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# **Review of the Regional Transit Plan**

**December, 1994**

**prepared for the King  
County Council**

**John T. Doolittle & Associates, Inc.**

*in association with:*

**Toronto Transit Consultants, Ltd.**

**MacDorman & Associates**

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# JOHN T. DOOLITTLE & ASSOCIATES, INC.

*Management and Operations Consulting Services*

97 CEDAR ROAD

MYSTIC, CONNECTICUT 06355

(203) 536-4610

December 23, 1994

Mr. Stevan Gorcester  
Transportation Staff Advisor  
King County Council  
402 King County Courthouse  
Seattle, WA 98104

Dear Mr. Gorcester:

Doolittle & Associates is pleased to submit this final report on our review of the RTA's Master Plan for the King County Council. I appreciate the advice and support provided by you, David Hopkins, and others of the County Council staff. I also appreciate the openness and cooperation of the RTA staff in addressing our needs for information during the review.

The report was prepared by the consultant team. Besides me, the team included Brian McCollom (MacDorman & Associates), Ken Knight (Toronto Transit Consultants, Ltd.), and Ben Porter (Porter & Associates, Inc.). Mr. McCollom was responsible for the bus/rail integration chapter. Mr. Knight prepared the capital costs chapter, and Mr. Porter prepared the financial plan chapter. Please feel free to contact me or any member of the consultant team if you need any further information, or if you have any questions regarding the content of the report.

Thank you for this opportunity to have been of service to the King County Council.

Sincerely,

*John T. Doolittle, Jr.*

John T. Doolittle, Jr.,  
President

*BDP*

# REVIEW OF THE REGIONAL TRANSIT PLAN

prepared for the King County Council

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## 1. Summary

On October 29, 1994, the Central Puget Sound Regional Transit Authority (RTA) adopted a Master Plan to serve as the basis for a referendum to be placed before voters within the RTA district in March, 1995. The Master Plan proposes a \$6.7 billion transit program, the most prominent features of which are light rail and commuter rail lines connecting the principal population centers of King, Pierce, and Snohomish counties. Implementation of the RTA Master Plan will have potentially far-reaching effects on how this new development in the region will be accommodated.

Adoption of the Master Plan culminates years of debate about the form and extent of a regional rail system. Although roots of the plan date from the 1968 Forward Thrust rail referendum, it was the region's adoption of **Vision 2020** in 1990 and subsequent development of a regional transit plan by the Joint Regional Policy Committee (JRPC) that shaped today's debate about what the rail system should accomplish.

Due to the potentially far-reaching effects of the RTA Master Plan, the RTA's enabling legislation specified that the legislative authorities of each county confirm their continued participation in the RTA, given the extensive modifications to the JRPC plan in the now-adopted RTA Master Plan.

This report documents information presented to the King County Council during its consideration of this decision. This information was shared with the Council at a joint meeting of the Regional Transit Committee and the Transportation, Transit, and Regional Governance Committee on December 1, 1994. Based on the joint committee's recommendation, and following public discussion at its December 5, 1994 meeting, the Council decided on December 12, 1994 to continue participation in the RTA.

The contents of this report are as follows:

- **The Plan's relative scale and performance** – the RTA plan was compared to the JRPC plan and to other rail transit systems in the U.S.
- **Operating issues** – presents implementation issues likely to arise with the LRT system, commuter rail system, and bus services which should be addressed in the next phase of planning.
- **Bus/rail integration** – presents an assessment of the impact on Metro bus operations associated with full implementation of the rail system.
- **Capital costs** – presents an assessment of the capital cost methods and results as presented in the RTA Master Plan.
- **Financing plan** – presents a review of the reasonableness of the methods and assumptions used in preparing the RTA's financial plan.

These sections of the report are followed by appendices which provide additional technical information.

## 2. The Plan's Relative Scale and Performance

Because the RTA's rail plan would be the first passenger rail system in the Puget Sound region, it is both interesting and useful to place the projected performance of the plan in some context that would facilitate its evaluation. This section of the report presents a comparison of the RTA plan to the plan previously adopted by the JRPC, and to other rail systems across the U.S.

### 2.1 Comparison to the JRPC Plan

The JRPC plan, adopted in May, 1993, served as the predecessor for the RTA Master Plan. The JRPC Plan also was a necessary interim step in the formation of the RTA.

The RTA Master Plan shares some similarities with the JRPC plan, but differs from the JRPC in several important ways (see Appendix A for maps of both plans). Within King County, the rail components of the RTA plan follow similar horizontal alignments in the North and South corridors. The vertical alignments have changed considerably in the South corridor, and both the horizontal and vertical alignments have changed considerably in the East corridor. Another important difference is the RTA plan's decreased emphasis on regional bus improvements. Whereas the JRPC plan would devote approximately 25% of local tax revenues to bus service and bus-related improvements, the RTA Master Plan devotes approximately 17% of local tax revenues to these purposes. Collectively, these changes reduced the cost of the plan by about half – from approximately \$13 billion to \$6.7 billion. Precise comparisons of the overall costs of the two plans are limited by the brevity of the final financing plan which accompanied the JRPC plan.

Most of the discussion regarding a comparison of the two plans has focused on costs. Somewhat less discussion has occurred regarding the relative performance of the two plans, especially where rail alignments were similar. Questions regarding this type of performance comparison arose in part due to the RTA plan's emphasis on at-grade rail construction.

Exhibit 2-1 presents a comparison of the rail components of the RTA Master Plan and the JRPC plan. The JRPC plan data has been modified to allow a reasonably direct comparison to the RTA plan. The major adjustments included: (1) converting the JRPC plan cost to 1995 dollars; and (2) deleting those segments of the LRT system in the JRPC plan which are excluded from the RTA plan (i.e., extension of the East line to Totem Lake, the Renton extension from the South line, the North line north of SW 164th Street in Snohomish County, and the South line south of Tacoma). Adjustments were also made to the JRPC plan ridership, beyond those needed for the comparable segments. These adjustments included: (1) discounting the ridership to 2010 from 2020; and (2) discounting of the baseline ridership which had overstated the JRPC ridership estimates relative to the ridership methodology now used by the RTA.

**Exhibit 2-1:  
Comparison of the RTA and  
JRPC Plans**

Plan Element	RTA Plan	JRPC Plan			difference, RTA vs. JRPC
		As Adopted	Comparable Segments	Ridership Adjustments	
<b>Capital Costs</b>					
LRT	\$4,184M	\$8,423M	\$6,082M		(\$1,898M)
Comm. Rail	595M	318M	318M		276M
total	\$4,779M	\$8,741M	\$6,401M		(\$1,622M)
<b>Operating Costs</b>					
LRT	\$120M	\$146M	\$96M		\$24M
Comm. Rail	26M	22M	22M		4M
total	\$146M	\$168M	\$118M		\$28M
<b>Daily Boardings</b>					
LRT	169,000	305,650	247,021	190,264	(21,264)
Comm. Rail	17,100	8,100	8,100	7,232	9,868
total	189,800	318,250	259,621	201,514	(11,714)
<b>Performance</b>					
Cost per Boarding	\$4.66	\$4.05	\$3.57	\$4.60	(\$0.06)
Revenue Speed LRT	25.0	30.0	30.0	30.0	(5.0)
Revenue Speed Comm. Rail	34.0	34.0	34.0	34.0	0

*(for additional information, please refer to Appendix A)*

Generally, the RTA plan accomplished its reduction in costs while maintaining comparable ridership productivity:

- For comparable segments, the RTA plan reduced capital costs by \$1.6 billion (25%) though operating cost estimates are slightly higher.
- Daily boardings decreased by about 12,000 (6%), owing mainly to the lower operating speed of the RTA plan (about 25 mph versus 30 mph+ in the JRPC plan).
- Cost per boarding was practically the same in both plans.

It is important to note, however, that the RTA ridership estimates assume a tunnel alignment through the University District. A surface alignment, which is still under consideration, is generally acknowledged to have a lower operating speed and would probably carry less riders. With this caveat, the changes made to the JRPC plan appear to be cost effective.

## 2.2 Comparison to Other Rail Systems

Another perspective on the plan's performance can be achieved by its comparison to other multimodal systems developed in the United States since the beginning of the resuscitation of urban transit in the mid 1960's. This comparison is first placed in a historical perspective, then viewed from a statistical perspective for light rail transit and commuter rail services.

### *Rail System Development in the U.S.*

Most of the major intermodal transit systems in the country were developed through various strategies by private and public agencies over a period of many decades. The primary examples of these kinds of older, more established, systems are in the Boston region, Metropolitan New York City, Philadelphia, Chicago, and Cleveland. Over the recent two or three decades, the preexisting rail transit, commuter rail, light rail, bus, and trolley bus systems operating in these metropolitan areas have been improved through various strategies which have resulted in rehabilitation, and often expansion of these systems.

Since 1965 or so, three major new regional rail rapid transit systems have been developed in San Francisco, Atlanta, and Washington, D.C. These single mode rail rapid transit systems have been developed based on an original regional system plan. In the case of Atlanta and San Francisco, full original build out was initiated at the outset and carried out over a period of several years. Since the completion of these original system plans of 60 to 70 miles, newly planned extensions have been developed and implemented - in both cases to the respective airports.

In the case of Washington D.C., the system that has been under construction for the past three decades has been based on an original plan with staging based on a combination of financial and service considerations.

In San Francisco, the rail rapid transit system of BARTD has been complemented by the light rail system owned and operated by the City of San Francisco, and a commuter rail line connecting San Francisco with the suburbs and commercial areas to the South which is sponsored by the State.

In Baltimore, the State of Maryland has developed three new rail modes since 1970. The first stage of a 60 mile regional rail rapid transit system has been completed and has been in operation for several years. The second stage is under construction. At the same time, the state rehabilitated commuter rail lines between Baltimore and Washington, D.C., and between Washington and the northwestern Maryland suburbs, as well as a light rail line between Baltimore and its north central suburbs. Further extensions of the light rail line are planned to the airport and its neighboring commercial and residential areas. Both the commuter rail and light rail lines were developed and implemented in parallel to the rail rapid system, over a relatively brief implementation period.

The other light rail systems that have been developed over the past two decades have taken a more incremental approach. These systems are in Buffalo, San Diego, San Jose, Sacramento, Portland, Los Angeles, Denver, and St. Louis. In these cases, new light rail lines have been

developed incrementally in segments generally in the 10 to 20 mile range. In some cases, these lines are the first phase in longer term plans for a multi corridor or a full regional system.

With the exception of Los Angeles and San Jose, none of these regions has a companion commuter rail or rail rapid transit operation. San Jose is at the southern end of the commuter rail service on the Peninsula to San Francisco. In Los Angeles, the County MTA is developing other light rail and rail rapid transit lines in addition to the existing light rail line to Long Beach, and the County is a partner in a multi-county agency that has developed and implemented a regional commuter rail system.

*Statistical Comparison: LRT Systems*

A summary of the major financial and operating characteristics of the RTA plan and that of a selection of other existing systems is provided on Exhibit 2-2. In this table, we have compared the RTA light rail plan to the average of four groups of other systems:

- the three new rail rapid systems in San Francisco, Atlanta, and Washington
- the seven new light rail systems in San Diego, San Jose, Sacramento, Buffalo, Portland, Los Angeles, and Baltimore
- the seven "old" light rail systems in Boston, Philadelphia, Cleveland, Pittsburgh, San Francisco, Newark and New Orleans (even though the latter two are very small and quite different otherwise)
- the average of the all three groups.

*(the detailed data for each of these systems is presented in Appendix B)*

The new systems that have recently begun operation in Denver and St. Louis are not included in this comparison, because the data from these systems are not yet available. In general, both of these lines are being developed incrementally in the style of the other new light rail systems.

<b>Exhibit 2-2: LRT Systems Comparison</b>						
<b>System Group</b>	<b>Directional Route Miles</b>	<b>Operating Costs</b>	<b>Vehicle Hours</b>	<b>Cost per Hour</b>	<b>Passengers per Hour</b>	<b>Farebox Recovery</b>
Rail Rapid Systems	124	\$211M	1,207,000	\$162	91.2	NA
Newer LRT Systems	33	\$20M	124,868	\$167	71.1	36.4%
Older LRT Systems	47	\$30M	187,229	\$167	105.8	40.0%
Group Average	68	\$87M	506,499	\$165	89.4	38.2%
RTA (projected)	138	\$120M	674,550	\$178	75.2	40.0%
RTA % of group average	203%	137%	133%	108%	84%	105%

The general conclusions that can be reached from this comparison include:

- the operating and financial characteristics of the RTA light rail plan are more comparable to the three large rail rapid systems (BART, WMATA, MARTA) that were built under the concept of achieving full regional service as soon as possible
- the scale of the RTA light rail system is significantly larger than those of either the seven new or the seven old light rail systems
- the level of service provided, measured in vehicle hours, is greater than both the other new systems and the old light rail systems - in part because of the length of the system
- the operating costs of the RTA system, measured in cost per car hour, are comparable to the average of the other systems
- the 40% "operating ratio" assumed by the RTA is very close to the average of the other systems
- the ridership productivity (riders per vehicle hour) is lower than that for the rail rapid systems and the older LRT systems, but slightly above the newer LRT systems.

#### *Statistical Comparison: Commuter Rail*

The comparison of the proposed commuter rail element of the plan calls for some similarly judgmental considerations. The current set of commuter rail programs that are in operation in the United States vary significantly in nature and extent, operating and financial characteristics, and underlying costs factors. Some are owned by public agencies, and operate passenger services only. Some are publicly owned and operated by private carriers. Some are owned by private companies and subsidized by public agencies.

For the purpose of this comparison, we selected a sample of five commuter rail lines: one in Boston, two in Chicago, the new system in southern Florida serving the three counties en route to Miami, and the system operated by CalTrans serving San Francisco. The results of this comparison are presented in Exhibit 2-3 (top of following page).

The general conclusions that can be drawn from the commuter rail system comparison are as follows:

- The estimated cost per hour of the RTA commuter rail system is less than the average cost per hour of the other systems.
- The average passengers per hour of the RTA system is about 60% that of the other systems.
- The speed of the RTA system is comparable to that of the other systems.
- The level of service provided, measured in revenue hours, falls within the range of the other systems and is about the same as the services provided by BN in Chicago.
- The estimate of total annual passengers is lower than the average of the other systems, and exceeds only that of the Tri-Rail service in south Florida.

The overall scale of the planned commuter rail system is partly a function of the indirect alignment of the existing right of way, a partly of a desire to serve Tacoma on one end of the route and Everett on the other. The aspect of the plan helps the overall equity of the redistribution of the tax revenues, but diminishes the cost effectiveness of the overall scheme.

**Exhibit 2-3:  
Commuter Rail  
Systems Comparison**

System	Operating Cost per Revenue Hour	Riders per Revenue Hour	Operating Speed	Annual Statistics (000s)			
				Operating Expenses	Vehicle Miles	Vehicle Hours	Riders
Boston (MBTA)	\$199	39.8	29.7	\$99,954	15,177	511	19,949
Chicago (C&NW)	\$262	64.2	32.9	\$95,565	12,342	370	23,299
Chicago (BN)	\$279	92.7	34.5	\$34,234	4,886	142	11,359
Florida Tri- Rail	\$367	51.2	40.6	\$16,249	1,892	56	2,267
CalTrans	\$327	68.8	33.5	\$28,774	2,951	88	6,058
1992 Average	\$287	63.3	34.2	\$54,955	7,450	233	12,606
1995 Value @ 4%/year	\$323	63.3	34.2	\$61,817	7,450	233	12,606
RTA (projected)	\$256	34.9	32.9	\$32,000	4,110	125	4,361
RTA % of peer group	79.3%	55.1%	96.1%	51.8%	55.2%	55.7%	34.6%

### 3. Operating Issues

The operation of the services proposed in the plan carries with it a set of assumptions which are common to such plans. The nature of several of these assumptions is that they require the acceptance and cooperation by a number of other agencies and organizations to be carried out effectively and within the cost and service quality parameters of the plan.

It would not necessarily be the case that all of these issues would be resolved at this stage of the planning. However, the ability of the RTA eventually to deliver the services it proposes at that costs it estimates will depend to at least some extent on its ability to work with each of the relevant agencies to reach an acceptable resolution. For the short term, agreements in principle would be useful to support the financial and operating feasibility of the plan.

The operating issues and assumptions can be unique to each of the three major modes of the plan: commuter rail, light rail, and "feeder bus" and "trunk bus" services.

#### 3.1 Commuter Rail

The commuter rail operating plan calls for operating passenger service on the same tracks that the railroad currently operates freight services. This is a practice that is common to many existing commuter rail operations in this country and elsewhere, and is generally a very feasible scheme. The volume of freight service on this line is extensive, and greater than is found on many joint passenger and freight operations.

The difficulties of such operation are known to the RTA, and have not been ignored. They include:

- using rolling stock that is safe to operate in common with freight operations
- coordinating schedules so that passenger service can achieve on time performance
- avoiding passenger service delays caused by freight operations on a railroad owned and managed by the freight railroad
- allocating to costs of right of way maintenance in such a way that reflects the generally higher standards required for high speed passenger service, while the extent of wear and tear is largely a function of the weight and volume of freight traffic.

The resolution of these issues can be dealt with in the eventual contract for services, but should be spelled out in a memorandum of understanding with the railroad before the commitment is made to make the capital improvements on the railroad that are a part of the plan and will be necessary to provide the levels of service contemplated by the plan.

The eventual agreement with the railroad will also be subject to the federal procurement regulations to which agencies that receive FTA funding are bound. These include the requirement that service contracts be competitively procured initially, and then re-competed every three to five years. The application of this principle to an operating contract with an owning railroad may require an exemption from the FTA.

