensible policies regarding transfers and fare zones and bus scheduling with this in mind. Having two 30-minute headway bus lines intersect doesn't do much good unless they intersect at similar times. And since people in a neighborhood have multiple destinations, it makes sense to create a grid or network of routes so that they can all get to their destinations.

However, this points out one of the main weaknesses of light rail. Because light rail is a fixed guideway system with high capital costs, there is little benefit from "branching" a trunk line. Instead, the "least inefficient" way of delivering light rail service to the suburbs is to build a trunk line and orient all the suburban bus routes as feeders into the trunk line. The more efficient way of providing service would be through our integrated bus network. With buses, one can operate multiple routes along a trunk line and then each of those routes depart from the busway and service individual neighborhoods. This allows suburban riders to minimize on transfer times and get to their destinations at lower overall cost.

Airport Parking Characteristics
(Source: Interviews with airport officials)

Airport	Hourly parking cost	Daily parking cost
Washington (DCA)	$2.00	$8
Chicago (MDW)	$3.00	$7-10
Chicago (ORD)	$3.00	$7-10
Atlanta	$2.00	$5-9
Baltimore	$2.00	$7
Cleveland	$3,00	$11
Philadephia	$3.50	$6
St. Louis	$1.50	$5-6.50
Average	**$2.25**	**$7.72**
Portland (actual)	**$2.00****	**$6.00*****

** first 30 minutes free
*** Portland's daily parking cost was increased to $8 soon after the interviews were completed.

Because a rail system relies on a network of suburban feeder routes, the true operating cost of light rail has to include the cost per rider for the various feeders. That is, we need to compare the cost of an express bus/suburban bus network to a light rail/suburban feeder bus network. Thus, although MAX's operating cost per boarding is at a reasonable level, the operating cost for each of the feeder routes that light rail is dependent upon is very, very high. The table below shows the lowest operating cost transit lines in the Tri-Met system (out of a total of 85 lines), using FY '99 data:

Tri-Met's Most Efficient Bus Routes
(Source: Jarigise, 1998)

Route	Operating Cost per Boarding
72 Killingsworth-82nd	$0.90
15 NW 23rd Ave.	$0.93
14 Hawthorne	$1.03
15 Mt Tabor	$1.04
41 Capitol Highway	$1.05

MAX came in 11th position at $1.20 per boarding. The other top ten low cost routes were 9-Powell, 5-Interstate, 5-King Blvd, 4-Division, and 40-Mocks Crest, all inner city Portland routes. The weighted average for the

lines in the system was $1.46 per boarding. Hence, at first blush, light rail looks cheaper to operate than the average transit line.

However, the suburban feeders that light rail depends upon are among the highest cost per passenger of any lines in Tri-Met's system: 26-Stark $1.60, 24-Halsey $1.68, 22-Parkrose $2.16, 80-Gresham/Troutdale $3.00, 83-Hollywood/47th $3.24, 23-San Rafael $3.30, 25-Glisan/Rockwood $3.39, 81-Gresham/257th $4.52, 84-Sandy $4.53, and 27-Market/Main $4.69.

The person taking a light-rail train is more likely to be taking a linked transit trip involving two boardings, rather than a single boarding trip. Hence the cost of a Gresham bus-rail trip might be $1.20 plus $2.16, or $1.20 plus $3.30. By comparison, an express bus route that can troll though the suburbs to pick up passengers and bring them to an activity center can do so at a much lower cost. Here are a few: 91-TV Highway Express $1.81, 99-McLoughlin $1.99, 96-Tualatin-I-5 $2.04, 92-S. Beaverton Express $2.23.

The sad thing about the opening of the new Westside line is the canceling of most of the express routes and their replacement with a host of light rail feeders to boost up light rail ridership numbers. Riders will largely experience increases in travel and transfer times and Tri-Met will experience rises in operating costs. However, this decline in service and patronage is masked by the way that Tri-Met and other transit agencies collect ridership data.

Tri-Met and the other agencies typically measure ridership by boardings rather than by trips. Since a greater proportion of light rail trips are linked trips, boardings will jump up even though trips will not. Unfortunately, if we measure the success of a transit agency by the number of boardings (ridership) rather than mode share or number of trips, they have every incentive to build a high cost trunk and feeder route network.

To give some data as evidence of this, Atlanta made a huge investment in its rail system between 1980 and 1985, and switched from a bus network to a hub and spoke heavy rail network. Between those years, ridership (i.e., boardings) rose by 88%. Over a slightly longer time period, 1979-86, linked trips rose by only 20% (Kain, 1996). Thus, most of the increase in ridership was simply a diversion of riders from buses to rail.

As we build the third, fourth, and fifth light rail lines in the region, we are building lines in territory that is less and less likely to use transit at higher and higher cost. The network we will be left with will be one we cannot afford to operate.

B. The Inefficiency of Congestion

A popular argument in favor of new rail systems involves comparisons with external costs of driving, particularly automobile congestion and pollution. The congestion reduction externality is a benefit that should be aimed for in making transportation investments. An important question is: at what cost do we want to achieve that benefit? Is a single transit passenger worth $18, $21, or $24? In viewing this cost estimate, the community needs to ask if the resulting pollution or congestion benefits are anywhere near this high. Moreover, for a given level of benefit, could other transit investments, particularly in the inner city, achieve more transit riders at a lower cost?

To answer these questions, we need to understand the distinction between transit ridership and congestion relief. There is a long accepted concept in transportation planning known as "triple convergence," first noted by Anthony Downs of the Brookings Institution (Downs, 1992). That is, when facing rush hour congestion, people react to the congestion by changing their behavior in three ways: (1) mode change (rail, transit, car, telecommute), (2) time of travel change (rush hour, off-peak), and (3) route change (highway, arterial). With congestion, actual roadway demand is lower than its potential because people avoid those conditions. However, this also means that during any rush hour condition, there is a lot of latent demand waiting to use the congested roadway should conditions improve.

Thus, if a transit line is constructed and, say, 1,000 new travelers take that line, then congestion on the competing highway improves, particularly during rush hour. However, because rush hour congestion initially improves, many travelers who had previously avoided the congestion, will revert back to the highway. That is, they change their mode, the time of travel, or their route. Thus, there are big differences between gross number of transit riders and the net effect on drivers.

C. Congestion, Pollution, and Airport MAX

The other major externality, pollution, should also be considered. However, the details of the Airport MAX project show that congestion and pollution will be worse as a result, not better. Even Tri-Met's Draft Environmental Assessment is lukewarm on this issue: "The project would not contribute to cumulative air quality effects in the region. Because vehicle miles traveled are reduced under the Proposed Project, there would be a small, but insignificant, improvement in cumulative regional air quality," (Tri-Met, 1998c). However, the weakness in the ridership forecast makes this claim highly suspect.

Estimates of the congestion effect are somewhat complicated by whether one considers the office development as part of the project and whether the alternative is no office development or development in another location. To take an initial look, assume for the moment that Airport MAX delivers 7,500 daily riders. As part of the project, the Portland International Center generates 10,000 workers, of whom 6% use transit and 94% use automobiles. That represents over 9,000 cars. Even if you assume that every MAX rider was previously an automobile user or would have been, that means that traffic conditions at the airport and along Airport Way will get worse not better.

VII. Alternatives to Building Airport MAX

There are many better ways to achieve improved airport access and higher ridership gains than building a light rail extension. Since the focus of this study is on the project rather than solving a particular problem, which alternative should be looked at is hard to determine. Nevertheless, here are six possibilities:

• Buy Clean Buses

Instead of six $2.8 million light-rail vehicles, Tri-Met could purchase 72 low-pollution, natural gas buses, which would increase Tri-Met's fleet by 11%. The Port of Portland can convert its feeder bus fleet to natural gas, too. For Tri-Met's full $47 million expenditure, the fleet could be expanded by over 25%.

• Build an Airport HOV lane

Instead of a light rail line, the city, state and Port could use the same right of way to connect the airport to one of the freeways. The cost for such an HOV connection would be much less than $182 million, and would allow buses, vans, taxis, and high occupancy cars to avoid congestion on Airport Way.

• Deregulate Airport Taxis

The current flat per-mile fare system of taxicab rates penalizes airport customers who have lower average costs than other riders. Their fares are substantially above cost, which is demonstrated by the amount of time that drivers waste in the holding pen while waiting for an airport customer. A simple alternative is to create separate queues for each cab company and allow customers to bargain for better fares. Price competition both at downtown cab stands and at the airport would reduce the cost of this alternative.

• Implement Congestion Pricing on Banfield

Congestion pricing is the use of peak-hour tolls on congested roadways. The principle itself is not new; most consumers are familiar with it in the pricing of air travel, movies, long-distance telephone calls, vacation resorts, and restaurants. By charging different rates at different periods of demand, consumer behavior is changed so that the particular facility is used more efficiently.

In the case of peak-period pricing for highways, a surcharge during the two or three hours of peak demand would induce some motorists to travel with additional passengers (carpooling), change the time of their trip, use transit, or possibly cancel a trip. In conditions of heavy congestion, it only requires a small percentage of people to make such changes for the traffic to disappear. And unlike the problems of "triple convergence" associated with traditional "free" ways, the benefits of traffic relief remain permanent, because the peak-period surcharge discourages motorists from shifting from other routes or other times to the now-decongested roadway.

Unlike traditional highway tolling, congestion pricing relies on Automatic Vehicle Identification (AVI), electronic systems that debit pre-authorized accounts of vehicle owners as the vehicle passes a designated tolling point. This eliminates one of the major problems associated with traditional tolling, namely that the process of manually collecting money actually creates a great deal of congestion. Such electronic systems are being used successfully in congestion pricing programs in Los Angeles, Toronto and San Diego.

A Metro/ODOT Task Force is currently looking at eight possible congestion pricing experiments within the Portland region including an I-84 option. Congestion pricing would reduce travel time and create lasting incentives for people to use alternative modes, not just for airport travel but for commuting travel as well. By implementing that option, the community could improve travel times for the overwhelming majority of airport customers who rely upon the highway and street network to get them to their destinations.

• Use Congestion Pricing at Airport

Airport congestion exists primarily at the ramp area during certain hours, although this condition may improve as current construction projects are completed. Rather than spend $182.9 million for a rail line that few will use, the Port could make users of premium lanes at the terminal pay an additional cost. Such a system would encourage alternate uses and reduce the wait time experienced by airport travelers at the terminal ramp. And since those congestion pricing payments would increase Port revenue and not its costs, this revenue could be returned to the community as a whole in the form of rebates or reduced airport taxes.

• Return Dollars to Taxpayers

Without the $182.9 million project, the Port can reduce airline ticket taxes. Tri-Met can increase service bus service. Urban renewal district funds can be used for schools or parks. Metro can retire some of its bonded indebtedness.

VIII. Conclusions

Fundamentally, building the Airport MAX extension is a waste of resources that the Portland region cannot afford. Taxpayer resources could be used for better alternatives. With Tri-Met's $47.5 million contribution alone, bus service on the system could be expanded 25%. By comparison, even the optimistic ridership gains promised by Tri-Met amount to only 1.8% of current ridership. Before deciding whether to subsidize light rail trips to the airport at costs of $25 or $30 (along with those of visitors from Dallas and Los Angeles), we must consider whether reducing bus services for inner-city passengers is an acceptable cost.

This region is in danger of believing our own press reports. In national publications, local government officials (correctly) promote our scenery, our commitment to environmental protection and our quality of life. In return, we get a lot of attention in the national press for our farmland preservation policies and our transit system. But ultimately, we have to live with the system we build.

As an analogy, recall the 18th century Russian noble, Grigori Potemkin, who sought to impress Empress Catherine the Great of the richness of his land by building fake villages along the route that she traveled. The buildings had the appearance of charm and prosperity, but little function. From this ploy comes the term "Potemkin villages."

In Portland, we are building Potemkin transit. It's new, it looks pretty, but it's very costly to build and very costly to operate. Designing a system around fixed routes and bus-to-rail transfers guarantees that passenger travel times will increase and net ridership will decline. Whether we face the same fate as Grigori Potemkin remains to be seen.

Like Potemkin, our knowledge of transit (particularly by non-transit users) is dominated by image and visual impression. People will often say that "the experience of light rail is better than riding the bus." However that's a bit like saying that the new Mercedes is a better ride than the old Ford. If we keep disinvesting in our inner city buses, which get faithful ridership at low operating costs, what kind of transit system will we be left with? Will we get to the point of Los Angeles where the bus riders joined the NAACP in a suit under civil rights laws to stop the transit agency's unrealistic rail construction projects and the diversion of revenue from the bus system?

My recommendation is that we declare victory with last year's opening of Westside light rail and call an end to the diversion of mass transit money to light rail. Instead we should

focus on developing a truly balanced transportation system. This means maintaining our bus system, removing property tax subsidies for road construction, deregulating taxi and van shuttles, and using congestion pricing and HOV lanes to increase mobility and access.

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Founded in 1991, Cascade Policy Institute is Oregon's premier public policy organization. Cascade's mission is to explore private, voluntary ideas that strengthen Oregon's economy, support personal responsibility, and secure individual freedom. To that end Cascade publishes studies, organizes public forums, and furnishes speakers. Focusing on local and state issures, Cascade provides practical, innovative solutions for concerned citizens, policymakers and the media.

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