BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF ALLOCATING THE INTERSTATE REGIONAL RESERVE AND AMENDING THE TRANSPORTATION IMPROVEMENT PROGRAM ACCORDINGLY	))))	RESOLUTION NO. 90-1200 Introduced by Mike Ragsdale

WHEREAS, Metro Resolution No. 89-1072 adopted the Metro Transportation Improvement Program; and

WHEREAS, $5,053,664 is included in the Interstate Transfer Regional Reserve; and

WHEREAS, This Reserve is available for allocation to final costs on the Banfield LRT and Highway project, the I-505 Alternatives project or to other regional transit or highway projects; and

WHEREAS, Federal-Aid Urban funds are available for region-wide highway improvements of which a portion remains unallocated; now, therefore,

BE IT RESOLVED:

1. That the Council of the Metropolitan Service District hereby allocates the Interstate Transfer Regional Reserve as follows:

Banfield Freeway	$ 608,820
Banfield LRT	1,000,000
Convention Center Area	2,000,000
Light Rail Vehicles	1,444,844
	$5,053,664

2. That the $2,000,000 Convention Center area allocation to the City of Portland shall revert to the Regional Reserve for reconsideration if, by July 1, 1990, the City has failed to finalize all

required City of Portland budget actions and actions required to form local improvement districts and urban renewal districts.

3. That the Council of the Metropolitan Service District hereby allocates Federal-Aid Urban funding as follows:

Hawthorne Bridge Transition Structure -

LRT Compatibility:

P.E.	$100,000
Reserve	190,000
	$290,000
Metro Transportation Planning	$300,000
	$590,000

4. That the Transportation Improvement Program be amended to incorporate these actions.

5. That these actions are consistent with the Regional Transportation Plan and affirmative Intergovernmental Project Review is hereby given.

ADOPTED by the Council of the Metropolitan Service District this 25th day of January, 1990.

Tanya Collier, Presiding Officer

ACC:mk
90-1200.RES
01-19-90

STAFF REPORT

CONSIDERATION OF RESOLUTION NO. 90-1200 FOR THE PURPOSE OF ALLOCATING THE INTERSTATE TRANSFER REGIONAL RESERVE AND AMENDING THE TRANSPORTATION IMPROVEMENT PROGRAM ACCORDINGLY

Date: December 29, 1989 Presented by: Andrew C. Cotugno

PROPOSED ACTION

This resolution would allocate the last remaining unallocated Interstate Transfer funds, now contained in a Regional Reserve, as follows:

Banfield Freeway	$ 608,820
Banfield LRT	1,000,000
Convention Center Area	2,000,000
Light Rail Vehicles	1,444,844
	$5,053,664

It would also allocate FAU funds as follows:

Hawthorne Bridge Transition Structure - LRT Compatibility:	
P.E.	$100,000
Reserve	190,000
	$290,000
Metro Transportation Planning	$300,000
	$590,000

TPAC and JPACT have reviewed this allocation and TIP amendment and recommend adoption of Resolution No. 90-1200.

FACTUAL BACKGROUND AND ANALYSIS

Of the total $501 million Interstate Transfer Program, $65.5 million remains to be spent. However, of this amount only $5 million remains to be allocated to specific projects. The remainder has already been allocated and the projects are scheduled over the next several years. This $5 million is the final allocation from the Regional Reserve which was originally $16.97 million and has had the following allocations to date:

May, 1987		February, 1988	
I-505 Alternative . .	$1,085,000	Stark Street.	$1,150,000
Banfield Highway. . .	387,000	185th Avenue.	1,680,000
Sunset/217.	500,000	82nd Drive.	1,680,000
Oregon City Bypass. .	50,000	Marine Drive.	3,200,000
	$2,022,000		$7,710,000

April, 1988		May, 1988	
Metro Planning. . . .	$ 50,000	Tri-Met TDP Reserve .	$2,100,000
April, 1989			
		TOTAL ALLOCATED . . .	$11,916,914
Metro Planning. . . .	$ 34,914	BALANCE AVAILABLE . .	$ 5,053,664

THE RECOMMENDATIONS FOR ALLOCATION OF THIS $5,053,664 ARE DESCRIBED BELOW:

Recommendation No. 1 - Allocate $608,820 toward final Banfield highway costs.

The overall Banfield highway costs have been finalized and ODOT has indicated that $608,820 is ineligible for reimbursement from UMTA Section 3 funds. The past Interstate Transfer funding allocation is fully spent and an additional $608,820 is recommended for allocation.

Tri-Met has indicated that the final Banfield LRT costs are anticipated to be within the Interstate Transfer and Section 3 Full-Funding Agreement amounts previously approved for the project.

ODOT has indicated that the I-505 Alternatives project is nearly complete and sufficient Interstate Transfer allocation is available.

Recommendation No. 2 - Allocate $1 million toward final Banfield LRT costs.

The Banfield LRT Full-Funding Agreement provides an overall cap to UMTA's funding commitment to the project plus a clause allowing for additional federal funding participation over and above the cap for "extraordinary costs" that were not foreseen in the originally approved scope (for such costs as those incurred due to acts of God and court settlements). The Banfield Full-Funding Agreement currently has approximately $5 million remaining up to the cap plus a potential additional $5 million under the provision for "extraordinary cost" eligibility. The following expenditures are proposed by Tri-Met within the remainder of the Full-Funding Agreement:

Settlement of Claims, Legal Fees, Etc.	$ 2.10 m.
Double Track (Gresham)	6.97
Storage Track (Ruby Junction)	1.03
	$10.10 m.

However, in 1986, as a precondition to adding the Vintage Trolley project to the scope of the Banfield LRT project, UMTA required that the first $1 million of costs above the Full-Funding contract be borne locally before any federal funds up to the "extraordinary cost" limit would be provided. In December, 1986, TPAC and JPACT concurred that this amount should be committed from the Interstate Transfer Regional Reserve. At this time, it is necessary to determine whether to seek the additional funding provided by the "extraordinary cost" clause and therefore whether to commit the $1 million of Interstate Transfer funding. It is recommended that this funding be committed because of the ability to implement a $5 million package of LRT improvements with only $1 million of locally available funds subject to later approval of the projects by UMTA.

Recommendation No. 3 - Allocate $2 million toward Convention Center Area Transportation Improvements.

In early 1989, the City of Portland established a Convention Center Area Transportation Capital Improvement Program (see Attachment A) to support the Convention Center and implement aspects of the Urban Renewal plan. This is a comprehensive package of improvements to traffic circulation, pedestrian amenities, transit improvements, street lighting and other related projects. The total $33.7 million improvement program relies on a diverse set of funding from the Convention Center project itself, the City of Portland, private property interests, the urban renewal district, previously approved FAU funds and this $2 million allocation. This improvement program also includes previously approved federal transit funding for the Convention Center LRT station and the Convention Center hotel component of Project Breakeven. If this Interstate Transfer funding is not allocated, the other funding participants could reduce their funding commitment since it would be impossible to implement the full improvement package. Because of the contingent nature of the other funding sources, it is recommended that a deadline of July 1, 1990 be established to finalize all other required City of Portland budget actions and actions required to form local improvement districts and urban renewal districts. If this deadline is not met, this allocation should revert to the Regional Reserve for reconsideration.

Recommendation No. 4 - Allocate the remaining $1,444,844 for light rail vehicles.

Tri-Met is seeking to acquire at least 10 additional light rail vehicles to improve their present spares ratio to ensure proper maintenance schedules can be met and to provide sufficient capacity to serve short-term ridership growth (see Attachment B). Continued peak-hour ridership growth since opening day has forced Tri-Met to minimize spares in order to maximize actual operating capacity. As ridership continues to grow, further decreases in spares as an option is no longer available. Furthermore, as the vehicles approach 250,000 miles in 1990, a higher spares ratio will be required for recommended maintenance. The need for additional light rail vehicles is as follows:

-	Needed now to allow adequate spares	2
-	Needed through 1998 to keep up with capacity needs of peak hour ridership growth	6
-	Needed through 1998 to stay ahead of peak hour ridership growth	3
	Total	11

In order to establish a vehicle order of at least 10 vehicles, Tri-Met is expecting to commit the following funding sources (including this Regional Reserve):

Section 9 Funding	$ 9.01 m.
Previous Interstate Transfer Allocation	3.36
Regional Reserve	1.44
	$13.81 m.

Additional TIP amendments will be required to approve these other aspects of the light rail vehicle purchase.

ALTERNATIVES -- TPAC CONSIDERED AT LENGTH OTHER ALTERNATIVES THAT COULD BE PURSUED IN LIEU OF RECOMMENDATIONS 3 AND 4 (DESCRIBED PREVIOUSLY):

Candidate arterial projects that could be considered are as follows:

Washington County

Baseline Road - 185th to 231st	$11.97 m.
Murray Boulevard - U.S. 26 to Cornell	1.50 m.

Clackamas County

Sunnybrook Extension - east of I-205	$10. m.
I-205 LRT	5. m.

Multnomah County

207th - I-84 to Glisan	$ 5.5 m.
Hawthorne Bridge - LRT Conversion	.3 m.
Hawthorne Bridge Transition Structure - Shortfall	3.2 m.
Metro Transportation Planning	.3 m.

City of Portland

Convention Center area circulation 2.0 m.

This funding could be allocated on a 100 percent discretionary basis, on a 100 percent formula basis or 75 percent formula/25 percent discretionary as now used for FAU allocation. Assuming an allocation of $3,444,843 (after allocation of Regional Reserve funding to final Banfield highway and LRT costs), possible formula distributions are as follows:

	Population	Percent	100% Formula	75/25 Formula
Multnomah County	139,204	14.1	$ 485,723	$ 364,292
City of Portland	419,810	42.4	1,460,613	1,095,460
Clackamas County	179,615	18.1	623,517	467,637
Washington County	251,517	25.4	874,990	656,243
Regional Allocation			0	861,211
TOTAL	990,146	100.0	$3,444,843	$3,444,843

In addition, TPAC indicated that sufficient funding should be available for proposed LRT studies, either from this source or others.

The initial package of projects is recommended for adoption in lieu of any of these alternatives because this will complete ongoing projects of regional significance. However, in addition, two items identified above are recommended for allocation of FAU funds:

I. Hawthorne Bridge Transition Structure (Attachment C) -- include LRT compatibility in structure design of replacement transition structure.

   a. P.E. to determine preferred LRT alignment on the Hawthorne Bridge and cost to retrofit the entire Hawthorne Bridge for LRT (including consideration of bridge fatigue) as compared to the cost of a new LRT bridge: $100,000

   b. Reserve for construction in the event P.E. concludes LRT compatibility can be included: $190,000

II. Metro Transportation Planning -- to be included in FY 91 and 92 Unified Work Program: $300,000

These FAU allocations are recommended to come proportionately from the City of Portland Contingency and the Regional FAU Reserve as follows:

Portland	(42.4%)	$250,160
Region	(57.6%)	339,840
		$590,000

As in the past, funding for Metro Transportation Planning is predicated on equal funding commitments from ODOT, Tri-Met and the region.

This funding commitment has been in place for the past four years and is now scheduled for renewal. This FAU allocation would be the region's share of this commitment for the next two years.

EXECUTIVE OFFICER'S RECOMMENDATION

The Executive Officer recommends approval of Resolution No. 90-1200.

Attachments

ATTACHMENT A

CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS

March 6, 1989

FINANCE AGREEMENT

CONVENTION CENTER TRANSPORTATION PROGRAM

MARCH 6, 1989

We the undersigned do hereby commit our support to implementation of a public improvement program for the Convention Center Area substantially in conformance with the attached Exhibit "A". In so doing, we recognize that the scope and breadth of individual projects remains flexible and subject to the recommendations of the Policy Team and approval of the City Council, but that our mutual intent is to implement these improvements to the highest and best interests of the redevelopment of the district and to complement the public's existing investment in the Oregon Convention Center. To that end, we pledge our combined resources as outlined in the attached Exhibit "A". Recognizing that we as individuals may not possess sole authority to commit corporate or public resources to this end, we agree to seek and obtain such authority as is necessary within forty-five days of execution of this agreement. Should any party hereto, for whatever reason, choose not to fully participate as outlined in Exhibit "A", that action, by virtue of this agreement, shall be cause for the other parties to reduce their fiscal commitment by a commensurate amount. In any case, no such reduction will be accommodated by deletion of elemental projects described in Exhibit "A" and shall be made in a way which preserves the maximum integrity of the program in attempting to meet the stated goals and objectives. In addition to the program outlined in Exhibit "A", the parties understand public safety is a priority issue that will be addressed through a separate program.

By execution of this understanding and agreement, we pledge to one another our continuing support for the overall program and agree to work in good faith to achieve the objectives set forth in Exhibit "A".

Earl Blumenauer, Commissioner
City of Portland

Loren Wyss
Tri-Met

Ted Runstein
ERC

Bill Scott
Pacific Development

for Don Forbes
Oregon Department of Transportation

Harry Demorest
Portland Development Commission

Larry Troyer
Lloyd Center

Tom Walsh
Metro/OCC

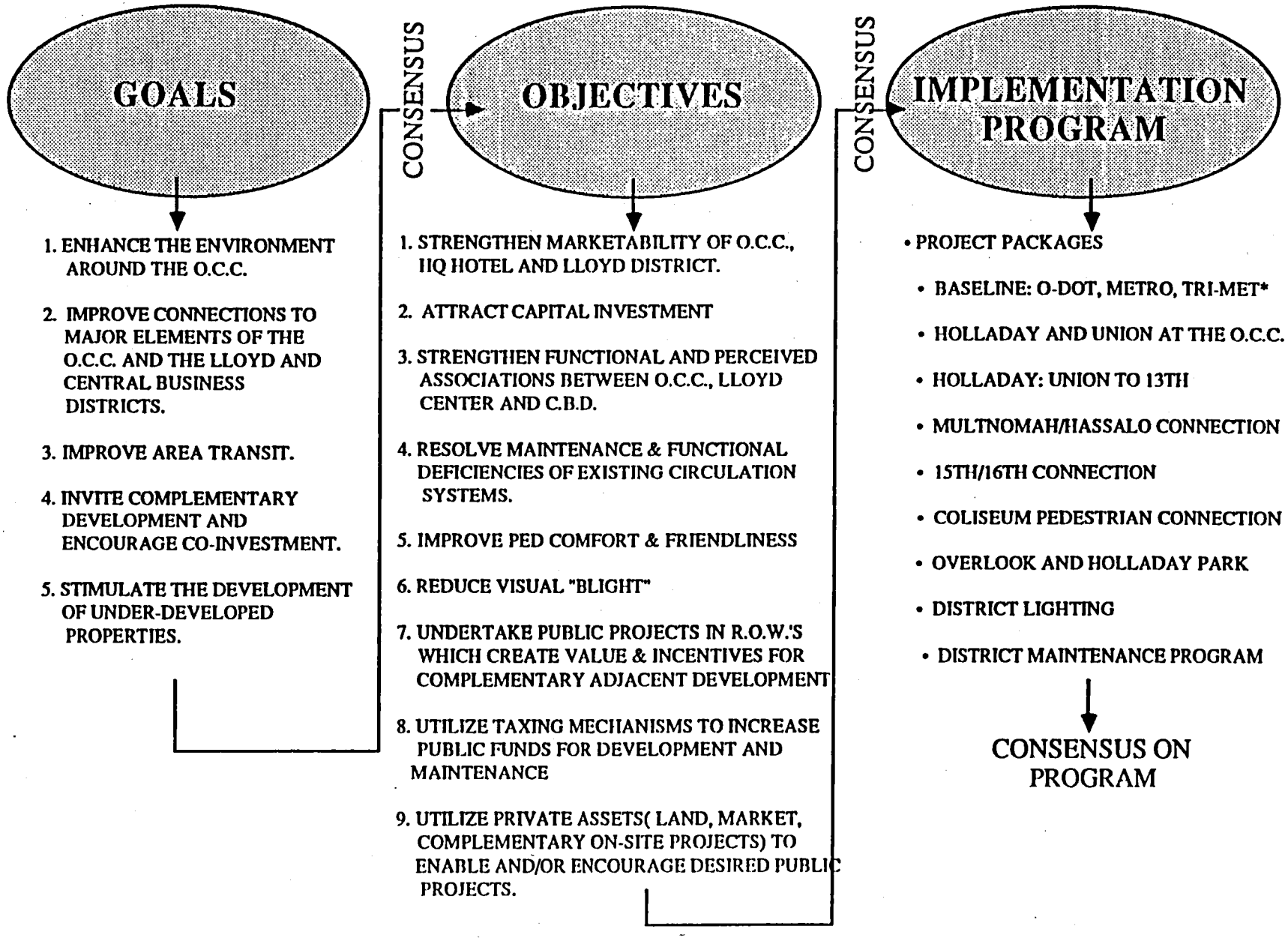
CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS

Finance Agreement
EXHIBIT 'A'

March 6, 1989

CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS

PROCESS DIAGRAM



CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS

MATRIX

PROJECT PACKAGES / PROGRAM GOALS	ENHANCE THE ENVIRONMENT AROUND THE O.C.C.	IMPROVE CONNECTIONS TO THE LLOYD AND CENTRAL BUSINESS DISTRICTS	IMPROVE AREA TRANSIT	INVITE COMPLEMENTARY DEVELOPMENT AND CO-INVESTMENT	STIMULATE DEVELOPMENT OF UNDER-DEVELOPED PROPERTIES
HOLLADAY AND UNION AT THE O.C.C.	●	●	●	●	●
HOLLADAY: UNION TO 13TH	●	●	●	●	●
MULTNOMAH/HASSALO CONNECTION	●	●	◒	●	●
15TH/16TH CONNECTION	◒	●	◒	◒	●
COLISEUM CONNECTION	●	●	◒		◒
OVERLOOK & HOLLADAY PARK	●	●			◒
DISTRICT LIGHTING	●	●			◒
DISTRICT MAINTENANCE PROJECTS	●			◒	◒

● COMPLEMENTS

◒ CONSISTENT

UNRELATED

CONVENTION CENTER CAPITAL IMPROVEMENTS
IMPLEMENTATION STRATEGY
March 6, 1989

REQUIREMENTS

Element	Budget Estimate (Millions)
Holladay/Union at O.C.C.	$ 2.327
Holladay, Union to 13th	5.106
Multnomah/Hassalo	0.787
Hotel Site Acquisition	4.500
16th Two-Way, 15th/16th	5.026
Right-of-Way*	0.100
Williams/Hassalo Intersection	0.205
District Lighting	2.377
Overlook & Holladay Park	0.847
District Maintenance Projects	ODOT
General Contingency (4.7%)	1.047
Program Total	**$22.322**
Baseline	11.381
Area Total	**$33.703**

*Railroad property purchase. Remainder donated in exchange for equal land area from street vacations.

CONVENTION CENTER CAPITAL IMPROVEMENTS
IMPLEMENTATION STRATEGY
March 6, 1989

RESOURCES

Source	Amount (Millions)
FAU (King Blvd. / Halliday St.)	$ 1.960
Match	0.130
Region Funds	2.000
Match	0.300
Tri-Met "Project Breakeven"	4.500
Street Lighting	3.000
Metro Pedestrian Fund	0.200
PDC/Urban Renewal (15th/16th)	5.126
Private Sector Participation	5.106
Program Total	**$22.322**
Baseline Funding	11.381
Area Total	**$33.703**

CONVENTION CENTER CAPITAL IMPROVEMENTS
IMPLEMENTATION STRATEGY
March 6 1989

EXHIBIT A ADDENDUM
BASELINE RESOURCES

Source	Amount (Millions)
ODOT	$ 4.700
Lloyd Blvd. Extension	
Holladay Off-Ramp	
Grand Avenue Ramp Improvement	
Tri-Met Grant	$ 3.481
Holladay LRT Station	
Coliseum Station	
Bus Transfer Facility	
Right of Way	
METRO	$ 2.700
Lloyd Blvd. & First Avenue Right of Way	
Holladay, 1st-Union Basic Street plus Signals	
Basic LRT Platform	
Union Avenue West Frontage	
Oregon Street to Two-Way	
Detours, Miscellaneous & Engineering	
Pedestrian Improvements	
Hassalo/Williams Right Turn	
Two-Way Lloyd & Misc. @ 9th & 11th	
City	$ .500
OCC Area Lighting to Metro	
Revise Holladay to Eastbound	
Widen Hassalo, Williams - Occident	
Union, East Side Lights	
Consultants (Cooper, ZGF I, ZGF II)	
OCC Project Manager	
Total	**$11.381**

CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS

Assumptions & Proposed Schedule

March 6, 1989

CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS

Proposed Critical Path Dictating Project Schedules

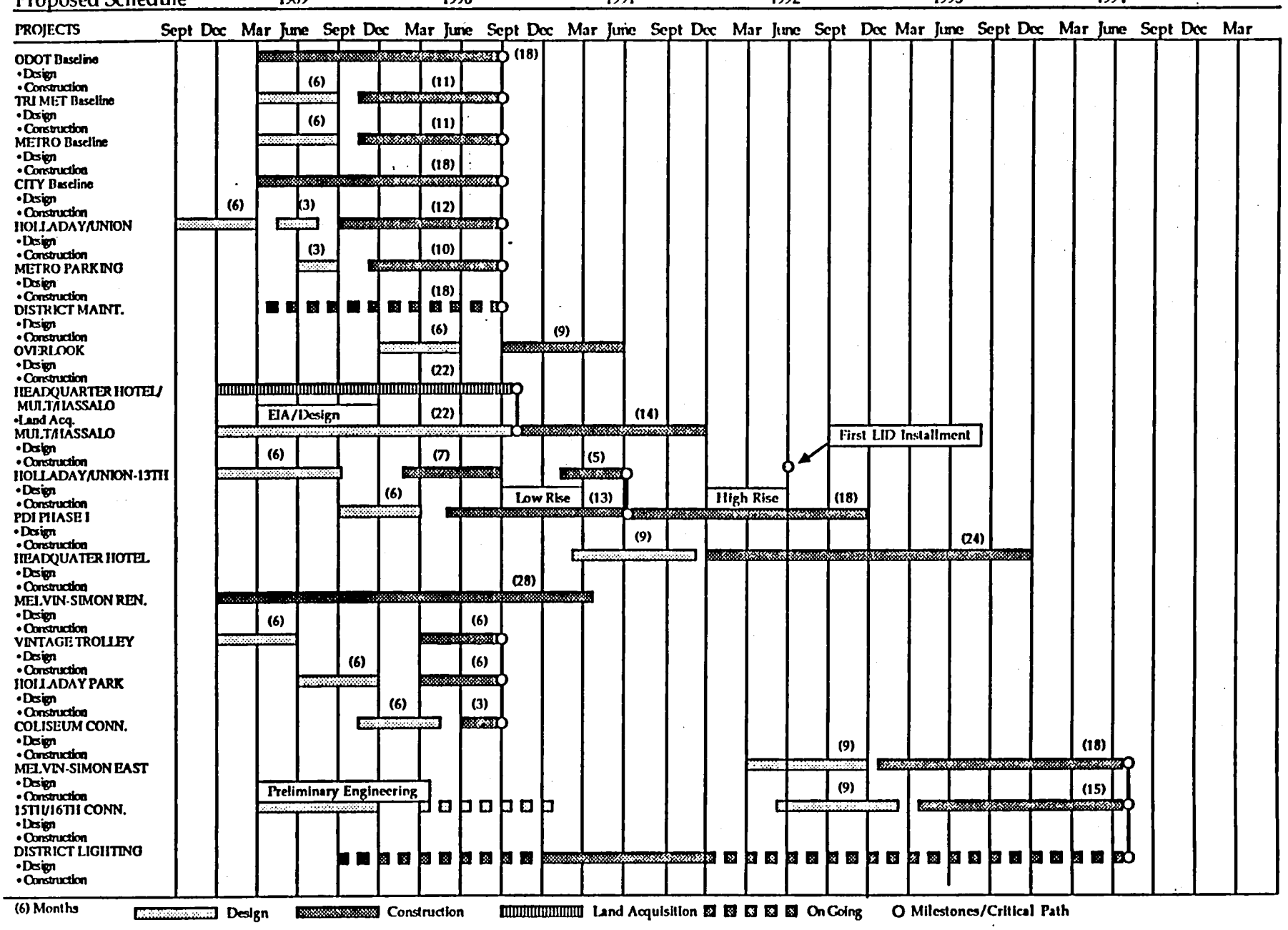
March 6, 1989

The attached project schedules and derivative cash flow and funding projections are based upon a sequence of assumptions regarding the project requirements, characteristics and resources associated with each of the potential participants. The participants include the Portland Office of Transportation, the Oregon Department of Transportation, Tri-Met, the Exposition and Recreation Commission, the Portland Development Commission, the Portland Bureau of Parks, Metro, Melvin Simon & Associates, Inc., and Pacific Development Inc. The assumptions regarding their rele-vant project requirements, characteristics and resources have been reviewed and con-firmed by each. The reconciliation of these multiple objectives suggests the following critical path of interdependent projects and events.

Projects	Events
Projects Associated with Oregon Convention Center	The following must be completed by September 1990: - All ODOT Baseline projects - All Tri-Met Baseline projects - All Metro Baseline projects - Metro Parking Lot - All District Maintenance by ODOT, City and others - All other improvements to Union and Holladay adjacent to the Convention Center The following should be completed by September 1990: - Vintage Trolley - Coliseum Connection - Phase 1 improvements to Holladay Park - Phase 1 improvement to the Overlook (ROW acquisition will probably delay this project for a year)

Multnomah/Hassalo	Construction must follow completion of EIA and design work estimated to consume 22 months. Construction must follow successful acquisition of new ROW to accommodate alignment. ROW acquisition may be coordinated with acquisition of Headquarters Hotel site. Construction may be coordinated with construction of Headquarters Hotel.
Holladay/Union-13th	Must follow completion of Multnomah/ Hassalo project to assure acceptable vehicular access to district properties during its construction. Should be completed with or prior to the completion of PDI's initial development on Holladay. Should also avoid conflicts with Christmas shopping season.
15th/16th Streets Project	Must follow successful acquisition of ROW necessary to accommodate alignment. Must be constructed and completed in coordination with Melvin Simon's improvement to its eastside properties. Must be completed when development and redevelopment of area properties require completion of ring road to accommodate increased vehicular traffic.
Lighting Improvements	To occur in coordination with related projects such as street improvements that are implemented.

CONVENTION CENTER TRANSPORTATION CAPITAL IMPROVEMENTS



ATTACHMENT B

LRV PURCHASE

-Analysis-

DRAFT

Part II

- Ridership Demand
- Maintenance Requirements
- Timing and Procurement Issues
- Financing Alternatives

Financial Planning
October 1989

Light Rail Vehicle Purchase

In this report the issues surrounding the decision to proceed or not to proceed with the purchase of additional eastside light rail vehicles now are analyzed. Two basic questions are addressed: 1. When do we need LRVs? (ridership and maintenance issues), and 2. How do we pay for them? (financial issues).

I. Timelines

The following discussion of the maintenance and ridership issues should be read keeping several procurement dates in mind. As the scenarios in Exhibit I show, Tri-Met could expect to have additional LRVs delivered by late 1992 at the earliest (Alternative I), or by early to mid-FY 1994 (Alternative II) if we begin the procurement process now. If we wait a year to begin the procurement process, the delivery dates increase one year (Alternative III). Procurement issues are discussed in more detail below.

II. Ridership

A. What is the trend in peak ridership growth?

Peak Load Data

Since the first year of operation, discretionary, off-peak, novelty ridership on MAX has been contracting, as evidenced by declining weekend rail ridership, and peak hour commuter ridership has been expanding, as evidenced by increasing peak hour loads.

While average weekday light rail boardings have increased only slightly since opening year,

FY87 19,500
FY88 19,600
FY89 19,700

peak direction, peak one hour loads have increased about 14% per year on average:

Average AM Peak Loads -Fall-		% Change	Average AM Peak Loads -Spring-		% Change
1986 Fall	1,432	-	1987 Spring	1,518	-
1987 Fall	1,695	18.4%	1988 Spring	1,607	5.9%
1988 Fall	1,912	12.8%	1989 Spring	1,912	18.9%
	Average	15.6%		Average	12.4%

MAX peak hour trip by trip passenger volumes at Lloyd Center from 10/86 through 7/89 are presented in Exhibits II and III. The Lloyd Center is the peak load point.

Present Supply and Demand

Of the 22 vehicles operating during the peak hour, there are 15 inbound direction cars through the peak load point at Lloyd Center. Tri-Met's peak loading standard says that the average load during the peak one hour in the peak direction will be 218% of seated capacity, or 166 passengers per car ("Tri-Met Service Standards," April 1989). This is 76 passengers seated, 90 standing, 4 people standing per square meter throughout the peak hour. At 166 passengers per car, the peak hour capacity of the line at the peak load point is 2,490 passengers.

Presently, passenger volumes during the peak one hour average about 125 to 135 passengers per car. During the peak twenty minutes, passenger volumes average 150 to 166 passengers per car. (See Exhibits III and IV).

During the peak 30 minutes, passenger volumes are consistently 20% higher than the peak hour average and during the peak 20 minutes, passenger volumes are consistently 30% higher than the peak hour average. If we assume the same relationship, the peak 20 minutes will be at an even higher standard when the peak one hour standard of 166 passengers per car is reached. Car loads during the peak 20 minutes will be 264% of capacity, 5 passengers standing per square meter, and car loads during the peak 30 minutes will be 242% of capacity, 4.5 passengers standing per square meter, necessitating schedule adjustments. (See Exhibits III, IV and IX and Section II.D. below.)

Exhibit V is a snapshot of the peak one hour and direction on MAX since the opening of the line, summarizing the data presented in this section.

B. What is the basis for our loading standards and how do they compare to other transit agencies? What level of crowding will people tolerate?

Vehicle loading standards specify the acceptable average number of passengers per vehicle passing the peak load point during the hour (or 20 minutes, or 30 minutes, depending on the transit agency) of the day when the highest passenger loadings occur. The standards are based on the practical capacity of the vehicles as defined by the equipment specifications, and are designed to ensure safety, passenger comfort, and operating efficiency. While different transit agencies may adopt different standards, transit agencies universally measure peak loads in this manner.

To answer our questions, a phone survey of other light rail properties was conducted. Exhibit X presents the results of the survey.

From the results of the survey, it is apparent that:

- 4 standing passengers per square meter is the maximum "practical" car load that passengers will tolerate on a daily basis, according to nearly all properties surveyed.

- o 6 standees per square meter is considered to be a "crush" load.

- o Calgary operates at near crush conditions throughout the peak hour, but Calgary officials say passengers are compensated for this with 3 minute peak period headways. While Buffalo officials have a goal of achieving over 5 standees per square meter in the peak one hour, they carry no where near this today.

- o Sacramento's peak hour load standard compensates for peak 20 minute loads. Sacramento, which has peak hour loads that are similar to Tri-Met's, is buying 10 additional light rail vehicles to accommodate peak hour growth.

- o Tri-Met's load standard is in line with that of other rail properties.

C. How many vehicles will be needed and when?

Projected Supply and Demand

Based on the the trend in peak hour loads since 1986, we can project increases in MAX peak hour ridership for the next few years using either (a) the average annual increase in peak loads--14% per year--or (b) by fitting a least squares line to the data. Using the least squares formula, projected peak hour ridership increases 7% per year. Exhibits VI and VII present projected peak hour ridership using the least squares formula.

Based on the least squares projection, by 1992 every trip in the peak one hour will operate at 218% of capacity. By 1993 four additional light rail vehicles will be required to operate at 218% of capacity, by 1994 six additional light rail cars will be needed, and by 1995 eight additional cars will be needed. (See Exhibit VIII.)

Without additional cars, we will be carrying five passengers per square meter during the peak 20 minutes by 1992. By 1993, we will be carrying 5 passengers per square meter in the peak 30 minutes and 6 passengers per square meter in the peak 20 minutes. These are crush loads. At or before this point, ridership growth will be constrained by lack of capacity. People will not be able to ride when they want to ride, and while some passengers will adjust and move to the shoulders, others will find other means of transportation. (See Exhibit IX).

How tenable are these projections? The observed increases in MAX peak hour ridership are substantiated by cutline counts which show that traffic volumes in the region are increasing. Between 1986 and 1988, eastside all day traffic volumes increased 12%, 6% annually, and peak hour volumes increased 6%, 3% per year. (Source: Keith Lawton, Metro, 9/89.)

The LRV peak hour ridership projections are nearly identical to Metro 1998 east/west MAX peak hour projections. While one forecast is not verification of another forecast, the observed and projected MAX ridership is consistent with the projected growth that makes Westside light rail construction defensible. The purchase of additional vehicles based on these ridership projections would be entirely consistent with Tri-Met's regional rail plans.

D. Can peak hour capacity be increased without cars? Is there a scheduling technique that will allow Tri-Met to save a car in the peak?

In general there are two techniques available: (a) techniques that would allow us to cut a car by decreasing cycle time, and (b) techniques that would allow us to increase peak load point capacity, by increasing the number of cars though the peak load point in the peak one hour.

All known and available techniques have been analyzed by Bill Coffel, Ken Zatarain and Hal Juram. (See 9/28/89 memo from Bill Coffel, attached).

They concluded that:

- There is one feasible option for increasing peak hour/direction capacity--an additional car-cut, already in practice at Tri-Met.
- Only one more opportunity exists to perform the car-cut operation--adding one car trip west of Gateway in the peak.
- Trip adjustments, where a group of trips is moved slightly so that service is concentrated at the time of greatest need, will be used in conjunction with the car-cut to further relieve peak of the peak overcrowding.
- Tri-Met's options are limited by (a) the single track operation between Ruby Junction and Cleveland, (b) the design of the line with integration of bus service, and (c) fairly high reverse direction and East County ridership. In fact, passenger volumes east of Gateway remain high, and should reverse commuting and off-peak traffic increase with the opening of the Gresham Mall, the car cut may no longer be viable.
- Implementation of another car-cut combined with trip adjustments would alleviate peak capacity problems for one year, given the trend in peak hour ridership growth. (See Exhibit VIII).
- The car cut requires an additional operator.
- There is no known scheduling technique that would allow Tri-Met to operate with one less car in the peak without severe overcrowding. Again, our options are reduced by single track and bus service meets, but even without these two factors, our ability to increase peak period, peak load point capacity would be limited by the high passenger volumes east of Gateway. Sixty-four percent of the maximum load arrives at Gateway from the east.
- As an interim measure to alleviate overcrowding, rail service could be supplemented with express bus service from Gateway. Buses would standby at Gateway, and passengers would be encouraged to board express buses.

Advantages would be: 1) Provides a low cost capital solution if spare peak buses are available. 2) Provides a slightly quicker trip.

Disadvantages: 1) Service would require additional operators, each rail car carries the equivalent of three buses. This alternative could not be accomplished by diverting existing bus lines to the rail line to pick up passengers, mostly because there is not enough capacity available even today on the inner segments of the bus lines that are the most likely candidates for diversion (the 15-Mt. Tabor and the 19-Glisan). Diverted bus service will not be attractive to MAX riders because, as local service, it will continue to make lots of local stops. 2) Would be likely to constrain ridership growth. People prefer rail. When the Norristown light rail line was out of operation for six months after a serious accident, SEPTA replaced the rail service with express buses and found that they lost rail ridership. Riders found other means for their commute.

A peak hour MAX fare surcharge was also considered, but ruled out, as a means of increasing peak hour capacity without additional cars. The idea was ruled out because we don't know if it would work, or how well it would work. Also, it is in contradiction with the newly established policy of simpler fares.

E. Why are a greater number of cars required compared to the original 1980 operating plan, although passenger loadings are lower?

The following table compares the two plans:

COMPARISON OF OPERATIONS PLANS

Indicator	Proposed 1980	Existing 1989	Percent Difference
Passengers/Day	31,875	19,700	(38.2%)
Peak Hour and Direction Pax	3,848	1,866	(51.5%)
Peak Fleet	23 cars	22 cars	(4.3%)
Peak Hour/Direction Trains	13	8	(38.5%)
Peak Hour/Direction Cars	22	15	(31.8%)
Short-turn Trains	8	1	(87.5%)
Peak Hour Headway	4.6 min.	6.6 min.	43.4%
Average Schedule Speed	22.6 mph	18.9 mph	16.4%)
Cycle Time	96 min.	120 min.	25.0%
Loading Standard	175	166	(5.1%)
Loading Standard Percent	230%	218%	(5.2%)
Average Loading	175	125	(28.6%)
Average Loading Percent	230%	164%	(28.7%)

Source: James Gallagher, Rail Operations, 9/89

Observations:

1. There is a marked difference between the number of cars proposed in the peak hour and direction (22 versus 15) even though the peak fleet (23 versus 22 cars) is nearly identical. Clearly, the peak direction carrying capacity of the two operating plans is different.

2. The cycle time, the time it takes between the start of round trips, is significantly different, approaching the order of 2 trains or 4 cars. The effect of an increase in cycle time is a reduction of the number of trains that can pass the peak load point within one hour. The reasons for the difference in cycle time have been presented in "Justification for New LRV Purchases," 2/4/88, Ken Stanley, attached.

   In order to stage a large number of cars at a single point within one hour, service on the balance of the line would suffer given the same peak fleet and/or total fleet.

3. The number of trains we are able to "short-line" today is much lower than what was proposed in 1980 (1 today compared to 8 in 1980) because we have a higher number of passengers east of Gateway than was anticipated in 1980.

4. Finally, the loading standard assumed in 1980 is different, and accounts for one more 1989 car:

	1980 Peak Hour Load	/	Load Standard	=	# Cars
1980	3,848		175		22
1989	3,848		166		23

   The 1980 standard was modified in the summer of 1983 to 166 passengers per car. The change was attributed to the difference between the Duwag "B" car assumed in 1980 and the Bombardier car that, by 1983, was ordered and essentially designed.

F. Ridership Summary

If peak period ridership continues to grow at current rates, additional vehicles will be necessary by 1993, given that the second car cut works as planned. Obviously, there is no way to know whether peak ridership will continue to grow as it has since the line opened. Still, because of the long lead time required to buy LRVs, we must make a decision that is based on projected data, but assess the risk that the projections are wrong. If we are making a decision that is based on a compelling situation today, we are probably making a decision that is several years too late. The projections say that by waiting to buy LRVs (Exhibit I, Scenario III) we risk constraining ridership growth on MAX. If commuters are not able to ride when they want to ride, they are likely to find other means of transportation.

The decision when to buy LRVs and how many depends on how we view the future of MAX:

Where do we want the system to be in three or four years?

1. Do we want to risk a degradation of rail service to our current and future riders? If this is our ridership strategy, then how many cars do we purchase and when do we purchase them? (Ridership Strategy #1.)

2. Do we want cars to meet future demand? If this is our ridership strategy, then how many cars do we purchase and when do we purchase them? (Ridership Strategy #2.)

3. Do we want cars to be able to keep pace with growth and to encourage increased ridership by providing an increment of expansion as we are proposing with the Westside line? If this is our ridership strategy, then how many cars do we purchase and when do we purchase them? (Ridership Strategy #3.)

III. Maintenance

A. How many spare vehicles does rail maintenance require today? Is labor allocated efficiently by rail maintenance?

Current Staffing

Light Rail Vehicle Maintenance is staffed with twelve vehicle mechanics and four vehicle cleaners. Six apprentice mechanics are now in training. Vehicle maintenance is staffed twenty hours a day, seven days a week with alternating shifts. As Exhibit XI shows, nearly all vehicle maintenance and cleaning is performed at night when the greatest number of vehicles are available. Of the twelve vehicle mechanics, seven work a PM shift.

Not all vehicle maintenance can take place at night or on weekends. A number of maintenance tasks require two shifts to complete. A preventive maintenance cycle requires two shifts, more if defects are discovered. Truing also requires two shifts. On a daily basis, one vehicle under goes both interior and exterior cleaning, requiring two shifts. Day shifts are also necessary to take care of in-service problems as they arise.

Current Spare Requirements

Currently, there are twenty-six light rail vehicles in the active fleet. Twenty-two vehicles are required for peak service -- eleven two car trains operate weekdays between 5:30 AM and 9:00 AM and 3:00 PM and 6:00 PM. This leaves four spare vehicles.

A vehicle is in the active fleet if it is not out of service for repairs or modifications for an extended period or an indefinite period. A vehicle is in the inactive fleet if it is out of service for maintenance and cannot be easily rotated into and out of service on a daily, or near daily basis with the rest of the fleet.

One spare LRV is scheduled on a daily basis for preventive maintenance (PMs). Each vehicle is scheduled for preventive maintenance once a month, twelve times a year. Preventive maintenance tasks require that the vehicle be out of service for 24 hours, approximately, more if defects are discovered. Because of the number of vehicles, the length of time the checks require and the number of checks required each year, preventive maintenance cannot be performed just at night or on weekends.

One spare is scheduled on a daily basis for interior/exterior cleaning. Light maintenance and unscheduled repairs are also performed on this vehicle if necessary. This vehicle also serves as a revenue spare. When there is an inservice failure, this vehicle can generally be prepared for revenue service within thirty minutes.

One spare has been required on a daily basis for fleetwide modifications. Small modifications are performed during the night shift, by campaign on weekends or on a vehicle that is in for preventive maintenance. In general, however, modifications have kept one vehicle out of service on a daily basis since opening day. These have included VTAG installation, door sensitive edge, brakes, paint, TWC, intercom, signal tripping. Presently, there are

five fleetwide modifications underway. The number of large modifications are expected to decrease after the air-conditioning retrofit, but by that time overhauls and unscheduled repairs are expected to more than make up for the decrease.

In addition to scheduled maintenance (PMs, cleaning, modifications), unscheduled maintenance also requires spares. These are defects that are discovered during PM checks or in-service when there is an equipment failure. Defects are unpredictable and their impact on spares is also unpredictable. Two or more safety or performance related defects, which require that the vehicle come out of service immediately, may occur on the same day. Non-performance related defect repairs are postponed to the night shift or weekends.

Rail vehicle spare requirements change daily. On some days spares may be required for:

1 - Preventive maintenance
1 - VTAG installation or other vehicle modification
1 - Paint
1 - Cleaning and unscheduled repairs

Other days:

1 - Accident repair
1 - Preventive maintenance
1 - Preventive maintenance (if rail maintenance is behind schedule)
1 - Unscheduled repairs

Other days:

1 - Preventive maintenance
1 - Modifications such as passenger intercom installation
1 - Cleaning
1 - Unscheduled repairs

Exhibit XII presents the results of a survey of spare ratios at other properties. All of the agencies with spare ratios lower than, or similar to, Tri-Met's are in the process of purchasing additional vehicles, or are not yet even in operation (Baltimore).

B. Do we know that high mileage will result in critical mechanical problems?

Yes. Defects (unscheduled repairs) are clearly a function of age and accumulated mileage as the following data show:

Maintenance Indicators-Trend in Unscheduled Repairs

	FY87	FY88	FY89	
Annual Fleet Mileage	1,375,401	1,417,721	884,400	(1)
Annual Average Miles/Car	52,990	54,500	51,000	(2)
Number of Defects	9,685	9,901	6,990	(1)
Defects Per Car Mile	.00704	.00698	.00790	(1)
Miles Per Defect	142.01	143.19	126.52	(1)
Percent Change-Defects/Mile	-	(.86%)	13.1%	
Percent Change - Miles/Defect	-	.83%	(13.2%)	
Percent Change - Defects	-	2.2%	5.9%	(2)
Percent Change - Car Miles	-	3.0%	(6.8%)	

(1) Eight months actual data.
(2) Annualized, based on eight months actual data.

Source: James Gallagher, Rail Operations, 9/89.

Observations

1. The number of defects (unscheduled repairs) varies with mileage as expected.

2. The rate of occurrence, however, is directly related to the age (and accumulated mileage) of the equipment.

3. Car miles decreased in 1989 partly as a result of single-car "day base" service. However, the rate of occurrence is increasing as car miles decrease, i.e. the age factor. Note the 13.1% increase in defects per car mile versus the 6.8% decrease in car miles. Also, an annualized figure for 1989 defects would be nearly 10,500 for the year. In 1988 the rate of occurrence decreased slightly as both the car miles and raw number of defects increased, not so for 1989.

4. In addition, manhours per defect are increasing. Manhours per defect were 1.12 hours/defect between 1/87-6/87, 1.32 hours/defect between 7/87-12/87, and 1.99 hours/defect 1/89-7/89. (Not shown on table.)

5. The increase in the defect rate is an indication that the vehicles are in need of overhauls, and that the overhaul program should not be postponed.

The increase in unscheduled repairs has reduced the availability of spares for preventive maintenance. Rail Maintenance frequently is unable to meet the preventive maintenance schedule. In June, Rail Maintenance was 12 vehicles behind, half the fleet, 13 behind schedule in July, and as of September 22, Rail Maintenance was 12

PMs behind. (Source: memo from Julie Zaddack to Rudy Luepke, 9/28/89.)

Unable to meet the preventive maintenance schedule, where most defects are discovered, we risk additional inservice failures, or even multiple vehicle failures, resulting in vehicle availability problems.

Rail Maintenance has been able to meet peak service requirements partly because there have always been 26 vehicles in the active fleet, which means that generally, there are 4 vehicles that can be made ready for service on short notice, within 30 minutes to 24 hours. Even so, car availability is constrained today:

- When car 118 was out of service for three weeks for accident repair, all ongoing modifications were delayed to maintain availability of 22 peak service cars.

- When defects are found that are safety or performance related, routine maintenance (PMs and cleaning) is postponed to maintain the availability of 22 peak cars. If defects are found that are not performance or safety related, the vehicle goes out anyway and the repairs are made in the evenings or on weekends.

The inability of Rail Maintenance to meet the routine maintenance schedule indicates that additional manpower is needed, or another vehicle is needed, or both.

C. <u>How many maintenance spares will be required for overhauls, air conditioning? Will additional personnel and working different shifts accomplish maintenance requirements at a cost which is less than the cost of an additional maintenance spare?</u>

One additional maintenance spare is <u>justified</u> and <u>necessary</u>, given current peak service requirements, overhauls, and an increasing defect rate. Two spares may be <u>justified</u>. Additional personnel and different shifts will not accomplish the task for less. However, because under the most optimistic timeline, where Tri-Met purchases LRVs with local funds new LRVs will arrive six months to over a year later than needed for overhauls, a third shift of mechanics will be required.

<u>Air Conditioning</u>

In June 1990, after the Rose Festival, one rail revenue vehicle will be removed from the fleet to perform a prototype installation of air conditioning. The retrofit will keep the vehicle out of service six weeks, until August of 1990. When the retrofit is complete, including testing, each successive vehicle retrofit is expected to take two weeks to complete. Retrofitting air conditioning to the vehicles is a complex task that will require the vehicles to be unavailable for revenue service. This means that for one year between June 1990 and September 1991, there will

be 25 vehicles in the active fleet, one less than today. At this point, there will be only three revenue spares for routine maintenance, cleaning, other modifications, and unscheduled repairs, increasing the chance that peak service requirements will not be met.

Vehicle Overhaul Evaluation

Bombardier recommends that the LRVs be overhauled at 250,000 miles. Rail maintenance plans on beginning the overhaul program on October 1, 1990. This will involve the removal of one car from service when it has reached 225,000 miles of service. Various systems on the car will be dismantled, inspected, and evaluated, and if necessary, overhauled. A detailed vehicle structure inspection will also be performed on the vehicle. At the completion of the first car, the next high-mileage car will be evaluated and overhauled. The total evaluation period of the two cars with revenue vehicle technicians working three shifts (twenty-four hours, seven days a week) will take approximately sixteen weeks, ending the evaluation program in February 1991.

During the overhaul evaluation, these vehicles will not be available for rotation into revenue service. At this point, if the air conditioning retrofit proceeds as planned, there will be only 24 vehicles in the active fleet for four months. Only two vehicles will be available for preventive maintenance, unscheduled maintenance, cleaning, and for rotation into revenue service, seriously increasing the chance either that peak service requirements will not be met, or that scheduled maintenance will be deferred. (See Exhibit XV and Exhibit I.A.)

Given the periodic difficulties Rail Maintenance experiences today with vehicle availability given an active fleet of 26 vehicles, it would not be prudent to reduce the active fleet to 24 vehicles. It is for this reason that other strategies for the air-conditioning retrofit must be analyzed. These options might include: (a) performing the retrofit on weekends, with additional labor, (b) postponing the retrofit until the overhaul evaluations have been completed, or (c) postponing the retrofit until new vehicles arrive. All of these options will increase the cost of the retrofit program.

Progressive Overhaul

At the end of the overhaul evaluation, the active fleet will be 25 vehicles until the air conditioning retrofit is completed. The purpose of the overhaul evaluation is to assign various overhaul tasks to specific preventive maintenance checks (where possible) to keep the vehicle down time to a minimum, therefore keeping the active fleet, the number of vehicles that are available for rotation into service, as large as possible. Just as modifications and unscheduled repairs are routinely performed on vehicles already in the shop for preventive maintenance, various parts will be overhauled during preventive maintenance checks. After the air

conditioning retrofit, and during the progressive overhaul, the active fleet will be 26 vehicles if the progressive overhaul does not require vehicles to be out of service longer than expected, and nothing else diminishes the active fleet (such as an accident, or a series of defects).

Accurate overhaul figures will not be available until the evaluation is conducted. However, all of the known overhaul tasks will double the amount of time required for a PM, if spread out over a period of one year, with 24 hour shifts, seven days a week. It is not known how long the entire progressive overhaul will take, but is will be at least one year, probably more.

If periodic overhauls increase PM time by 100%, and manpower stays the same, theoretically, 13 PM/overhauls can be accomplished each month. That leaves 13 additional preventive maintenance checks to be performed to meet the routine PM schedule. To keep up with the additional maintenance required by an increasing defect rate and by progressive overhauls without additional vehicles, Rail Maintenance plans on adding additional mechanics on all shifts, plus a third shift (for a 24-hour day, 7-day week) staffed with four or five mechanics, and moving as much work as possible to nights. By reducing the elapsed time for overhauls with additional labor, Rail Maintenance believes all 26 monthly PMs can be accomplished without an additional spare. The same result could be accomplished without a third shift if one more revenue spare were available during the day. This way fewer mechanics would work on the vehicles, but over a longer period of time. Exhibit XIII illustrates the tradeoff between labor (an additional shift) and capital (an additional revenue spare). While Tri-Met will have to cover increased maintenance requirements with additional labor, at least for the next several years, the vehicle is clearly the better investment.

D. Has Rail Maintenance looked at creative approaches to vehicle maintenance, like alternating shifts?

Comparison of Rail Vehicle Overhaul Philosophies

To some extent this question has already been answered. But in addition, there are two different vehicle overhaul philosophies. One approach is to do a comprehensive overhaul at predetermined intervals and simply change out, repair or rehabilitate major vehicle systems and components from the wheels upward. During this process, the vehicle is largely dismantled and unavailable for service for an extended period. The vehicle overhaul evaluation is something like this approach. Another approach, the progressive overhaul, is to recognize that different parts wear out at different rates and to change out or rehabilitate the various parts as they wear out. This is the philosophy Rail Maintenance has selected.

Each has advantages and disadvantages:

Comprehensive Overhaul

Advantages

- o Maximum fleet availability prior to overhaul cycle.
- o Minimim operations staffing

Disadvantages

- o In service failures tend to increase.
- o Vehicle availability is unpredictable.
- o Overhaul becomes a major project; early failures wait for overhaul process to gear up.
- o Demands a larger spare ratio to achieve overhaul productivity in production line fashion.
- o Components not life-expired are changed out indicating a measure of inefficiency and waste.

Progressive Overhaul:

Advantages:

- o Overhaul program is routine and ongoing.
- o Changeout and rehabilitation is less likely to be done prematurely, or worse, upon in-service failure.
- o Fleet requirements can be planned and availability is more predictable because of short-term downtime for progressive overhaul work.
- o Overall fleet reliability is more likely to remain stable during the overhaul process, important with a large fleet of vehicles that are all the same age, accumulating mileage at the same rate.

Disadvantages:

- o Slightly higher annual operating and manpower costs as maintenance labor is not disguised as a "capitalized" cost.

(Source: Memo from James Gallagher to Bill Allen, 8/17/89.)

E. Maintenance Summary

At least one, and preferably two, LRVs are needed now to maintain an adequate spare ratio and meet routine and on-going inspection, maintenance and overhaul requirements.

Exhibit XV shows the mileage that the 26 LRVs will accumulate if they continue to operate exactly as they did in FY89--one car midday, two cars as needed Saturdays and Sundays. Notice that by FY94, the vehicles will be approaching the second overhaul cycle. Under some scenarios we will not see additional vehicles until 1994-1995. It is important to note that with the Gresham Mall and

the Convention Center openings, it will become impossible to maintain one-car midday service. This means the rail cars will accumulate mileage, and will age faster than Table XV suggests, putting Tri-Met at even greater risk for in-service failures and advancing the date of the second overhaul cycle. While these are highly reliable vehicles, the fleet requires <u>at least</u> four revenue spares at all times, even if vehicle maintenance is staffed 24 hours, seven days a week. By 1994 Tri-Met will be approaching a second overhaul cycle, which means another increase in unscheduled repairs; with ridership high and increasing, we risk the predictability of MAX service.

RIDERSHIP AND MAINTENANCE
SUMMARY TABLES

LRV Requirements
(Based on Exhibit VIII)

Maintenance requirements (Current Service Levels)	1-2
Ridership Strategy #1	1-2
Ridership Strategy #2 (Allows Tri-Met to meet projected demand through 1995)	8*
Ridership Strategy #3 (Allows Tri-Met to meet projected demand through 1997, when Westside opens)	11*

*includes maintenance spares.

	Ridership Req.	Maintenance Req.	Total
Ridership Strategy #1	-	1 - 2	1 - 2
Ridership Strategy #2	6	2	8
Ridership Strategy #3	8	3	11

IV. Timing: Risk and Procurement Issues

A. What are the ridership and maintenance risks associated with the gap in delivery dates between the alternative procurement/funding scenarios presented in Exhibit I?

Three alternatives for the purchase of light rail vehicles are being discussed:

I. Fund the vehicles locally, begin the procurement process now. Vehicles would be in service by mid to late 1992.

II. Fund the vehicles federally, with FY90 and FY91 Section 9 and Regional Reserve funds, begin the procurement process now. Vehicles would be in service by mid to late 1993.

III. Wait one year. Procure additional vehicles with a possible order for Westside vehicles. Vehicles may be in service by mid to late 1994.

Exhibit VIII (column C) presented the projected number of cars required in the fleet to maintain a 218% load standard. Using column C as a guide, under Alternative I, vehicles will arrive ahead of when the will be needed to accommodate ridership under the status quo ridership strategy, but after they are needed for maintenance purposes. The greatest risk under Alternative I is deferred maintenance. (The financial risk these alternatives present are discussed in Section IV.)

Under Alternative II, vehicles arrive far too late for maintenance purposes, and slightly too late to accommodate peak loads under the status quo ridership strategy. The risks under this alternative are deferred maintenance and possibly the inability to meet peak demand.

Under Alternative III, vehicles arrive far too late for maintenance purposes, and far too late to accommodate peak loads under the status quo ridership strategy. The risks under this alternative are deferred maintenance, the inability to meet peak hour demand, and seriously compromised service quality.

B. What are the procurement issues presented by each of these alternatives? What about sole source, BUY AMERICA regulations? Are these regulations likely to eliminate any one of these procurement/funding scenarios?

Neither the state or federal sole source or BUY AMERICA regulations will be likely to eliminate any of the three funding alternatives. Based on a precedent set recently by Sacramento, as well as a survey of other rail manufacturers conducted by Tri-Met Engineering this year, it appears that Tri-Met has a good case for the federal approval of sole source procurement with Bombardier as well as a BUY AMERICA waiver if we decide to buy additional LRVs from Bombardier.

The state and federal sole source procurement and BUY AMERICA requirements that would have be fulfilled have been addressed in a memo from Kevin McDonald to Bruce Harder, 9/28/89, attached.

Local Funding

Just in terms of procurement, local funding is, of course, the most straightforward option. BUY AMERICA regulations do not apply, and while state sole source regulations do apply, a contract may be awarded without competitive bidding or RFP if, after making a reasonable effort to identify other sources through a market survey, Tri-Met determines that there is only one source that can provide the equipment. (See McDonald memo.)

Federal Funding

Similar sole source requirements must be met, and a BUY AMERICA waiver must be obtained, if the vehicles are to be federally funded. To obtain an exception to the Buy America Act, Tri-Met would have to show that:

(a) The application of the Act will be inconsistent with the public interest,

(b) Materials are not produced in the U.S. in sufficient and reasonably available quantities and of a satisfactory quality, or

(c) The inclusion of domestic materials will increase the cost of the overall project contract by more than 25%.

Tri-Met must satisfy one of the above.

Point (b), that "materials are not produced in the U.S. in sufficient and reasonably available quantities and of a satisfactory quality" was the argument that Sacramento officials developed for UMTA. Those documents are also attached.

In Sacramento's case, the approval of the BUY AMERICA waiver was also tacit approval from UMTA that they could proceed to negotiate a contract with Siemen's, the LRV manufacturer, then submit the negotiation memo and cost analysis for UMTA approval of the contract.

Based on the Sacramento precedent, plus recent discussions with Sacramento officials, a likely procurement timeline for federally funded vehicles for Tri-Met would be:

Alternative II:	Bombardier Proposal with Federal Funding, Sole Source Approval and BUY AMERICA Waiver.
Oct.'89-Jan. '90	Board Process Prepare Specifications Prepare BUY AMERICA Waiver Arguments Prepare Regional Funding Package
Jan. '90-Mar. '90	Letter of No Prejudice Request
Jan. '90	Grant Application Submitted
Jan. '90-June '90	BUY AMERICA Waiver Received LONP Received
July '90-Aug. '90	Prepare Price and Cost Analysis for Sole Source Submittal
Sep. '90-Oct. '90	Begin Contract Negotiations with Bombardier
Nov. '90-Dec. '90	Send Cost Analysis and Negotiation Memo to UMTA for Sole Source Approval
Jan. '91	UMTA Approves Contract
Jan. '91	Funds Allocated
Jan. '91-Dec. '91	Engineering and Design
Mar. '91-Feb. '93	Production
Oct. '92-Feb. '93	Delivery

We are pursuing additional information from UMTA on the procurement schedule.

C. Is the Bombardier price a good price? Perhaps Tri-Met should wait and go through a competitive bidding process to obtain the best price?

The Bombardier price of $1.9 million per car is their proposed price. Until Tri-Met negotiates with Bombardier, it will be impossible to say what the contract price will be. According to the UMTA sponsored "Rail Car Cost Containment Study," August 1988, negotiated rail car procurements are crucial to obtaining a favorable price.

While it is extremely difficult to make comparisons, because rail car costs are largely determined by the design and the features of the vehicle and the particular car requirements each rail property has, the Bombardier proposed price appears to be reasonable. Baltimore paid $1.9 million per car recently for an order of 35 cars. Sacramento recently negotiated a price with Siemens Duewag of $1.4 million a car, down from Siemens' first proposal of $1.7

million, for an order of 10 cars, and Los Angeles is paying $1.76 million per car for an order of 35 vehicles. (All prices have been CPI adjusted. Source: Booz, Allen & Hamilton, "Light Rail Vehicle Comparison Matrix," 3/11/89, updated by Denny Porter.)

In cases where the agency requires essentially the same vehicle, effective competition in the rail car industry is likely to be inadequate. The market survey conducted by Tri-Met Engineering this year showed that no manufacturer of LRVs is willing or able to make the Bombardier vehicle for Tri-Met as long as Bombardier is around. Recently San Diego, intending to procure cars that were essentially the same as their original fleet, went out to bid. They encouraged competitive bidding and expected to get a number of proposals. Of the car builders who responded, two were found in compliance with the RFP and invited to submit bids. When bids were submitted, only one was received from Siemens/Duewag. San Diego determined that the bid price was too high, rejected all bids and negotiated a reasonable price with Siemens/Duewag.

One additional cost advantage of a sole source procurement is that Tri-Met is assured of only two fleet types. The proposed BN Bombardier vehicle will be 95% the same as our current fleet, according to Tri-Met Engineering.

D. Are there any advantages to waiting a year? By waiting will Tri-Met be able to attach an order to an order of Westside vehicles and achieve the price advantage of quantity discounts?

The cost advantage that Tri-Met may receive through quantity discounts is unlikely to outweigh the risks associated with waiting a year. The risk that Westside vehicle funds are not available next fall must be weighed against the price advantage we think we might receive with a larger car order, factoring in inflation.

Things rarely get cheaper in the future, and at 9.4% per year, LRV inflation has outpaced the CPI by over 5% annually since the early '70s. (Source: "Rail Cost Containment Study," UMTA, August 1988.) In order to receive an advantage from a quantity discount by waiting one year, Tri-Met would have to receive a large order discount that is greater than 9.4%.

It is not at all clear from the data presented in the "Rail Cost Containment Study" what the cost advantage is with large orders. Exhibit XVI shows the cost per car for all the light rail vehicle purchases in the U.S. since the early 1970s, CPI adjusted. From the data, it appears that the price per car bears little relationship to the size of the car order. The smallest car order shown was six vehicles. The greatest LRV procurement cost savers identified in the report were:

- o Negotiated procurement,
- o Existing, proven design,
- o Smaller cars, and
- o Large order sizes, which, as Exhibit XVI shows, would be on the order of 100 vehicles.

Waiting a year presents risks on a number of levels. First, we expose ourselves to additional risk on the ridership and maintenance side. Second, there are election risks. Third, even if the May and November votes pass, it is likely that our first Westside allocation from the new start account in FY91 will not include funds for vehicles, but only for final engineering. Jeff Booth feels that funds for Westside vehicles will be a low priority for draws on the new start account next year, and that Tri-Met will not be able to make large draws on the new start account for the Westside until FY92. (See memo from Claire Cushman and Cynthia Weston to Bob Post and Bruce Harder, 8/28/89, attached.)

Since UMTA regulations unequivocally prohibit a procurement of 10 light rail vehicles with an option for 32 (number of Westside vehicles), we would have no alternative but to go ahead with a small order of 10 vehicles if we decide to wait a year then do not get an allocation for Westside vehicles in FY91. Given high LRV inflation, the possibility of Bombardier exiting the light rail business, and the ridership and maintenance risks we are exposing ourselves to by waiting a year, we should be certain beyond a doubt that new start funds will be available in FY91 for Westside vehicles and that the cost advantages are worth the risks before we make a decision to wait a year.

V. Funding Issues

The largest financial problem facing Tri-Met is the decline of federal capital funds. Today, Tri-Met's continuing capital revenues are only $5 million, while the district's (federally fundable) continuing capital requirements are $8 million. The current situation will only worsen as inflation increases the cost of capital and Gramm-Rudman dictates further federal transit assistance cuts. In addition, under the 1992 Surface Transportation Act, transit agencies are likely to face 50% local match of federal funds. With one possible exception (explained below), all the available one-time funds from Tri-Met's capital reserves have been programmed.

Tri-Met's estimated federal capital shortfall, given all of the projects that are pending or underway during the next five years, is $13.9 million. These projects include the Gresham Mall, the Convention Center Hotel, double track, storage track, articulated buses, continuing bus requirements and the North Mall. This assumes that Tri-Met receives a full appropriation from the Banfield Full Funding Agreement, and that Section 9 revenues increase from $4.5 million in FY89 to $6.1 million this year. The Section 9 estimates are based on the recent House budget recommendation plus a $900,000 allocation for MAX, and decline 7% in subsequent years. The estimate also assumes the continuation of 75%/25% federal match.

While federal discretionary funds are likely to be available in the future for some bus purchases, it is unlikely that Section 3 bus monies will be available on a continuing basis for Tri-Met's future bus procurements.

Unless we receive state capital assistance, Tri-Met will be faced with spending its own funds on many capital expenditures that were once federally funded. With a $13.9 million federal shortfall, it is only a matter of <u>when</u> and <u>which</u> projects. It is for this reason that it is somewhat deceptive to think about purchasing rail vehicles with federal funds as "cheaper" than purchasing rail vehicles with local funds without looking at the total picture.

A. Local Funding

Long-term financing of capital projects is appropriate when the project life is longer than the time required to pay for it. Light rail vehicles, storage track and double track, which all last 30-35 years, and land for the Convention Center Hotel, are all capital expenditures that are appropriate for long-term financing.

Alternative I, local funding of LRVs, could take a number of forms, but one option might be:

- A municipal lease agreement.
- Vehicles would be financed over a 25 year period at tax exempt rates.

- Tri-Met would maintain working capital adequate to maintain a $6-$7 million sinking fund invested at taxable rates. The spread between taxable and tax-exempt rates has historically been 1.5 percentage points, and would save Tri-Met $2 million in costs (present value).

- The net increase in continuing expenditures would be $1.7 million a year.

The strengths of financing LRVs locally are:

- LRVs would be in service at the earliest possible date.

- Insures federal funds for capital projects that are not appropriate for long-term financing, and for which federal funds have not yet been identified, including the articulated bus procurement in FY94 and FY95 and subsequent bus procurements.

The weaknesses of local financing of LRVs are:

- Will increase continuing expenditures by $1.7 million for 25 years.

- Does not honor the gentleman's agreement we made with Hatfield for the appropriation of Section 3 funds for buses--that it was to free Section 9 funds for the purchase of light rail vehicles.

B. Federal Funding

An alternative for the financing of LRVs with federal funds has recently been developed. This scenario would revise the most recent UMTA Funding Plan as follows:

(millions)

$ 3.36	Regional Reserve d e(4)
2.90	Section 9 ($4.3 million minus $1.4 million for additional Gresham Mall funds)
1.03	Storage Track (Section 9)
2.26	LRVs (Section 9)
1.80	Section 9 carryover
4.30	Regional Reserve
$15.65	Total

The key to this scenario is that Tri-Met will agree to locally fund the hotel if the City of Portland agrees to support our request for $4.3 million additional Regional Reserve funds. Higher Section 9 estimates, based on the House Appropriations Committee recommendation, may allow Tri-Met to utilize Section 9 as proposed in our most recent UMTA Funding Plan for Project Breakeven.

In addition, Tri-Met will attempt to close out the Banfield Full Funding Agreement (F.F.A.) in FY91 for Banfield system improvements:

$3.70 Double Track
$1.03 Storage Track
$2.10 Claims
$4.30 Project Breakeven

The scenario is complex and will require discussion and agreement concerning the re-ordering of Tri-Met's capital priorities. It has the following advantages:

- It honors the gentleman's agreement Tri-Met made with Hatfield to purchase LRVs with Section 9 funds in exchange for Section 3 discretionary funds for buses.
- Avoids requesting a Letter of No Prejudice for Section 9 funds that would be allocated after the 1992 Surface Transportation Act.
- Does not diminish the effort to get Banfield Full Funding Agreement funds allocated.
- Satisfies City of Portland's interest in the Hotel.
- Satisfies Tri-Met concerns that local monies not be used on a large purchase before the Westside votes.
- Delivers vehicles within a reasonable, although not optimal, time. (Alternative II).
- May be able to justify buying the Hotel with local money, if we make a successful bid for F.F.A. and if the lease revenues from the Hotel pay back the expense over time.

The proposal has the following disadvantages:

- Regional Reserve strategy may not work, in which case Tri-Met must be prepared to use local funds.
- May not fulfill Congressional directive to Tri-Met to use Section 9 funds for Project Breakeven. (Although UMTA may question our use of Section 9 funds for this project.)
- Tri-Met may be locked into the Hotel site purchase this way, a project that is not a top district priority, given the current funding situation.
- Project Breakeven will no longer "break-even."

VI. Conclusions

While the analysis does not reduce to one simple answer or recommendation, it sets the stage for that decision. A tremendously complex set of issues and variables are reduced to a manageable few. Also, some decisions cannot be made because they must be tested before the outcome is known (i.e. a sole source procurement and BUY AMERICA waiver). Nonetheless, the decision matrix is relatively straightforward:

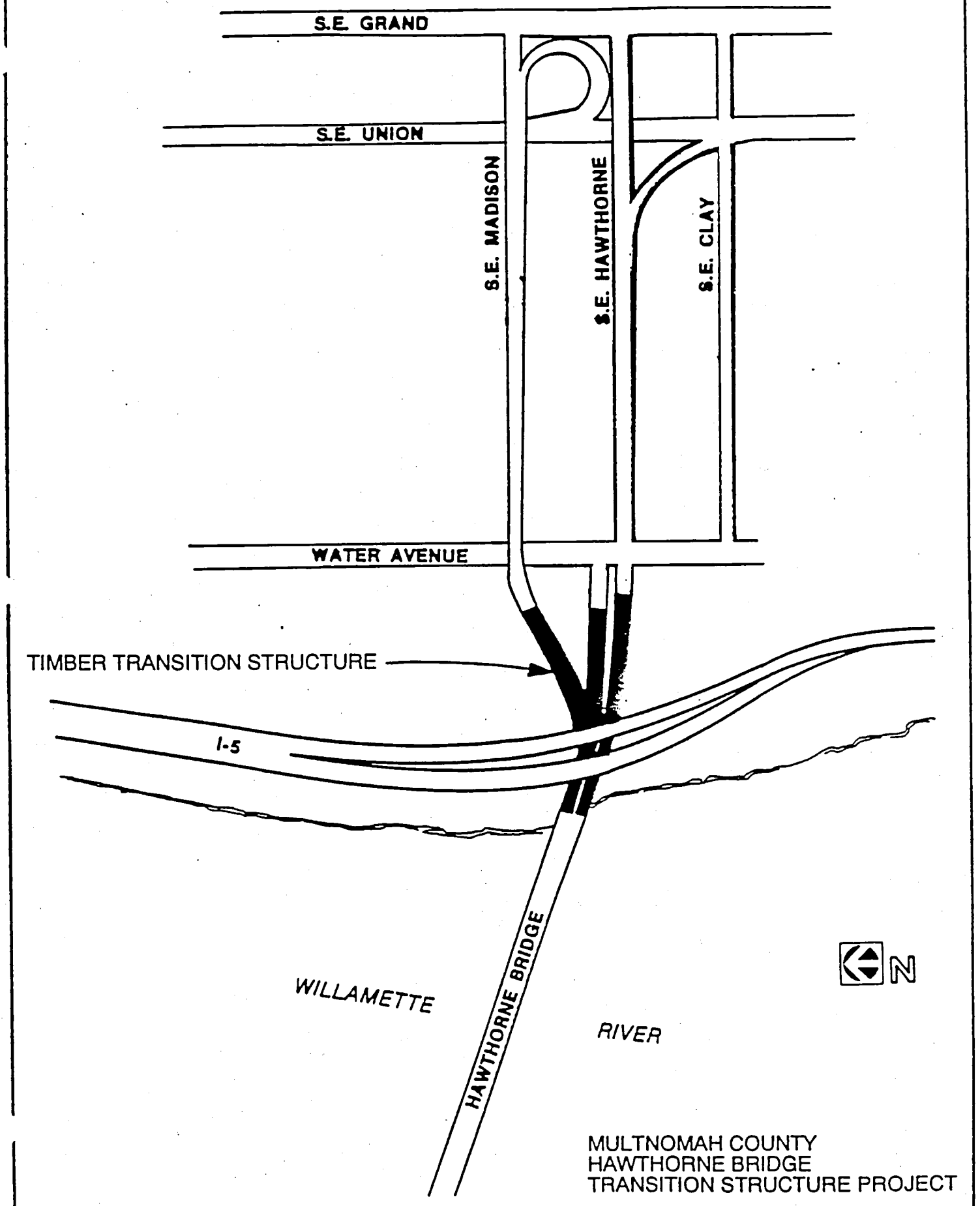
1. Ridership - We need a clear resolution of how we want the light rail system to respond to ridership demands. How we answer the questions posed on page 6 answer the LRV question from a ridership perspective. (See pages 6 and 15.)

2. Maintenance - We are operating at high risk. (See pages 14-15.)

3. Timing - Maintenance requirements pose a problem under any timetable. However, we must explore the federal funding alternative.

4. Funding - Our long term capital program is at risk under any scenario. We may have to use local funds for some projects, or else delete some projects that are pending. It invites questions of priority, are LRVs basic Tri-Met services? If they are, do we have any choice but to proceed?

ATTACHMENT C



MULTNOMAH COUNTY
HAWTHORNE BRIDGE
TRANSITION STRUCTURE PROJECT

CH2M HILL

INTERGOVERNMENTAL RELATIONS
COMMITTEE REPORT

RESOLUTION NO. 90-1200, ALLOCATING THE INTERSTATE TRANSFER REGIONAL RESERVE AND AMENDING THE TRANSPORTATION IMPROVEMENT PROGRAM ACCORDINGLY

Date: January 18, 1990 Presented By: Councilor DeJardin

COMMITTEE RECOMMENDATION: At the January 9, 1990, Intergovernmental Relations Committee meeting, Councilors Bauer, Devlin, Gardner and I were present, voting unanimously to recommend Council adopt Resolution No. 90-1200 as amended. Councilor Collier was excused. The amendment, supported unanimously, added a new no. 2 to the "Be It Resolved" section making the $2 million Convention Center Area allocation contingent upon the City of Portland, by July 1, 1990, finalizing all required actions to form local improvement and urban renewal districts.

COMMITTEE DISCUSSION/ISSUES: Transportation Director Andy Cotugno presented the resolution which allocates the remaining $5.05 million "Regional Reserve" from the $17 million Interstate Transfer Fund reserve for the Banfield Freeway. The resolution also provides for $590,000 additional expenditures of Federal Aid Urban (FAU) funds from the City of Portland contingency and the Regional FAU Reserve. Allocation of the Banfield Regional Reserve could not occur until final costs of the Banfield Freeway were known. Final Freeway costs of $608,820 are now known and recommended for payment. The resolution provides for additional expenditures for the $5.05 million as follows:

1) $1 million for final Banfield Light Rail (LRT) costs, commitment of which could leverage an additional $5 million from the Urban Mass Transit Authority (UMTA) for LRT improvements;
2) $2 million toward Convention Center Area Transportation improvements, consistent with the Council's prior adoption of Resolution No. 89-1109 amending the Transportation Improvement Program (TIP) for Tri-Met's Section 9 and Section 3 discretionary programs;
3) $1.44 million for at least 10 additional light rail vehicles to ensure proper maintenance schedules and provide for projected short-term ridership growth.

Expenditure of the $590,000 FAU funds would be for: (A) Hawthorne Bridge LRT compatibility studies and a construction reserve if preliminary engineering concludes LRT can be included ($290,00), and (B) funding for Metro transportation planning ($300,000). The transportation planning funds are contingent upon equal funding commitments from the State, Tri-Met and the region. Staff noted Metro has received this "expanded" funding consistently since 1977 and it is now up for renewal for another two year commitment. The Committee discussed the Convention Center allocation and Mr. Cotugno recapped Metro's commitments to date of $2.4 million approved for a new Convention Center LRT station and $4.3 million supported for Tri-Met's Project Breakeven (Resolution No. 89-1109). Mr. Cotugno noted Metro's Transportation Policy Alternatives Committee (TPAC) supported Resolution No. 90-1200 by a vote of 12 to 4, with the member counties dissenting due to desires for some arterial projects to be funded. At its January 18 meeting, the Joint Policy Advisory Committee on Transportation (JPACT) also voted to recommend Council adoption of the resolution.