RCB

South North Transit Corridor Study

SOUTH/NORTH TRANSIT CORRIDOR STUDY

DRAFT FINDINGS REPORT

SOUTH PORTLAND CAPITAL COSTS MILWAUKIE TRANSIT CENTER TO PIONEER SQUARE

JULY 1994

Prepared for:
Tri-Met

Prepared by:
Parsons Brinckerhoff Quade & Douglas, Inc.
Fred Cooper Consulting Engineers

PB 100 YEARS

The preparation of this report was financed in part by the U.S. Department of Transportation, Federal Transit Administration and by the Washington State Department of Transportation. The opinions, findings and conclusions expressed in this report are not necessarily those of either the Federal Transit Administration or the Washington State Department of Transportation.

TABLE OF CONTENTS

DRAFT FINDINGS REPORT
SOUTH PORTLAND CAPITAL COSTS

1.0 OBJECTIVE

The objective of this findings report is to summarize the comparative capital cost estimates and major cost differences for the four alignment alternatives between the Milwaukie Transit Center and the Portland CBD.

2.0 LOCATION

Four Light Rail Transit alignment alternatives have been developed by Tri-Met for purposes of developing cost estimates and measuring potential impacts of the conceptual designs. These conceptual designs define the baseline assumptions for the data and the findings presented in this report.

All the alignment alternatives have common end points at the Milwaukie Transit Center and at Pioneer Square in the Portland CBD. All conceptual alignments would follow a common segment on or beside the existing S.P. Tillamook Branch right-of-way from the Milwaukie Transit Center to the North Milwaukie Park & Ride.

The Sellwood alignment alternative would turn west from the North Milwaukie Park & Ride along the P.T.C. right-of-way and cross the Willamette River on a new structure north of the existing Sellwood Bridge. The conceptual alignment would follow the Willamette Shore right-of-way to Johns Landing. The modified version of the Master Plan alignment, developed and described in a separate findings report, is the assumed alignment through Johns Landing. The conceptual alignment then would continue in the Willamette Shore Line Rail right-of-way and enters the Portland CBD via SW Harrison Street and the PSU campus. It is the longest of the four alternatives, at slightly over seven miles in length.

The three other alignment alternatives could use either the P.T.C. Oaks Bottom alignment alternative or the East McLoughlin alignment alternative. For purposes of comparison, the three river crossings were costed using the East McLoughlin alignment. This alignment would continue north from the North Milwaukie Park & Ride generally next to McLoughlin Blvd. North of SE Haig Street, the Ross Island alignment alternative would cross McLoughlin Blvd. on an overpass, and continue across the Willamette River north of Ross Island and south of the existing Ross Island Bridge. The conceptual alignment then would merge with the Willamette Shore Line Rail right-of-way and continues to Pioneer Square in the same conceptual alignment as

the Sellwood alternative. The Ross Island alternative is slightly less than 6 1/2 miles long.

The Caruthers alignment alternative would follow the same conceptual alignment as the Ross Island alternative north of the North Milwaukie Park & Ride to a point just north of Center Street. It then would cross under McLoughlin Blvd. in box structure, enter the P.T.C. right-of-way, and continue north under the existing Ross Island Bridge. The Caruthers alignment would cross the Willamette River on a bridge just south of the OMSI and join the Sellwood and Ross Island alignments in the area of the west Marquam Bridge Interchange.

It is assumed that the West Marquam Bridge ramps would be retrofitted for seismic protection (Phase 2). Costs for that retrofit are included in the estimate for the three alternatives which could pass under those ramps.

The Caruthers alternative would proceed to the Portland CBD in the same conceptual alignment as the Sellwood and Ross Island alignments. It is slightly more than 6 1/2 miles long.

The Hawthorne alignment alternative would follow the same conceptual alignment as the Caruthers alternative north of the North Milwaukie Park & Ride. However, instead of crossing the Willamette River south of OMSI, it would proceed north and cross the Willamette River on the existing Hawthorne Bridge. It is assumed that the bridge would be retrofitted for LRT. It is also assumed that the east Marquam Bridge would undergo a Phase 2 seismic retrofit. The alignment then would proceed west on a SW Main/Madison couplet, meeting the other alignment alternatives at a common point at Pioneer Square in the Portland CBD. It is the shortest of the four alignment alternatives, at slightly over six miles in length.

3.0 COMPARATIVE CAPITAL COST ESTIMATE RESULTS

The capital costs for the South Portland alignment alternatives were estimated using the South/North cost methodology. A capital cost estimate does not include any maintenance or operating costs. The cost analysis is based on the assumptions for the conceptual alignments.

The capital cost for the four alternative alignments between Pioneer Square in Portland's CBD and the Milwaukie Transit Center are summarized below. All costs are in 1994 dollars.

TOTAL COST OF EACH ALTERNATIVE ($ Millions)					
ALTERNATIVE	TOTAL COST ($ millions)	DISTANCE (Miles)	COST PER MILE	PERCENT OVER HAWTHORNE ALT.	COST OVER HAWTHORNE ALT.
SELLWOOD	$465	7.06	$65.9	+10%	+$41
ROSS ISLAND	$461	6.44	$71.6	+9%	+$37
CARUTHERS	$465	6.68	$69.6	+10%	+$41
HAWTHORNE	$424	6.18	$68.6	N/A*	N/A*

*N/A - Not Applicable

The capital cost summary with a full breakdown by cost category is contained in the appendix to this report.

The cost differential is not very significant. The lowest cost alternative, Hawthorne, is only nine to ten percent less than the other alternatives.

The alternatives are further broken down in this report to identify other comparative costs measures. The following subsections compare costs in four distinct geographical sections: 1) between the Milwaukie Transit Center and the North Milwaukie Park & Ride, 2) in the Portland CBD, 3) for the four different river crossings, and 4) from the Portland CBD to the North Milwaukie Park & Ride without the river crossing. Another subsection lists the systemwide capital costs for elements such as Light Rail Vehicles (LRV's) and the control center. All these costs are summarized at the end of this section.

3.1 Milwaukie Transit Center to North Milwaukie Park & Ride (Common Segment)

Each alternative has a common segment from the Milwaukie Transit Center to the North Milwaukie Park & Ride. This common segment is removed, in the following table, to further compare the costs of the four alternatives.

COST OF EACH ALTERNATIVE WITHOUT COMMON SOUTH SEGMENT ($ Millions)					
ALTERNATIVE	COST ($ millions)	DISTANCE (Miles)	COST PER MILE	PERCENT OVER HAWTHORNE ALT.	COST OVER HAWTHORNE ALT.
SELLWOOD	$423	5.90	$71.7	+11%	+$41
ROSS ISLAND	$419	5.28	$79.4	+10%	+$37
CARUTHERS	$423	5.52	$76.6	+11%	+$41
HAWTHORNE	$382	5.02	$76.4	N/A*	N/A*

*N/A - Not Applicable

The cost per mile of all alternatives increases when the common segment is removed from the analysis. This indicates that costs per mile are lower for the common segment compared to the remaining alignments.

3.2 Portland CBD Costs

The next geographic area to be examined is the Portland CBD. In the Hawthorne alternative, the LRT alignment would reach the existing bridge after a length of less than one-half mile from Pioneer Square. The Sellwood, Ross Island and Caruthers alternatives would share a common conceptual alignment for a mile through the Portland CBD before exiting the CBD near Riverplace area.

The following table shows just the CBD costs, and does not include systemwide costs such as LRV's.

COST OF CBD SEGMENT FOR EACH ALTERNATIVE ($Millions)					
ALTERNATIVE	COST ($ millions)	DISTANCE (Miles)	COST PER MILE	PERCENT OVER HAWTHORNE ALT.	COST OVER HAWTHORNE ALT.
SELLWOOD	$85.9	1.00	$85.5	+99%	$42.7
ROSS ISLAND	$85.9	1.00	$85.5	+99%	$42.7
CARUTHERS	$85.9	1.00	$85.5	+99%	$42.7
HAWTHORNE	$43.2	0.45	$96.1	N/A*	N/A*

*N/A - Not Applicable

There is a significant capital cost penalty for additional route length within the Portland CBD. These costs differentials are discussed in a separate findings report for the Portland CBD.

3.3 River Crossing Costs

To examine the river crossing structure costs, the effects of the conceptual structures and approaches is compared. In each case, the LRT bridge is assumed to include pedestrian and bicycle improvements. No allowances for auto traffic are assumed in this estimate. A separate findings report discusses these crossing structures, and other crossing options investigated, in more detail.

The following table lists the estimated capital costs of the bridge structures for the Willamette River Crossings only. It does not include systemwide costs such as LRV's.

COST OF EACH RIVER CROSSING STRUCTURE ($Millions)					
ALTERNATIVE	COST ($ millions)	DISTANCE (Feet)	COST PER FOOT	PERCENT DIFF. HAWTHORNE ALT.	COST DIFF. HAWTHORNE ALT.
SELLWOOD	$38.9	1,585	$24,543	-36%	-$22.1
ROSS ISLAND	$70.2	3,070	$22,866	+15%	+$9.2
CARUTHERS	$59.6	2,830	$21,061	-2%	-$1.4
HAWTHORNE	$61.0	2,325	$26,237	N/A*	N/A*

*N/A - Not Applicable

The analysis indicates that river crossing costs only are not a single criterion for estimating the capital costs of an alignment.

The Hawthorne alternative river crossing structure is one of the higher cost crossings and the highest on a route-foot basis. This is because retrofitting the existing structure for seismic protection and upgrading the movable span for the combined auto and LRT operations is an assumed cost. This high cost reduces the benefit of the shorter Portland CBD alignment associated with the Hawthorne alignment alternative.

Although the cost per foot for the Ross Island alternative river crossing structure and the Caruthers alternative river crossing structure are lower than Hawthorne, the length of the approaches and main span would add significantly to the total cost of the those structures. The Sellwood alternative river crossing is both lower in cost per foot and overall structure length than the Hawthorne crossing, resulting in it being the lowest cost crossing estimated.

3.4 South of CBD to North Milwaukie Park & Ride

The last geographical area to be compared is the connecting segments between the Portland CBD and the North Milwaukie Park & Ride. As in the case of the river crossing structure analysis, this section compares alternatives of different length and does not include systemwide costs such as LRV's. The following table also excludes the cost of the river crossing structures.

COST OF CONNECTING SEGMENT CBD-MILWAUKIE ($ Millions)					
ALTERNATIVE	COST ($ millions)	DISTANCE (Miles)	COST PER Mile	PERCENT DIFF. HAWTHORNE ALT.	COST DIFF. HAWTHORNE ALT.
SELLWOOD	$182	4.60	$39.6	+3%	+$5.5
ROSS ISLAND	$157	3.69	$42.5	-11%	-$19.3
CARUTHERS	$167	3.98	$41.9	-5%	-$9.3
HAWTHORNE	$176	4.13	$42.6	N/A*	N/A*

*N/A - Not Applicable

The cost per mile is very close indicating that the predominate cost factor is alignment length rather than higher cost construction or location. The Sellwood alternative indicates a lower cost per mile in the above analysis. However, the connecting segment for the Sellwood alternative is longer after crossing the Sellwood bridge to the east side of the Willamette River.

3.5 Systemwide Costs

The next area of cost to be examined is the systemwide costs. This cost reflects the need for more LRV's, larger storage, maintenance yard, and control center requirements inherent in a longer alignment. The costs are directly related to alignment alternative length. The magnitude of this cost is a significant part of the overall cost of each alternative, and the difference in systemwide costs is a significant portion of the difference in overall cost between alternatives.

SYSTEMWIDE COSTS ($ Millions)					
ALTERNATIVE	COST ($ millions)	DISTANCE (Miles)	COST PER MILE	PERCENT OVER HAWTHORNE ALT.	COST OVER HAWTHORNE ALT.
SELLWOOD	$117	7.06	$16.5	+14%	+$14.5
ROSS ISLAND	$106	6.44	$16.5	+4%	+$4.2
CARUTHERS	$111	6.73	$16.5	+9%	+$9.1
HAWTHORNE	$102	6.18	$16.5	N/A*	N/A*

*N/A - Not Applicable

3.6 Right-of-Way Costs

Right-of-way costs were estimated by Tri-Met based on the conceptual alignments and assumptions for the four alternatives. These right-of-way costs are included in the geographical cost analysis and total cost of each alternative described in this report.

Right-of-way costs have been included for all potential acquisitions identified, including rights-of-ways already in public ownership (e.g. Willamette Shore Line and ODOT right-of-way). If an alignment were selected for implementation which included publicly owned right-of-way, the cost of right-of-way in that segment would be included in the overall capital cost. However the cost could also be included in the local match allocation, so there could be a benefit to the region not recognized in the above analysis.

The following table lists total right-of-way costs for each alternative, and the portion of those costs which are based on right-of-way in public ownership.

RIGHT-OF-WAY (R.O.W.) COST ($ Thousands)						
	PUBLIC RIGHT-OF-WAY COSTS ($ Thousands)					TOTAL
ALTERNATIVE	WILLAMETTE SHORE LINE	ODOT	CITY OF PORTLAND	MULTNOMAH COUNTY	TOTAL PUBLIC R.O.W. COST	R.O.W. COST ($ Thousands)
SELLWOOD	$2,090	$468	$28	0	$2,586	$62,000
ROSS ISLAND	$960	$1,586	$51	0	$2,597	$70,000
CARUTHERS	0	$1,461	$368	0	$1,829	$60,000
HAWTHORNE	0	$1,606	$173	$388	$2,168	$55,000

3.7 Summary Costs

A summary table combines the above information for an overall perspective. With the exception of the CBD area, location does not appear to be the major cost factor. The major cost factor appears to be overall alignment length.

COST SUMMARY ($ Millions)						
ALTERNATIVE	CBD	RIVER CROSSING	CONNECTING SEGMENTS	COMMON SEGMENT	SYSTEM WIDE	TOTAL
SELLWOOD						
COST	$85.9	$38.9	$182	$41.5	$117	$465
COST Diff. Hawthorne	+$42.7	-$22.1	+$5.5	$0	+$14.5	+$41
DISTANCE	1.00	0.30	4.60	1.16	-0	7.06
ROSS ISLAND						
COST	$85.9	$70.2	$157	$41.5	$106	$461
COST Diff. Hawthorne	+$42.7	+$9.2	-$19.3	$0	+$4.2	+$37
DISTANCE	1.00	0.58	3.69	1.16	-0	6.43
CARUTHERS						
COST	$85.9	$59.6	$167	$41.5	$111	$465
COST Diff. Hawthorne	+$42.7	-$1.4	-$9.3	$0	+$9.1	+$41
DISTANCE	1.00	0.54	3.98	1.16	-0	6.68
HAWTHORNE						
COST	$43.2	$61.0	$176	$41.5	$102	$424
COST Diff. Hawthorne	$0	$0	$0	$0	$0	$0
DISTANCE	0.45	0.44	4.13	1.16	-0	6.18

APPENDIX

Summary Tables

Capital Cost by Category

Parsons Brinckerhoff Quade & Douglas

Project: **S/N LRT – Sellwood River Crossing**
Date: 01–Jul–94

Sheet No.	DESCRIPTION	Distance (ft.)		Systemwide	Right of Way	1 Utility	2 LRT Str. Constr'n	3 LRT Grd Constr'n	4 Struc–tures	5 Track–work	6 Cross–ings	7 LRT Stations	8 Park & Ride Lots	9 Fare Collect'n	10 Traction Power	11 Signal System	12 Communi–cations	13 Special Condit'ns	SUB TOTALS	Engr & Admin (34%)	Contin–gencies (25%)	Segment Totals	
25	West Option	1,140		–	$0	$46,900	$0	$970,560	$0	$477,000	$464,434	$1,087,701	$801,375	$337,316	$356,440	$167,500	$125,960	$0	$4,835,186	$1,643,963	$1,208,797	$7,687,946	
29 COMMON	West Option	5,000		–	$0	$175,000	$0	$3,420,000	$3,120,000	$1,590,000	$232,217	$0	$0	$0	$1,330,000	$625,000	$470,000	$186,681	$11,148,898	$3,790,625	$2,787,225	$17,726,748	
	SPRR			–	$0	$214,375	$0	$1,528,875	$0	$1,493,000	$0	$0	$0	$0	$0	$0	$0	$0	$3,236,250	$1,100,325	$809,063	$5,145,638	
	PTC SEPERATE OPTION																						
29W	West Option	2110		–	$0	$73,850	$0	$1,443,240	$3,477,388	$807,860	$0	$841,553	$3,994,535	$168,658	$561,260	$263,750	$198,340	$0	$11,830,434	$4,022,348	$2,957,609	$18,810,390	
	SPRR			–	$0	$42,000	$0	$423,600	$0	$183,600	$0	$0	$0	$0	$0	$0	$0	$0	$649,200	$220,728	$162,300	$1,032,228	
	PTC SEPERATE OPTION																						
23	West Option	4,855		–	$0	$258,230	$67,200	$3,758,485	$151,400	$2,552,665	$1,526,302	$333,256	$0	$168,658	$1,291,430	$606,875	$456,370	$0	$11,170,871	$3,798,096	$2,792,718	$17,761,685	
22a	Sellwood Br LRT EAST/WEST SIDES	3,805		–	$0	$133,175	$124,290	$2,602,620	$957,650	$1,441,340	$928,868	$313,156	$0	$168,658	$1,012,130	$475,625	$357,670	$0	$8,515,182	$2,895,162	$2,128,796	$13,539,139	
22a	Sellwood Br East Approach	125		–	$0	$37,500	$0	$0	$600,000	$68,750	$0	$0	$0	$0	$49,125	$15,625	$11,750	$0	$782,750	$266,135	$195,688	$1,244,573	
22a	Sellwood Br Main Span	1,100		–	$0	$330,000	$0	$0	$13,376,000	$605,000	$0	$0	$0	$0	$432,300	$137,500	$103,400	$0	$14,984,200	$5,094,628	$3,746,050	$23,824,878	
22a	Sellwood Br West Approach	360		–	$0	$108,000	$0	$0	$1,728,000	$198,000	$0	$0	$0	$0	$141,480	$45,000	$33,840	$0	$2,254,320	$766,469	$563,580	$3,584,369	
22a	Sellwood Br Pedestrian Add–on	1,585		–	$0	$0	$0	$0	$6,444,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,444,000	$2,190,960	$1,611,000	$10,245,960	
	Phase II Seismic retrofit																						
	Marquim Br – West Appr			–	$0	$0	$0	$0	$5,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000,000	$1,700,000	$1,250,000	$7,950,000	
22	West Option (Nebraska south)	2,000		–	$0	$70,000	$0	$1,504,000	$0	$656,000	$232,217	$313,156	$0	$168,658	$532,000	$250,000	$188,000	$0	$3,914,031	$1,330,771	$978,508	$6,223,309	
22	West Option (Johns Landing)	4,910		–	$0	$1,434,750	$3,427,260	$1,169,820	$11,477,000	$4,164,510	$696,651	$382,788	$0	$168,658	$1,418,480	$613,750	$483,040	$0	$25,436,707	$8,648,480	$6,359,177	$40,444,364	
	(Modified Master Plan)																						
21	West Option	6595		–	$0	$2,021,150	$4,000,883	$3,015,580	$3,666,300	$5,734,170	$479,032	$695,944	$0	$337,316	$1,754,270	$824,375	$619,930	$0	$23,148,950	$7,870,643	$5,787,238	$36,806,831	
CBD	West Side (S3a)	5300		–	$0	$6,100,000	$21,200,000	$0	$0	$13,500,000	$0	$1,600,000	$0	$900,000	$3,200,000	$50,000	$50,000	$0	$46,600,000	$15,844,000	$11,650,000	$74,094,000	
ROW	EAST/WEST BANK ALIGNMENT			–	$31,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,600,000	$10,744,000	$7,900,000	$50,244,000	
ROW	CBD (S3A)			–	$7,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,400,000	$2,516,000	$1,850,000	$11,766,000	
SYS	LRT Vehicles (3/mi.)	–		$53,682,330	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$53,682,330	$18,251,992	$13,420,582	$85,354,904	
SYS	Maintenance Yard	–		$17,770,109	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$17,770,109	$6,041,837	$4,442,527	$28,254,473	
SYS	T.C.C.	–		$1,842,530	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$1,842,530	$626,460	$460,633	$2,929,623	
	TOTALS	37,300		$73,294,968	$39,000,000	$11,044,930	$28,819,633	$19,836,780	$49,997,738	$33,471,895	$4,559,721	$5,567,554	$4,795,910	$2,417,922	$12,078,915	$4,075,000	$3,098,300	$186,681	$292,245,947 $292,245,947	$99,363,622	$73,061,487	$464,671,056	$464,671,056
																				34.00%	25.00%		$12,458 7.06 $65,776,493

NOTE: 1.) Real Estate is INCLUDED. Note Real estate has additional contingency
2.) Central Business District alignment costs ARE INCLUDED. (LRT, TCC & MF costs based on per mile costs)

Parsons Brinckerhoff Quade & Douglas

Project: **S/N LRT – Ross Island River Crossing**
Date: 01–Jul–94

Sheet No.	DESCRIPTION	Distance (ft.)	Systemwide	Right of Way	1 Utility	2 LRT Str. Constr'n	3 LRT Grd Constr'n	4 Struc–tures	5 Track–work	6 Cross–ings	7 LRT Stations	8 Park & Ride Lots	9 Fare Collect'n	10 Traction Power	11 Signal System	12 Communi–cations	13 Special Condit'ns	SUB TOTAL	Engr & Admin (34%)	Contin–gencies (25%)	Segment Totals	
25	East & West Option	1,140	–	$0	$46,900	$0	$970,560	$0	$477,000	$464,434	$1,087,701	$801,375	$337,316	$356,440	$167,500	$125,960	$0	$4,835,186	$1,643,963	$1,208,797	$7,687,946	
29 COMMON	East Side	5,000	–	$0	$175,000	$0	$3,420,000	$3,120,000	$1,590,000	$232,217	$0	$0	$0	$1,330,000	$625,000	$470,000	$186,681	$11,148,898	$3,790,625	$2,787,225	$17,726,748	
	SP RR		–	$0	$214,375	$0	$1,528,875	$0	$1,493,000	$0	$0	$0	$0	$0	$0	$0	$0	$3,236,250	$1,100,325	$809,063	$5,145,638	
	PTC Seperate Option																					
29E	East Side	3,070	–	$0	$107,450	$132,492	$1,255,140	$6,189,000	$1,085,770	$232,217	$1,104,078	$3,327,878	$168,658	$760,760	$383,750	$288,580	$0	$15,035,773	$5,112,163	$3,758,943	$23,906,879	
	SP RR		–	$0	$31,150	$0	$377,004	$0	$136,170	$0	$0	$0	$0	$0	$0	$0	$0	$544,324	$185,070	$136,081	$865,475	
28	East Side	4,430	–	$0	$155,050	$472,500	$3,030,120	$3,362,000	$1,408,740	$90,000	$911,191	$0	$168,658	$1,178,380	$553,750	$416,420	$0	$11,746,809	$3,993,915	$2,936,702	$18,677,426	
27A	East Side	7,180	–	$0	$251,300	$280,569	$4,223,700	$5,470,050	$2,264,870	$1,044,977	$586,303	$0	$168,658	$1,920,520	$902,500	$678,680	$3,837,500	$21,629,627	$7,354,073	$5,407,407	$34,391,107	
26	East Side – ROSS ISLAND	2,035	–	$0	$814,000	$121,840	$1,391,940	$1,300,780	$697,010	$0	$586,303	$0	$168,658	$541,310	$254,375	$191,290	$0	$6,067,506	$2,062,952	$1,516,877	$9,647,335	
	ROSS ISLAND Br – East Appr	140		$0	$42,000	$0	$0	$672,000	$77,000	$0	$0	$0	$0	$55,020	$17,500	$13,160	$0	$876,680	$298,071	$219,170	$1,393,921	
	ROSS ISLAND Bridge	1,800	–	$0	$540,000	$0	$0	$21,888,000	$990,000	$0	$0	$0	$0	$707,400	$225,000	$169,200	$0	$24,519,600	$8,336,664	$6,129,900	$38,986,164	
	ROSS ISLAND Br – West Appr	1130	–	$0	$339,000	$0	$0	$5,424,000	$621,500	$0	$0	$0	$0	$444,090	$141,250	$106,220	$0	$7,076,060	$2,405,860	$1,769,015	$11,250,935	
	Pedestrian Add–on	3070	–	$0	$0	$0	$0	$11,688,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,688,000	$3,973,920	$2,922,000	$18,583,920	
	Phase II Seismic retrofit																					
	Marquim Br – West Appr		–	$0	$0	$0	$0	$5,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000,000	$1,700,000	$1,250,000	$7,950,000	
RI21	ROSS ISL APPR TO 21	1365	–	$0	$47,775	$0	$810,540	$545,040	$434,070	$0	$594,963	$0	$168,658	$363,090	$170,625	$128,310	$0	$3,263,071	$1,109,444	$815,768	$5,188,283	
RI21CBD	ROSS ISL DWG#21 TO CBD	1400	–	$0	$49,000	$0	$889,200	$3,571,400	$538,000	$0	$0	$0	$0	$372,400	$175,000	$131,600	$0	$5,726,600	$1,947,044	$1,431,650	$9,105,294	
CBD	West Side (S3a)	5,300	–	$0	$6,100,000	$21,200,000	$0	$0	$13,500,000	$0	$1,600,000	$0	$900,000	$3,200,000	$50,000	$50,000	$0	$46,600,000	$15,844,000	$11,650,000	$74,094,000	
ROW	EAST/WEST BANK ALIGNMENT		–	$36,700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$36,700,000	$12,478,000	$9,175,000	$58,353,000	
ROW	CBD		–	$7,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,400,000	$2,516,000	$1,850,000	$11,766,000	
SYS	LRT Vehicles (3/mi.)	–		$48,919,683	–	–	–	–	–	–	–	–	–	–	–	–	–	$48,919,683	$16,632,692	$12,229,921	$77,782,295	
SYS	Maintenance Yard	–		$16,193,190	–	–	–	–	–	–	–	–	–	–	–	–	–	$16,193,190	$5,505,685	$4,048,298	$25,747,172	
SYS	T.C.C.	–		$1,679,024	–	–	–	–	–	–	–	–	–	–	–	–	–	$1,679,024	$570,868	$419,756	$2,669,648	
	TOTALS	33,990		$66,791,897	$44,100,000	$8,913,000	$22,207,401	$17,897,079	$68,230,270	$25,313,130	$2,063,845	$6,470,539	$4,129,253	$2,080,606	$11,229,410	$3,666,250	$2,769,420	$4,024,181	$289,886,281	$98,561,335	$72,471,570	$460,919,186	$460,919,186

NOTE: 1.) Real Estate is INCLUDED. Note Real estate has additional contingency
2.) Central Business District alignment costs ARE INCLUDED. (LRT, TCC & MF costs based on per mile costs)

34.00% 25.00%

$13,560
6.44
$71,599,097

Parsons Brinckerhoff Quade & Douglas

Project: **S/N LRT – Hawthorne River Crossing**
Date: 01–Jul–94

Sheet No.	DESCRIPTION	Distance (ft.)	Systemwide	Right of Way	1 Utility	2 LRT Str. Constr'n	3 LRT Grd Constr'n	4 Struc–tures	5 Track–work	6 Cross–ings	7 LRT Stations	8 Park & Ride Lots	9 Fare Collect'n	10 Traction Power	11 Signal System	12 Communi–cations	13 Special Condit'ns	SUB TOTAL	Engr & Admin (34%)	Contin–gencies (25%)	Segment Totals
25	East & West Option	1,140	–	$0	$46,900	$0	$970,560	$0	$477,000	$464,434	$1,067,701	$801,375	$337,316	$356,440	$167,500	$125,960	$0	$4,835,186	$1,643,963	$1,208,797	$7,687,946
29 COMMON	East Side	5,000	–	$0	$175,000	$0	$3,420,000	$3,120,000	$1,590,000	$232,217	$0	$0	$0	$1,330,000	$625,000	$470,000	$186,681	$11,148,898	$3,790,625	$2,787,225	$17,726,748
	SP RR		–	$0	$214,375	$0	$1,528,875	$0	$1,493,000	$0	$0	$0	$0	$0	$0	$0	$0	$3,236,250	$1,100,325	$809,063	$5,145,638
	PTC Seperate Option																				
29E	East Side	3,070	–	$0	$107,450	$132,492	$1,255,140	$6,189,000	$1,085,770	$232,217	$1,104,078	$3,327,878	$168,658	$760,760	$383,750	$288,580	$0	$15,035,773	$5,112,163	$3,758,943	$23,906,879
	SP RR		–	$0	$31,150	$0	$377,004	$0	$136,170	$0	$0	$0	$0	$0	$0	$0	$0	$544,324	$185,070	$136,081	$865,475
28	East Side	4,430	–	$0	$155,050	$472,500	$3,030,120	$3,362,000	$1,408,740	$90,000	$911,191	$0	$168,658	$1,178,380	$553,750	$416,420	$0	$11,746,809	$3,993,915	$2,936,702	$18,677,426
27A	East Side	7,180	–	$0	$251,300	$275,028	$4,223,700	$5,620,050	$2,264,870	$1,277,194	$1,172,606	$0	$337,316	$1,920,520	$902,500	$678,680	$3,837,500	$22,761,264	$7,738,830	$5,690,316	$36,190,410
26	East Side – Hawthorne	7,130	–	$0	$1,959,940	$532,896	$2,780,460	$12,039,500	$4,212,450	$651,733	$4,640,798	$0	$337,316	$1,930,870	$891,250	$670,220	$0	$30,647,433	$10,420,127	$7,661,858	$48,729,418
	Hawthorne Br – East Appr	595		$0	$178,500	$0	$0	$2,975,000	$327,250	$0	$0	$0	$0	$233,835	$74,375	$55,930	$0	$3,844,890	$1,307,263	$961,223	$6,113,375
	Hawthorne Bridge	1,380	–	$0	$414,000	$0	$0	$30,425,000	$759,000	$0	$0	$0	$0	$542,340	$172,500	$129,720	$0	$32,442,560	$11,030,470	$8,110,640	$51,583,670
	Hawthorne Br – West Appr	350	–	$0	$105,000	$0	$0	$1,575,000	$192,500	$0	$0	$0	$0	$137,550	$43,750	$32,900	$0	$2,086,700	$709,478	$521,675	$3,317,853
	Phase II Seismic retrofit																				
	Marquim Br – East Appr		–	$0	$0	$0	$0	$5,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000,000	$1,700,000	$1,250,000	$7,950,000
CBD	West Side (HAW to 1st)	233	–	$0	$306,900	$1,470,330	$0	$1,000,000	$607,825	$0	$0	$0	$0	$164,471	$56,125	$43,710	$0	$3,651,361	$1,241,463	$912,840	$5,805,664
CBD	West Side (S1)	2,140	–	$0	$3,400,000	$10,500,000	$0	$0	$3,900,000	$0	$1,300,000	$0	$700,000	$1,400,000	$0	$0	$0	$21,200,000	$7,208,000	$5,300,000	$33,708,000
ROW	EAST BANK ALIGNMENT		–	$32,100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$32,100,000	$10,914,000	$8,025,000	$51,039,000
ROW	CBD		–	$2,300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,300,000	$782,000	$575,000	$3,657,000
SYS	LRT Vehicles (3/mi.)	–	$46,987,506	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$46,987,506	$15,975,752	$11,746,877	$74,710,135
SYS	Maintenance Yard	–	$15,553,609	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$15,553,609	$5,288,227	$3,888,402	$24,730,238
SYS	T.C.C.	–	$1,612,708	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$1,612,708	$548,321	$403,177	$2,564,205
	TOTALS	32,648	$64,153,823	$34,400,000	$7,345,565	$13,383,246	$17,565,859	$71,305,550	$18,454,575	$2,947,795	$10,216,374	$4,129,253	$2,049,264	$9,955,166	$3,872,500	$2,912,120	$4,024,181	$266,735,271	$90,689,992	$66,683,818	$424,109,081

$424,109,081

NOTE:
1.) Real Estate is INCLUDED. Note Real estate has additional contingency
2.) Central Business District alignment costs ARE INCLUDED. (LRT, TCC & MF costs based on per mile costs)

34.00% 25.00%

$12,991
6.18
$68,590,120

Parsons Brinckerhoff Quade & Douglas

Project: **S/N LRT – Caruthers River Crossing** ***** THIRD ALIGMENT OPTION *****
Date: 05–Jul–94

Sheet No.	DESCRIPTION	Distance (ft.)	Systemwide	Right of Way	1 Utility	2 LRT Str. Constr'n	3 LRT Grd Constr'n	4 Struc–tures	5 Track–work	6 Cross–ings	7 LRT Stations	8 Park & Ride Lots	9 Fare Collect'n	10 Traction Power	11 Signal System	12 Communi–cations	13 Special Condit'ns	SUB TOTAL	Engr & Admin (34%)	Contin–gencies (25%)	Segment Totals
25	East & West Option	1,140	–	$0	$46,900	$0	$970,560	$0	$477,000	$464,434	$1,087,701	$801,375	$337,316	$356,440	$167,500	$125,960	$0	$4,835,186	$1,643,963	$1,208,797	$7,687,946
29 COMMON	East Side	5,000	–	$0	$175,000	$0	$3,420,000	$3,120,000	$1,590,000	$232,217	$0	$0	$0	$1,330,000	$625,000	$470,000	$186,681	$11,148,898	$3,790,625	$2,787,225	$17,726,748
	SPRR		–	$0	$214,375	$0	$1,528,875	$0	$1,493,000	$0	$0	$0	$0	$0	$0	$0	$0	$3,236,250	$1,100,325	$809,063	$5,145,638
	PTC Seperate Option																				
29E	East Side	3,070	–	$0	$107,450	$132,492	$1,255,140	$6,189,000	$1,085,770	$232,217	$1,104,078	$3,327,878	$168,658	$760,760	$383,750	$288,580	$0	$15,035,773	$5,112,163	$3,758,943	$23,906,879
	SPRR		–	$0	$31,150	$0	$377,004	$0	$136,170	$0	$0	$0	$0	$0	$0	$0	$0	$544,324	$185,070	$136,081	$865,475
28	East Side	4,430	–	$0	$155,050	$472,500	$3,030,120	$3,362,000	$1,408,740	$90,000	$911,191	$0	$168,658	$1,178,380	$553,750	$416,420	$0	$11,746,809	$3,993,915	$2,936,702	$18,677,426
27A	East Side	7,180	–	$0	$251,300	$275,028	$4,223,700	$5,620,050	$2,264,870	$1,277,194	$1,172,606	$0	$337,316	$1,920,520	$902,500	$678,680	$3,837,500	$22,761,264	$7,738,830	$5,690,316	$36,190,410
26	East Side – Caruthers	5,685	–	$0	$293,575	$47,906	$2,167,082	$14,039,500	$3,184,590	$0	$1,980,214	$0	$168,658	$1,552,850	$710,625	$534,390	$200,000	$24,879,390	$8,458,993	$6,219,848	$39,558,230
	Caruthers Br – East Appr	100	–	$0	$30,000	$0	$0	$480,000	$55,000	$0	$0	$0	$0	$39,300	$12,500	$9,400	$0	$626,200	$212,908	$156,550	$995,658
	Caruterhs Bridge	1,200	–	$0	$360,000	$0	$0	$14,592,000	$660,000	$0	$0	$0	$0	$471,600	$150,000	$112,800	$0	$16,346,400	$5,557,776	$4,086,600	$25,990,776
	Caruthers Br – West Appr	1,530	–	$0	$459,000	$0	$1,275,000	$7,344,000	$841,500	$0	$0	$0	$0	$601,290	$191,250	$143,820	$0	$10,855,860	$3,690,992	$2,713,965	$17,260,817
	Pedestrian Add–on	2830	–	$0	$0	$0	$0	$9,672,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,672,000	$3,288,480	$2,418,000	$15,378,480
	Phase II Seismic retrofit																				
	Marquim Br – West Appr		–	$0	$0	$0	$0	$5,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000,000	$1,700,000	$1,250,000	$7,950,000
21 to CBD	West Approach to CBD	675	–	$0	$158,675	$0	$253,080	$915,000	$214,650	$0	$0	$0	$0	$179,550	$84,375	$63,450	$250,000	$2,118,780	$720,385	$529,695	$3,368,860
CBD	West Side (S3a)	5,300	–	$0	$6,100,000	$21,200,000	$0	$0	$13,500,000	$0	$1,600,000	$0	$900,000	$3,200,000	$50,000	$50,000	$0	$46,600,000	$15,844,000	$11,650,000	$74,094,000
ROW	EAST/WEST BANK ALIGNMENT		–	$30,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$30,400,000	$10,336,000	$7,600,000	$48,336,000
ROW	CBD		–	$7,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,400,000	$2,516,000	$1,850,000	$11,766,000
SYS	LRT Vehicles (3/mi.)	–	$50,819,476	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$50,819,476	$17,278,622	$12,704,869	$80,802,967
SYS	Maintenance Yard	–	$16,822,052	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$16,822,052	$5,719,498	$4,205,513	$26,747,062
SYS	T.C.C.	–	$1,744,229	–	–	–	–	–	–	–	–	–	–	–	–	–	–	$1,744,229	$593,038	$436,057	$2,773,324
	TOTALS	35,310	$69,385,757	$37,800,000	$8,382,475	$22,127,926	$18,500,561	$70,333,550	$26,911,290	$2,296,062	$7,855,790	$4,129,253	$2,080,606	$11,590,690	$3,831,250	$2,893,500	$4,474,181	$292,592,891 $292,592,891	$99,481,583	$73,148,223	$465,222,696 $465,222,696

NOTE: 1.) Real Estate is INCLUDED. Note: Real estate has additional contingency
2.) Central Business District alignment costs ARE INCLUDED. (LRT, TCC & MF costs based on per mile costs)

34.00% 25.00%

$13,175
6.69
$69,566,011