BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF STUDYING THE SOUTH/NORTH DOWNTOWN PORTLAND ALIGNMENT OPTIONS AND AN AMENDED NORTH TERMINUS OPTION IN THE DEIS, CONCURRING WITH THE SOUTH/NORTH STEERING GROUP'S SELECTION OF DESIGN OPTIONS, AND ADOPTING THE MAJOR INVESTMENT STUDY FINAL REPORT	) RESOLUTION NO. 95-2243)) Introduced by:) Councilor Monroe))))

WHEREAS, In April 1993, the Metro Council adopted Resolution No. 93-1784 and the C-TRAN Board of Directors adopted Resolution No. BR-93-9404 which selected the Milwaukie and I-5 North Corridors as the region's next high-capacity transit priority for study and combined them into the South/North Transit Corridor to be studied within a federal Draft Environmental Impact Statement; and

WHEREAS, In October 1993, the Federal Transit Administration approved the South/North application to initiate Alternatives Analysis/Draft Environmental Impact Statement and the South/North Preliminary Work Plan, and issued notification of intent in the *Federal Register* to publish a South/North Environmental Impact Statement; and

WHEREAS, In November 1993, the Federal Transit Administration and the Federal Highway Administration jointly issued the Metropolitan Planning Rule which included the Major Investment Study guidelines to replace the Alternatives Analysis guidelines and provided for consultations to determine how projects that had been initiated prior to the new rules would comply under the Major Investment Study guidelines; and

WHEREAS, In December 1994, a Major Investment Study consultation was held between Metro, the Federal Transit Administration and the Federal Highway Administration and it was determined that Tier I of the South/North Transit Corridor Study would conclude by addressing the Major Investment Study guidelines documented in a Major Investment Study Final Report; and

WHEREAS, The role of the Steering Group in the terminus and alignment alternative narrowing process is to forward its recommendations to participating jurisdictions for their consideration, that participating jurisdictions are to forward their recommendations to the C-TRAN Board of Directors and the Metro Council who are to make the final determination of the alternatives to advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, The role of the South/North Steering Group in the design option narrowing process is to consider recommendations from the South/North Project Management Group and Citizen Advisory Committee and to select the design option(s) which will be studied further in the Draft Environmental Impact Statement; and

WHEREAS, In December 1994, the Metro Council adopted Resolution No. 94-1989 and the C-TRAN Board of Directors adopted Resolution No. BR-94-011 which identified the locally preferred design concept and scope for the corridor (light rail transit, the Phase One terminus alternatives and alignment alternatives) to advance into the Draft Environmental Impact Statement and

Preliminary Engineering for further study; and

WHEREAS, In December 1994, within the same resolution, the Metro Council and the C-TRAN Board of Directors also determined that within the Portland central business district, a surface light rail transit alternative on 5th and 6th Avenues shall be developed based upon several principles and that if prior to initiation of the Draft Environmental Impact Statement it is concluded that a 5th/6th Avenue alignment cannot be developed that addresses those principles, other alternatives will be developed for further study in the Draft Environmental Impact Statement; and

WHEREAS, In March 1995, the South/North Steering Group selected both the Caruthers and Ross Island Crossing alternatives and both the I-5 and Interstate Avenue alignment alternatives for further study in the Draft Environmental Impact Statement; and

WHEREAS, In May 1995, Metro Council adopted Resolution No. 95-2138A which approved the federally-required financially constrained Regional Transportation Plan which included the locally preferred design concept and scope for the South/North Corridor; and

WHEREAS, In August 1995, the C-TRAN Board of Directors adopted resolution No. 95-048 which amended the Phase One northern terminus for study in the Draft Environmental Impact Statement from the vicinity of 99th Avenue in Hazel Dell, Washington to the Veterans Administration Hospital/Clark College in Vancouver, Washington until the Clark County Transportation Futures Process concludes; and

WHEREAS, The alignment design options currently under study have been developed and evaluated based upon the criteria and measures from the *Evaluation Methodology Report* and documented within various technical memoranda, including the *South/North Design Option Narrowing Report* and the *Design Option Briefing Document*; and

WHEREAS, A comprehensive public involvement program for the design option narrowing process was developed and implemented by the South/North Study that included, but was not limited to, numerous community meetings, a 45-day public comment period, public meetings for the Steering Group to receive oral comment and an ongoing Citizens Advisory Committee that provided regular public comment opportunities; and

WHEREAS, Various options for a 5th/6th Avenue surface light rail alignment were evaluated by the Downtown Portland Oversight Committee which concluded that the recommended design option on 5th/6th Avenues adequately addresses the criteria established by Metro Council, the C-TRAN Board of Directors and the Oversight Committee and should therefore be exclusively studied further within the Draft Environmental Impact Statement; and

WHEREAS, In October and November 1995, the Project Management Group and the Citizens Advisory Committee formed independent recommendations for both design option narrowing and the downtown Portland alignment alternative and forwarded them to the Steering Group for consideration; and

WHEREAS, In November 1995, the Steering Group adopted the South/North *Design Option Narrowing Final Report* (Exhibit A)

which identifies the design options that best meet the project's adopted goal and objectives and which will advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, In November 1995, the Steering Group adopted the proposed light rail alignment design for 5th/6th Avenues in downtown Portland; and

WHEREAS, In December 1994 Metro adopted Resolution 94-2040C and the 2040 Concept Plan and directed staff to prepare 2015 household and employment forecasts consistent with the 2040 Concept Plan; and

WHEREAS, Metro staff coordinated with regional jurisdictions in the development of household and employment forecasts allocated to 1260 transportation analysis zones (TAZ's) and completed these allocations in December 1995 -- as summarized in Exhibit D; and

WHEREAS, The South/North DEIS must commence immediately in order to ensure timely completion; now, therefore

BE IT RESOLVED:

1. That Exhibit B is hereby adopted as the *South/North Downtown Portland Tier I Final Report*.

2. That the Metro Council has concluded in this *Final Report* that the downtown Portland design options, A-2, B-3, C-1, N-1, N-2, and S-1 described in Exhibit B, would generally retain current automobile access and pedestrian facilities; would generally provide for a lane of joint bus and light rail operations and a lane of exclusive bus operations on 5th/6th Avenues; adequately addresses the criteria established by

Resolution No. 94-1989 as adopted by the Metro Council and the C-TRAN Board of Directors; and shall therefore be exclusively studied further within the Draft Environmental Impact Statement.

3. That the Metro Council concurs with the design options selected by the South/North Steering Group for further study within the Draft Environmental Impact Statement as described in the *Design Option Narrowing Final Report* (Exhibit A) which are generally as follows:

a. *Minimum Operable Segments*. (1) a full-length project from the vicinity of the Clackamas Regional Center, through downtown Milwaukie, Portland and Vancouver, to the vicinity of the Veterans Administration Hospital/ Clark College; (2) a bi-state minimum operable segment from the vicinity of downtown Milwaukie/Market Place station and park-and-ride lot to the vicinity of the Veterans Administration Hospital/Clark College; and (3) three Oregon-only minimum operable segments each with a southern terminus in the vicinity of the Clackamas Regional Center and a northern terminus at: a) the vicinity of the Rose Quarter; b) the vicinity of the Edgar Kaiser Medical Center; or c) the vicinity of the Expo Center.

b. *South Terminus*. North of Clackamas Town Center alignment with a Sunnyside Park-and-Ride Terminus east of I-205; and South of Clackamas Town Center alignment with a 93rd Avenue Town Center Area Terminus.

c. *Railroad Avenue/Highway 224*. Alignment adjacent to

Railroad Avenue.

d. *Downtown Milwaukie*. McLoughlin Boulevard/Main Street with a Monroe Street Alignment; and Southern Pacific Branch Line with a Monroe Street alignment.

e. *Ross Island Crossing*. North Ross Island Crossing alignment with a West of McLoughlin Boulevard sub-option.

f. *Caruthers Crossing and Southeast Portland*. Caruthers Modified with a West of Brooklyn Yards alignment.

g. *Steel Bridge to Kaiser*. East I-5/Kerby Avenue alignment; and Wheeler Avenue/Russell Avenue alignment.

h. *North Portland*. All-I-5 alignment; and All-Interstate Avenue (Metro work with Tri-Met and City staff to evaluate as soon as the technical data for the DEIS is available which North Portland crossover option warrants further study; and staff will report back to the South/North Project Management Group, Citizen Advisory Committee and Steering Group).

i. *Hayden Island*. West of I-5 (under ramps).

j. *Columbia River Crossing*. Low-level lift span.

k. *Downtown Vancouver*. Two-way on Washington Street.

4. That, consistent with an action taken by the C-TRAN Board of Directors in August 1995, the South/North Phase One northern terminus to be studied within the Draft Environmental Impact Statement is amended to be in the vicinity of the Veterans Administration Hospital and Clark College in Vancouver, Washington.

5. That Metro Council adopts the *Major Investment Study Final Report* (Exhibit C) documenting the South/North Tier I process, reports and conclusions which selected the locally preferred design concept and scope for the South/North Corridor and led to its inclusion within the Regional Transportation Plan addressing the federal Metropolitan Planning Rule and Major Investment Study guidelines.

6. Staff will prepare travel demand forecasts for the South/North DEIS that use as a basis the 2015 household and employment forecast completed in December 1995 (Exhibit D) which assumes a 4,000-5,000-acre Urban Growth Boundary expansion.

ADOPTED by the Metro Council this 21 day of Dec., 1995.

J. Ruth McFarland, Presiding Officer

Approved as to Form:

Daniel B. Cooper, General Counsel

LS:lmk
95-2243.RES
12-11-95

EXHIBIT D

Exhibit One: Household and Employment Allocation Summary
By 20 District and County 1994 and 2015 - 12/11/95
Approximate Aggregation from TAZ Level

County	District	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
Multnomah	1	10242	148884	19437	214856	9195	65972
	2	123894	172225	142326	219685	18432	47460
	3	43798	81562	57633	98336	13835	16774
	4	35447	27916	49590	37387	14142	9471
	5	37783	42691	59228	77402	21445	34711
	20	2376	1499	4536	1362	2161	-137
County Total		253540	474777	332750	649027	79210	174250
Clackamas	6	28931	31533	35497	47517	6567	15984
	7	12661	31099	25350	60521	12689	29422
	8	20484	24445	26908	37626	6424	13181
	9	9918	13584	17855	22498	7937	8914
	10	12252	19327	24406	38444	12153	19117
	19	30035	22910	48915	39321	18879	16411
County Total		114282	142898	178932	245927	64650	103029
Washington	11	8703	23854	18366	43988	9663	20134
	12	20389	48210	29892	64872	9504	16662
	13	36569	59537	53118	94704	16549	35167
	14	35504	32575	72692	76565	37188	43990
	15	15180	26094	29411	62273	14231	36179
	16	8209	10215	13480	19876	5271	9661
	18	9322	9147	13806	19434	4484	10287
County Total		133874	209632	230764	381713	96890	172081
Clark County	17	102664	123754	171842	206211	69178	82457
3 County		501697	827307	742446	1276667	240749	449360
Region Total		604361	951061	914288	1482878	309927	531817

Note - District and County Data are not precise due to aggregation.
Source: Metro, DRC, 12/11/95

Clark county forecast data represent a "worst case" scenario for purposes of facilities planning and does not represent an official Clark County forecast.

1260 TAZ Level

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rtz	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
1	545	28521	1121	37839	576	9318
2	12	8537	281	11419	269	2882
3	14	1201	111	2669	97	1468
4	302	1483	800	4846	498	3363
5	5	457	149	1340	144	883
6	195	8	376	295	181	287
7	0	756	422	3606	422	2850
8	141	3703	826	5221	685	1518
9	18	3866	954	4058	936	192
10	1021	11734	1841	16095	820	4361
11	1576	2432	2069	3053	493	621
12	410	23248	957	29847	547	6599
13	126	3900	266	6471	140	2571
14	188	97	262	1155	74	1058
15	1310	10090	2732	14120	1422	4030
16	950	2800	1110	3861	160	1061
17	677	8612	1127	11253	450	2641
18	1644	6124	1713	6324	69	200
19	103	9301	157	10252	54	951
20	33	24	46	26	13	2
21	170	28	899	165	729	137
22	72	25	252	68	180	43
23	412	42	1667	278	1255	236
24	159	22	1072	193	913	171
25	32	2039	50	2601	18	562
26	256	599	573	1249	317	650
27	301	109	1150	267	849	158
28	351	79	375	85	24	6
29	4997	9457	5269	10163	272	706
30	855	166	944	210	89	44
31	367	1128	621	1206	254	78
32	123	811	243	838	120	27
33	44	495	99	507	55	12
34	1977	954	2068	972	91	18
35	298	59	441	90	143	31
36	101	11	235	39	134	28
37	446	89	500	101	54	12
38	436	61	711	119	275	58
39	383	485	687	842	304	357
40	1366	1700	1643	1865	277	165
41	597	97	659	117	62	20
42	1168	247	1354	286	186	39
43	828	9538	849	10038	21	500
44	316	4853	359	4991	43	138
45	0	325	300	4320	300	3995
46	34	1565	918	4691	884	3126
47	661	1446	750	1499	89	53
48	241	424	261	437	20	13
49	427	1503	490	1591	63	88
50	281	3	324	20	43	17
51	523	371	617	481	95	110
52	1015	371	1046	383	31	12
53	778	69	894	93	116	24
54	1308	488	1676	594	368	106
55	1874	1178	2031	1315	157	137
56	730	783	786	870	56	87
57	39	23	47	26	8	3

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rtz	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
58	180	26	200	36	20	10
59	174	13	196	21	22	8
60	206	19	219	22	13	3
61	28	35	30	39	2	4
62	1100	342	1324	409	224	67
63	676	134	817	164	141	30
64	268	533	317	587	49	54
65	536	2490	641	2736	105	246
66	476	41	573	201	97	160
67	888	64	957	79	69	15
68	698	464	932	636	234	172
69	586	2055	752	2503	166	448
70	634	13	694	62	60	49
71	257	18	390	46	133	28
72	266	155	507	206	241	51
73	297	1184	621	1253	324	69
74	869	293	2116	732	1247	439
75	1110	62	1467	140	357	78
76	1922	2033	2137	2280	215	247
77	705	81	725	123	20	42
78	317	50	367	247	50	197
79	1015	122	1385	233	371	111
80	626	4209	956	5474	330	1265
81	888	652	1065	862	177	210
82	784	147	896	220	112	73
83	624	286	781	519	157	233
84	315	1971	555	2800	239	829
85	594	659	647	920	53	261
86	800	964	943	1310	143	346
87	1028	137	1330	324	302	187
88	1210	373	1593	712	383	339
89	555	56	735	115	180	59
90	1130	1125	1709	1635	579	510
91	783	126	974	235	191	109
92	218	10739	400	15630	182	4891
93	421	318	602	718	181	400
94	935	1129	1093	1513	158	384
95	144	3030	374	4074	230	1044
96	579	5823	879	6729	300	906
97	384	1978	453	2224	69	246
98	510	1349	756	1904	246	555
99	937	467	1012	595	75	128
100	43	239	1068	3145	1025	2906
101	933	154	1541	1101	608	947
102	230	76	661	141	431	65
103	722	49	1762	206	1040	157
104	630	268	975	497	344	229
105	182	15	469	123	288	108
106	36	479	1490	1945	1454	1466
107	207	984	327	2181	120	1197
108	564	258	800	608	236	350
109	232	5	241	45	9	40
110	260	563	844	1423	584	860
111	715	2996	1155	5060	440	2064
112	365	1653	446	2684	81	1031
113	884	3805	3097	4701	2213	896
114	924	1251	1005	1659	81	408

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rtz	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
115	480	2304	482	2503	2	199
116	6	5358	6	6381	0	1023
117	1555	900	1592	1087	37	187
118	1037	90	1223	188	186	98
119	437	70	490	139	53	69
120	1175	119	1287	222	112	103
121	867	170	956	246	89	76
122	2352	937	2503	1258	151	321
123	291	64	303	88	12	24
124	108	164	258	514	150	350
125	132	1614	199	3414	67	1800
126	219	2506	219	2878	0	372
127	1531	342	1569	480	38	138
128	1082	616	1681	1141	599	525
129	101	41	1200	165	1099	124
130	339	18	595	78	256	60
131	864	1135	1726	1819	862	684
132	168	2178	328	2293	160	115
133	1733	870	1910	1180	177	310
134	738	33	738	3053	0	3020
135	79	784	79	3655	0	2871
136	41	2574	41	3616	0	1042
137	25	4395	1267	5150	1242	755
138	0	42	231	774	231	732
139	5	641	5	1312	0	671
140	31	834	805	1126	774	292
141	406	392	899	546	493	154
142	150	611	284	701	134	90
143	285	404	658	705	373	301
144	429	74	499	138	70	64
145	681	415	783	490	102	75
146	1391	1184	1451	1581	60	397
147	573	27	650	79	77	52
148	980	164	1748	518	768	354
149	489	62	591	121	102	59
150	685	960	1629	1402	944	442
151	922	144	1822	290	900	146
152	775	171	914	268	140	97
153	784	79	1000	183	216	104
154	1017	58	1270	184	253	126
155	289	8	581	85	292	77
156	342	5	553	101	211	96
157	125	0	125	671	0	671
158	0	0	37	622	37	622
159	117	2294	117	2870	0	576
160	29	1149	235	2887	206	1738
161	289	2649	441	2891	152	242
162	345	2086	897	3544	552	1458
163	495	111	805	395	310	284
164	614	87	619	149	5	62
165	85	36	430	82	345	46
166	237	31	1979	1214	1742	1183
167	151	721	1544	1566	1393	845
168	226	24	1127	337	901	313
169	446	70	933	222	486	152
170	470	52	1059	234	589	182
171	445	24	503	76	58	52

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rtz	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
172	285	1608	665	2535	381	927
173	181	3	541	46	360	43
174	168	16	724	149	556	133
175	426	244	1828	1178	1402	934
176	218	10	711	132	493	122
177	427	427	596	1360	169	933
178	349	313	483	443	133	130
179	443	40	698	209	255	169
180	791	340	988	485	198	145
181	1261	178	2665	421	1404	243
182	1733	461	2457	1063	724	602
183	681	148	929	742	248	594
184	382	30	523	191	140	161
185	325	199	376	237	52	38
186	149	146	204	236	55	90
187	90	604	106	823	16	219
188	229	116	429	196	200	80
189	129	200	375	315	246	115
190	694	133	1511	478	817	345
191	255	111	615	1815	360	1704
192	380	50	880	165	500	115
193	193	50	304	74	111	24
194	252	20	256	40	4	20
195	1	203	1	531	0	328
196	357	65	398	145	41	80
197	1	63	1	1224	0	1161
198	209	573	661	2101	452	1528
199	86	0	222	39	136	39
200	142	47	434	84	292	37
201	398	53	424	118	26	65
202	359	17	359	58	0	41
203	2	744	2	1999	0	1255
204	1724	230	1984	417	260	187
205	655	112	982	314	327	202
206	287	280	465	414	178	134
207	377	45	663	530	286	485
208	870	100	1065	208	195	108
209	27	1453	27	4204	0	2751
210	148	352	148	2275	0	1923
211	165	1164	1744	3223	1579	2059
212	22	420	937	3826	915	3406
213	25	1957	435	5385	410	3428
214	1	0	313	1525	312	1525
215	334	34	4442	1058	4108	1024
216	897	82	1578	320	681	238
217	1018	550	1230	816	212	266
218	1025	530	1207	753	182	223
219	670	2634	842	2881	172	247
220	1657	210	3065	622	1408	412
221	377	150	839	517	462	367
222	36	1	54	14	18	13
223	8	0	8	4664	0	4664
224	0	1214	0	3504	0	2290
225	4	22	4	4954	0	4932
226	150	168	2061	282	1911	114
227	132	387	2250	3165	2118	2778
228	167	120	1259	370	1092	250

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rtz	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
229	788	633	1908	1401	1120	768
230	1067	327	1466	471	399	144
231	121	50	1434	980	1313	930
232	23	5602	23	6998	0	1396
233	359	117	359	898	0	781
234	11	50	11	1003	0	953
235	8	333	375	4425	366	4092
236	191	72	355	411	164	339
237	20	1000	20	2106	0	1106
238	1	180	1	606	0	426
239	426	31	635	112	209	81
240	959	100	1468	278	509	178
241	595	46	846	66	251	20
242	989	1643	1338	2187	349	544
243	1027	387	1254	765	227	378
244	333	677	926	1436	593	759
245	12	0	185	182	173	182
246	12	26	199	222	187	196
247	10	0	12	2	2	2
248	38	3	98	67	60	64
249	562	760	1262	2153	700	1393
250	31	655	31	1207	0	552
251	184	1709	188	2034	4	325
252	358	2921	578	3383	220	462
253	608	1342	1018	1906	410	564
254	673	40	804	142	131	102
255	121	28	154	32	33	4
256	608	268	714	406	106	138
257	1251	526	1415	756	163	230
258	675	94	1375	4410	700	4316
259	866	57	1201	68	335	11
260	206	87	257	121	51	34
261	212	699	312	750	100	51
262	575	69	908	146	333	77
263	48	96	112	183	64	87
264	392	2832	866	3006	474	174
265	327	1365	565	1641	238	276
266	436	64	576	279	140	215
267	8	212	8	5300	0	5088
268	323	199	383	285	60	86
269	158	182	234	1179	76	997
270	957	620	1526	732	569	112
271	791	153	851	203	60	50
272	890	1416	1110	1503	220	87
273	1341	1281	1371	1417	30	136
274	159	808	164	815	5	7
275	25	9	28	13	3	4
276	138	73	145	106	7	33
277	44	81	47	88	3	7
278	90	12	98	17	8	5
279	31	17	34	18	3	1
280	773	937	1780	2775	1007	1838
281	1836	3537	3099	6498	1263	2961
282	1680	1245	3056	1720	1376	475
283	1655	2734	2155	4869	500	2135
284	293	225	409	872	116	647
285	1096	375	1336	797	240	422

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rtz	hh94	adj94emp	tfhh15	tfemp15	dhh15-94	demp15-94
286	877	1162	1646	2345	769	1183
287	165	254	237	351	72	97
288	88	60	108	66	20	6
289	208	97	228	105	20	8
290	18	31	41	58	23	27
291	63	35	83	38	20	3
292	259	401	454	512	195	111
293	244	93	284	106	40	13
294	490	175	610	193	120	18
295	357	370	404	383	47	13
296	99	302	124	308	25	6
297	171	194	176	201	5	7
298	53	18	55	22	2	4
299	114	237	119	240	5	3
300	144	22	148	29	4	7
301	149	450	159	466	10	16
302	65	9	68	14	3	5
303	29	30	34	31	5	1
304	213	239	213	239	0	0
305	323	143	393	200	70	57
306	415	72	455	95	40	23
307	116	15	146	22	30	7
308	584	1671	796	2264	212	593
309	428	47	475	96	47	49
310	166	92	249	390	83	298
311	141	964	256	1656	115	692
312	221	4351	344	5190	123	839
313	35	2516	108	2730	73	214
314	924	2747	1146	3760	222	1013
315	885	940	1159	1638	274	698
316	105	746	105	1329	0	583
317	1512	2118	1629	2338	117	220
318	1357	118	1877	268	520	150
319	220	290	250	353	30	63
320	705	2554	757	2674	52	120
321	152	432	264	518	112	86
322	836	578	1382	1061	545	483
323	829	4386	1579	5901	750	1515
324	469	169	574	362	105	193
325	1150	744	1250	1056	100	312
326	631	927	706	1192	75	265
327	2060	3111	2560	4544	500	1433
328	423	252	473	341	50	89
329	1021	4552	1146	6677	125	2125
330	381	1078	481	2405	100	1327
331	547	1537	597	1774	50	237
332	11	5354	73	6167	62	813
333	634	193	973	473	339	280
334	1921	276	2336	698	415	422
335	671	64	979	142	308	78
336	767	721	955	941	189	220
337	271	103	517	144	246	41
338	208	10	730	68	522	58
339	971	106	1466	223	495	117
340	620	43	1697	1082	1077	1039
341	741	107	1674	241	933	134
342	304	64	750	124	445	60

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343	181	18	491	213	310	195
344	2353	598	2805	1238	452	640
345	745	533	1008	690	262	157
346	506	58	970	522	464	464
347	334	1199	365	1200	31	1
348	258	994	464	1335	206	341
349	88	1346	210	1500	122	154
350	9	1203	26	1388	16	185
351	323	1862	398	2403	75	541
352	960	262	1010	417	50	155
353	2012	510	2087	712	75	202
354	484	248	534	446	50	198
355	692	109	1682	1335	990	1226
356	586	353	804	353	218	0
357	668	114	952	114	284	0
358	80	78	80	78	0	0
359	533	96	613	226	80	130
360	612	167	500	273	-112	106
361	938	472	1536	793	598	321
362	1391	1151	1850	1539	459	388
363	854	5112	2220	7254	1366	2142
364	181	3022	181	4200	0	1178
365	19	1518	19	4695	0	3177
366	154	205	496	775	342	570
367	30	38	108	137	79	99
368	150	93	1739	2034	1589	1941
369	513	1115	2513	4850	2000	3735
370	15	616	15	3383	0	2767
371	9	375	17	1175	8	800
372	180	885	785	1475	605	590
373	2582	580	2982	850	400	270
374	142	115	152	127	10	12
375	205	55	205	55	0	0
376	93	13	350	194	258	181
377	1170	472	1466	548	296	76
378	787	290	1724	548	937	258
379	779	969	371	1606	-408	637
380	901	248	1143	552	242	304
381	628	186	1687	1157	1059	971
382	1134	404	1544	723	410	319
383	1127	2310	1989	2313	862	3
384	53	2682	419	4014	366	1332
385	10	1445	424	3284	415	1839
386	1128	2028	2479	3522	1350	1494
387	591	1966	1573	6937	982	4971
388	1265	3198	2166	5142	901	1944
389	77	2184	496	3904	420	1720
390	1	550	206	1260	205	710
391	47	1976	47	2566	0	590
392	47	6	47	10	0	4
393	44	351	845	1019	801	668
394	108	59	112	68	4	9
395	50	191	233	237	183	46
396	963	310	2463	984	1500	674
397	18	2	818	212	800	210
398	153	14	316	17	163	3
399	256	45	256	65	0	20

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400	151	33	1801	981	1650	948
401	210	89	466	296	256	207
402	18	21	158	103	139	82
403	249	51	1069	244	821	193
404	352	29	392	93	40	64
405	673	69	710	218	36	149
406	489	918	615	2131	125	1213
407	237	540	655	1269	418	729
408	584	882	1343	2587	759	1705
409	605	57	669	164	65	107
410	665	110	739	685	74	575
411	21	3947	48	4156	27	209
412	369	316	398	560	29	244
413	764	392	1618	1004	854	612
414	628	425	651	456	23	31
415	713	279	723	287	10	8
416	342	644	371	791	29	147
417	118	18	120	19	1	1
418	481	411	564	611	83	200
419	243	77	268	135	26	58
420	200	1	214	19	14	18
421	344	190	401	440	57	250
422	681	154	861	404	180	250
423	557	24	707	64	150	40
424	40	425	104	798	64	373
425	414	1566	548	1690	133	124
426	817	108	902	158	85	50
427	683	670	733	1070	50	400
428	1410	1184	1560	1234	150	50
429	973	214	1008	314	35	100
430	657	1535	759	1844	102	309
431	217	166	232	192	15	26
432	293	51	320	151	27	100
433	77	1159	125	1494	48	335
434	6	1008	6	1349	0	341
435	130	113	630	2113	500	2000
436	645	470	820	670	175	200
437	555	25	845	115	290	90
438	410	450	535	800	125	350
439	259	873	409	1209	150	336
440	199	714	240	905	41	191
441	362	396	581	1396	219	1000
442	625	435	954	1350	329	915
443	491	6723	744	11223	253	4500
444	7	961	217	3961	210	3000
445	7	161	106	961	99	800
446	130	163	137	166	7	3
447	937	1198	1237	1698	300	500
448	998	187	1153	303	155	116
449	279	26	298	40	19	14
450	621	387	658	416	37	29
451	746	995	821	1487	75	492
452	735	106	785	121	50	15
453	503	292	581	322	78	30
454	475	1029	528	1281	53	252
455	768	158	789	190	21	32
456	363	262	387	338	24	76

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457	1339	236	1390	275	51	39
458	298	54	457	147	159	93
459	1257	316	1457	616	200	300
460	1249	410	1450	491	201	81
461	162	1729	290	2141	128	412
462	128	1101	235	1419	107	318
463	355	1086	468	1386	113	300
464	34	5601	34	6601	0	1000
465	424	7	810	2077	386	2070
466	550	52	899	302	349	250
467	181	56	450	256	269	200
468	237	45	585	247	348	202
469	189	410	548	692	360	282
470	320	186	1435	845	1115	659
471	379	94	729	694	350	600
472	618	480	968	630	350	150
473	450	90	686	207	236	117
474	129	45	1061	508	932	463
475	518	350	1002	675	484	325
476	281	183	1935	918	1654	735
477	105	58	925	452	820	394
478	353	83	1053	483	700	400
479	180	55	1200	1255	1020	1200
480	31	35	954	1035	923	1000
481	290	1506	1011	2906	721	1400
482	224	439	974	789	750	350
483	172	61	422	461	250	400
484	138	70	188	712	50	642
485	592	39	742	389	150	350
486	132	0	218	43	86	43
487	94	889	97	1339	3	450
488	120	1284	122	1582	2	298
489	382	1061	429	1311	47	250
490	44	686	44	2886	0	2200
491	17	1182	17	1364	0	182
492	1090	1072	1133	1246	43	174
493	894	433	913	528	19	95
494	383	683	570	1672	187	989
495	51	266	73	338	22	72
496	262	24	292	274	30	250
497	161	1922	161	2677	0	755
498	156	354	161	2354	5	2000
499	4	342	55	686	51	344
500	12	238	99	825	87	587
501	398	497	674	1065	276	568
502	250	154	581	284	331	130
503	256	124	256	124	0	0
504	247	35	384	35	137	0
505	549	122	1384	495	835	373
506	320	34	451	93	131	59
507	387	2	1282	341	895	339
508	141	46	241	91	100	45
509	899	2075	1045	2258	147	183
510	4	2879	58	3241	54	362
511	1453	556	1527	628	75	72
512	675	117	1343	412	668	295
513	508	78	1387	478	879	400

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514	968	759	1134	1111	166	352
515	531	526	722	738	191	212
516	112	1560	396	2329	284	769
517	1290	2266	1634	2890	343	624
518	271	30	1415	551	1145	521
519	184	19	239	44	55	25
520	1535	387	1615	423	79	36
521	4863	4586	8887	9506	4024	4920
522	449	128	565	128	117	0
523	433	217	1523	2045	1091	1828
524	245	27	494	169	248	142
525	444	128	551	128	107	0
526	471	2234	1418	3903	947	1669
527	207	51	557	328	351	277
528	696	349	1421	561	725	212
529	373	114	594	114	220	0
530	408	151	645	151	237	0
531	270	91	444	91	174	0
532	545	54	575	190	30	136
533	356	61	600	61	244	0
534	371	60	480	60	108	0
535	8168	5018	9275	5080	1107	62
536	790	132	1050	280	260	148
537	1797	1379	2540	1664	743	285
538	2200	550	2827	631	627	81
539	294	87	2189	1893	1895	1806
540	275	372	527	568	252	196
541	298	339	374	343	76	4
542	634	279	2062	744	1429	465
543	690	571	1474	3923	784	3352
544	166	45	211	45	46	0
545	281	63	357	63	76	0
546	279	37	427	93	148	56
547	200	51	530	444	329	393
548	541	944	700	945	159	1
549	131	248	171	249	40	1
550	396	388	919	493	523	105
551	915	1151	1298	1163	383	12
552	371	575	550	575	179	0
553	2147	2372	6206	6480	4059	4108
554	301	305	429	305	128	0
555	475	106	571	176	95	70
556	31	931	58	1123	27	192
557	28	1477	41	1565	13	88
558	277	85	470	196	193	111
559	299	266	533	338	234	72
560	419	70	2644	395	2225	325
561	207	28	682	95	475	67
562	280	108	458	130	178	22
563	1202	94	1525	148	323	54
564	122	44	759	179	637	135
565	158	77	294	77	136	0
566	746	83	945	114	199	31
567	74	546	119	573	45	27
568	148	15	214	59	67	44
569	375	173	488	224	113	51
570	450	232	528	280	78	48

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571	938	170	1078	179	140	9
572	699	236	892	374	193	138
573	989	244	1343	560	353	316
574	586	285	690	391	104	106
575	297	109	335	151	37	42
576	861	231	1101	318	240	87
577	250	78	264	91	13	13
578	69	146	82	168	13	22
579	209	246	339	380	130	134
580	44	3	621	99	577	96
581	348	68	899	213	550	145
582	59	25	1523	347	1464	322
583	851	62	1074	128	223	66
584	1195	203	1481	278	285	75
585	1349	158	1508	487	159	329
586	729	455	820	579	91	124
587	240	68	262	99	23	31
588	229	64	302	103	73	39
589	501	1380	517	1399	16	19
590	428	247	509	384	80	137
591	189	4	193	5	4	1
592	206	56	222	61	15	5
593	364	138	425	260	61	122
594	391	363	427	488	37	125
595	93	15	115	70	22	55
596	437	461	550	855	113	394
597	355	494	391	572	36	78
598	213	19	229	25	17	6
599	406	10	413	12	7	2
600	608	136	676	353	69	217
601	8	547	66	771	58	224
602	400	499	500	628	100	129
603	188	799	392	1265	204	466
604	154	8	196	78	42	70
605	117	71	335	276	218	205
606	602	648	688	664	86	16
607	696	600	1059	805	363	205
608	306	77	389	126	83	49
609	560	104	570	106	10	2
610	638	999	693	1063	55	64
611	851	1959	964	2104	113	145
612	274	319	331	395	57	76
613	283	125	321	132	38	7
614	393	85	406	87	13	2
615	320	285	323	286	3	1
616	583	59	602	63	19	4
617	615	235	680	260	65	25
618	518	28	1050	140	532	112
619	698	62	923	107	225	45
620	1196	131	1323	163	127	32
621	1299	231	1491	377	192	146
622	461	115	774	415	313	300
623	1	572	2	1013	1	441
624	4	46	318	1312	314	1266
625	28	2516	391	3773	362	1257
626	54	574	152	888	98	314
627	322	1418	399	1490	77	72

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628	490	760	558	844	68	84
629	288	287	338	401	50	114
630	38	1047	40	1113	2	66
631	541	523	888	1104	348	581
632	80	32	343	1163	262	1131
633	146	129	930	1176	784	1047
634	215	1003	822	1922	606	919
635	341	1484	494	1705	152	221
636	127	22	389	397	262	375
637	847	483	1136	1104	289	621
638	219	16	253	52	34	36
639	599	835	772	1060	173	225
640	522	310	646	491	124	181
641	217	52	234	68	16	16
642	382	62	825	1672	443	1610
643	102	1209	469	2593	367	1384
644	427	27	439	31	12	4
645	368	670	492	756	124	86
646	44	0	264	558	220	558
647	8	0	562	2287	554	2287
648	18	709	23	730	6	21
649	7	114	44	187	37	73
650	14	29	209	517	196	488
651	751	519	1092	1223	341	704
652	618	975	774	1464	156	489
653	10	41	50	196	40	155
654	118	439	143	537	25	98
655	27	333	104	632	77	299
656	369	738	472	1130	103	392
657	143	1178	243	1566	100	388
658	83	344	125	508	42	164
659	47	421	89	580	41	159
660	282	518	352	756	70	238
661	365	41	425	57	60	16
662	545	161	1782	512	1237	351
663	388	101	1046	639	658	538
664	391	505	461	569	70	64
665	233	18	318	65	85	47
666	452	632	570	956	118	324
667	171	239	283	676	113	437
668	87	233	197	659	110	426
669	157	1237	322	1842	165	605
670	297	93	309	124	12	31
671	275	73	290	97	15	24
672	160	105	184	131	24	26
673	163	70	384	614	221	544
674	5	0	220	545	215	545
675	846	242	993	420	147	178
676	40	104	86	216	46	112
677	0	18	68	768	68	750
678	1	218	91	1214	91	996
679	7	499	23	1336	15	837
680	0	0	0	0	0	0
681	88	332	550	1143	462	811
682	277	38	643	655	366	617
683	188	51	355	265	167	214
684	406	1018	539	1063	133	45

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685	441	285	481	365	41	80
686	71	166	167	429	96	263
687	108	920	162	1042	54	122
688	52	3	78	17	26	14
689	550	89	780	205	230	116
690	194	57	1081	304	888	247
691	361	79	830	227	470	148
692	97	194	326	268	229	74
693	174	35	286	65	113	30
694	2182	462	2492	622	310	160
695	331	131	375	186	43	55
696	47	1435	52	1436	5	1
697	221	77	309	177	88	100
698	187	15	413	75	225	60
699	370	223	374	224	4	1
700	191	213	384	370	192	157
701	377	12	539	128	161	116
702	52	508	302	979	251	471
703	138	232	198	395	60	163
704	967	237	1248	397	281	160
705	144	135	367	193	223	58
706	111	64	363	153	252	89
707	487	606	487	606	0	0
708	123	43	123	43	0	0
709	699	591	801	646	101	55
710	309	72	671	157	362	85
711	341	221	616	347	275	126
712	229	58	623	118	394	60
713	110	7	143	89	32	82
714	1680	1678	2137	2991	457	1313
715	2032	2767	2230	3039	198	272
716	741	192	744	192	3	0
717	324	1405	631	1577	307	172
718	1608	2146	1743	2351	135	205
719	364	1986	388	2005	24	19
720	1841	784	1900	845	59	61
721	439	267	531	351	92	84
722	704	388	880	637	176	249
723	733	366	753	374	20	8
724	877	170	904	175	27	5
725	320	2284	443	2582	123	298
726	492	712	721	1312	229	600
727	323	1657	731	2308	408	651
728	186	2968	1310	4784	1124	1816
729	249	4831	277	4876	28	45
730	403	693	558	899	155	206
731	241	336	375	422	134	86
732	739	164	775	167	36	3
733	568	118	577	118	9	0
734	465	260	532	329	67	69
735	506	204	593	232	87	28
736	808	203	988	319	180	116
737	857	419	1004	484	147	65
738	582	199	712	315	130	116
739	924	847	1151	1101	227	254
740	652	770	803	919	151	149
741	533	1145	562	1178	29	33

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742	259	535	440	774	181	239
743	577	571	687	666	110	95
744	246	257	416	449	170	192
745	543	387	642	496	99	109
746	296	528	388	700	92	172
747	749	780	766	804	17	24
748	196	205	208	207	12	2
749	500	36	571	61	71	25
750	447	431	630	571	183	140
751	145	97	149	98	4	1
752	212	13	215	14	3	1
753	224	183	238	185	14	2
754	202	19	202	19	-0	0
755	487	68	669	185	182	117
756	594	172	719	291	125	119
757	260	2	264	3	4	1
758	236	4	297	14	61	10
759	481	364	553	460	72	96
760	309	115	560	340	251	225
761	319	44	361	51	42	7
762	707	271	752	292	45	21
763	268	4809	425	5489	157	680
764	311	2538	341	3684	30	1146
765	1358	4624	1499	6171	141	1547
766	2259	2601	2470	2905	211	304
767	919	555	954	582	35	27
768	704	332	735	337	31	5
769	1070	5191	1102	5203	32	12
770	1510	1331	1641	1426	131	95
771	835	991	930	1068	95	77
772	1467	1280	1635	1419	168	139
773	1249	981	1466	1261	217	280
774	2814	1301	2938	1332	124	31
775	912	618	1231	950	319	332
776	1620	706	1762	754	142	48
777	651	640	715	691	64	51
778	868	360	932	445	64	85
779	1114	647	1250	789	136	142
780	1206	1573	1329	1727	123	154
781	305	2978	351	3888	46	910
782	0	1710	0	2031	0	321
783	1132	2806	1120	3624	-12	818
784	789	1093	842	1170	53	77
785	1133	736	1181	804	48	68
786	1216	961	1280	1047	64	86
787	1043	1062	1130	1190	87	128
788	0	610	0	936	0	326
789	168	2097	567	2544	399	447
790	406	1843	446	2330	40	487
791	1006	451	1056	514	50	63
792	236	4479	336	4620	100	141
793	372	1329	409	1592	37	263
794	678	907	790	1108	112	201
795	325	3540	635	4403	310	863
796	925	1573	1025	1696	100	123
797	720	660	782	728	62	68
798	1129	595	1219	705	90	110

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799	1426	758	1555	912	129	154
800	1134	281	1251	436	117	155
801	752	990	846	1087	94	97
802	1398	1304	1581	1439	183	135
803	1660	197	1793	247	133	50
804	895	146	963	164	68	18
805	770	700	847	748	77	48
806	744	208	787	226	43	18
807	553	36	575	43	22	7
808	707	315	736	324	29	9
809	794	626	858	637	64	11
810	650	115	661	124	11	9
811	595	381	716	547	121	166
812	382	944	553	1168	171	224
813	398	625	755	1107	357	482
814	513	715	647	825	134	110
815	302	956	419	1073	117	117
816	97	40	166	69	69	29
817	157	559	310	656	153	97
818	236	40	240	40	4	0
819	617	275	728	439	111	164
820	701	146	864	271	163	125
821	1334	96	1416	178	82	82
822	562	254	598	294	36	40
823	578	57	587	58	9	1
824	859	37	943	89	84	52
825	945	575	1084	699	139	124
826	462	145	483	147	21	2
827	624	180	676	187	52	7
828	812	728	915	825	103	97
829	445	614	447	614	2	0
830	632	1262	702	1353	70	91
831	637	328	787	451	150	123
832	1219	550	1309	642	90	92
833	550	477	643	533	93	56
834	500	604	596	733	96	129
835	1240	1062	1360	1167	120	105
836	901	390	998	597	97	207
837	47	391	81	417	34	26
838	635	116	650	118	15	2
839	767	111	779	111	12	0
840	61	79	71	79	10	0
841	716	2573	903	2614	187	41
842	852	103	917	111	65	8
843	870	113	993	140	123	27
844	713	367	1063	611	350	244
845	694	181	726	198	32	17
846	0	687	0	2045	0	1358
847	205	10106	845	17053	640	6947
848	326	1504	557	3003	231	1499
849	13	6349	237	9032	224	2683
850	506	906	784	1134	278	228
851	234	1546	357	1868	123	322
852	40	9821	40	11014	-0	1193
853	623	204	772	302	149	98
854	575	142	577	142	2	0
855	721	204	725	205	4	1

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856	780	522	831	598	50	76
857	1451	614	1512	664	61	50
858	653	70	682	75	29	5
859	744	414	760	419	16	5
860	650	139	666	142	16	3
861	472	189	606	300	134	111
862	357	290	372	294	15	4
863	188	102	235	143	47	41
864	225	2848	242	2021	17	-827
865	241	219	316	299	75	80
866	281	32	305	37	24	5
867	521	288	597	319	76	31
868	487	498	596	604	109	106
869	769	176	817	230	48	54
870	1643	155	1699	229	56	74
871	1095	375	1218	443	123	68
872	990	461	1167	492	177	31
873	1455	238	1593	381	138	143
874	847	130	969	266	122	136
875	459	706	582	837	123	131
876	657	265	703	313	46	48
877	290	816	295	821	5	5
878	260	49	298	90	38	41
879	679	211	690	215	11	4
880	914	113	930	118	16	5
881	198	86	288	173	90	87
882	154	125	157	125	3	0
883	569	73	576	74	7	1
884	530	309	649	496	119	187
885	1025	137	1092	146	67	9
886	1116	297	1136	299	20	2
887	464	11	507	21	43	10
888	660	317	1119	718	459	401
889	1397	688	1697	845	300	157
890	1165	382	1231	440	66	58
891	1692	580	1773	686	81	106
892	2434	2737	2955	3238	521	501
893	331	753	572	1144	241	391
894	79	1165	95	1647	16	482
895	6	2323	75	2445	69	122
896	8	1321	8	1499	0	178
897	1	264	1	449	0	185
898	11	452	11	681	0	229
899	9	679	9	891	0	212
900	5	1884	5	2055	-0	171
901	7	703	48	1222	41	519
902	2	3182	0	7996	-2	4814
903	0	587	30	824	30	237
904	16	4213	-0	6000	-16	1787
905	13	3390	13	3694	0	304
906	968	1510	1153	1854	185	344
907	18	927	128	1243	110	316
908	340	3316	823	4706	483	1390
909	574	956	841	1295	267	339
910	261	1911	309	3448	48	1537
911	362	443	756	943	394	500
912	1	820	1	877	0	57

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913	514	238	669	363	155	125
914	200	593	458	856	258	263
915	317	1132	638	1494	321	362
916	1190	433	1304	560	114	127
917	724	576	775	663	51	87
918	780	378	795	490	15	112
919	879	92	945	121	66	29
920	2054	1898	2522	2298	468	400
921	1526	397	1644	444	118	47
922	2154	3244	2550	3668	396	424
923	1758	344	1964	544	206	200
924	1142	913	1351	1513	209	600
925	11	4569	0	9596	-11	5027
926	26	1904	25	4449	-1	2545
927	9	0	0	800	-9	800
928	124	1747	124	2703	-0	956
929	349	5504	891	5861	542	357
930	1108	595	2283	567	1176	-28
931	204	65	452	65	248	0
932	22	1863	98	2130	76	267
933	30	627	51	939	21	312
934	56	222	77	332	21	110
935	207	513	227	598	20	85
936	3	167	27	326	24	159
937	8	41	78	512	70	471
938	457	658	531	805	74	147
939	174	171	194	247	20	76
940	54	613	95	1066	41	453
941	428	245	460	273	32	28
942	91	1850	136	2057	45	207
943	667	161	756	208	89	47
944	237	589	256	619	19	30
945	2280	955	2585	1441	305	486
946	362	1603	409	1717	47	114
947	256	2019	340	2293	84	274
948	51	1156	174	2535	123	1379
949	21	2967	55	3569	34	602
950	0	219	0	263	0	44
951	118	193	283	342	165	149
952	164	207	318	298	154	91
953	368	383	380	388	12	5
954	306	285	610	493	304	208
955	424	133	436	150	12	17
956	275	11	284	20	9	9
957	472	155	514	171	42	16
958	351	533	379	553	28	20
959	1	120	1	186	0	66
960	4	57	4	61	0	4
961	193	1819	245	1885	52	66
962	3012	5144	3697	6144	685	1000
963	26	503	-0	6135	-26	5632
964	70	1763	147	2010	77	247
965	3	2626	3	2862	0	236
966	168	191	175	214	7	23
967	483	91	557	112	74	21
968	58	1264	58	1504	0	240
969	20	1380	20	1510	0	130

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970	99	1373	129	2041	29	668
971	9	2055	9	2372	-0	317
972	319	5271	308	5067	-11	-204
973	36	1479	35	1413	-1	-66
974	103	1940	100	1840	-4	-100
975	181	3844	175	3647	-6	-197
976	81	6322	78	5998	-3	-324
977	255	175	250	246	-5	71
978	421	313	407	297	-14	-16
979	412	310	398	294	-14	-16
980	231	2853	223	2707	-8	-146
981	354	507	348	548	-7	41
982	762	3000	904	3985	142	985
983	237	1171	285	1221	48	50
984	251	175	243	166	-9	-9
985	308	14	298	13	-10	-1
986	239	437	231	415	-8	-22
987	204	469	197	445	-7	-24
988	342	512	398	509	56	-3
989	267	6995	338	6674	72	-321
990	200	34	222	42	22	8
991	412	25	510	188	98	163
992	504	193	628	245	124	52
993	127	59	202	163	76	104
994	274	59	343	108	69	49
995	158	29	206	61	48	32
996	339	213	523	261	183	48
997	292	8	386	48	94	40
998	108	0	129	10	21	10
999	27	572	62	4543	35	3971
1000	3	769	101	2114	98	1345
1001	107	32	163	51	57	19
1002	372	180	649	283	277	103
1003	173	2549	172	3201	-1	652
1004	261	256	493	297	232	41
1005	62	2013	60	2051	-2	38
1006	635	967	871	1030	236	63
1007	283	303	350	331	67	28
1008	517	101	724	175	206	74
1009	384	27	522	86	138	59
1010	283	29	381	68	97	39
1011	448	61	940	188	492	127
1012	341	272	458	336	117	64
1013	150	994	240	1112	90	118
1014	803	589	985	647	182	58
1015	693	208	806	277	113	69
1016	678	175	902	410	224	235
1017	1	592	9	740	8	148
1018	6	3373	16	3377	9	4
1019	379	223	592	279	214	56
1020	264	251	365	266	101	15
1021	677	37	839	73	162	36
1022	709	560	860	625	150	65
1023	252	888	349	986	97	98
1024	833	527	1122	647	289	120
1025	577	475	768	599	191	124
1026	809	260	1213	567	404	307

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1027	394	56	594	107	201	51
1028	550	644	670	691	120	47
1029	741	405	865	479	124	74
1030	27	1703	33	1959	6	256
1031	25	2779	63	3069	37	290
1032	357	29	531	80	175	51
1033	259	14	313	46	53	32
1034	465	200	579	289	114	89
1035	572	498	763	594	191	96
1036	186	180	365	411	179	231
1037	696	81	843	137	147	56
1038	273	427	314	425	42	-2
1039	467	303	537	323	70	20
1040	695	1334	853	1341	158	7
1041	477	451	543	461	66	10
1042	458	52	653	125	195	73
1043	474	1020	778	1203	304	183
1044	633	128	909	254	276	126
1045	185	398	338	505	153	107
1046	206	653	211	899	6	246
1047	237	175	314	234	77	59
1048	355	669	739	1002	385	333
1049	262	578	446	1027	184	449
1050	276	70	309	83	33	13
1051	306	61	352	80	47	19
1052	224	114	292	137	67	23
1053	104	0	156	21	51	21
1054	390	436	529	529	138	93
1055	225	174	456	233	231	59
1056	179	8	405	58	226	50
1057	449	73	664	243	215	170
1058	47	130	107	696	60	566
1059	548	284	692	422	144	138
1060	543	312	739	374	197	62
1061	562	124	786	220	224	96
1062	342	120	894	276	552	156
1063	568	1836	1150	1905	582	69
1064	266	27	406	73	140	46
1065	219	145	354	237	135	92
1066	307	1515	423	2117	117	602
1067	354	82	486	157	132	75
1068	523	358	731	501	208	143
1069	405	429	643	643	239	214
1070	81	645	182	1425	101	780
1071	361	1077	529	1270	168	193
1072	225	558	378	697	153	139
1073	555	1455	797	1790	242	335
1074	132	191	305	442	172	251
1075	144	1143	153	1434	9	291
1076	265	1510	580	1636	315	126
1077	369	706	662	915	293	209
1078	671	166	1010	289	339	123
1079	369	76	720	239	350	163
1080	43	166	142	227	99	61
1081	517	298	714	433	197	135
1082	879	125	1282	345	403	220
1083	166	175	282	284	115	109

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1084	171	185	333	537	162	352
1085	395	5	525	64	130	59
1086	314	3	388	36	73	33
1087	371	284	509	368	137	84
1088	129	880	229	953	100	73
1089	325	143	429	201	104	58
1090	469	82	548	114	78	32
1091	11	758	11	832	0	74
1092	366	87	521	159	155	72
1093	562	135	662	174	100	39
1094	375	143	508	201	133	58
1095	386	214	682	376	296	162
1096	913	165	1402	364	488	199
1097	666	83	924	243	258	160
1098	556	26	709	91	153	65
1099	275	317	356	366	81	49
1100	679	69	834	113	154	44
1101	126	6	191	54	64	48
1102	416	135	926	373	510	238
1103	421	56	743	227	323	171
1104	172	57	279	98	107	41
1105	691	329	1084	520	392	191
1106	845	349	1098	582	253	233
1107	466	500	852	1379	386	879
1108	316	99	584	165	269	66
1109	113	128	164	812	51	684
1110	136	22	170	22	35	-0
1111	120	20	158	19	38	-1
1112	136	25	168	227	32	202
1113	98	67	147	64	49	-3
1114	75	3	112	28	37	25
1115	109	244	226	281	117	37
1116	139	94	3417	5808	3277	5714
1117	436	149	949	682	514	533
1118	121	8	2822	2022	2701	2014
1119	240	68	371	246	131	178
1120	325	160	631	275	306	115
1121	708	174	935	270	226	96
1122	998	161	1187	212	189	51
1123	636	56	762	110	126	54
1124	1147	242	1412	480	265	238
1125	275	1487	365	1658	90	171
1126	678	296	960	544	282	248
1127	961	160	1402	375	441	215
1128	948	143	1125	394	177	251
1129	455	2821	710	2935	255	114
1130	469	1052	889	1406	421	354
1131	468	101	663	273	195	172
1132	947	162	1111	273	163	111
1133	283	274	448	353	165	79
1134	147	3	271	178	125	175
1135	687	40	868	191	181	151
1136	199	112	711	241	512	129
1137	515	95	866	177	351	82
1138	564	386	749	624	186	238
1139	509	608	735	989	226	381
1140	278	396	399	600	122	204

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1141	589	88	710	142	120	54
1142	1008	247	1245	357	237	110
1143	607	216	712	459	105	243
1144	625	152	853	246	228	94
1145	1174	258	1463	606	288	348
1146	82	1099	176	1240	94	141
1147	139	929	303	1301	163	372
1148	213	62	292	964	79	902
1149	189	1709	254	2033	66	324
1150	36	808	35	1044	-1	236
1151	173	97	235	176	62	79
1152	476	106	639	236	163	130
1153	314	19	457	86	143	67
1154	317	266	424	549	107	283
1155	273	632	357	817	84	185
1156	451	186	698	297	247	111
1157	452	323	767	519	314	196
1158	163	200	320	468	157	268
1159	916	326	1289	1045	373	719
1160	652	1032	777	1683	124	651
1161	1571	238	2409	702	837	464
1162	467	761	731	3165	263	2404
1163	513	1817	1520	2447	1007	630
1164	244	571	1041	1037	797	466
1165	109	0	396	108	287	108
1166	497	70	788	257	291	187
1167	432	86	802	326	369	240
1168	277	145	343	138	66	-7
1169	228	17	263	26	35	9
1170	206	0	217	1	11	1
1171	122	194	176	242	54	48
1172	211	238	327	515	116	277
1173	318	67	438	387	120	320
1174	246	118	838	325	592	207
1175	463	208	625	199	162	-9
1176	412	202	603	323	192	121
1177	795	227	1095	229	301	2
1178	292	168	687	583	395	415
1179	61	5	530	188	470	183
1180	299	29	384	29	85	0
1181	495	47	742	54	247	7
1182	356	26	646	29	290	3
1183	234	111	1904	967	1671	856
1184	456	420	824	1899	368	1479
1185	157	3	553	319	396	316
1186	59	123	206	1142	147	1019
1187	116	0	717	1298	601	1298
1188	107	10	277	79	170	69
1189	351	283	484	288	133	5
1190	187	65	425	220	238	155
1191	437	28	595	38	158	10
1192	720	116	2032	574	1312	458
1193	415	17	1571	535	1156	518
1194	288	79	803	387	515	308
1195	583	89	664	211	81	122
1196	367	23	1063	351	696	328
1197	40	23	349	307	309	284

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1198	32	471	173	1662	142	1191
1199	623	16	1258	847	634	831
1200	297	56	792	459	495	403
1201	130	0	313	433	183	433
1202	70	23	189	163	120	140
1203	166	0	503	133	337	133
1204	121	33	182	2187	60	2154
1205	420	116	657	677	237	561
1206	333	3638	470	3828	137	190
1207	432	386	623	1040	191	654
1208	885	72	1049	275	164	203
1209	559	723	765	1403	206	680
1210	346	61	511	118	164	57
1211	454	15	531	743	77	728
1212	812	342	1586	899	774	557
1213	107	46	446	241	339	195
1214	110	7	353	92	243	85
1215	421	54	775	753	354	699
1216	50	35	148	485	98	450
1217	163	105	516	876	353	771
1218	111	43	144	41	33	-2
1219	221	163	279	178	59	15
1220	120	14	537	156	418	142
1221	142	34	1229	2707	1087	2673
1222	160	90	192	198	32	108
1223	94	44	135	158	41	114
1224	315	306	429	451	113	145
1225	274	116	2123	2022	1849	1906
1226	727	264	2306	1616	1580	1352
1227	94	27	167	3111	72	3084
1228	190	87	305	215	115	128
1229	225	130	354	170	130	40
1230	371	175	661	542	290	367
1231	145	22	1686	1094	1541	1072
1232	625	69	1451	718	826	649
1233	151	12	969	344	818	332
1234	152	34	731	237	579	203
1235	372	235	530	231	158	-4
1236	406	24	562	46	156	22
1237	393	33	600	33	207	-0
1238	465	78	636	87	172	9
1239	138	121	145	130	7	9
1240	281	156	569	2226	287	2070
1241	1171	111	1788	218	618	107
1242	601	86	758	135	157	49
1243	1097	296	1407	2500	310	2204
1244	1911	55	3927	1300	2017	1245
1290	1724	1821	1745	2111	21	290
1291	1668	694	1919	1152	251	458
1292	1268	904	2253	795	985	-109
	604360.6	951061	914288	1482878	309927.4	531816.59

STAFF REPORT

CONSIDERATION OF RESOLUTION NO. 95-2243 FOR THE PURPOSE OF STUDYING THE SOUTH/NORTH DOWNTOWN PORTLAND ALIGNMENT OPTIONS AND AN AMENDED NORTH TERMINUS OPTION IN THE DEIS, CONCURRING WITH THE SOUTH/NORTH STEERING GROUP'S SELECTION OF DESIGN OPTIONS, AND ADOPTING THE MAJOR INVESTMENT STUDY FINAL REPORT

Date: November 30, 1995 Presented by: Richard Brandman

PROPOSED ACTION

Adoption of this resolution would:

1. Determine the alignment alternative and design options within downtown Portland that will be studied further within the Draft Environmental Impact Statement (DEIS);

2. State Metro Council's concurrence with the design options selected by the South/North Steering Group for further study within the DEIS;

3. Determine, consistent with an action previously taken by the C-TRAN Board of Directors, that the Phase One terminus for study within the DEIS will be in the vicinity of the Veterans Administration Hospital and Clark College until the Clark County Transportation Futures process concludes; and

4. Adopt the *Major Investment Study Final Report* documenting the South/North Tier I process, reports and conclusions, which included the locally preferred design concept and scope for the South/North Corridor.

5. Direct staff to prepare travel demand forecasts for the South/North DEIS that use as a basis the 2015 household and employment forecast completed in December 1995 which assumes a 4,000-5,000-acre Urban Growth Boundary (UGB) expansion.

TPAC has reviewed the proposed South/North LRT options and accompanying reports and recommends approval of Resolution No. 95-2243.

The South/North Steering Group unanimously recommends approval of Resolution No. 95-2243.

BACKGROUND

Resolution No. 95-2243 would address four issues related to the South/North Transit Corridor Project: 1) Downtown Portland alignments; 2) Design option narrowing; 3) The northern Phase One

terminus for study in the DEIS; and 4) The *Major Investment Study Final Report*. Following is a discussion of each of those issues as they relate to the proposed resolution.

Downtown Portland Alignments

During the South/North Preliminary Alternatives Analysis, the Scoping Process and Tier I, a wide range of alternatives within downtown Portland was evaluated and screened from further study. That screening process reached a major milestone in December 1994, when the Metro Council and the C-TRAN Board of Directors adopted Resolution No. 94-1989 and Resolution No. BR-94-011, respectively, and the *Tier I Final Report*. Within the *Final Report*, the Metro Council and the C-TRAN Board selected a surface light rail alignment on 5th and 6th Avenues (the Transit Mall) as the alternative alignment within downtown Portland to advance into the DEIS for further study. The Tier I narrowing process also concluded that a subway alternative should be removed from further consideration.

In selecting the surface light rail alignment on 5th and 6th Avenues, Metro Council identified a list of conditions placed upon its action. In summary, it was determined that prior to initiating work on the DEIS, a six-month detailed study of the 5th/6th surface alternative be conducted to ensure that the selected alternative could adequately address various principles, most importantly, that light rail, buses, pedestrians and automobiles could be accommodated on the Transit Mall and that the economic vitality of downtown Portland would be preserved and enhanced. To ensure that a broad base of interests would be addressed in the study, the principles also stated that the downtown alignment study would be performed in close coordination with the downtown Portland community.

In January 1995, the South/North Steering Group initiated the Downtown Portland Alignment Study by appointing the Downtown Portland Oversight Committee. The Oversight Committee was made up of downtown property and business owners and downtown residents. A full listing of the committees' memberships can be found in Exhibit B.

Through the six-month study, the Downtown Oversight Committee adopted criteria and measures, identified design options, developed and evaluated a wide range of technical information on those options, participated in a field trip on the Mall during the peak evening rush hour and conducted a variety of public involvement activities. Details of the study process and results can be found in Exhibit B.

On June 29, 1995, following this extensive and detailed analysis, the Downtown Portland Oversight Committee unanimously adopted its recommendation that the surface light rail alternative on 5th and 6th Avenues be studied within the DEIS and that no other surface street or subway alternatives be studied further. The Committee

also recommended specific design options for each segment of downtown Portland that should be studied in greater detail within the DEIS. A detailed description of those recommended options can be found in Exhibit B.

The Committee based its recommendation on the recognition that the Downtown Portland Plan has been implemented through over 20 years of public and private investments in downtown Portland. Those investments have created a high density spine of development along 5th and 6th Avenues that is designed to be served by the Transit Mall. The Committee also noted strong concern about potential construction impacts. The Committee proposed a wide range of construction management and mitigation techniques that should be considered for inclusion within the South/North construction plan for downtown Portland.

Following the Oversight Committee, the South/North Project Management Group, the Citizens Advisory Committee and the Steering Group unanimously endorsed the Oversight Committee's recommendations. Recommendations from the Tri-Met Board of Directors and the City of Portland are scheduled to be adopted prior to consideration of this resolution by Metro Council.

Design Option Narrowing

The purpose of the design option narrowing process is to define in a higher level of detail the alignment options to be studied further within the DEIS. The corridor has been divided into eleven segments, with two to nine alignment design options in each segment. Data on the design options has been developed that addresses the various criteria and measures for design option narrowing, adopted by the South/North Steering Group in the *Tier I Evaluation Methodology Report* (Metro: December 1993). The methods and data are documented in the *Design Option Narrowing Technical Summary Report* and the *Design Option Narrowing Briefing Document*. The draft *Technical Summary Report* was reviewed by the Expert Review Panel in June 1995. The Panel found that the methods and data are appropriate and adequate for making the narrowing choices within this phase of the project. A listing of the design options considered and a summary of the data on each of the options is included within Exhibit A.

A 45-day public comment period was offered between June 1 and July 15, 1995, which included meetings conducted by the South/North Steering Group to receive public comment. In addition, public comments were received over the Metro Hotline, through the mail, at each of the CAC meetings and through a variety of community meetings held throughout the Corridor. Documentation of comments received concerning design option narrowing can be found in the *Design Option Narrowing Public Comment Report* (Metro: October 1995).

In September 1995, following review of the technical information and public comment, the PMG adopted the *Design Option Narrowing*

Final Recommendation Report which identified the design options within each segment proposed by the PMG to be studied further within the DEIS. The CAC considered the PMG recommendations and adopted its own independent recommendations in October 1995. The Steering Group considered both recommendations, public comment and the technical data and adopted the *Design Option Narrowing Final Report* which identifies the design options to advance into the DEIS for further study.

As indicated in the *Evaluation Methodology Report*, the Steering Group has the responsibility to determine which design options are to advance into the DEIS for further study. However, participating jurisdictions were afforded the opportunity to review and comment on those design options. Metro is one of several participating jurisdictions given the opportunity to review and comment on the *Design Option Narrowing Final Report* (Exhibit A). Approval of Resolution No. 95-2243 would voice Metro Council's concurrence with the set of design options selected by the Steering Group.

A detailed description of the options, the rationale for their selection and a listing of issues associated with the options are included within Exhibit A.

Northern Phase One Terminus

The *Tier I Final Report* identified the terminus options selected by Metro Council and the C-TRAN Board of Directors to be studied within the DEIS. It also noted that the South/North Corridor would be developed in two distinct phases. The Clackamas Town Center Area and the vicinity of 99th Avenue in Hazel Dell were selected as the southern and the northern termini for Phase One. The Phase Two termini were identified as Oregon City in the south and 134th Avenue in the north.

Subsequently, in August 1995, following an extensive public effort to initiate the Clark County Transportation Futures Process, the C-TRAN Board of Directors amended the Phase One terminus for study within the DEIS to be in the vicinity of the Veterans Administration Hospital and Clark College near I-5 just north of downtown Vancouver until the Transportation Futures Process concludes in 1996. The southern termini and the Phase Two northern terminus were unchanged.

MIS Final Report

The South/North Transit Corridor Study was initiated in April 1993 with the selection of the priority corridors by the Metro Council and the C-TRAN Board of Directors. In October 1993, the Federal Transit Administration (FTA) approved Metro's request to advance the Corridor into Alternatives Analysis and issued notification in the *Federal Register* of its intent to publish a South/North DEIS. Subsequently, in November 1993, FTA and FHWA issued the Metropolitan Planning Rule which established

guidelines for the Major Investment Study (MIS) process which replaced the Alternatives Analysis process previously used for light rail planning purposes.

The new guidelines also provided for consultations between local and federal governments to determine how studies initiated under the Alternatives Analysis guidelines (*transitional projects*) should be modified to comply with the MIS requirements. A consultation for the South/North study was held in December 1994, where it was determined that the South/North Study would conclude by addressing the MIS requirements, documented within an *MIS Final Report*. The report would document alternatives previously studied within the Corridor and the locally preferred design concept and scope selected by the study to be included within the Regional Transportation Plan.

The locally preferred design concept and scope was adopted through the Tier I process of Scoping and narrowing of alignment and terminus alternatives. The federally mandated financially constrained Regional Transportation Plan, which includes the locally preferred design concept and scope for the South/North Corridor, was adopted by Metro Council in May 1995.

Resolution No 95-2243 would adopt the *MIS Final Report* (Exhibit C) which documents the Tier I process leading to the selection of the locally preferred design concept and scope for the South/North Corridor, and subsequently included in the Regional Transportation Plan.

2015 Household and Employment Forecast for South/North DEIS

The Metro Growth Management staff have recently completed a month's long process in conjunction with the region's jurisdictions and government agencies to prepare a 2015 household and employment forecast that is consistent with the adopted 2040 Concept Plan. As an initial step, this process identified the overall regional level of household and employment growth and reached a regional consensus on the allocation of this growth to 20 districts throughout the region including Clark County, Washington.

Metro staff then worked closely with jurisdiction staff to further refine the growth allocation from the 20-district level to the 1260 transportation analysis zones (TAZ's) used for the travel demand modeling. This TAZ allocation process was completed in early December 1995 with the assumption of a 4,000-5,000-acre expansion of the UGB. Metro staff will continue to work with jurisdiction staff to develop a second round of TAZ growth allocations that are based on an assumption of no expansion of the UGB.

Metro staff have coordinated the development of a 2015 Clark County growth allocation with staff from the Southwest Washington Regional Transportation Council (RTC). RTC has worked with the

jurisdictions in Clark County to prepare a TAZ allocation that is consistent with the allocation prepared for the Oregon portion of the region.

The South/North DEIS work needs to proceed as quickly as possible in order to meet key federal funding deadlines. A critical early task in the preparation of the DEIS is the production of travel demand forecasts. These forecasts are used in a wide range of analyses including traffic impacts, transit impacts, transit ridership, noise and vibration impacts, energy impacts and air quality impacts. For federal purposes, these forecasts could be considered conservative in that a smaller UGB expansion would slightly increase South/North Corridor transit ridership.

Resolution No. 95-2243 would direct staff to use the December 1995 TAZ allocation as the basis for travel demand forecasting for the South/North DEIS. This direction would apply to all of the evaluation measures in the South/North DEIS but would not apply to any other studies at this time. Use of this forecast for the South/North LRT DEIS would not preclude adoption by Metro Council of a forecast that assumes a smaller expansion of the UGB at a later date. The South/North Project Management Group, which consists of all the participating jurisdictions in the project, unanimously recommends this approach.

South North
Transit Corridor Study

DRAFT

Downtown Portland Tier I Final Report

South/North Steering Group

December 1, 1995

METRO

Downtown Portland
Tier I Final Report

DRAFT

South/North Corridor Transit Study

December 1, 1995

Metro Council

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

Resolution of Findings and Conclusions Concerning the South/North Light Rail Alignment in Downtown Portland

Introduction

In December 1994, the Metro Council and C-TRAN Board of Directors adopted the *South/North Tier I Final Report.* That report identified a surface alternative on the transit mall as the preferred Downtown Portland Light Rail Alignment that should be developed for further study in the Draft Environmental Impact Statement (DEIS). The report further determined that, prior to initiating work on the DEIS, the design of the 5th/6th Avenue alignment should be developed in detail to determine whether that alignment adequately addresses various principles also outlined in the report.

The Downtown Portland Oversight Committee was formed in response to those principles to ensure Downtown Portland community involvement in developing the surface light rail Transit Mall alignment options for further study and in selecting the locally preferred alternative. In particular, the charge of the oversight committee was to:

- Identify the most promising surface light rail transit (LRT) designs for a surface alignment through Downtown Portland within the 5th/6th Avenue Transit Mall between Union Station in the north and I-405 in the south.

- Accomplish this task in accordance with the principles established in the *South/North Tier I Final Report*, including the need to accommodate bus, light rail, auto and pedestrian travel on the Transit Mall.

- Determine whether those most promising alternatives adequately address the established criteria. If the criteria are adequately addressed, then only the surface LRT alternative for Downtown Portland will advance into the Tier II Draft Environmental Impact Statement (DEIS) for further study.

If the criteria are not adequately addressed, then one or more other alternatives within Downtown Portland will be developed along with the surface alternative for further study within the Tier II DEIS.

The findings and recommendations of the Oversight Committee were unanimously adopted on June 29, 1995 and are documented in: 1) *Resolution of Findings and Recommendations Concerning the South/North Light Rail Alignment in Downtown Portland: Downtown Portland Oversight Committee*; and 2) *Central Business District, Portland, Oregon, South/North Light Rail Alignment Recommendations Report.* Recommendations for the Downtown Portland Alignment were also adopted by the South/North Project Management Group (PMG) on October 19, 1995 and by the South/North Citizens Advisory Committee (CAC) on November 9, 1995.

Those findings and recommendations form the basis of the Metro Council's findings and conclusions for Downtown Portland.

In summary, the Metro Council finds that the following combination of alternatives meets the principles established by the Metro Council and the C-TRAN Board and that more detailed study of other tunnel and surface street alignments is not warranted. In addition, the Metro Council makes the following findings and conclusions. These findings and conclusions are documented in greater detail in the following chapters of this *Downtown Portland Tier I Final Report.*

Findings

The Metro Council has found that the surface LRT Transit Mall alternative and design options identified below for further study within the DEIS:

1) Reinforce the goals and objectives of the Central City Plan by supporting existing and future public and private development and investment in a manner that is consistent with commitments dating back to the Downtown Plan which was adopted over 20 years ago;

2) Maintain existing traffic and access patterns on 5th and 6th Avenues and within the Central Business District (CBD) which supports existing and future businesses and retailing and adds to the activity and quality of the streets;

3) Provide fast and convenient transit service to existing and future downtown office and commercial uses, delivering the most people to where they want to go, maximizing the potential for increased transit ridership to and from the Central City;

4) Maintain the current pedestrian character of the Transit Mall by retaining the sidewalk widths, pedestrian amenities and trees currently in place on the Central and North Mall;

5) Improve the role of the Portland Transit Mall as the central pedestrian boulevard and transit spine in the Downtown and CBD by extending it southward and changing its emphasis to light rail;

6) Ensure the least construction impacts and cost by placing light rail in a location where sidewalk reconstruction, street grade changes, utility relocations and other reconstruction work can be minimized and the benefits of past investments in the North and Central Transit Mall utility relocation, strain pole foundations, sidewalk improvements and surface grade adjustments can be utilized;

7) Offer the opportunity to reconfigure the Central City transit circulation plan, utilizing off-mall service (approximately 25-35 buses per hour by 2015) on other streets, most significantly 10th and 11th Avenues, where development can benefit from improved transit connections to the regional system, Central City Streetcar and intra-downtown circulation within Fareless Square;

8) Provide good light rail access to the River District, University District and River Place/South Waterfront area;

9) Reinforce the multi-modal transportation center concept by providing the best opportunity for a good connection at Union Station between light rail, Amtrak, inter- and intra-city buses and future high speed rail;

10) Provide the opportunity to maintain the function of the Portland Transit Mall while improving its aesthetic environment by minimizing the 'sheet metal' affect while simultaneously maximizing its functional passenger capacity;

11) Create the opportunity for coordination of construction and funding of improvements to the Central Mall and a funding source to insure that 5th and 6th Avenues can be enhanced to the original demanding Central Mall design standards; and,

12) Fulfill an objective of the Central Mall business community to enhance the pedestrian environment by reducing items on the street and increasing visibility of retailing along 5th and 6th Avenues by removing over half of the existing bus stops, shelters and related items.

Conclusions

Therefore, as a general approach for the continued study of Downtown Portland alignments within the South/North Transit Corridor, Metro Council concludes:

1) Consistent with the *Tier I Final Report* conclusions and the *Regional Transportation Plan* (Metro: May 1995), the preferred design concept and scope for the South/North Corridor is light rail extending through Downtown Portland south into Clackamas County and north into Clark County;

2) That the A-2 Central Mall, B-3 North Mall, C-1 South Mall, S-1 South Entry and N-1 and N-2 North Entry options (illustrated in Figure A) meet the principles established by the Metro Council and are selected for further study within the DEIS and that more detailed study of other tunnel and surface street alignments is not warranted;

3) That convenient, readily accessible service be provided to all Central City districts including Riverplace, South Auditorium, Portland State University, Central Business District, Old Town/Chinatown and Union Station. Station stops at these locations should be established even if central city travel time for the LRT is lengthened. (The number and location of stations will be determined following publication of the DEIS and prior to publication of the Final Environmental Impact Statement (FEIS.)

4) That Tri-Met, the City of Portland, Metro and the Downtown Portland business community work to develop a plan for the central city streetcar and a central city transit circulation and facility plan that would spread transit access throughout more of the

central city area based upon the results of the DEIS and completed in conjunction with the FEIS.

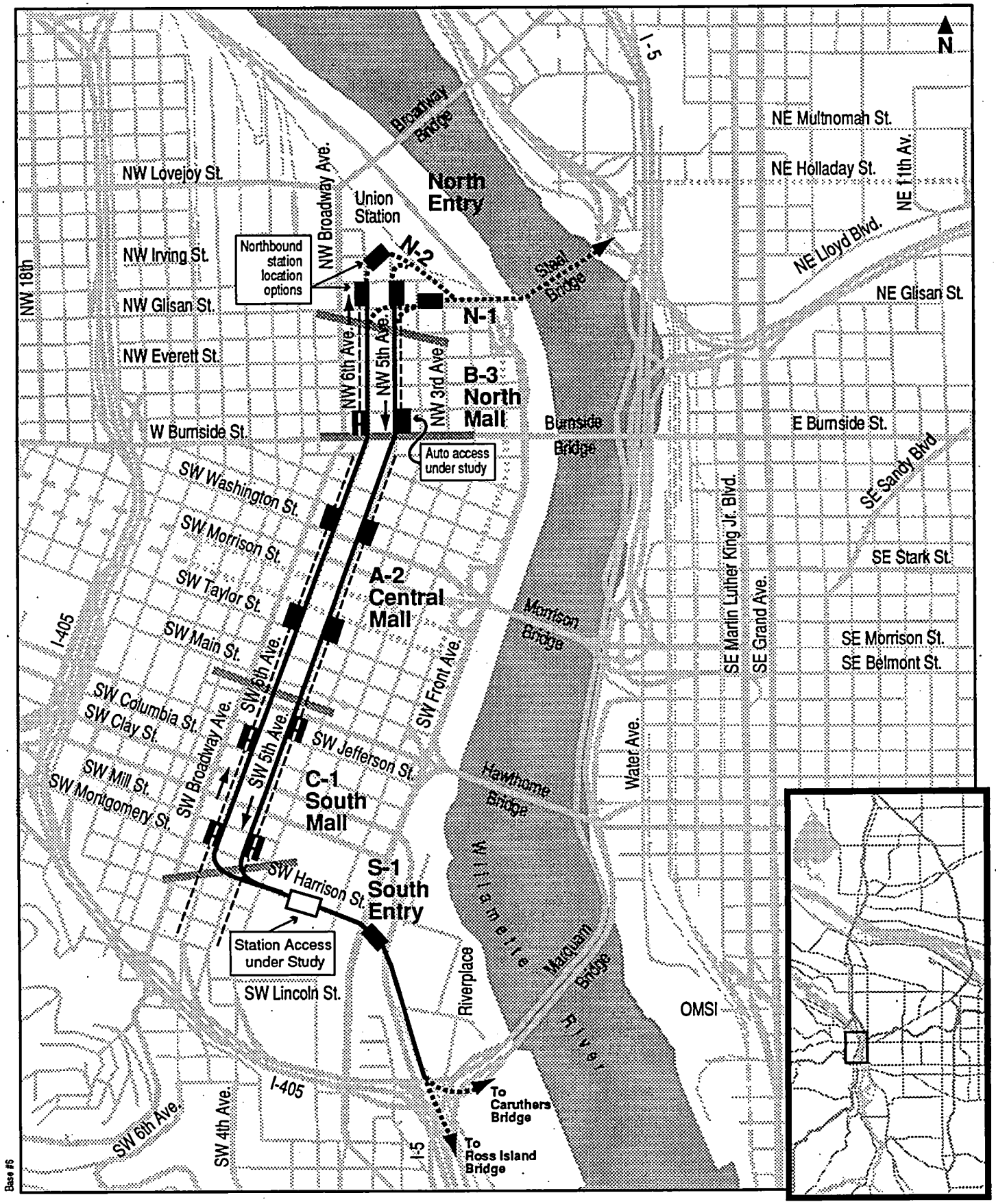
5) That a high-level, urban design standard be developed and implemented guiding the design and construction of the light rail alignment throughout the central city area;

6) During final design, a detailed construction management and mitigation plan should be developed for the central city area that would create a *Downtown Portland Construction District.* In addition, a Downtown Portland LRT Committee should be formed to oversee the design, development of contract documents and construction of all work within the Special Downtown Portland Construction District. Alternative contracting methods should be employed so that a contractor would be selected, based upon their experience and qualifications, to address the unique requirements of this project (including but not limited to the need to avoid disruption to adjacent businesses, to minimize the duration of construction and to avoid displacements); consequently, the low bidder may not be selected. Finally, the project should implement a temporary traffic management plan and a variety of special programs to mitigate the construction impacts on the central city.

   These methods should be based on criteria to be established by the Downtown Portland LRT Committee. Criteria to be considered include: a) negotiated rather than low-bid contracting; b) incentive and penalty clause; and, c) use of a single prime contractor for LRT and utility construction.

7) Construction time should be limited to three months per block in the North Mall, four months per block in the Central Mall, and six months per block in the South Mall and south portals. Major parallel sections of SW 5th and 6th Avenues in the Central Mall should not be under construction at the same time.

8) The entire central city construction plan, including major utility reconstruction, should be approved by Portland City Council, such action having been taken after a public hearing.



South North Transit Corridor Study

Light Rail Design Option:

Downtown Portland

5th/6th Avenue Surface Couplet

December 1995

Figure A

- Light Rail Transit (LRT) alignment
- LRT alignment options
- MAX
- Westside LRT
- Existing railroad
- Mall auto access
- Station with no auto access on mall
- Station with auto access on mall

Note: Alignment, station and park and ride locations are currently under study and may change.

0 1/8 1/4

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Resolution of Findings and Conclusions

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Appendix D: South/North Project Management Group Downtown Portland Recommendation

Appendix E: South/North Citizen Advisory Committee Downtown Portland Recommendation

Appendix F: South/North Steering Group *Resolution of Findings and Recommendations*

Appendix G: Participating Jurisdiction Recommendations

Appendix H: Metro Council Resolution No. 95-2243 and Staff Report

I. Background

This document sets forth the findings and conclusions of the Metro Council for the Downtown Portland alignment alternative and design options to be advanced into the Draft Environmental Impact Study (DEIS) for further study. It also contains a summary of information prepared by members of the Downtown Oversight Committee and the Downtown Technical Committee between January and June 1995. At the conclusion of the South/North Light Rail Project Tier I process in December 1994, consistent with the recommendation from the South/North Steering Group, the Portland City Council and Tri-Met, Metro Council adopted a policy that the South/North light rail alignment in Downtown Portland to be developed for further study in the DEIS should be on the Transit Mall, provided that light rail would enhance and maintain the character of the Mall. The agencies wanted to ensure that the introduction of light rail would result in a Mall that facilitates efficient bus and light rail operations, preserves auto access, maintains a pedestrian friendly environment and supports the economic vitality of the city. This policy and the commitment by the project to work closely with the Downtown Portland community led to the initiation of the Downtown Portland Alignment Study and to the formation of the Downtown Portland Oversight Committee.

Downtown Alignment Study

The primary objective of the South/North Light Rail Downtown Alignment Study was to identify the most promising surface light rail transit options for a surface alignment through Downtown Portland on 5th and 6th Avenues between Union Station in the north and Portland State University in the south and to determine whether these options adequately address the principles established by Metro Council in December 1994. The study also identified the most promising alignment alternatives on the north end from the Steel Bridge to 5th and 6th Avenues and on the south end connecting the downtown and Portland State University with RiverPlace.

Technical aspects of the study were conducted by the Downtown Technical Committee consisting of representatives of Metro, Tri-Met, the City of Portland Office of Transportation, Association for Portland Progress (APP) and the consulting firms of Shiels Obletz Johnsen, Zimmer Gunsul Frasca Partnership and Kittelson & Associates. Findings and conclusions of the Downtown Technical Committee were presented to the Downtown Oversight Committee, the S/N Project Management Group, the S/N Citizens Advisory Committee and the S/N Steering Group in order to assist them in developing recommendations and fulfilling their charge. Following is an outline of the Downtown Portland LRT study process illustrated in Figure 1.

Downtown Portland Oversight Committee

The Downtown Portland Oversight Committee was appointed by the South/North Steering Group to assess the feasibility of 5th and 6th Avenues as the alignment for light rail through the Portland Central Business District for the proposed South/North Light Rail Project. The Oversight Committee consists of representatives of public agencies, businesses and property owners.

Following is an excerpt from the Committee's charge that was distributed at the first meeting of the Committee in February 1995.

> The Oversight Committee's purpose was to:
>
> - Identify the most promising surface light rail transit (LRT) designs for a surface alignment through Downtown Portland within the 5th/6th Avenue Transit Mall between Union Station in the north and I-405 in the south.
>
> - Accomplish this task in accordance with the principles established in the *South/North Tier I Final Report*, including the need to accommodate bus, light rail, auto and pedestrian travel on the Transit Mall.
>
> - Determine whether those most promising alternatives adequately address the established criteria. If the criteria are adequately addressed, then only the surface LRT alternative for Downtown Portland will advance into the Tier II Draft Environmental Impact Statement (DEIS) for further study.
>
> - If the criteria are not adequately addressed, then one or more other alternatives within Downtown Portland will be developed along with the surface alternative for further study within the Tier II DEIS.

The Downtown Portland Oversight Committee was comprised of the following persons:

W. Charles Armstrong, Chairman, Chief Executive Officer, Bank of America, Chair
Mike Burton, Executive Officer, Metro
Earl Blumenauer, Commissioner, City of Portland
John R. Post, Deputy General Manager, Tri-Met
John Eskildsen, President, US Bank of Oregon
Greg Goodman, Vice President, City Center Parking
Jim Mark, Executive Vice President, Melvin Mark Properties
William S. Naito, Vice President, Norcrest China
Patrick Done, Manager, Pioneer Place
Tammy Hickel, General Manager, Nordstrom - Oregon Region
Lindsay Desrochers, Vice President, PSU Finance and Administration
Philip Kalberer, President, Kalberer Hotel Supply
Vern Rifer, Downtown Community Association
Jordan Schnitzer, Vice President, Harsch Investment
Susan Emmons, Executive Director, Northwest Pilot Projects
E. Kay Stepp, Portland Development Commission
Kerry Kincaid, Downtown Retail Council
Richard Michaelson, President, Planning Commission, City of Portland

The recommendations of the Downtown Portland Oversight Committee were adopted unanimously on June 29, 1995. They are described in the *Resolution of Findings and*

Recommendations Concerning the South/North Light Rail Alignment in Downtown Portland (Appendix C) and the *Portland, Oregon Central Business District South North Light Rail Alignment Recommendation Report.*

Public Comment

Several meetings were held within Downtown Portland in the spring of 1995 to present information on the Downtown Portland Alignment Study to interested residents and business owners. A meeting to receive Public Comment on the design options under consideration was held by the Downtown Oversight Committee on June 12, 1995. Documentation of the Public Comment received at that meeting and throughout the study process can be found in the *South/North Downtown Portland Segment Public Comments Report* (Metro: November 1995).

Project Management Group

The South/North Project Management Group (PMG) adopted its recommendations for Downtown Portland on October 19, 1995 and amended them slightly on November 16, 1995. Those recommendations are documented in a memorandum from the PMG to the Steering Group dated October 27, 1995. (This memorandum can be found in Appendix D.)

Citizens Advisory Committee

The South/North Citizens Advisory Committee (CAC) adopted its recommendations for Downtown Portland on November 10, 1995. Those recommendations are documented in a memorandum from the CAC to the Steering Group dated November 10, 1995. (This memorandum can be found in Appendix E.)

Steering Group

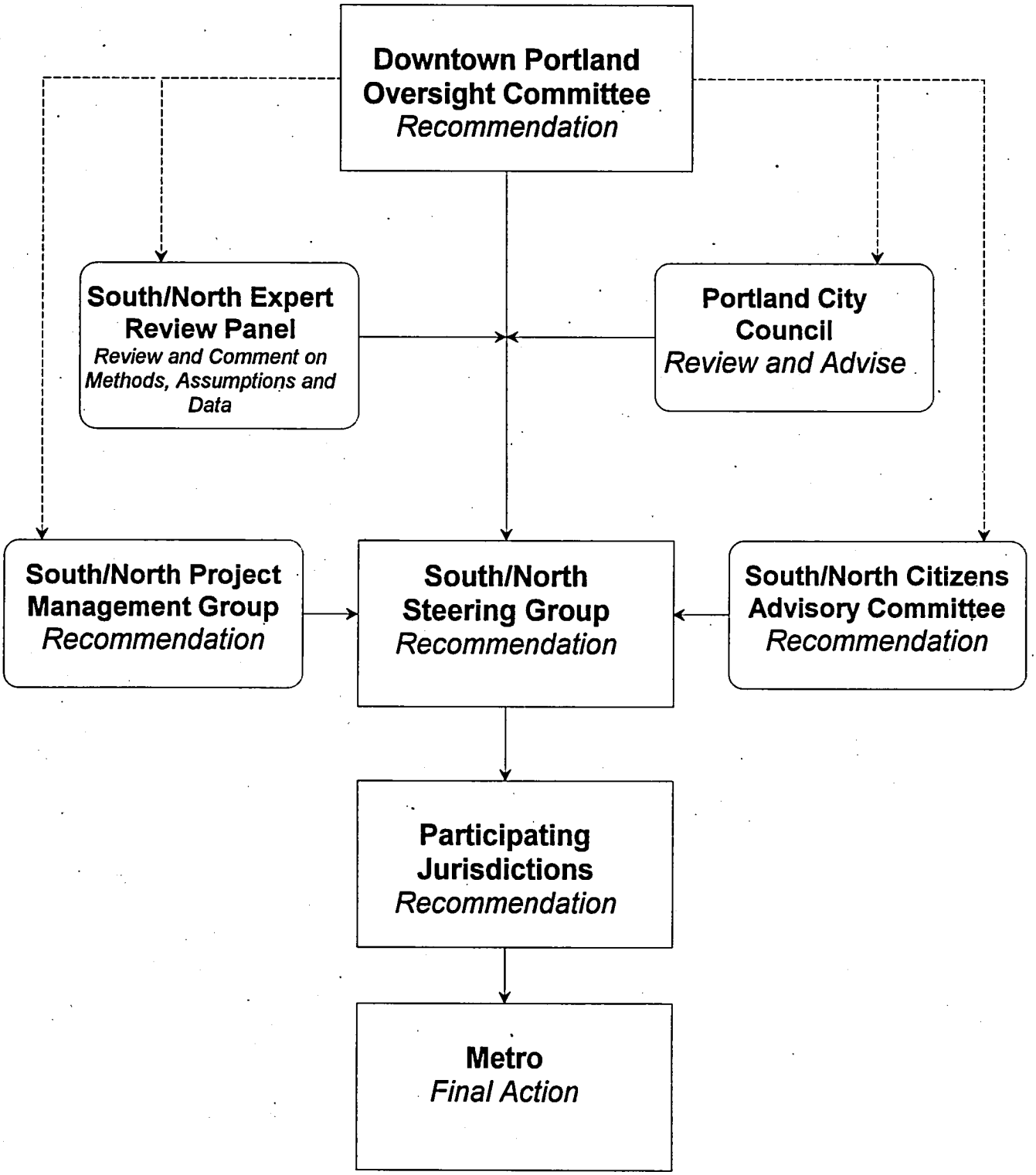
On November 20, 1995, the S/N Steering Group unanimously endorsed the recommendations of the Oversight Committee, the PMG and the CAC and adopted the *S/N Downtown Portland Tier I Findings and Recommendations* included in Appendix F. The Steering Group's recommendation was forwarded to participating jurisdictions and Metro Council for their consideration.

Participating Jurisdictions

Jurisdictions participating in the S/N Transit Corridor study were provided the opportunity to forward independent recommendations to the Metro Council and are included in Appendix G.

Figure 1

Downtown Portland Surface LRT Alignment Study Process



November 20, 1995
Downtown2prs

II. Policy Framework

Central City Plan

The future viability and livability of Downtown Portland depends on transit for improved access. The Central City Plan and Central City Transportation Management Plan (CCTMP) calls for high growth of housing and jobs in the Central City. Specific goals have been adopted by the City calling for the creation of an additional 15,000 housing units and 75,000 jobs in the Central City.

The projected growth in the Central City is to be achieved with little increase in freeway access and parking. Central City growth is to be supported by increased mass transit and by locating housing in the Central City near the jobs. This strategy depends not only on improved transit connections with the suburbs including principally four light rail lines supplemented by continued bus service, but also by improved transit accessibility within the Central City. Accordingly, it is appropriate that a bus service plan should be developed that provides improved service to areas of the Central City now not well served complementing Fareless Square and the planned Central City Streetcar. The adoption of the A-2 Central Mall alternative supports a revised downtown bus circulation plan that would be developed and implemented over the next two decades.

The Central City Plan was adopted by the Portland City Council in 1988 and establishes the overall framework for development. The zoning and comprehensive plan designations are shown in Figure 2 and the Floor Area Ratios in Figure 3. The Central City Plan incorporated the Downtown Plan, first adopted by the City Council in 1972.

The Transit Mall is centered in the highest density employment corridor established by the Downtown Plan, with Floor Area Ratios (FAR's) ranging from 15:1 to 12:1. The next highest densities with FAR's of 9:1 were established along the North Mall and the Hawthorne and Morrison Bridgeheads. A major goal of the Downtown Plan was to develop a downtown residential neighborhood and established the RX area (the downtown residential zone) west of the Park blocks. The City also has a "No Net Loss Housing Policy" where, if a change of the Comprehensive Plan from residential to nonresidential is approved, it will be necessary to show that the loss of housing potential can be replaced.

Figure 4 illustrates the year 2010 downtown population distribution and Figure 5 illustrates the 2010 employment distribution. Approximately one-third of the employment is situated between Fourth and Broadway, and 88 percent east of the Park Blocks.

Figure 2

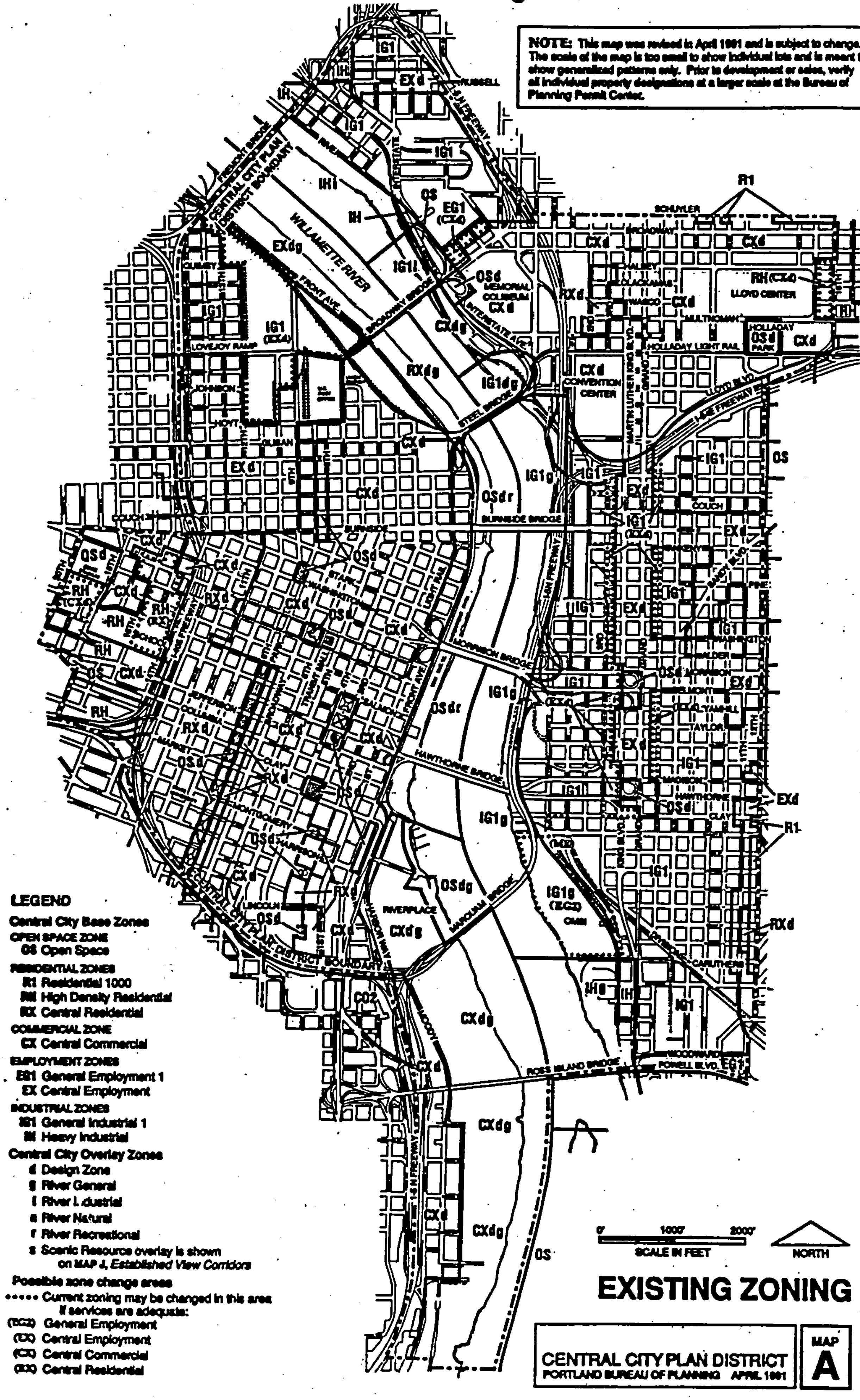
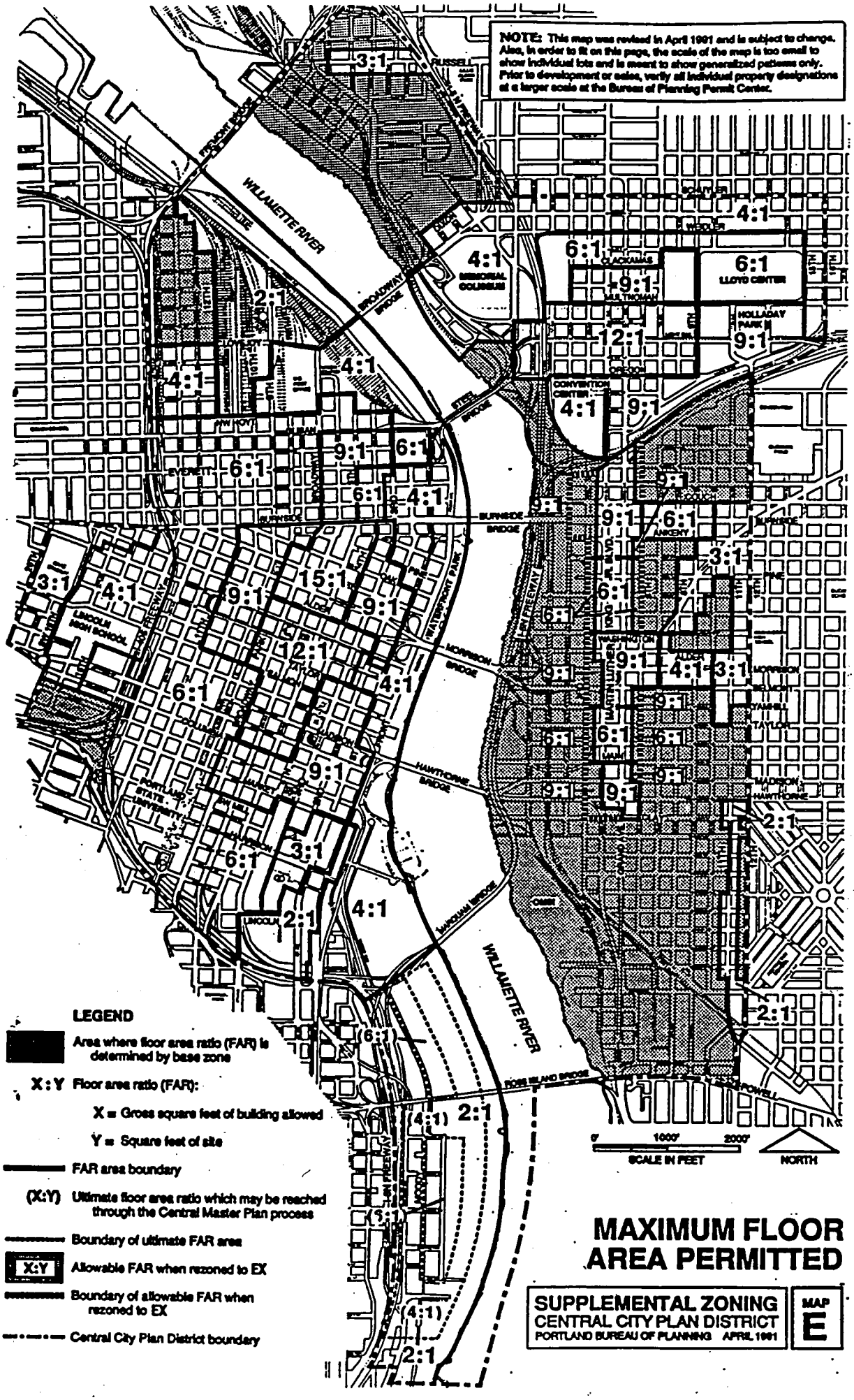

NOTE: This map was revised in April 1991 and is subject to change. The scale of the map is too small to show individual lots and is meant to show generalized patterns only. Prior to development or sales, verify all individual property designations at a larger scale at the Bureau of Planning Permit Center.
LEGEND
Central City Base Zones
OPEN SPACE ZONE
OS Open Space
RESIDENTIAL ZONES
R1 Residential 1000
RH High Density Residential
RX Central Residential
COMMERCIAL ZONE
CX Central Commercial
EMPLOYMENT ZONES
EG1 General Employment 1
EX Central Employment
INDUSTRIAL ZONES
IG1 General Industrial 1
IH Heavy Industrial
Central City Overlay Zones
d Design Zone
g River General
i River Industrial
n River Natural
r River Recreational
s Scenic Resource overlay is shown on MAP 4, Established View Corridors
Possible zone change areas
••••• Current zoning may be changed in this area if services are adequate:
(EG2) General Employment
(EX) Central Employment
(CX) Central Commercial
(RX) Central Residential
0' 1000' 2000'
SCALE IN FEET
NORTH
WILLAMETTE RIVER
LLOYD CENTER
CONVENTION CENTER
MEMORIAL COLISEUM
BURNSIDE BRIDGE
MORRISON BRIDGE
HAWTHORNE BRIDGE
MARQUAM BRIDGE
ROSS ISLAND BRIDGE
STEEL BRIDGE
BROADWAY BRIDGE
RIVERPLACE
CENTRAL CITY PLAN DISTRICT BOUNDARY
EXISTING ZONING
CENTRAL CITY PLAN DISTRICT
PORTLAND BUREAU OF PLANNING APRIL 1991
MAP A

Figure 3



MAXIMUM FLOOR AREA PERMITTED

SUPPLEMENTAL ZONING
CENTRAL CITY PLAN DISTRICT
PORTLAND BUREAU OF PLANNING APRIL 1991

MAP **E**

2010 DOWNTOWN POPULATION

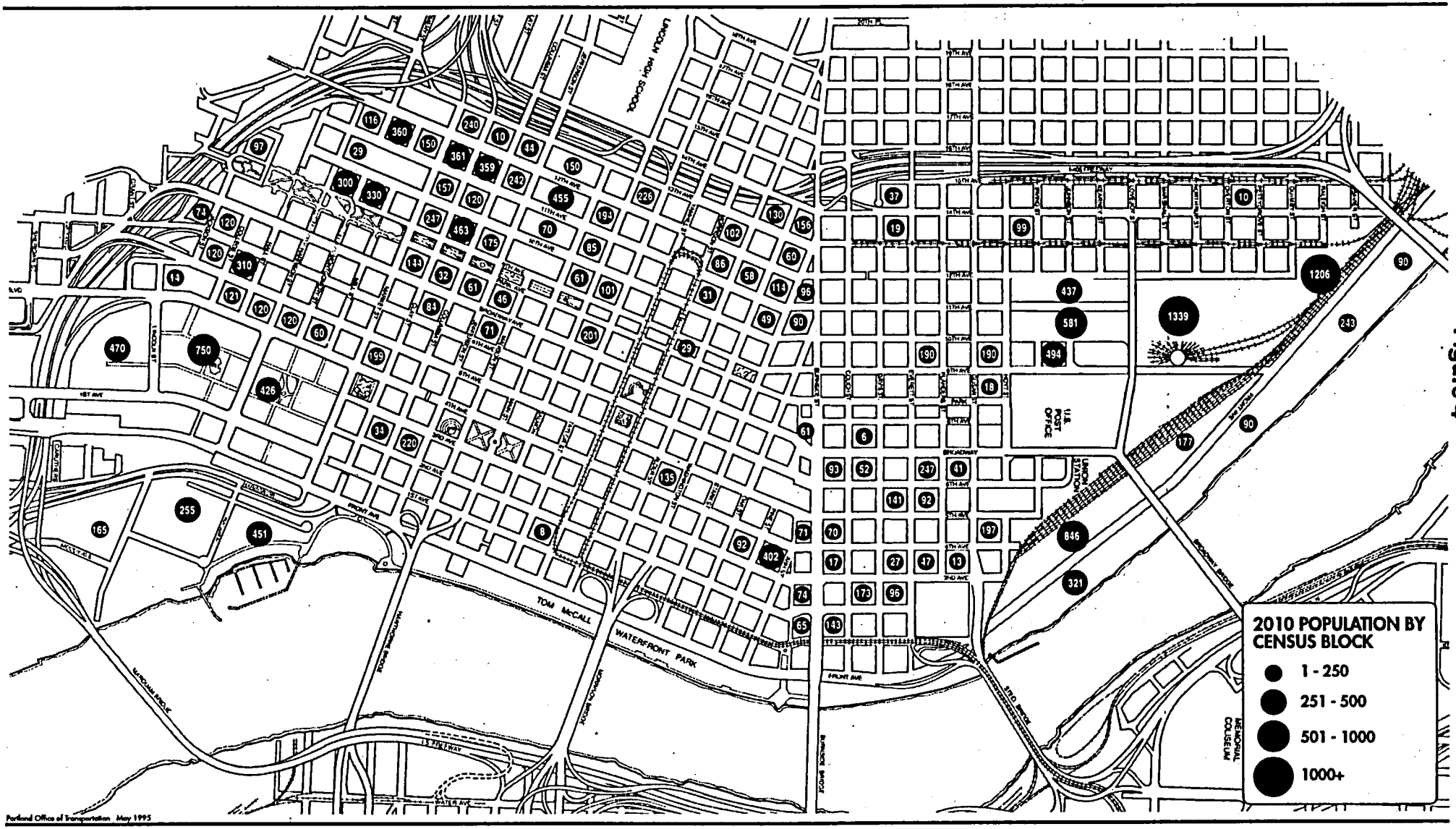


Figure 4

2010 DOWNTOWN EMPLOYMENT

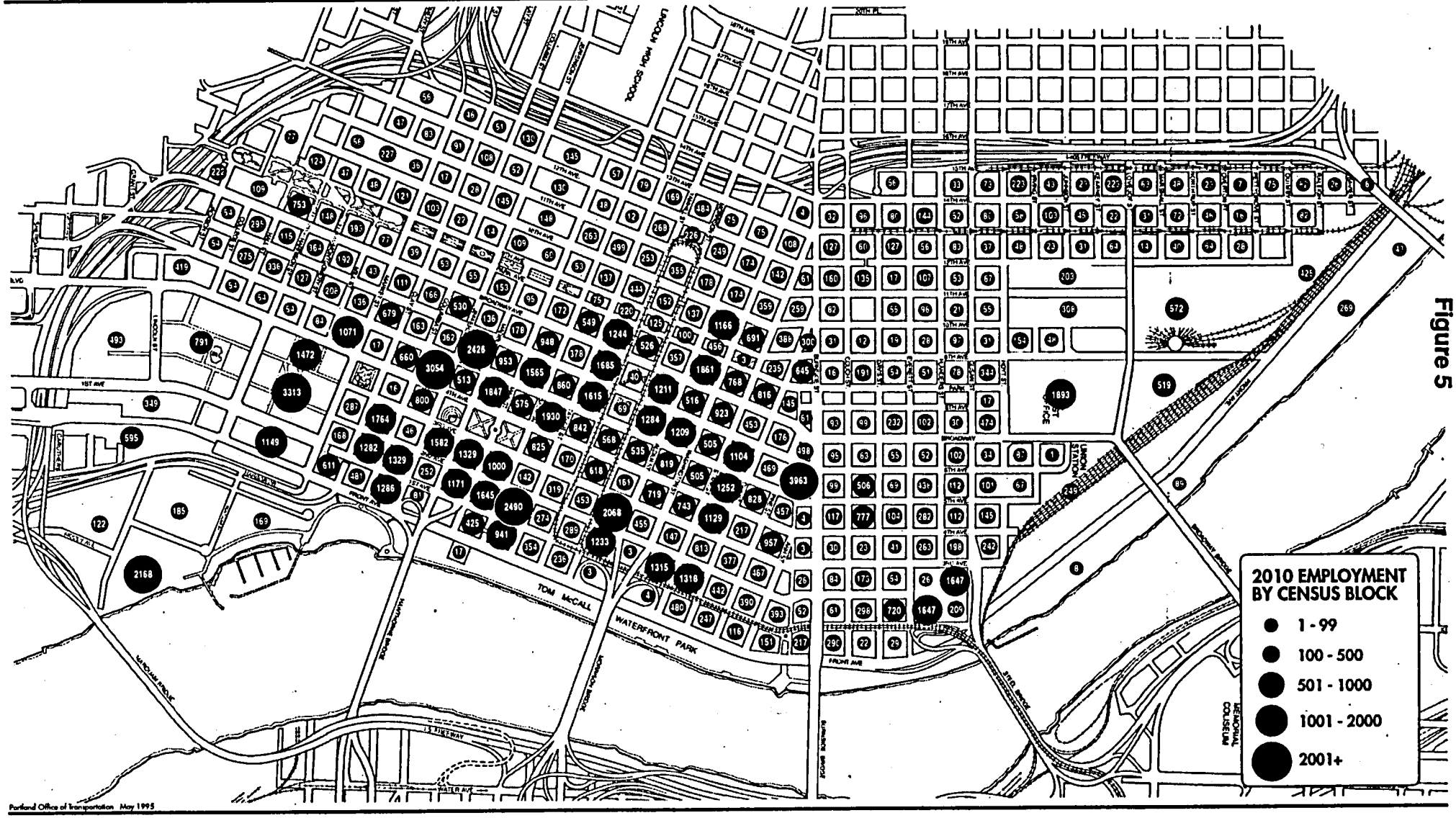


Figure 5

Based upon the Downtown Plan and the Central City Plan, the Portland City Council reinforced the importance of light rail on 5th and 6th Avenues Mall in three separate resolutions. In 1979 in conjunction with the Banfield Light Rail Project, the City Council supported the Morrison/Yamhill alignment with the condition that light rail will be on the Mall in the future. In 1983, the Westside DEIS and Locally Preferred Alternative, the City Council endorsed the concept of two downtown rail alignments for the Westside, the Morrison/Yamhill alignment and a Mall alignment. In 1989, Westside PE/DEIS supported the need for only the Morrison/Yamhill alignment for the Westside and deferred light rail on the Transit Mall to the next light rail corridor.

Central City Transportation Management Plan

The Portland City Planning Commission has recommended the Central City Transportation Management Plan (CCTMP) for City Council's approval. The CCTMP will serve as the transportation element to the Central City Plan, and will replace the Downtown Parking and Circulation Policy as the adopted City policy to meet federal air quality standards for carbon monoxide.

The CCTMP calls for the creation of an additional 15,000 housing units and 75,000 jobs in the Central City. To accommodate this growth and preserve livability, the plan includes a strategy for continued transit improvements and development of housing in the Central City so that people will have greater opportunity to live near their Central City jobs. The Transit modal split goal for 2010 is 60 percent for commuter trips, a 20 percent increase in market share in the next 15 years.

The CCTMP provides policy guidance for increasing the role of bus service to off-mall destinations for improving intra-Central City mobility. The CCTMP will establish street classification designations for the Central City. Potential transit designations are shown in Figure 6.

The Banfield/Cross-Mall Decision

In 1979, several options were considered for the Banfield Light Rail Project's downtown alignment. The options included the Transit Mall, 4th and Broadway and Yamhill/ Morrison (or the so-called Cross-Mall alignment). While the Transit Mall and 4th and Broadway alignments were considered to be more supportive of the Downtown Plan, downtown destinations and future expansions of light rail, the Cross-Mall alignment was selected. The Cross-Mall would avoid the impacts of reconstructing the newly completed Transit Mall, the traffic conflicts that light rail would create on 4th and Broadway and the need to revise the principal focus of the Transit Mall from bus transit, at that time still the principal mode for transit access in the downtown. In adopting the Cross-Mall alignment for the Banfield Light Rail, the Council stated its support for modifying the Transit Mall for light rail in the future when constructing a second regional light rail corridor.

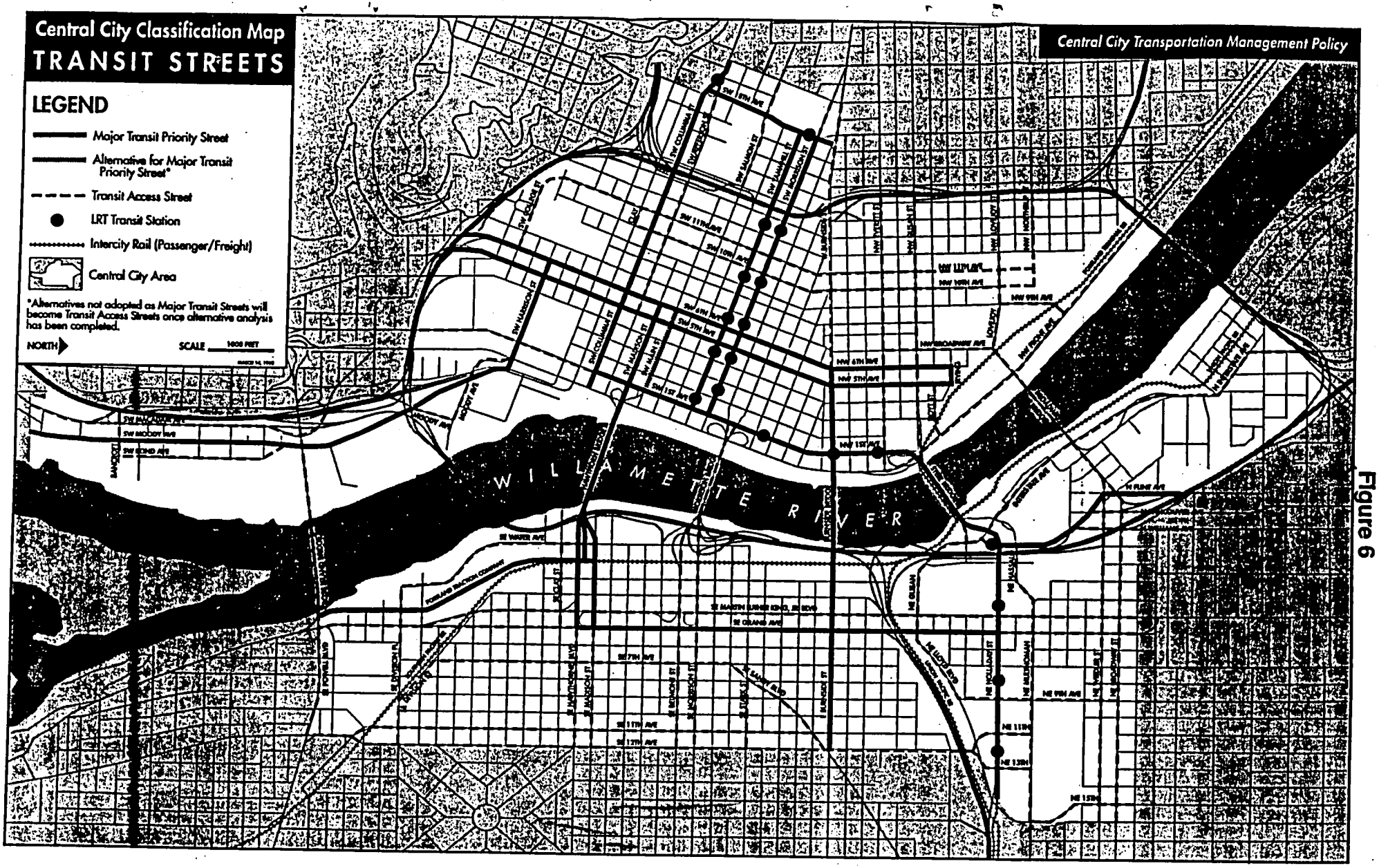

Central City Classification Map
TRANSIT STREETS
LEGEND
Major Transit Priority Street
Alternative for Major Transit Priority Street*
Transit Access Street
LRT Transit Station
Intercity Rail (Passenger/Freight)
Central City Area
*Alternatives not adopted as Major Transit Streets will become Transit Access Streets once alternative analysis has been completed.
NORTH
SCALE
WILLAMETTE RIVER

Figure 6

Westside Corridor

In 1983, after a re-evaluation of the 1979 Mall and Cross-Mall recommendations, the City Council adopted a resolution directing that the Westside Light Rail should operate through the downtown on an extension of the Yamhill and Morrison Cross-Mall alignment. This decision was based on the conclusion that the Cross-Mall has sufficient capacity to serve both the Westside and Banfield corridors and that the creation of a new downtown light rail corridor was not warranted until development of the South/North light rail corridor in the future. At that time, the City Council also directed that steps should be taken to evaluate a subway option as an alternative to a surface alignment in the north/south corridor.

Regional Transportation Plan

The Regional Transportation Plan adopted by Metro in 1992 and revised in May 1995 states: "Service for the Banfield LRT will be provided via the cross-mall alignment on Morrison and Yamhill streets. When the South/North project is constructed, or when capacity on the cross mall-alignment is exceeded, a mall alignment using 5th and 6th Avenues will be implemented. This north/south corridor would form the backbone of the downtown transit system, serving as the major mode of access to and through downtown. Alternative LRT alignments that connect to the 5th/6th Avenue alignment which provide service to the South Waterfront, RX Zone, Historic Districts and other downtown destinations are under consideration and shown in Figure 4.4 (see Figure 7). As the mall reaches its transit capacity, bus routes currently using the mall will be rerouted to other streets consistent with the Downtown Plan and the Downtown Parking Circulation Policy (such as 2nd and 3rd and 10th and 11th Avenues)."

North Transit Mall

Meanwhile, 5th and 6th Avenues between W. Burnside and N.W. Irving were reconstructed extending the existing transit mall improvements across Burnside to Union Station and a new Tri-Met bus layover facility at N.W. Irving. In September 1994, the reconstruction of 18 blocks in Old Town was completed. The $10 million North Transit Mall project was designed to accommodate light rail south of N.W. Glisan. Numerous public and private utilities were relocated from the area that would be beneath a future light rail track slab in the left lane. Foundations beneath the street lighting fixtures were designed to accommodate future combination street light and strain poles to support the overhead traction electrification system for future light rail. In addition, the streets were graded to minimize cross-slopes and to limit longitudinal grade changes to ensure that adjustments in street grades would not be needed for light rail in the future.

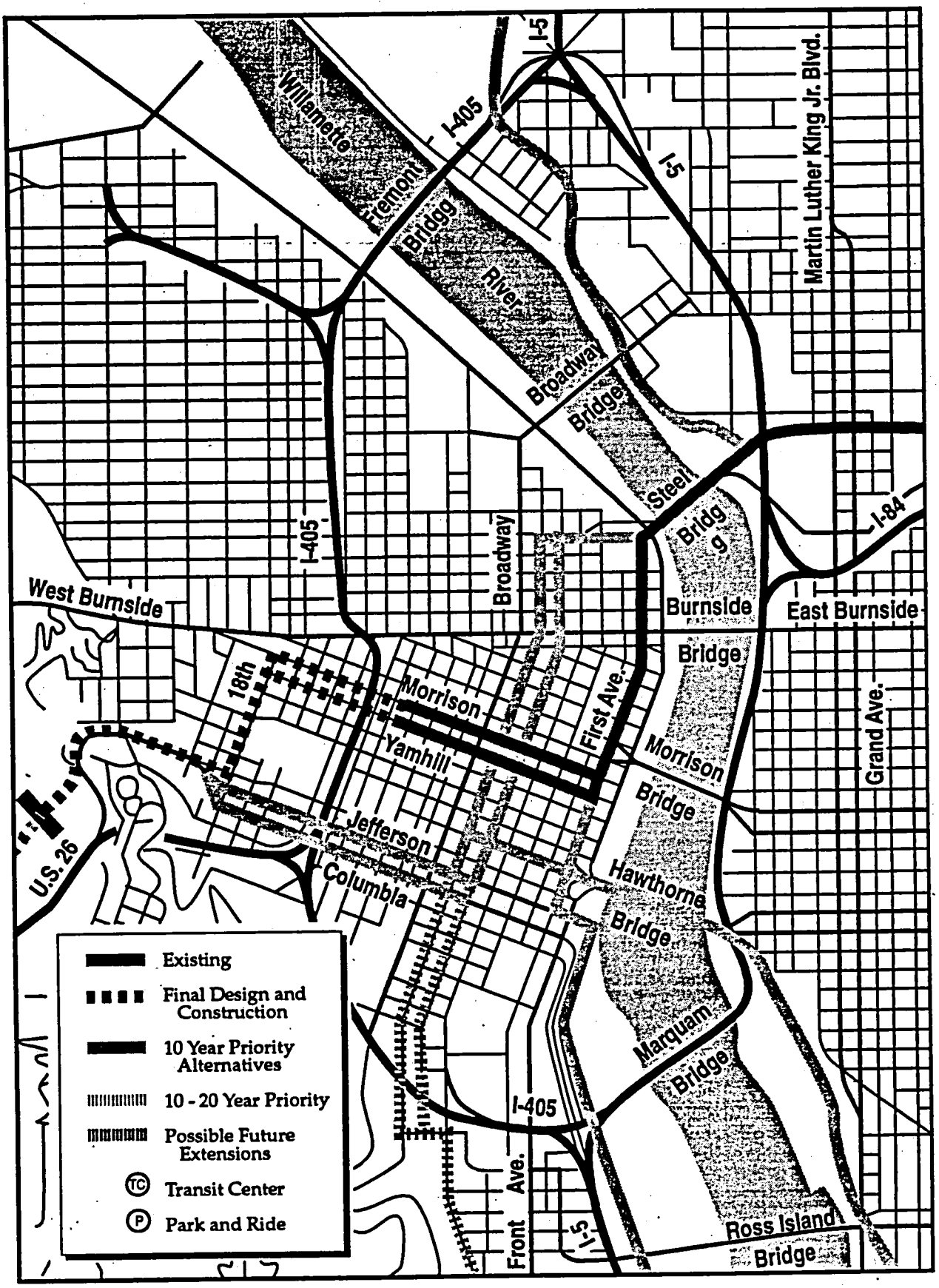


Figure 7 *Long-range LRT alignments in downtown Portland*

Downtown Rail Advisory Committee

The Downtown Rail Advisory Committee (DRAC), a committee chaired by Jordan Schnitzer, was appointed by the City of Portland in 1989 to advise the City of Portland on the Westside downtown alignment decision. In preparation for the South/North light rail planning process, the DRAC was re-convened twice to consider a South/North downtown alignment including both surface and subway options. During the first step of the South/North Light Rail planning in early 1993, an initial screening of all downtown north/south streets suggested that 5th and 6th Avenues should continue to be considered as the best surface alignment. Fourth, 5th, 6th and Broadway would be considered for a subway alignment. The screening criteria included constructability, operations, effectiveness of service and urban impacts.

In Spring 1994, travel forecasting and cost estimates were prepared for a 5th and 6th Avenues Transit Mall surface alignment and a generic tunnel under either 5th Avenue or Broadway. Principally, the results revealed that a tunnel would cost at least $275 million more than a surface alignment. The estimated cost for a surface alignment on 5th and 6th Avenues was estimated to cost between $288-309 million and a subway was estimated to cost $551-584 million. During the process, a tunnel alignment under 4th Avenue was proposed. While a number of technical difficulties were identified, a similar alignment was estimated to cost less, but still approximately $230 million more than the 5th and 6th Avenues surface alignment.

While there remained support for the tunnel and other surface alignments, the parties agreed that a six month study would be initiated to identify the best means of constructing light rail on the surface of 5th and 6th Avenue and that other alternatives would be advanced into the EIS process only if that alignment could not meet established criteria.

III. Criteria

The Downtown Light Rail Oversight Committee adopted the following criteria to be used in evaluating the various options for constructing light rail on 5th and 6th Avenues.

Central City Plan. Reinforce the goals and objectives of the Central City Plan. Consider:

- Existing development patterns
- Roles as office, retail, tourist and education center
- Consistency with designated street classification system
- Transit supportive development
- City housing agenda

Vehicular Access. Ensure adequate vehicular user access into and within downtown is maintained. Consider:

- Established auto circulation patterns on the Transit Mall
- Auto user access to the Transit Mall
- Traffic circulation patterns within Portland CBD, starting with existing patterns
- Service levels on downtown streets
- Service access to businesses on Transit Mall
- On-street and off-street parking

Light Rail Operations. Ensure that light rail facilities and operations are inviting, efficient and affordable. Consider:

- Access to light rail stations
- Light rail ridership
- Light rail travel times
- Capital and operating costs
- Light rail operations

- Future light rail capacity
- Reliability
- Connectivity/transfers
- Integration of light rail with bus and streetcar networks
- Safety

Bus Operations. Ensure that efficient bus operations and facilities are maintained in and through downtown. Consider:

- Access to bus stops
- Bus ridership
- Bus travel times
- Bus capital and operating costs
- Bus volumes, routing and operations
- Future bus capacity
- Connectivity/transfers
- Reliability
- Customer services
- Safety

Aesthetic Integrity. Ensure that the aesthetic integrity of the Transit Mall is maintained or improved. Consider:

- Quality of surfaces and furnishings
- Architectural continuity
- Visual clarity
- Space for amenities and services
- Trees

- Art
- Transit patron waiting space
- Capacity and patterns of pedestrian travel
- Odor, noise and sheet metal

Construction Impacts. Ensure that construction impacts are minimized. Consider:

- Duration of construction
- Quality of construction
- Management and mitigation of construction
- Geographic scope of construction
- Disruption of construction

IV. Alternatives

Consistent with its charge, the Downtown Oversight Committee developed and considered a series of options for constructing the South/North light rail on 5th and 6th Avenues. The options are listed in Table 1. It should be recognized that the descriptions of the alternatives and the drawings are based on a preliminary analysis and that actual dimensions, grades and treatment may vary during preliminary and final design of the project.

Central Mall. The Central Mall is defined as the portion of 5th and 6th Avenues between W. Burnside on the north and Madison Street on the south, the existing Portland Transit Mall. The 5th and 6th Avenue rights-of-way are 80 feet wide. The street area has two 12 foot wide continuous exclusive bus lanes with an intermittent 12 foot wide auto lane, generally three blocks in length. Existing sidewalks are typically 26 feet wide on the bus loading side and 18 feet on the opposite side. At four locations, every fourth block, a 30 foot wide sidewalk interrupts the 3 block long auto lane.

A-1 (4-Lane). The street area would be expanded to include two 12 foot wide exclusive bus lanes, a 12 foot wide exclusive lane for light rail and an intermittent 12 foot auto lane in three block segments as exists. Existing sidewalks on the bus loading right side of the street would be reduced to 17 feet. Sidewalks on the left side would be reduced to 15 feet and light rail station platforms would be located every fourth block on a 28 1/2 foot-wide sidewalk (narrowed from 30 feet) which would interrupt the 3-block long auto lane.

A-2 (2 and 3-Lane LRT/Bus Share). The street width would remain unchanged, but with one 12 foot wide exclusive bus lane, one 12 foot wide lane for LRT and an intermittent 12 foot wide auto lane as exists. Buses would be able to use the LRT lane to overtake other buses when light rail vehicles are not present. Existing sidewalk widths would remain unchanged except that the 30 foot wide sidewalk would be expanded to 31 1/2 feet to act as LRT stations on the left side of the street in the two-lane blocks.

A-3 (3-Lane LRT/Auto Share). The street area would include two 12 foot wide exclusive bus lanes as exists. Light rail would be located in the 12 foot wide auto lane on the left side of the street which would be shared by autos. Sidewalks would remain their current widths except at light rail platforms which would be located on every fourth block on 19 1/2 foot wide sidewalks (narrowed from 30 feet), interrupting the 3-block long auto lane.

A-4 (3-Lane Bus/Auto Share). The street and sidewalks would be as described for A-3 above. However, autos would share the two bus lanes rather than the light rail lane.

Table 1
Matrix of Downtown Transit Mall Configurations

1-Jul-95

Segment		Profile	Shared Modes	Between LRT Station* Roadway configuration	Between LRT Station* Sidewalk widths	At LRT Stations* Roadway configuration	At LRT Stations* Sidewalk widths
A) Central Mall *(Burnside to Madison)* *80' ROW*	1	Four Lane Profile	No Shared Lanes	48' curb to curb one lane auto one lane LRT two lane bus	17' and 15'	31.5' curb to curb one lane LRT two lane bus	28.5' and 17'
	2	Three Lane Profile	LRT/Bus Share	36' curb to curb one lane auto one lane LRT and some bus one lane bus	18' and 26'	22.5' curb to curb one lane LRT one lane bus	31.5' and 26'
	3		LRT/Auto Share	36' curb to curb one lane shared LRT/auto two lanes bus	18' and 26'	34.5' curb to curb one lane LRT two lanes bus	19.5' and 26'
	4		Bus/Auto Share	36' curb to curb one lane LRT one lane shared bus/auto one lane bus	18' and 26'	34.5' curb to curb one lane LRT one lane shared bus/auto one lane bus	19.5' and 26'
	5	Existing	no shared	36' or 24' two lane bus one lane auto	18' and 26' w/o auto 30' and 26'	NA	NA
B) North Mall *(North of Burnside)* *60' ROW*	1	Two lane Profile	No shared lanes	24' curb to curb one lane LRT one lane bus	16' and 20'	22.5' curb to curb one lane LRT one lane bus	17.5' and 20'
	2		LRT/Auto share	24' curb to curb one lane shared LRT/auto one lane bus	16' and 20'	22.5' curb to curb one lane LRT one lane bus	17.5' and 20'
	3		Bus/Auto share	24' curb to curb one lane LRT one lane share bus/auto	16' and 20'	22.5' curb to curb one lane LRT one lane bus/auto	17.5' and 20'
	4	Existing	Bus/Auto share	24' curb to curb one lane bus one lane shared bus/auto	16' and 20'	NA	NA
C) South Mall *(South of Madison)* *80' ROW*	1	Four lane Profile 6th Ave is shown. 5th Ave differs	Bus/Auto share	48'-44' curb to curb one lane LRT two lanes shared bus/auto 1 lane parking or 3rd auto/bus	5th Ave 16' and 20' 6th Ave 17' and 15'	46.5' curb to curb one lane LRT two lanes shared auto/bus 1 lane parking or 3rd auto/bus	19.5' and 14'
	2	Existing	Bus/Auto Share	50' curb to curb two lanes parking three lanes shared bus/auto	15' and 15'	NA	NA

**looking north*

1.5' extension of sidewalk is typical at stations

Table 1 continued

Matrix of Downtown South and North Entry Configurations

28-Jun-95

Segment	*Profile*	
S) South Entry	**1.** Harrison Street	Between First and Front Avenues, the 80 foot ROW would be expanded to include LRT and provide for traffic capacity. Between First and Fourth Avenues, the current 80 foot ROW would be maintained with sidewalks similar to existing, a narrow median, LRT adjacent to the median and single lane of traffic in each direction. Between Fourth and Fifth Avenues, the 60 foot ROW would be expanded north to accommodate both tracks and one lane of westbound or eastbound traffic.
	2 Lincoln Street	Currently, the 80 ROW on Lincoln Street includes two 12 foot sidewalks, two lanes of traffic in either direction and a median. LRT would be in the median either adjacent to a narrow median or in place of a median. One lane of traffic would provided in either direction along with standard sidewalks. LRT would be on the westside of 4th Ave. between Lincoln and Harrison.
	3 I-405	LRT would be on the north side of I-405 in a separate ROW until 4th Avenue. LRT would be on the westside of 4th Ave. between Lincoln and Harrison.
N) North Entry	**1** Glisan Street	Cross sections on Glisan would vary block by block. The current 60 foot ROW west of Fourth Avenue would be expanded between Fourth and Fifth Avenues to provide for LRT in both directions and two westbound traffic lanes. West of Fifth Avenue, the northbound track and two westbound traffic lanes would be provided.
	2 Irving/Union Station	Between the intersection of Third and Glisan and the intersection of Fifth and Irving, a new right of way would be created.

North Mall. The North Mall is defined as the portion of N.W. 5th and 6th Avenues between Glisan (or Irving, depending on the North Entry decision) and W. Burnside, the recently completed North Transit Mall extension. The street area currently has two 12 foot-wide lanes, the right lane for exclusive bus use and the left lane for mixed use by buses and autos. The sidewalk on the right bus loading side is 20 feet wide and the sidewalk on the opposite side is 16 feet wide. All of the alternatives would accommodate buses in the existing right lane and light rail in the existing left lane. A station would be located on the left side of 5th and 6th Avenues in the block between W. Burnside and N.W. Couch. The sidewalk in that block would be widened to 17 1/2 feet. The three alternatives that were considered represent variations in the auto use only.

B-1 (No autos). In this alternative, autos would not be permitted on segments of the North Mall with light rail.

B-2 (LRT/Auto Share). In this alternative, autos would continue to use the left lane, sharing the lane with light rail.

B-3 (Bus/Auto Share). In this alternative, autos would use only the right lane, sharing the lane with buses. Buses would be able to pass autos and buses by using the left light rail lane when light rail vehicles are not present.

South Mall. Only one option was considered for the segment south of the existing transit mall between S.W. Madison and S.W. Harrison.

C-1 (4-Lane). The 80 foot wide right-of-way of S.W. 5th and 6th Avenues between S.W. Madison and S.W. Harrison would be rebuilt with one light rail lane on the left side of the street, two 12 foot wide traffic lanes and an 8 foot wide parking lane on the right side of the street. An alternative configuration with three traffic lanes and no on-street parking could also be explored. Sidewalks would typically be 20 feet wide on the left side of the street and 18 feet wide on the right side. Light rail stations could be located between Mill and Montgomery and between Madison and Jefferson on 5th Avenue (in front of City Hall) and between Jefferson and Columbia on 6th Avenue (in front of the Oregonian Building). Sidewalks in these station blocks would generally be 21 1/2 feet wide. Parking would be eliminated for a one-half block length between Mill and Clay to accommodate bus stops on the right side of 5th and 6th Avnues. The important auto access on 6th Avenue to Taylor would be maintained, controlled by a signal at 6th Avenue and Jefferson insuring that conflicts with light rail vehicles moving from the left lane of 6th Avenue to the center lane of the Central Mall would be avoided.

North Entry. From the North, light rail would enter the downtown over the Steel Bridge using the existing trackway in the center span and a new trackway along the south side of the existing or a rebuilt Glisan Street ramp. The ramp would continue to meet grade at the intersection of N.W. 3rd and Glisan. Westbound traffic on the bridge would be limited to the single lane on the outside span. The single lane would extend down the Glisan ramp with a second left turn lane when approaching the 3rd Avenue intersection. Two alternative alignments for the trackway west of the intersection of 3rd and Glisan to N.W. 5th and 6th were considered.

N-1 (Glisan). In this alternative, the trackway would likely be located on the south side of Glisan. A station could be located between S.W. 3rd and 4th. Two lanes of traffic on Glisan could be maintained between 4th and 6th by widening the street to the north.

N-2 (Irving/Union Station). In this alternative, the trackway would be aligned diagonally across the intersection of 3rd and Glisan, through the block bounded by Glisan, Hoyt, 3rd and 4th to Irving. Depending on the exact configuration of the alignment, stations could either be located on the left side of 5th and 6th between Glisan and Hoyt (in front of the Greyhound terminal) or with the outbound station diagonally through the portion of the Greyhound building and parking lot north of Hoyt and the inbound station on the left side of 5th Avenue roughly between Irving and Hoyt.

South Entry. Prior to commencement of the study, two options for the connection to Moody were identified: A Jefferson and Columbia couplet and Harrison. The Jefferson and Columbia couplet was not pursued further because it would not provide direct service to Portland State University and the University District. Harrison and two relatively new alternatives, the Lincoln Street and the I-405 Options, were considered.

S-1 (Harrison). In the Harrison Street Option, the trackway would enter Harrison from Moody Street on an elevated structure over Harbor Drive. The trackway would cross Front and First Avenue at grade from the north side of Harrison. Harrison would be rebuilt for four or possibly five lanes of traffic between Front and First, requiring additional right-of-way on the south side of Harrison. The lanes would align with a future road proposed in the South Waterfront Development Plan connecting Harrison with the Moody Extension. A light rail station could be located on the bridge structure over Harbor Drive with direct pedestrian access from Harrison and to the RiverPlace/South Waterfront area by a ramp, stairway and/or elevator at the east end of the station. The elevation of the intersections of Harrison and Front and First would be raised by approximately 3 to 4 feet in order to reduce the grade of Harrison in that area to about 7 percent. This change would affect grades on Front and First approximately 200 feet each side of Harrison and on Harrison to just west of 2nd Avenue.

Presently, Harrison is an 80 foot wide right-of-way between Front and Fourth Avenues. Between First and Fourth, there are 12 foot sidewalks, two 11-1/2 foot eastbound and two 11-1/2 foot westbound traffic lanes and a 10 foot median. The character of the street is influenced by large street trees in the sidewalks and median. In this section, light rail trackways would be located in the left eastbound and westbound lanes, adjacent to the median, reducing the street to one 11 foot westbound and one 11 foot eastbound lane.

On Harrison between Fourth and 6th, given the narrower 60 foot right-of-way, light rail would be on the north side of the street with a single east or westbound traffic lane on the south side of the street.

S-2 (Lincoln). Light rail would enter the CBD on a structure over Harbor Drive and Front, from the South Waterfront property either north of the substation or between the substation and Harbor Drive. A station could be located in the South Waterfront area on the eastern end of the structure. At the west end of the structure, light rail would enter a retained fill and cross S.W. First Avenue at-grade. West of First, the trackway would be located in the median of Lincoln leaving one lane of traffic in each direction on Lincoln. Light rail would turn onto 4th Avenue with the two-way trackway on the west side of the street between Lincoln and Harrison. The trackway in this section of 4th would parallel three northbound traffic lanes. With standard width sidewalks on 4th, it is likely that the 80 foot right-of-way would have to be increased to as much as 88 feet. The trackway would turn west onto Harrison and, again onto 5th Avenue southbound and 6th northbound.

S-3 (I-405). This option would be limited to an entry that is served by the Caruthers/Marquam Crossing only. The configuration east of Front Avenue would preclude a connection to Moody and a possible Ross Island crossing. A station to serve the South Waterfront area would be located on the bridge structure approximately 30 to 35 feet above the ground elevation, approximately 45 feet beneath the lower deck of the Marquam bridge. Access from the station to the South Waterfront area would be by elevator and/or escalator. The bridge would continue over Moody and Harbor Drive entering the existing right-of-way of Caruthers. The two-way trackway would continue west under S.W. Front and First Avenues parallel to I-405 at the freeway level and enter 4th Avenue on the right, east side of the off-ramp. The trackway would continue north along 4th Avenue to Harrison as described above for the Lincoln Option.

V. Alignments Selected for Further Study in the DEIS

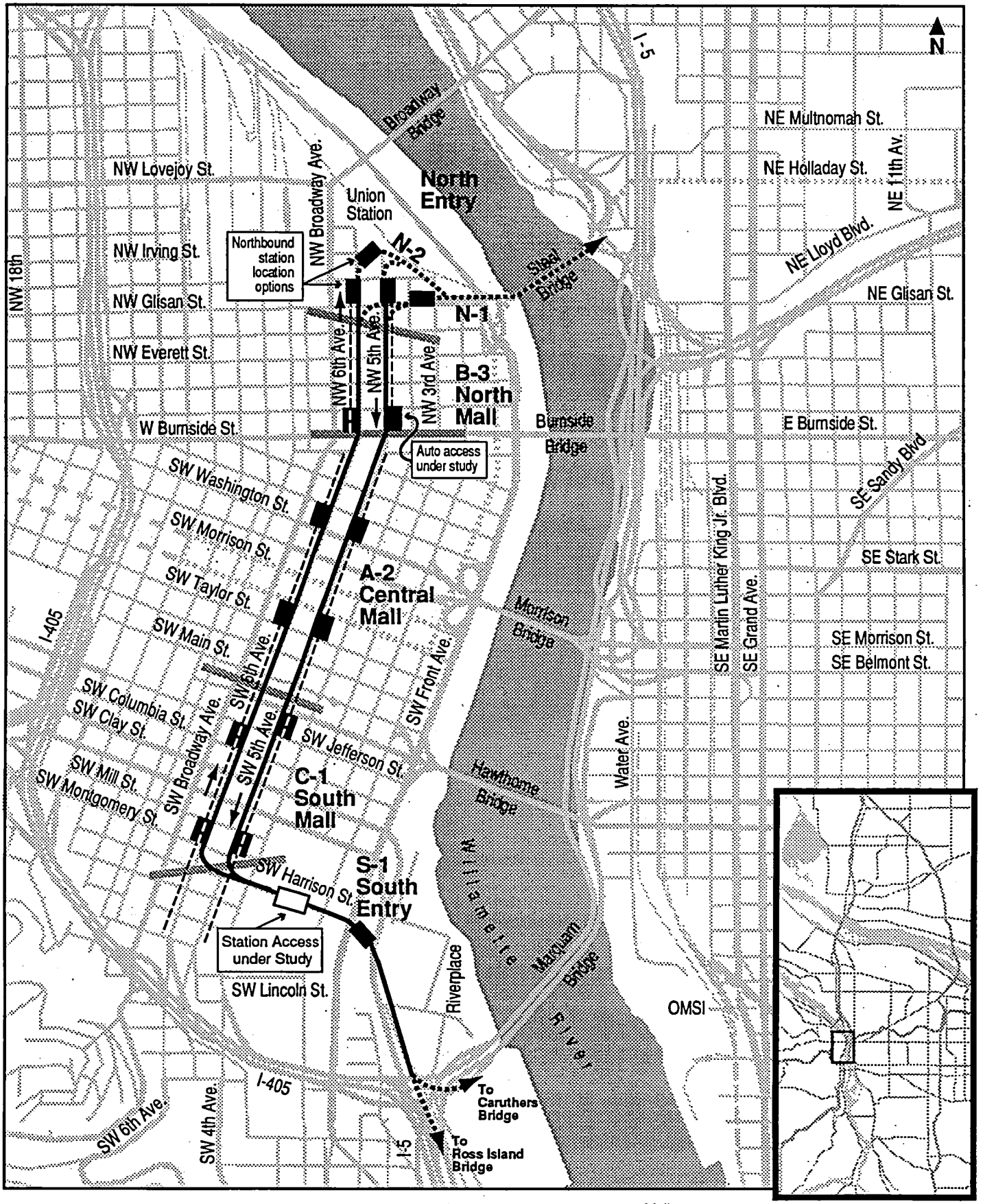
CBD Alignment

The South/North Project spent nearly 12 months evaluating alignment alternatives for the South/North Light Rail through the Portland Central Business District on 5th and 6th Avenues. After completing an exhaustive examination of the technical information and after conducting a public meeting at which a wide variety of opinions were expressed, and considering the recommendations from the Downtown Oversight Committee, the PMG and the CAC, the Metro Council finds: 1) that the following combination of alternatives meets the principles established by the Metro Council in December 1994 (*Tier I Final Report*) and the criteria established by the Oversight Committee (see Figure 8); 2) that those options defining the surface LRT alignment on the 5th/6th Avenue Transit Mall and connecting streets should be studied further in the DEIS; and 3) that more detailed study of other tunnel and surface street alignments is not warranted:

- A-2 with light rail in the center lane of the Central Mall
- B-3 with light rail in the left lane and autos mixed with buses in the right lane of the North Mall
- C-1 with light rail on the left side of 5th and 6th Avenues on the South Mall
- N-1 (Glisan) and N-2 (Irving/Union Station) Options for the North Entry to be studied further during the EIS process; and
- S-1 (Harrison) Option at the South Entry;

The Metro Council has found that if South/North Light Rail is placed on 5th and 6th Avenues in accordance with the above alternatives, existing auto routing and capacity can be preserved, pedestrian access and amenities can be enhanced and efficient bus and light rail service can be provided on the mall and to other developing areas of the downtown. Specifically, the Metro Council has found that the alignment selected for further study in the DEIS:

- Reinforces the goals and objectives of the Central City Plan by supporting existing and future public and private development and investment in a manner that is consistent with commitments dating back to the Downtown Plan which was adopted over 20 years ago;
- Maintains existing traffic and access patterns on 5th and 6th Avenues and within the Central Business District which supports existing and future businesses and retailing and adds to the activity and quality of the streets;
- Provides fast and convenient transit service to existing and future downtown office and commercial uses, delivering the most people to where they want to go, maximizing the potential for increased transit ridership to and from the Central City;



South North Transit Corridor Study

Light Rail Design Option:

Downtown Portland

5th/6th Avenue Surface Couplet

December 1995

Figure 8

- Light Rail Transit (LRT) alignment
- LRT alignment options
- MAX
- Westside LRT
- Existing railroad
- Mall auto access
- Station with no auto access on mall
- Station with auto access on mall

Note: Alignment, station and park and ride locations are currently under study and may change.

0 1/8 1/4 MILE

- Maintains the current pedestrian character of the Transit Mall by retaining the sidewalk widths, pedestrian amenities and trees currently in place on the Central and North Mall;

- Improves the role of the Portland Transit Mall as the central pedestrian boulevard and transit spine in the Downtown and CBD by extending it southward and changing its emphasis to light rail;

- Ensures the least construction impacts and cost by placing light rail in a location where sidewalk reconstruction, street grade changes, utility relocations and other reconstruction work can be minimized and the benefits of past investments in North and Central Transit Mall utility relocation, strain pole foundations, sidewalk improvements and surface grade adjustments can be utilized;

- Offers the opportunity to reconfigure the Central City bus circulation plan, utilizing off-mall service (approximately 25-35 buses per hour by 2015) on other streets, most significantly as 10th and 11th Avenues, where development can benefit from improved transit connections to the regional system, Central City Streetcar and intra-downtown circulation within Fareless Square;

- Provides good access to the River District, University District and RiverPlace/South Waterfront area;

- Reinforces the multi-modal transportation center concept by providing the best opportunity for a good connection at Union Station between light rail, Amtrak, inter and intra-City buses and future high speed rail;

- Provides the opportunity to maintain the function of the Portland Transit Mall while improving its aesthetic environment by minimizing the 'sheet metal' affect while simultaneously maximizing its functional passenger capacity;

- Creates the opportunity for coordination of construction and funding of improvements to the Central Mall and a funding source to ensure that 5th and 6th Avenues can be enhanced to the original demanding Central Mall design standards; and

- Fulfills an objective of the Central Mall business community to enhance the pedestrian environment by reducing items on the street and increasing visibility of retailing along 5th and 6th Avenues by removing over half of the existing bus stops, shelters and related items.

The Metro Council adopted these conclusions regarding the South/North Light Rail Downtown Alignment based on the additional comments, recommendations and findings set out in the balance of this section and under the following three sections titled Transit Operation Recommendations, Urban Design Recommendations and Construction Recommendations.

Following is a more detailed description of the alignment selected by the Metro Council for further study in the DEIS:

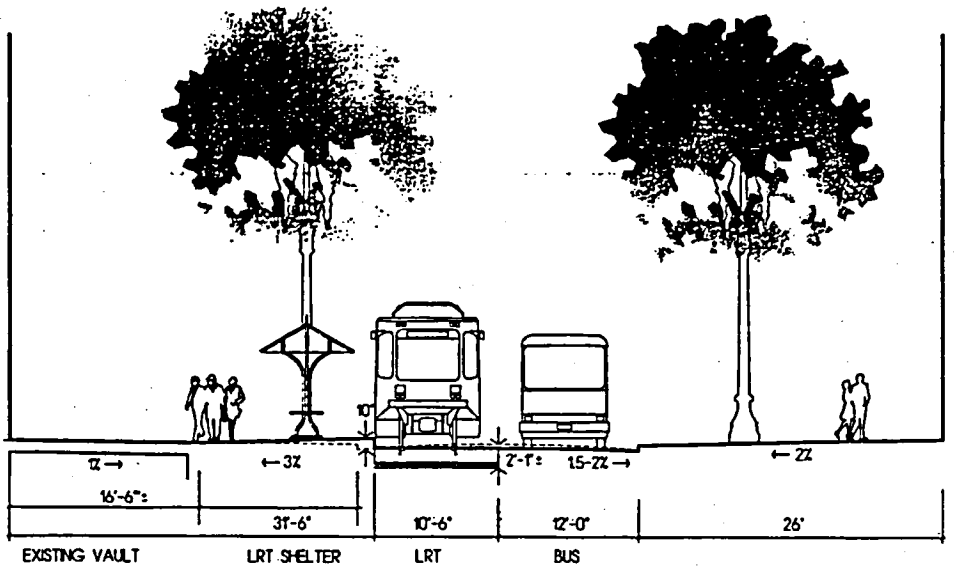
Central Mall. Light rail would be located in the center lane of the Central Mall as described under the A-2 Option above (see Figure 9). Of the Central Mall options, the A-2 Option best meets the principles established by Metro Council and the criteria established by the Oversight Committee. A-2 provides the most efficient use for all four modes: buses, light rail, autos and pedestrians; while preserving existing transit ridership capacity; existing auto access; pedestrian circulation; and existing sidewalks, street trees and other amenities. It would entail the least construction impacts and would have the lowest cost because light rail in the center lane can be accommodated with minimum adjustment to existing street and sidewalk alignments and grades; the least amount of utility relocation work and the highest probability of containing most construction work within the street area.

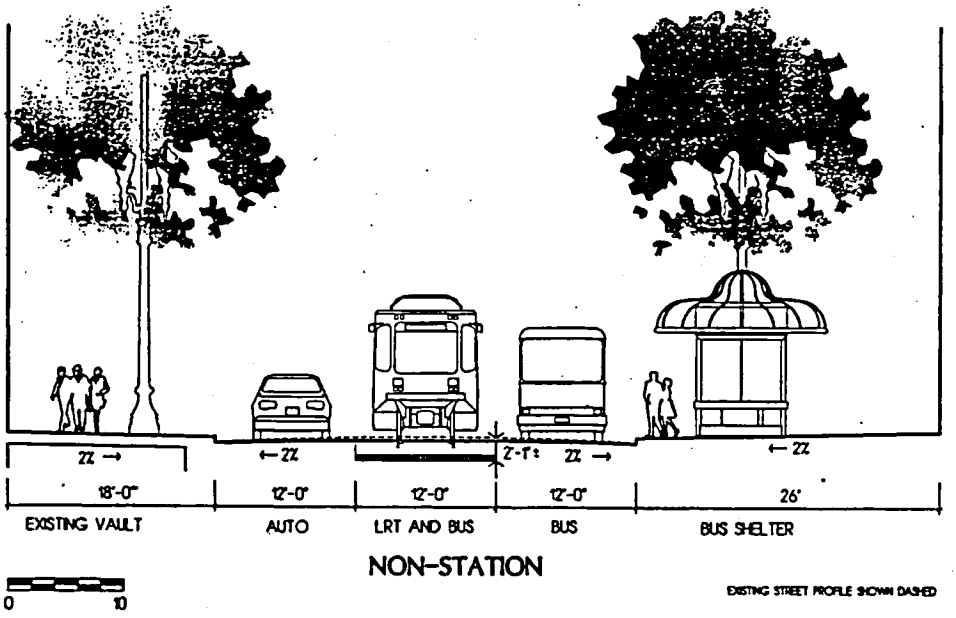
A-1, with its need to widen the street to four lanes and to narrow the sidewalks, would severely impact the mall design and amenities and seriously compromise pedestrian use on the transit mall streets. A-3, with autos sharing the light rail lane, would create serious conflicts with existing auto circulation in auto lanes on the mall and on cross streets and would reduce capacity and degrade operations of light rail. Because bus volumes would eliminate autos over time on the Transit Mall, A-4 would not provide for the long-term 24-hour a day, seven day a week provision of an auto lane on 5th and 6th Avenues and therefore, would not meet the established criteria for retaining existing auto traffic patterns.

North Mall. Light rail would be located in the left lane on 5th and 6th Avenues in the North Mall with buses and autos sharing the right lane, as described under the B-3 option above (Figure 10). In 2005 bus volumes on the North Mall are forecast to be approximately one-half of what they are today and, in combination with the A-2 Option on the Central Mall, may further be reduced as light rail frequencies increase over time and buses on 5th and 6th Avenues are routed on other streets. Accordingly, the limited number of autos projected to be using N.W. 5th and 6th should be able to use the right lane. However, auto use of the 5th Avenue bus lane in the light rail station block between W. Burnside and N.W. Couch may not be feasible due to potential conflicts with loading light rail vehicles. The issues of auto use in this block and the stacking of buses on 5th Avenue will be studied further during the EIS process. To further minimize conflicts with light rail, buses and auto circulation on 5th and 6th, alternative provisions on side streets would be made for any businesses presently using 5th and 6th for loading or access. Those improvements to private property would be included in the project scope and budget.

South Mall. Light rail would be placed in the left lane on 5th and 6th Avenues in the South Mall with autos and buses sharing two general purpose lanes as described under the C-1 Option above (see Figure 11). C-1 would entail reconstructing 5th and 6th Avenues between Madison and Harrison with improvements similar to those used on the Central Mall, fulfilling a long standing desire to extend the transit mall the full length of the downtown from Union Station at the north end to Portland State University at the south.

Figure 9





SURFACE LRT OPTIONS
PORTLAND CENTRAL BUSINESS DISTRICT

A2
CENTRAL MALL

North Entry. The N-1 (Glisan) and N-2 (Irving/Union Station) north entry options for connecting light rail from the Steel Bridge to 5th and 6th Avenues will be further studied during the EIS. In order to make a choice between these options, more information is needed about the Union Station developments, high speed rail, intermodal ridership and transfers, cost, the 3rd Avenue rail crossing, the impacts of each alternative on the neighborhood due to property acquisitions and other factors.

Both North Entry alternatives may involve impacts to private property. In the N-1 (Glisan) Option, widening of Glisan for two light rail tracks and to maintain two lanes of auto traffic west of 4th Avenue could require the acquisition of the Beaver Hotel. The Greyhound depot building may be adequately set back from its south property line to avoid similar impacts. It is possible that the parking lot and Comedy Club building on the southeast corner of the intersection of 5th Avenue and Glisan and 6th Avenue and Glisan could be impacted to make room for tracks turning from Glisan onto 5th Avenue and from 6th Avenue onto Glisan.

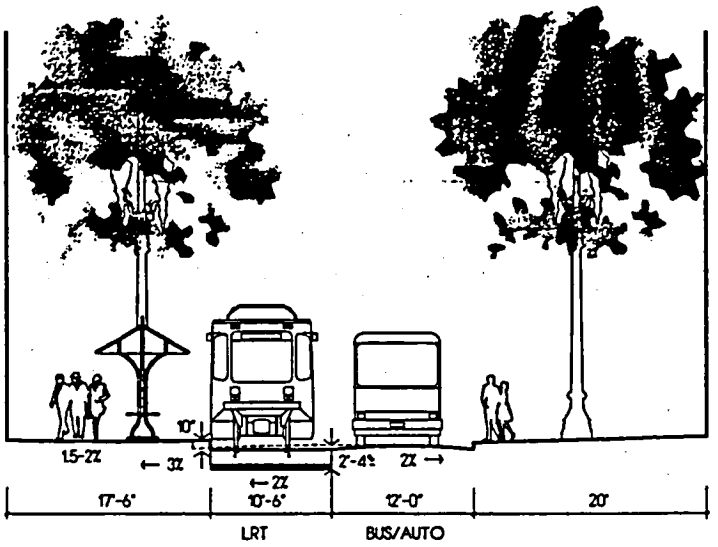
The N-2 (Irving/Union Station) Option would require the acquisition of the block between Glisan, Hoyt, 3rd and 4th and likely require the redevelopment of the existing Tri-Met bus layover facility between Irving, Hoyt, 4th and 5th Avenues. It is also likely that Hoyt Street between 4th and 5th Avenues would be vacated, impacting access to the Classic Chauffeur building. Under the N-2 (Irving/Union Station) Option, an outbound station could be located diagonally across the northern half of the Greyhound depot as described above, impacting that property.

If the N-2 (Irving) Option is selected, its configuration should be carefully designed to avoid conflicts with the proposed 3rd Avenue rail crossing connecting 3rd with Front Avenue and McCormick Pier and the Union Station Housing north of the railroad tracks.

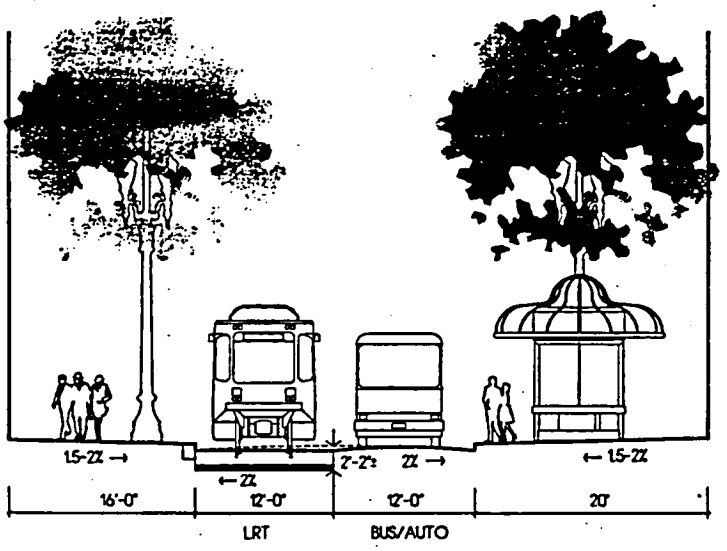
South Entry. Light rail would be placed in the median of Harrison Street between 1st and 4th Avenues as described under the S-1 option above (see Figure 12). Of the South Entry Options, the S-1 (Harrison) Option would provide the best service to the University District, South Auditorium area and RiverPlace/South Waterfront area at the least cost and operating time. As described above, the S-1 (Harrison) Option was developed with a station located on the bridge structure over Harbor Drive intended to serve both the South Auditorium and RiverPlace/South Waterfront areas. During the EIS process, access to this station and possible alternative locations for this station and/or other stations for better service for South Auditorium and RiverPlace/South Waterfront area residents and workers will be examined.

The operating time and cost of all three South Entry alternatives, assuming a Caruthers/Marquam Crossing from OMSI to the PSU station on 6th Avenue north of S.W. Montgomery Street were estimated by project staff. The operating times for the S-2 (Lincoln) and the S-3 (I-405) Options were estimated to be 20 seconds and 40 seconds longer than the S-1 (Harrison) Option, respectively. The projected capital cost would be $30 million and $14 million more than the E-1 (Harrison) Option, respectively. Unlike the S-3 (I-405) Option, the S-1 (Harrison) Option could be connected to either the Ross Island or the Caruthers/ Marquam Willamette River crossings.

Figure 10



STATION



NON-STATION

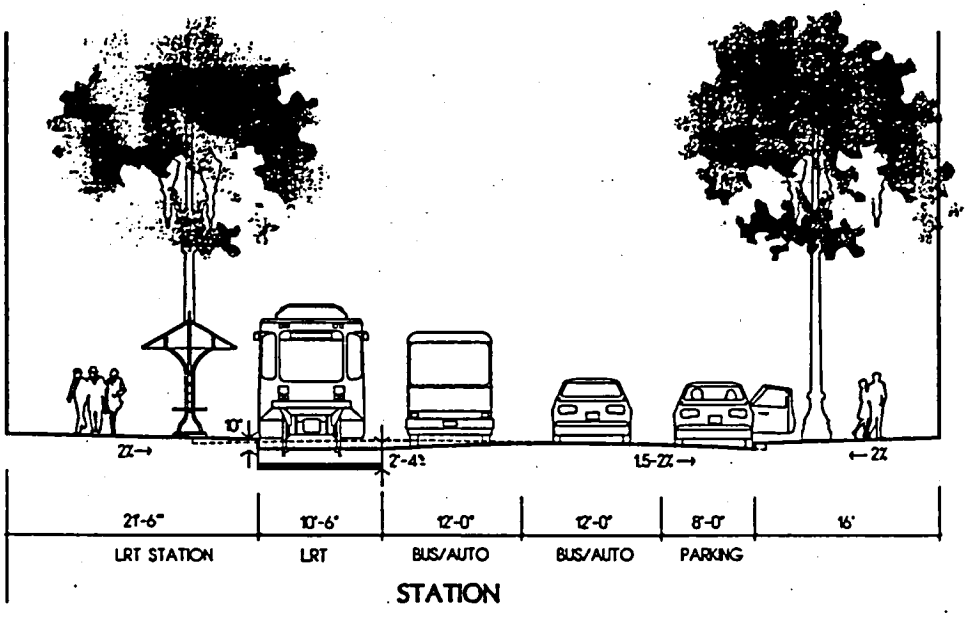
0 4 10

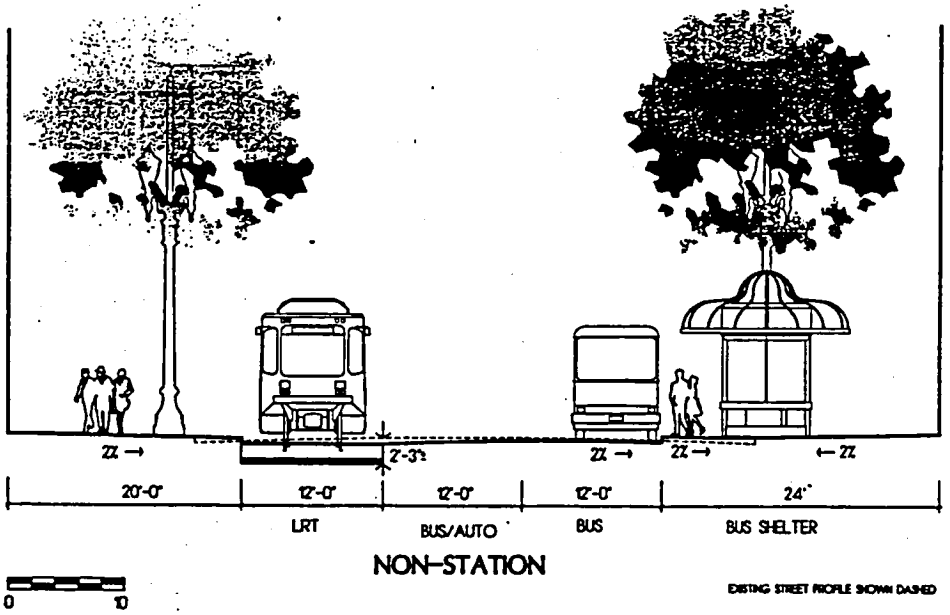
EXISTING STREET PROFILE SHOWN DASHED

SURFACE LRT OPTIONS
PORTLAND CENTRAL BUSINESS DISTRICT

B3
NORTH MALL

Figure 11





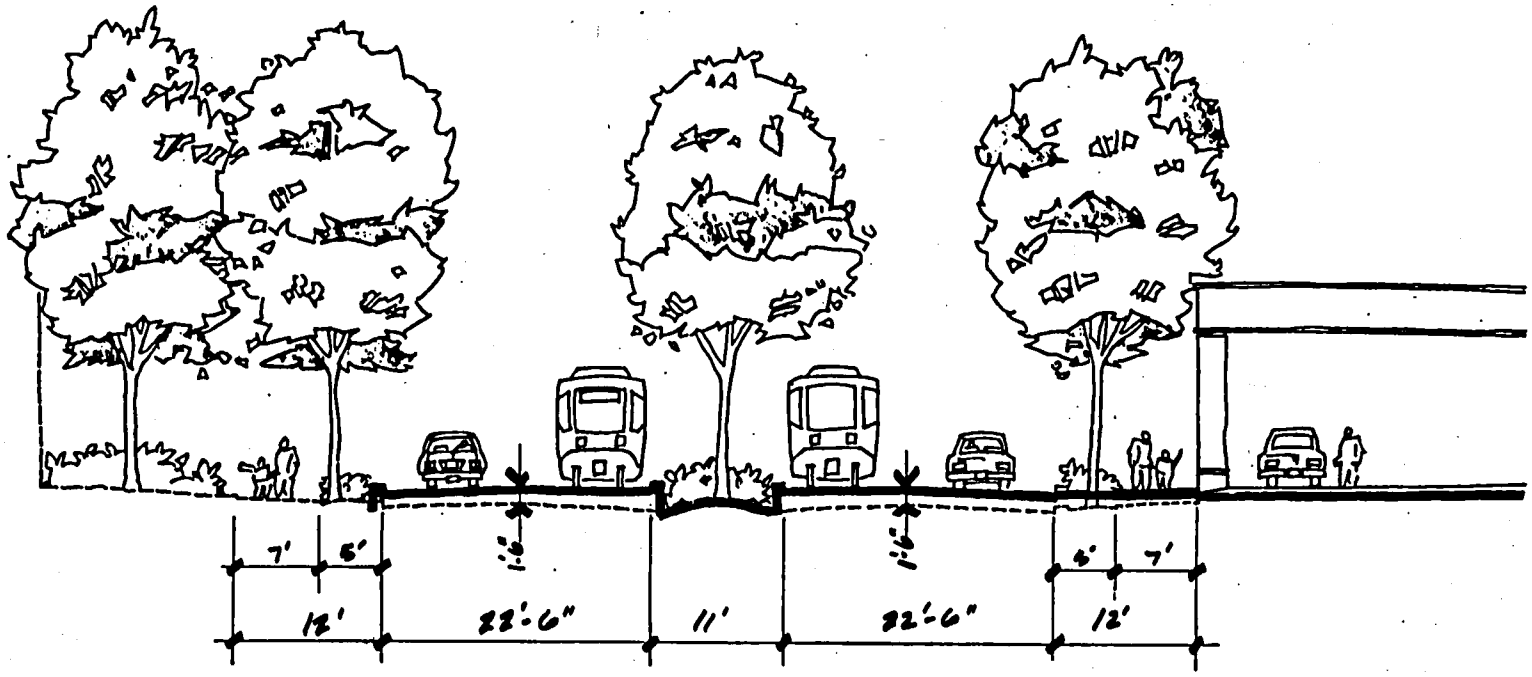
SURFACE LRT OPTIONS
PORTLAND CENTRAL BUSINESS DISTRICT

C1
SOUTH MALL

The station location of the S-2 (Lincoln) and S-3 (I-405) Options would be less desirable than in the S-1 (Harrison) Option. In the S-2 (Lincoln) Option, RiverPlace and the north part of the South Waterfront area would not be well served with an elevated station at the eastern end of the bridge structure over Harbor Drive and Moody. The location of this station would be further to the south, and even less accessible to RiverPlace, if the alignment is shifted to the south of the substation as has been suggested by the Portland Development Commission. The station on the S-3 (I-405) Option serving the South Waterfront area would also not be as convenient, located on the bridge structure approximately 30 to 35 feet above grade adjacent to the Marquam Bridge.

The three South Entry Options would have varying impacts on private property. Under all three options, light rail turning from Harrison onto 5th and from 6th onto Harrison would impact the property on the northeast corner of the intersection at 6th Avenue and Harrison, the PSU Center of Advanced Technology and at 5th and Harrison, the apartment building.

In the S-1 (Harrison) Option, the property on the south side of Harrison between First and Front Avenues would be impacted by the widening of Harrison to accommodate four (or five) traffic lanes and light rail on the north side of the street. On the S-2 (Lincoln) and S-3 (I-405) Options, properties would be impacted on Harrison between 4th and 5th Avenues and along 4th Avenue, south of Harrison. The right-of-way of 4th Avenue would likely have to be widened, impacting a number of properties on the west side of the street between Harrison and Lincoln. Texaco and Budget Rent-a-Car may be impacted even without a right-of-way expansion due to conflicts with the light rail trackway and their driveway accesses. On the S-2 (Lincoln) Option, the radio station would be impacted by the extension of the Lincoln right-of-way east of First Avenue. On the S-3 (I-405) Option, the beauty supply building on 4th Avenue and an apartment building and two small commercial buildings on Caruthers could be impacted.



A.
HARRISON ST. LOOKING WEST
PROPOSED, BETWEEN 1ST & 2ND STREETS

Figure 12

VI. Transit Operation Conclusions

Capacity and Ridership

Transit ridership to, from and through the CBD is projected to dramatically increase over the next two decades. With the Banfield and the completion of the Westside and South/North Light Rail Projects, there will be four major light rail trunk lines serving the CBD. The projected increased ridership should mostly be carried on light rail. Bus service and bus ridership to the downtown will diminish over what exists today. Total ridership to, from and through Downtown is set out in Table 2 below:

Table 2
Portland CBD Transit Ridership
(to, from and through CBD, excludes intras)

Year	P.M. Peak Hour Riders
1997	16,000
2005	19,100
2015	30,500

Consistent with future transit ridership patterns in the Central City, the A-2 Option in the Central Mall calls for a transition from exclusive bus use to a combined light rail and bus operation on the Transit Mall. Table 3 sets out the capacity and the projected volumes of light rail vehicles and buses over the 20 year period.

The ability of the 5th and 6th transit mall to accommodate both light rail trains and buses is one component of the overall downtown transit capacity. The downtown transit capacity includes the transit mall, Banfield LRT, Westside LRT and buses on off-mall streets. Buses can be accommodated on a number of other streets in the downtown such as 2nd, 3rd, 10th, 11th, Washington, Salmon, Jefferson and Columbia.

The patron capacity of the transit mall is based on the number of buses and trains that can pass through two lanes during the peak hour after taking into account traffic signal progressions and bus delays. For this analysis, the patron capacity of the off-mall transit streets is based on the number of buses that are unable to operate on the transit mall. The total transit capacity of these off mall streets to accommodate more buses per hour has not been estimated but would be more than indicated in Table 3.

For simplicity, the volumes listed below include trips only in the peak hour in one direction. The actual volumes on the mall would include trips leaving town in both directions. For instance, light rail trips on South/North would likely be 20 trains going north and 20 trains going south in the peak hour.

Table 3

Projected Transit Vehicle Volumes/Patron Capacity
(One Direction Only)

Year	Buses/Hour	LRV's/Hour	LRT Headway	Patron Capacity
1997				
Transit Mall	143	0	0	8,580
Off-Mall	29	13	4.5 min	5,640
Total	172	13		14,220
2005				
Transit Mall	105-110	8	7.5 min	9,000
Off-Mall	29	15	4 min	6,240
Total	139	23		15,240
2015				
Transit Mall	95-100	10	6 min	9,000
Off-Mall	59	15	4 min	8,040
Total	159	25		17,040
Beyond 2015				
Transit Mall	75-80	20	3 min	10,800
Off-Mall	79	20	3 min	10,740
Total	159	40		21,540

On the Central Mall there presently are 171-178 buses during the peak hour. This volume is expected to be decreased to 143 buses per hour when the Westside Light Rail begins revenue service in 1997 or 1998. When the South/North Light Rail begins revenue service in 2005, the bus volumes on the Central Mall are expected to be further decreased to 106 buses during the peak hour. Then, as light rail and bus ridership continues to grow, these volumes are projected to be increased to 125-130 buses per hour by 2015.

When the South/North Light Rail begins revenue service in 2005, trains would operate at approximately 15-minute frequencies during off-peak hours. However, during the peak hours, service would be increased to approximately 7-1/2 minute frequencies, a rate of 8 trains per hour. By 2015, the peak hour service is expected to increase to 6 minute frequencies, a rate of 10 trains per hour. The ultimate capacity of the system will be about 3 minute frequencies, a rate of 20 trains per hour, which if fulfilled would occur beyond the current 20 year planning time period.

Under the recommended A-2 Option, buses using the Central Mall would no longer operate in the leap-frog fashion as they do today. They would move in single file in the right lane and utilize the

center light rail lane to pass buses that are delayed. Because of the reduced number of buses and the reduced number of bus routes (approximately half of the 80-82 routes currently) buses on the Central Mall would only need to stop at one location on each block. Accordingly, the mid-block bus stop in each block of the Central Mall would be eliminated. In addition, all bus stops would be eliminated in blocks in which light rail stations are located, which would be every fourth block on the Central Mall. Buses would be organized into two rather than four groups. Each group would stop in every other block or every third block depending on the location of the bus stop relative to the light rail station blocks where all stops are eliminated. The mixed two and three block stopping frequency would result in buses stopping at fewer locations on the transit mall. This should reduce the operating times, and therefore operating cost for buses below what they are today on the mall.

Not only bus demand, but also bus capacity of the mall would be reduced because of inability to freely use the second lane for passing. This capacity would decrease as light rail frequencies increase. It is estimated that the capacity of the mall would be 105-110 buses per hour with light rail trains at 7 1/2 minute frequencies, 95-100 buses per hour with light rail trains at 6 minute frequencies and 75-80 buses per hour with light rail trains at 3 minute frequencies. In 2005, on the day that light rail begins operating on the mall, there would be adequate bus capacity to handle all of the projected mall bus volumes. However, during the following ten years, sometime between 2005 and 2015, light rail and bus volumes are projected to increase above capacity, to a point in 2015 when 25-35 buses per hour (during the peak hour) would have to be displaced to other streets. It is expected that the off-mall bus service may experience some increased operating time and cost caused by operating in mixed traffic rather than in exclusive bus lanes on the mall.

As explained, sometime between 2005 and 2015, Tri-Met would be required to initiate a series of bus system changes to implement off-mall service as the service requirements, demand projections and market conditions change in developing areas of the downtown. Tri-Met may choose to implement some of this service earlier, perhaps in conjunction with bus system changes that will be necessary during construction of South/North Light Rail or even sooner.

The *Regional Transportation Plan* (RTP; Metro: 1992, revised 1995) anticipates a long-term expansion of both the bus network and the light rail system. In addition to extensions of the east, west, south and north light rail lines, the RTP has identified the southwest corridor as a possible future light rail line. The southwest corridor could be served by either a radial line (out Barbur Boulevard to Tigard or out Macadam Avenue to Lake Oswego) or by an extension of the eastside light rail line (south on Highway 217 to Washington Square, Tigard and Tualatin). To date, travel demand forecasts have indicated that either of the radial lines would carry less than half the riders than would be carried by the east, west, south or north radial lines. An additional light rail extension could be an east side connection linking the south and north corridors between the Rose Quarter area and the south Willamette River crossing.

While the timing and configuration of these possible future extensions is uncertain, analysis done to date indicates that the Transit Mall could accommodate South/North Light Rail through to the year 2040. If the radial Barbur Corridor is built connecting to the transit mall, mall capacity

would be available through to the year 2020 (*South/North Tier I Technical Summary Report*; Metro: 1994). The eastside connection could provide additional long-term capacity in Downtown Portland by reducing the number of South/North trains that would need to enter the Portland CBD. Finally, an additional radial corridor into the Portland CBD may not be necessary if the Westside extension down Highway 217 is selected to serve the southwest corridor.

Downtown Bus Circulation Concept

Transit service in Downtown Portland should be viewed as part of a continuum to implement the Downtown Plan vision for an attractive, active and pedestrian-friendly district. The combination of Portland plans and policies has created an environment supportive of transit throughout the downtown area. The creation of the Transit Mall was part of this continuum to focus office development, improve transit ridership and enhance livability. In the future, the Transit Mall will continue to be the primary corridor for employment. The major focus for development activities should occur along the high-density spine which parallels the Transit Mall as well as the edges and corners of downtown, such as South Waterfront, University District, River District and the Willamette River Bridgeheads. Figure 13 illustrates a conceptual downtown bus circulation plan. This circulation plan could complement the South/North Light Rail A-2 downtown alignment recommendation and the downtown land use concepts expressed in the original Downtown Plan, the Central City Plan and the Central City Transportation Management Plan.

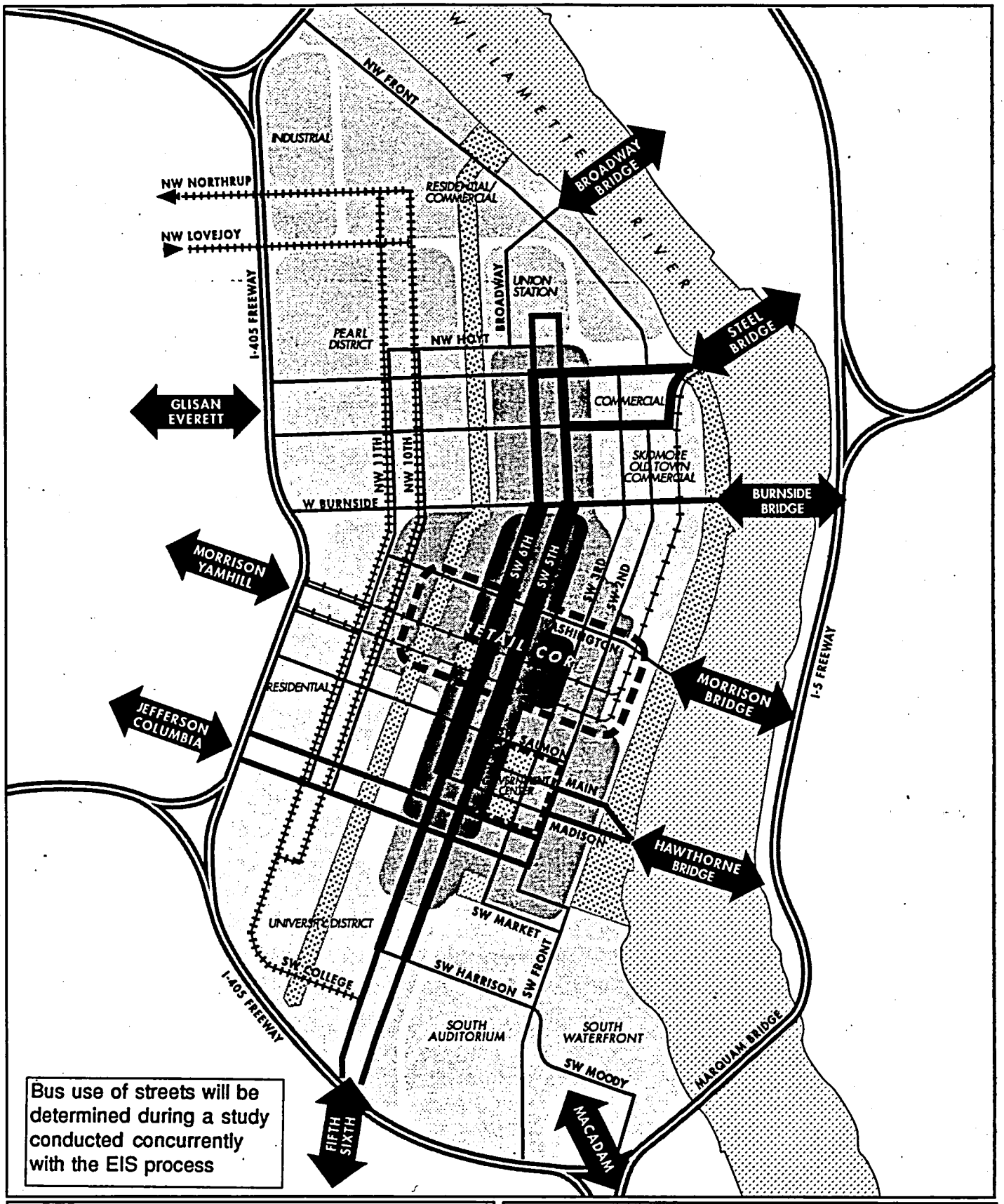
Off-Mall Bus Operational Requirements

The study has focused a considerable effort toward the analysis of the alignment options, particularly the Central Mall options, to ensure that transit operations within the downtown meet acceptable cost, ridership and operation efficiency criteria. Tri-Met has determined that implementation of the recommendations for the bus operations set out in this section, the designation of downtown streets for off-mall bus service in the following section and the package of specific infrastructure improvements in the section following that are essential to ensure successful downtown transit operations and their acceptance of the recommended A-2 Central Mall Option.

Bus Operation Conclusions

The following bus operation conclusions are made in conjunction with the A-2 Central Mall and other South/North Light Rail alignment recommendations:

Concurrently with the EIS process, Tri-Met, the City of Portland, Metro and business community/property owners will work together to continue to refine the conceptual plan shown in Figure 13. This will include the development of transit service plans, the streets in the downtown to be designated for transit, the design and location of improvements associated with off-mall bus service and the schedule for implementing the improvements and service plans.



DOWNTOWN BUS CONCEPT

BUS VOLUMES

- Highest
- High
- Medium
- Low
- Streetcar
- East/West LRT

Figure 13

DOWNTOWN LAND USE CONCEPT

- High Density Commercial
- Medium Density Commercial
- Land Use as Labeled
- Retail Core
- Major Open Space
- Government Center

Office of Transportation, City of Portland

In advance of the time that the South/North light rail begins, consideration should be given to operation of some buses on 10th and 11th, Jefferson and Columbia, Burnside, Everett and Glisan, Lovejoy and other east-west streets that are recommended for future bus service. This off-mall service should be designed to improve service in areas of the Central City where service presently is not provided, to facilitate convenient transfers and to provide efficient direct service for users. Minimum service levels should be established to ensure adequate frequency for good intra-downtown circulation during the off-peak hours. On the other hand, volumes of service should also be limited, particularly on busy traffic streets such as 2nd and 3rd, to minimize conflicts between buses and general traffic.

A bus service plan should be coordinated and integrated with the Central City Streetcar on 10th and 11th Avenues with ongoing planning for service to Northwest Portland, the River District and the University District and possible extensions to Oregon Health Sciences University and the North Macadam area.

The objectives should be to preserve existing ridership, identify opportunities for increased circulation in the Downtown, open new markets in Central City centers and meet the capacity requirements of the A-2 Central Mall alternative.

Bus Street Designations

Figure 6 indicates streets having a transit designation in the Central City Transportation Management Plan recently adopted by the Portland Planning Commission and by the City Council. The City, in cooperation with Tri-Met, Metro, the business community and others should review these designations to ensure that they are consistent with the light rail alignment decision and revisions in the bus service plan to accommodate the A-2 Central Mall Option recommendation. As described above, this process will take place concurrently with the EIS process. During this process, the following streets should be considered for off-mall bus service to provide improved circulation in other development areas of the downtown:

Jefferson and Columbia. Columbia and Jefferson are presently designated in the CCTMP as transit streets. Changes in their present classification may be warranted based on the abandonment of these streets for light rail and the possible future use of these streets for off-mall bus service.

Main and Madison. Main and Madison are designated as transit streets and are likely to continue to be used by buses using the Hawthorne Bridge.

Salmon and Washington. Concurrently with the EIS process, an off-mall bus routing study effort will be undertaken to identify the preferred operating corridor for buses in the major cross-mall retail corridor. Currently two bus lines operate approximately 24 buses during the peak hour on Salmon and Washington Streets acting as a couplet five blocks apart. Consideration should be given to the potential for using alternative or additional streets, reducing the volumes on the existing couplet, reducing the distance between the couplet, improving bus operations and minimizing existing auto conflicts, taking into account all modes

of transportation. Consideration should be given to Salmon and Taylor, Alder and Washington, and Stark and Oak. It is recommended that the City consider amending transit access street designations in conjunction with the FEIS based upon results of the off-mall bus routing study.

Burnside. Burnside currently is designated as a transit street, a designation that may remain unchanged by the A-2 alignment recommendation.

Everett and Glisan. Everett and Glisan are designated as transit street and likely will continue to carry off-mall bus service.

2nd and 3rd Avenues. 2nd and 3rd Avenues are not presently designated as transit streets, but may be desirable as streets for limited bus service to serve as an intra-downtown transit connection between Old Town and the South Auditorium area. Limitations on the volume of service would be appropriate.

10th and 11th Avenues. 10th and 11th Avenues are presently designated as transit streets and are excellent candidates for off-mall bus service. This service would complement and be operated in conjunction with Central City Streetcar presently being planned with a 10th and 11th Avenues alignment.

Off-Mall Bus Improvement Conclusions

Following are specific improvements that will be evaluated, some or all of which should be included in the South/North Light Rail Project scope and budget.

- Bus stop improvements including facilities such as shelters, benches, transit information and other improvements.

- Curb extensions to replace some existing curb side bus zones and at bus zones on newly designated off-mall bus streets. These extensions will eliminate some on-street parking, but less parking than curb side bus zones requiring additional space for buses to pull in and out. They also will speed up bus loading and unloading and provide additional space for bus shelters and pedestrians to wait away from adjacent storefronts.

- Design improvements to 5th Avenue for two blocks south of Burnside if during the EIS process such improvements prove necessary to meet mall capacity expectations, allow buses to proceed down the mall in an orderly manner and to eliminate current bus bottlenecks.

- Signal prioritization at some locations to allow buses to move more easily through congested intersections.

- Improved pedestrian crossings at key transit transfer connections where bus line cross.

- Transit and pedestrian improvements on 10th/11th Avenue in coordination with the Central City Streetcar project.

VII. Urban Design Conclusions

Urban design features incorporated into a light rail project can significantly affect the interaction of the facility with its local environment. Following are considerations of urban design that should be taken into account by Metro, Tri-Met and the City of Portland as the project proceeds. Final determination of urban design elements to be incorporated into the project will depend upon feasibility, costs, funding, local jurisdiction and property and business owner preferences, and transit operations constraints.

Portland Transit Mall

For nearly twenty years, the Portland Transit Mall has served as the centerpiece of Portland's downtown and Central City rejuvenation. It has received national acclaim for its design excellence. The Transit Mall has served as a model for downtown transportation projects that have followed it.

In Portland, light rail has been successful in operating on surface streets within the Central City, both on the Banfield and soon on the Westside project, largely due to the design sensitivity with which it has been incorporated into the streets. The design of the South/North Light Rail Project should be no less demanding. To the contrary, incorporation of light rail onto 5th and 6th and the 22 blocks of the original Transit Mall and 14 blocks of its northern extension will represent even a greater challenge, for it involves the reconstruction of street improvements of a quality unequaled anywhere in Portland.

The City of Portland recently completed a planning effort proposing to expend over $2 million aimed at restoring the aging Central Mall, suffering under two decades of heavy use. Broken and cracked bricks, crumbling granite, worn asphalt, missing street signs, chipped finishes, unused kiosks and patched paving are among the defects that would be repaired to restore the mall to its original form. The South/North Light Rail Project offers the opportunity to undertake this restoration in a coordinated way and with high-quality results that would not be possible if only local funds are available for the restoration.

In restoring the mall and in extending the street improvements to the South Mall and to the North and South Entries the quality of the design, materials and amenities should be similar to those used in the original transit mall project. Architectural finishes and treatments such as brick paving, granite curbs, gutters and feature strips, street trees, Portland historic ornamental street lighting fixtures, traffic signals, traffic and transit signs, flower pots, waste receptacles, Simon Benson drinking fountains and other features of the original transit mall should be the theme. Overhead train electrification systems should be designed with the same care afforded those installations on the Banfield Light Rail Project on First, Yamhill and Morrison and planned in the downtown and Goose Hollow segments of the Westside Light Rail project, by incorporating supporting the single wire overhead system from extensions on the Portland historic ornamental street lighting fixtures. Use of Portland historic Belgian block in the trackway should be considered, although it is recognized that other treatments may be more appropriate on the North and Central Mall where the trackway will be shared by buses.

North Entry

The urban design features of the 5th and 6th Transit Mall should be considered for Irving or Glisan. The Steel Bridge ramp should be reconstructed to accommodate pedestrian and bicycle access. A comfortable and defensible environment around and under the Steel Bridge ramp should be designed. In this area, particular attention should be paid to right-of-way design to minimize awkward leftover parcels and to encourage adjacent property redevelopment.

Harrison Street

Harrison Street has a unique quality created by the street trees, planting strips and median. Light rail should be incorporated to retain and enhance that quality. Despite grade changes required between First and Front Avenues, street trees should be retained by use of low retaining walls to preserve the existing ground level adjacent to them. Turnouts should be incorporated into the sidewalk design to accommodate loading where required and access should be retain to existing residential and commercial parking areas.

South Entry/Harbor Drive Structure

The bridge structure should be designed to appear as an extension of Harrison Street, with natural and easy pedestrian access over Harbor Drive, to RiverPlace, a task of some challenge given the likelihood of four or five lanes of traffic and lengthy pedestrian crossing at Front and First and Harrison. The station should have the dual function of serving transit riders and pedestrian and bicyclists crossings from Harrison to RiverPlace, over Harbor Drive. Architectural treatment of the bridge structure should complement the surrounding environment, views of the river and city and be inviting to the desired pedestrian uses. Cost sharing for the facility should be evaluated through the EIS and design process.

VIII. Construction Conclusions

The Metro Council emphasizes the importance of adopting a construction management framework addressing the conclusions contained in this section, including the pursuit of extraordinary means to ensure that impacts of the construction work on businesses in the downtown area are minimized. Every effort should be made by the participating agencies to implement the construction recommendations in this section, recognizing that some of them may require regulatory or policy changes not within the control of the local governments.

While the alignment alternatives selected for further study in the DEIS represent the least construction impact, the South/North Light Rail project construction through the downtown on 5th and 6th Avenues still represents an enormous undertaking. To one extent or another, light rail construction would be occurring in nearly 60 blocks. The project will cost approximately $300 million and will, if the framework given below is adopted, require an overall total of at least 3 years to complete. Following is a general description of the work that is currently anticipated to be performed as part of the S/N downtown construction:

Utilities

- Relocate manholes, access panels and vents in trackway.
- Relocate utilities from beneath the trackway, not always required but generally desired by the utilities and by Tri-Met.
- Replace waterlines within 100 feet of light rail with coated/bonded piping to meet standards of the Bureau of Water Works.
- Lower utility vaults and duct banks to match new grades or deeper paving structures.
- Install a new electrical duct bank for signals, street lighting, traction electrification and communications.
- Install catch basins and pipe storm drainage except on the North and Central Malls where those systems have been installed and the City has determined that most existing storm drainage pipes including those under the trackways may remain.

Streets

- Install track slabs to light rail cross and longitudinal grade standards which allow no cross slope and only a very gradual longitudinal slope.
- Replace existing street, intersection slabs and paving to meet the new trackway grades.
- Replace and upgrade the existing paving on the South Mall and North and South entries to Central Mall standards.

Sidewalks

- Reconstruct all sidewalks except on North and Central Malls.
- Reconstruct sidewalks on the North and Central Malls for light rail platforms.
- Install strain pole foundations in 3 locations in each block face except on the North Mall which was constructed with suitable foundations.
- Remove certain shelters on the Central Mall including both shelters on LRT station blocks and rear block bus stop locations on all other blocks.

Finishes

- Install shelters, transit information and ticket machines.
- Install traffic signals and signs.
- Install overhead electrification systems.
- Install street trees.
- Install kiosks, benches, flower pots, and other miscellaneous street furniture.

Scheduling/Phasing Construction

Left to natural forces, construction of the downtown South/North Light Rail alignment could require four or five years. A goal should be established to complete all of the downtown construction work within a three year period. Further, goals should be established for completing work within each block as follows, recognizing that some variation may occur due to variations in the extent of utility work and that light rail station blocks, at least in the North and Central Mall may require longer than other blocks involving minimum sidewalk reconstruction.

North Mall: 3-4 months for each block

Central Mall: 4-5 months for each block

South Mall, North and South Entries: 6-7 months for each block

During the EIS process, scheduling and phasing options for the work will be carefully assessed. Consistent with achieving the goals for completing the overall project in 3 years and for completing work in any one block within the time limits set out above, consideration will be given to meeting some or all of the following with regard to the overall phasing of the work:

- Completing work in one segment of the project before commencing another, by for example completing the North Mall before beginning the Central Mall;

- Completing work on one street before commencing another; and

- Avoiding construction work concurrently on both sides of any single block, particularly buildings such as U.S. Bancorp Tower, Meier & Frank, Standard Insurance Plaza, Orbanco and a number of others with frontage on both 5th and 6th Avenues.

Special Downtown Construction District

It is concluded that the entire area of construction of the South/North Light Rail Downtown alignment should be designated as a Special Downtown Construction District. This should geographically include all construction areas on light rail streets (Glisan/Irving, 5th, 6th and Harrison), adjacent cross streets, staging and storage areas in the downtown and streets where any off-mall bus improvements will be constructed concurrently with light rail.

Construction Management

Because of the demanding design requirements and potential for construction impacts, a special organization should be established by Tri-Met to oversee light rail work within the Special Downtown Construction District. A Downtown Portland Light Rail Committee of Tri-Met, Metro, City of Portland and business community/property owner leadership representatives should oversee the design, development of contract documents and construction of all work within the Special Downtown Construction District. The project manager for the Downtown light rail work should meet regularly with the Committee. Sufficient funds with contingency should be budgeted to ensure quality of the work and prompt and adequate responses can be made to changed conditions during construction.

Alternative contracting methods for construction within the Portland CBD should be investigated. Because of the growing evidence that, on projects such as this, the lowest initial bid can result in the overall highest cost to the impacted community, it is recommended that consideration be given to selecting contractors by a Request for Proposals (RFP) process. Contractors should not only be selected based on their cost and financial strength, but also based on their experience and qualifications to address the unique requirements of this project. The local public agencies should work with state and federal agencies and the Associated General Contractors to develop an acceptable RFP process for selecting contractors that would assemble the best subcontractor team and carry out the project as a partner with the public and private interests. In addition, the general contractors should be selected early in the final design phase so that they are available to provide input as a part of the design team developing contract documents and requirements for the conduct of construction.

Temporary Traffic Provisions

General traffic in the construction zones would have significant impact on the duration and cost of completing the work. Accordingly, it is essential that large portions of the light rail streets (Glisan/Irving, 5th, 6th and Harrison) be closed during construction. In addition, it is desirable to close cross streets whenever possible in order to enable the construction of entire intersections at one time rather than in halves. However, it is recognized that some cross streets cannot be closed and must be built in halves including streets crossing 5th and 6th such as Everett and Glisan, Burnside, Alder and Washington, Salmon and Taylor, Jefferson and Columbia and Market and Clay.

Light rail traffic on Yamhill and Morrison would also have to be maintained. Public access to parking garages and hotels such the Hilton Hotel, 6th Avenue Garage, U.S. Bancorp Tower Garage, Broadway Garage on the Central Mall and a number of other properties on other segments of the downtown alignment. On the North and Central Mall, most access conflicts have been removed. On the North and South Entries and on the South Mall, some loading zones, short term parking spaces and other special curbside uses may need to be permanently relocated to side streets. Also, as described for the North Mall above, revisions to private property may be needed in a limited number of cases to eliminate loading docks or other access that potentially conflicts with light rail. To the greatest extent possible, these changes should be made before construction begins in the affected area.

During construction, light rail and bus operations would have to be maintained. The buses on 5th and 6th Avenues will have to be rerouted as segments of those streets are closed for construction. One solution is to, for example, move buses from 5th Avenue onto 6th Avenue with temporary two-way bus operations when segments of 5th Avenue are closed for construction. Temporary two-way bus operations could be improved by delaying reconstruction of the 2-lane blocks in which light rail platforms will be located until one-way operations are restored. This strategy worked successfully during the original mall construction. It also could be supplemented by initiating, either temporary or permanent, bus service on designated off-mall transit streets before construction begins.

Design and Contracting Requirements

The Contract Documents set out the requirements for conducting construction. As recommended above, the general contractor(s) should be a member of the design team as a party to developing these documents insuring practicality of and commitment to the program. Some of the specific elements that should be considered for inclusion in the documents are:

- Limiting the scope of the construction work, by for example retaining existing sidewalks in the North and Central Malls to the maximum extent;

- Adopting an innovative track stab design that limits its depth (14" to 16") to minimize potential conflicts with existing utilities;

- Including public and private utility work within the scope of work performed by the general contractor so that the utility work can be more close integrated with other construction activities, eliminating time separations, contingencies and the potential for dead time;

- Providing for double and triple shifting, as well as 7-day work weeks, consistent with requirements of adjacent businesses (hotels vs. retailing), manpower availability and critical schedule benefits;

- Re-examining the need to relocate utilities from beneath the light rail track slab and investigating alternative means of accessing the utilities in order to allow them to remain;

- Revising Bureau of Water Works requirements to replace existing lines with new coated and bonded water lines adjacent to and within 100 feet of light rail in addition to cathodic protection built into the light rail track design, using the standard for water line reconstruction used on the downtown Banfield Light Rail project work;

- Providing for contractor incentives and liquidated damages by offering payments to the contractor for early completion and requiring payments by the contractor for late performance;

- Maintaining any required vehicular traffic and all pedestrian access to ground floor entrances and businesses;

- Establishing milestone dates for completing segments in accordance with the phasing and scheduling plan;

- Providing for a Thanksgiving to New Years work moratorium, the Rose Festival and other special events as appropriate; and

- Maintaining site cleanliness and orderliness including separate contractors to perform extraordinary cleaning tasks that may fall outside of the general contractor(s) responsibility.

Special Programs

In addition to contract document requirements set out above, the project management organization (the downtown light rail committee described above) should consider undertaking a series of special programs during construction aimed at mitigating the impacts of light rail construction on businesses and properties in the downtown. These should include:

- Conducting regular weekly community meetings to identify, discuss and resolve current construction problems with the project management staff and property and business owners and residents directly affected by the construction

- Assigning several field personnel to facilitate direct on-site communications between the project management staff and business owners and residents directly affected by the construction;

- Establishing a telephone complaint system staffed with personnel assigned on a 24-hour basis and with adequate authority to direct on-site project management and/or contractor supervisory personnel to initiate immediate corrective action;

- Establishing an on-site field office for project management personnel;

- Maintaining a claims processing program that claims for private property damage caused by construction are promptly processed and settled;

- Monitoring the construction work and diligently administering a schedule to enable accurate advanced notification of future construction work on a block-by-block, business-by-business basis;

- Maintaining Downtown Community Relations and Marketing programs for participation in public programs to promote downtown businesses and provide accurate information, heading off inaccurate new stories about downtown construction problems;

- Considering special mitigation programs such as provisions for new parking to replace parking that is permanently or temporarily displaced by construction, reduced parking cost in the vicinity of construction and reduced transit fares to the downtown.

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Appendix A

Tier I Final Report: Portland CBD Policy

2.5 Portland CBD Alignment Alternative

1. The Surface LRT Alternative on 5th and 6th Avenues within the Portland CBD will be developed in detail for further study within the Tier II DEIS.

2. Because of the critical function that the Portland CBD segment plays in the South/North Corridor, the study of the 5th/6th Avenue Surface Alignment is based upon the following principles:

   [a] To accommodate bus, light rail, general purpose automobile and pedestrian travel on the 5th/6th Avenue Transit Mall.

   [b] To develop for further evaluation Surface LRT Transit Mall design options that accommodate those modes of travel using both a three-lane and a four-lane configuration. The designs will address sidewalk widths, street trees and other amenities which are critical to a pedestrian friendly environment.

   [c] To retain automobile access on essential blocks that directly serve the Hilton Hotel, parking garages that enter and/or exit onto the Transit Mall and other important locations as determined through a collaborative process with interested downtown parties.

   [d] To establish the light rail station locations that will optimize both light rail access and automobile access on the Transit Mall. In general, those locations will be (1) near the PSU campus; (2) near City Hall; (3) near Pioneer Square; (4) south of Burnside; and (5) one or two stations to serve the Old Town, Union Station and north River District areas.

   [e] To work with the Downtown Portland community in developing the Surface LRT Transit Mall options for further study and in selecting the locally preferred alternative.

   [f] To develop the refined surface alternative(s) that address these principles for inclusion in the adoption of the *Detailed Definition of Alternatives Report*, and that if at that time it is concluded that a 5th/6th Avenue Surface Alignment cannot be developed that addresses those principles, other alternatives would be developed for further study within the Draft Environmental Impact Statement.

Appendix B

Downtown Portland Oversight Committee Membership and Charge

Downtown Portland Oversight Committee

W. Charles Armstrong, Chairman, Chief Executive Officer, Bank of America, Chair
Mike Burton, Executive Officer, Metro
Earl Blumenauer, Commisioner, City of Portland
John R. Post, Deputy General Manager, Tri-Met
John Eskildsen, President, US Bank of Oregon
Greg Goodman, Vice President, City Center Parking
Jim Mark, Executive Vice President, Melvin Mark Properties
William S. Naito, Vice President, Norcrest China
Patrick Done, Manager, Pioneer Place
Tammy Hickel, General Manager, Nordstrom - Oregon Region
Lindsay Desrochers, Vice President, PSU Finance and Administration
Philip Kalberer, President, Kalberer Hotel Supply
Vern Rifer, Downtown Community Association
Jordan Schnitzer, Vice President, Harsch Investment
Susan Emmons, Executive Director, Northwest Pilot Projects
E. Kay Stepp, Portland Development Commission
Kerry Kincaid, Downtown Retail Council
Richard Michaelson, President, Planning Commission, City of Portland

Downtown Portland Technical Committee

Greg Baldwin, Zimmer Gunsul Frasca
Gina Whitehill-Baziuk, Metro
Richard Brandman, Metro
David Calver, Tri-Met
Steve Dotterrer, City of Portland
Steffeni Gray, Association for Portland Progress
Steve Iwata City of Portland
Andrew Janssen, Tri-Met
Chris Kopca, Association for Portland Progress
Wendy Smith Novick, City of Portland
Karen Rabiner, City of Portland
Ross Roberts, Tri-Met
Roger Shiels, Shiels Obletz Johnsen
Leon Skiles, Metro
Dave Unsworth, Metro
Rick Williams, Association for Portland Progress

Downtown Mall Surface LRT Alignment Study

Purpose, Oversight Structure and Schedule

Purpose

- To identify the most promising surface light rail transit (LRT) designs for a surface alignment through downtown Portland within the 5th/6th Avenue Transit Mall between Union Station in the north and I-405 in the south.

- Accomplish this task in accordance with the principles established in the *South/North Tier I Final Report*, including the need to accommodate bus, light rail, auto and pedestrian travel on the Transit Mall.

- Determine whether those most promising alternatives adequately addresses the established criteria. If the criteria are adequately addressed, then only the surface LRT alternative for downtown Portland will advance into the Tier II Draft Environmental Impact Statement (DEIS) for further study.

- If the criteria are not adequately addressed, then one or more other alternatives within downtown Portland will be developed along with the surface alternative for further study within the Tier II DEIS.

Oversight Structure

Final determination of all alternatives to advance into the Tier II DEIS is made by Metro Council and the C-TRAN Board of Directors. Through their adoption of the *South/North Tier I Final Report* (December 22, 1994), Metro and C-TRAN have directed that a cooperative process be developed between the South/North Study's participating jurisdictions and the downtown Portland community to achieve the purpose described above. As such, Metro Councilor and Chair of the South/North Steering Group, Rod Monroe, has established the Downtown Alignment Oversight Committee and the Downtown Alignment Technical Committee. He has asked that the Oversight Committee be composed of a general cross-section of the downtown community including building owners, retail, business owners, residents from Union Station to Portland State University, Portland State University and the Association for Portland Progress. Their charges is described below:

- **Downtown Alignment Oversight Committee.** The purpose of the Downtown Alignment Oversight Committee is to:

  1) Guide the identification and development of the most promising surface alignments through downtown Portland within the 5th/6th Avenue Transit Mall;

2) Refine the criteria and measures to be used to evaluate the performance of the surface alignment alternatives;

3) Forward a recommendation to the South/North Steering Group on whether the alternatives adequately address those criteria or whether alignment alternatives in addition to the surface alignment on the 5th/6th Avenue Transit Mall should be advanced into the Tier II DEIS.

- **Downtown Alignment Technical Committee.** The purpose of the Downtown Alignment Technical Committee is to manage the preparation of the technical data and documentation that will be prepared to allow the refinement of the downtown surface alignment and that will be used to determine whether the surface alternatives adequately addresses the criteria established by the Oversight Committee. Membership on the Technical Committee includes Metro, Tri-Met and City of Portland staff, Association for Portland Progress Transportation Committee representatives and consultant support.

Schedule

It is anticipated that the majority of technical work required to complete the study will be by the end of April 1995. At that time, the Oversight Committee will determine whether there is adequate information to make an assessment of the surface LRT alternatives' performance. If the technical work appears to be adequate, then the decision-making process will be implemented. If the Oversight Committee determines that additional time and technical work would be beneficial in making the choices, then the schedule could be extended by approximately one month. The Oversight Committee is expected to meet every two to three weeks until the end of April 1995 with a total of about five or six meetings.

Appendix C

Downtown Portland Oversight Committee *Resolution of Findings and Recommendations*

Downtown Portland Oversight Committee

Resolution of Findings and Recommendations Concerning the South/North Light Rail Alignment in Downtown Portland

The Downtown Portland Oversight Committee was formed to:

- Identify the most promising surface light rail transit (LRT) designs for a surface alignment through downtown Portland within the 5th/6th Avenue Transit Mall between Union Station in the north and I-405 in the south.

- Accomplish this task in accordance with the principles established in the *South/North Tier I Final Report*, including the need to accommodate bus, light rail, auto and pedestrian travel on the Transit Mall.

- Determine whether those most promising alternatives adequately address the established criteria. If the criteria are adequately addressed, then only the surface LRT alternative for downtown Portland will advance into the Tier II Draft Environmental Impact Statement (DEIS) for further study.

- If the criteria are not adequately addressed, then one or more other alternatives within downtown Portland will be developed along with the surface alternative for further study within the Tier II DEIS.

First and foremost, because of our commitment to managing growth in the region in a way that preserves and improves our economic health and quality of life, the Downtown Portland Oversight Committee strongly supports the construction of the South/North Light Rail line through downtown Portland to Clackamas and Clark Counties. If funding is limited and the first construction segment cannot be a bi-state project, the Committee endorses the segment from the Blazer Arena, through downtown Portland, to Clackamas Town Center followed by a segment extending north.

Second, after working with the South/North Transit Corridor Study between February and June 1995 to develop and evaluate various options, the Downtown Oversight Committee finds that the following combination of alternatives meets the criteria established by the Committee and that more detailed study of other tunnel and surface street alignments is not warranted.

In addition, the Committee makes the following findings and recommendations to the South/North Steering Group. These findings and recommendations are documented in greater detail in the *Downtown Portland Oversight Committee: Central Business District South/North Light Rail Alignment Recommendations* report (June 1995).

Findings

The Downtown Portland Oversight Committee has found that the recommended alternative described below:

1) Reinforces the goals and objectives of the Central City Plan by supporting existing and future public and private development and investment in a manner that is consistent with commitments dating back to the Downtown Plan which was adopted over 20 years ago;

2) Maintains existing traffic and access patterns on 5th and 6th Avenues and within the Central Business District which supports existing and future businesses and retailing and adds to the activity and quality of the streets;

3) Provides fast and convenient transit service to existing and future downtown office and commercial uses, delivering the most people to where they want to go, maximizing the potential for increased transit ridership to and from the Central City;

4) Maintains the current pedestrian character of the Transit Mall by retaining the sidewalk widths, pedestrian amenities and trees currently in place on the Central and North Mall.

5) Improves the role of the Portland Transit Mall as the central pedestrian boulevard and transit spine in the Downtown and CBD by extending it southward and changing its emphasis to light rail;

6) Ensures the least construction impacts and cost by placing light rail in a location where sidewalk reconstruction, street grade changes, utility relocations and other reconstruction work can be minimized and the benefits of past investments in the North and Central Transit Mall utility relocation, strain pole foundations, sidewalk improvements and surface grade adjustments can be utilized;

7) Offers the opportunity to reconfigure the Central City transit circulation plan, utilizing off-mall service (approximately 25-35 buses per hour by 2015) on other streets, most significantly 10th and 11th Avenues, where development can benefit from improved transit connections to the regional system, Central City Streetcar and intra-downtown circulation within Fareless Square;

8) Provides good light rail access to the River District, University District and River Place/South Waterfront area;

9) Reinforces the multi-modal transportation center concept by providing the best opportunity for a good connection at Union Station between light rail, Amtrak, inter-and intra-City buses and future high speed rail;

10) Provides the opportunity to maintain the function of the Portland Transit Mall while improving its aesthetic environment by minimizing the 'sheet metal' affect while simultaneously maximizing its functional passenger capacity.

11) Creates the opportunity for coordination of construction and funding of improvements to the Central Mall and a funding source to insure that 5th and 6th Avenues can be enhanced to the original demanding Central Mall design standards; and,

12) Fulfills an objective of the Central Mall business community to enhance the pedestrian environment by reducing items on the street and increasing visibility of retailing along 5th and 6th Avenues by removing over half of the existing bus stops, shelters and related items.

Recommendations

The Downtown Portland Oversight Committee makes the following recommendations to the South/North Steering Group (illustrated in Figure 1):

1) That the South/North Light Rail project, between the Clackamas and Clark Counties be funded and constructed and that South/North Light Rail be extended through downtown Portland and if funding is limited and the first construction segment cannot be a bi-state project, the Committee endorses the segment from the Blazer Arena, through downtown Portland, to Clackamas Town Center followed by a segment extending north;

2) That the A-2 Central Mall, B-3 North Mall, C-1 South Mall, S-1 South Entry and N-1 and N-2 North Entry (which is the current preference of the Committee) options meets the criteria established by the Oversight Committee and should be selected for further study within the DEIS;

3) That convenient, readily accessible service be provided to all Central City districts including Riverplace, South Auditorium, Portland State University, Central Business District, Old Town/Chinatown and Union Station. Station stops at these locations should be established even if central city travel time for the LRT is lengthened.

4) That Tri-Met, the City of Portland, Metro and the Downtown Portland business community work to develop a plan for the central city streetcar and a central city transit circulation and facility plan that would spread transit access throughout more of the central city area based upon the results of the DEIS and completed in conjunction with the FEIS.

5) That a high level of urban design standard be developed and implemented guiding the design and construction of the light rail alignment throughout the central city area;

6) That a detailed construction management and mitigation plan be developed for the central city area that would create a *Downtown Portland Construction District.* In addition, a Downtown Portland LRT Committee should be formed to oversee the design, development of contract documents and construction of all work within the Special Downtown Portland

Construction District. Alternative contracting methods should be employed so that a contractor would be selected based upon their experience and qualifications to address the unique requirements of this project (including but not limited to the need to avoid disruption to adjacent businesses, minimize the duration of construction and avoiding displacements), which could mean that the low bidder may not be selected. Finally, the project should implement a temporary traffic management plan and a variety of special programs to mitigate the construction impacts on the central city.

These methods should be based on criteria to be established by the Downtown Portland LRT Committee. Criteria to be considered include a) negotiated rather than low bid contracting, b) incentive and penalty clauses, and c) use of a single prime contractor for LRT and utility construction.

7) Construction time be limited to three months per block in the North Mall, four months per block in the Central Mall, and six months per block in the South Mall and south portals. Major parallel sections of SW 5th and 6th Avenues in the Central Mall shall not be under construction at the same time.

8) The entire central city construction plan, including major utility reconstruction, shall be approved by City Council, such action having been taken after a public hearing.

Adopted

June 29, 1995

W. Charles Armstrong, Chair

June 29, 1995

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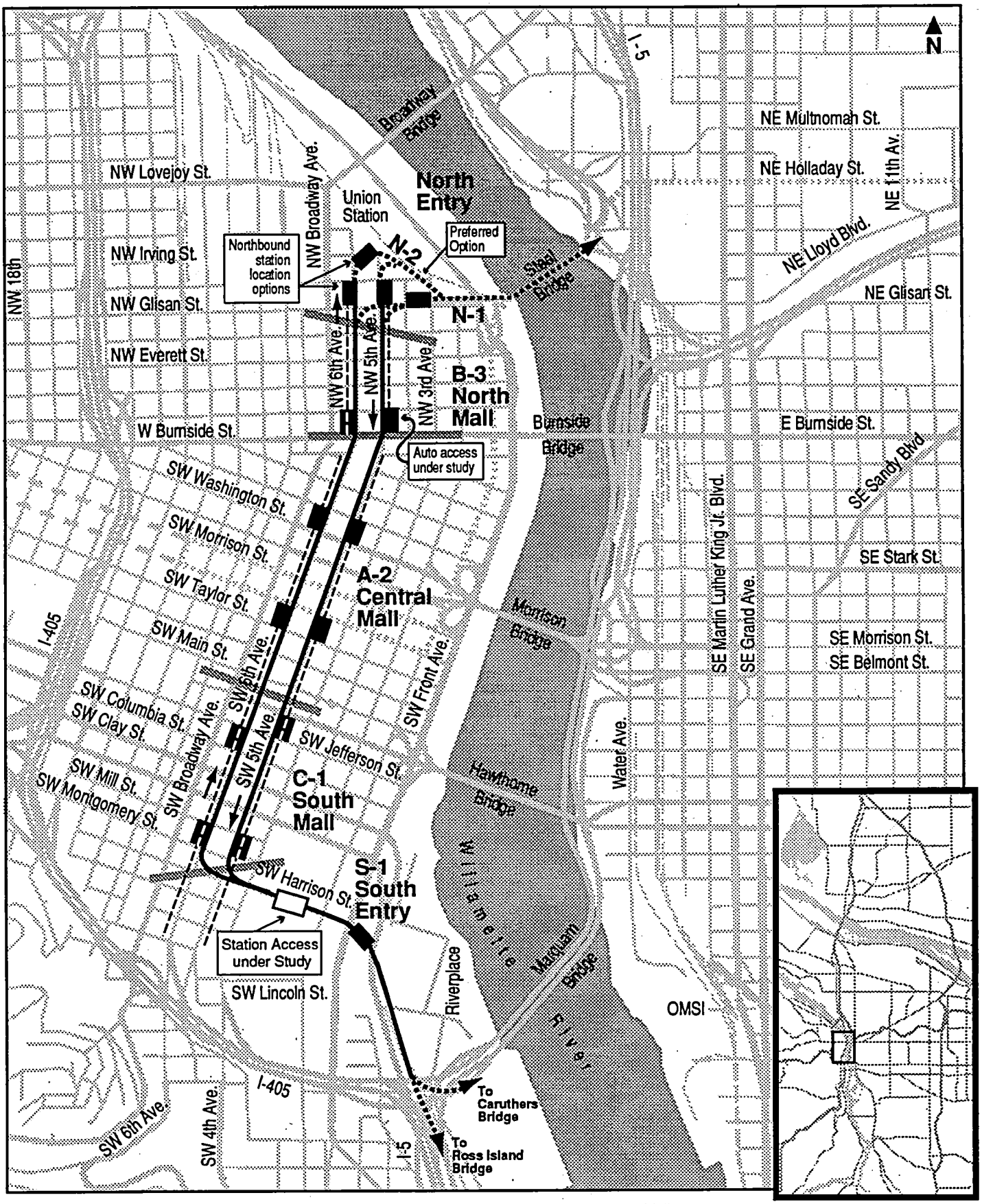

South North Transit Corridor Study

Light Rail Design Option:

Downtown Portland

5th/6th Avenue Surface Couplet

November 1995

- Light Rail Transit (LRT) alignment
- LRT alignment options
- MAX
- Westside LRT
- Existing railroad
- Mall auto access
- Station with no auto access on mall
- Station with auto access on mall

Note: Alignment, station and park and ride locations are currently under study and may change.

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Downtown Portland Oversight Committee

Appendix D

South/North Project Management Group Downtown Portland Recommendation

600 NORTHEAST GRAND AVENUE | PORTLAND, OREGON 97232 2736
TEL 503 797 1700 | FAX 503 797 1797

METRO

Date: October 27, 1995

To: South/North Steering Group

From: Richard Brandman, Chair
South/North Project Management Group

Re: Recommendations for Portland Central Business District

The purpose of this memorandum is to advise you that on October 19, 1995 the South/North Project Management Group (PMG) unanimously endorsed the Downtown Portland Oversight Committee's recommendations concerning light rail alignments in the Portland Central Business District (CBD) to be advanced into the Draft Environmental Impact Statement (CBD) for further study.

The Oversight Committee's recommendation, adopted unanimously on June 30, 1995, and its accompanying technical findings report, are enclosed. The Oversight Committee and its technical committee spent six months thoroughly evaluating a wide range of options for providing light rail transit (LRT) on the mall while accommodating buses, automobiles and pedestrians. The Committee adopted a wide range of criteria, identified in the report, and examined each of the options based upon those criteria. The Committee also considered public comment received at community meetings and written comments received during the study period.

Both the Oversight Committee and the PMG found that the recommended options in downtown Portland meet those criteria and would provide for an efficient transit system while preserving and enhancing the economic health and livability of downtown Portland. In addition, the PMG echoed the recommendation of the Oversight Committee that as the project moves toward construction Tri-Met needs to develop and implement a construction management plan that minimizes both the duration and extent of construction impacts within the downtown Portland. The report identifies a wide range of elements that should be considered for inclusion within the construction management plan.

The two Committees also reviewed previous actions taken by the region to narrow the downtown alignment to surface operations on the 5th/6th Avenue Transit Mall and found that no other surface street or subway alignment within downtown Portland provides a promising alternative to the Mall alignment. Therefore, both Committees recommend that only the surface alignment on the Transit Mall be forwarded into the DEIS for further study.

I look forward to discussing with you these recommendations and the technical work that lead to their adoption. If you have any questions concerning downtown Portland prior to the Steering Group Work Session (Thursday, November 2, 1995, 7:30 - 10:00 a.m.) please contact me at 503/797-1749.

Attachments

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Appendix E

South/North Citizens Advisory Committee Downtown Portland Recommendation

South North
Transit Corridor Study

Staff
Gina Whitehill-Baziuk
Metro
503/797-1746

November 10, 1995

To: Rod Monroe, Chair
South/North Steering Group

From: Rick Williams, Chair
South/North Citizens Advisory Committee

Re: **Downtown Portland Alignment Alternative Recommendation**

Over the past year, the South/North Citizen Advisory Committee (CAC) has been receiving technical information and public testimony concerning a light rail alignment within downtown Portland. On Thursday, November 9, 1995, the CAC adopted its recommendation to the South/North Steering Group for the light rail alignment within downtown Portland that should be studied further within the Draft Environmental Impact Statement (DEIS). The recommendation is the result of the Committee's: 1) review of the technical analysis prepared by project staff; 2) review of the recommendations adopted by the Downtown Portland Oversight Committee and the South/North Project Management Group; and, 3) consideration of public comment.

In forming its recommendation, the CAC first discussed the proposed options for the surface alignment on the 5th/6th Avenue Transit Mall. The range of options considered is outlined in the Oversight Committee's *Portland Central Business District South/North Light Rail Alignment Recommendations* report. The CAC agreed with the Oversight Committee's proposal and voted to recommend the same Transit Mall alignment options to the Steering Group for further study within the DEIS. Following is a summary of the alignment(s) recommended by the CAC for each segment of downtown Portland:

- **Central Mall.** *A-2*: This segment is between Madison Street and Burnside Street. The recommended option would place light rail in the center lane of 5th and 6th Avenues. The center lane would be shared between light rail vehicles and buses. The left lane would be dedicated to general automobile travel (closed at light rail station locations). The right lane would be available for exclusive bus use.

- **North Mall.** *B-3*: This segment is north of Burnside Street to either Glisan or Irving Street near Union Station. The preferred option

South/North
Citizen Advisory Committee

Rick Williams
Chair

would place light rail in the left lane of 5th and 6th Avenues. The right lane would be shared by buses and automobiles.

- **South Mall.** *C-1*: This segment is south of Madison Street to the Portland State University Campus at Harrison Street. The recommended option would place light rail generally on the left side of 5th and 6th Avenues. Buses and automobiles would share two or three lanes (depending upon the block) to the right of the light rail tracks.

- **North Entry.** *N-1 and N-2*: This segment would connect the Mall alignment with the Steel Bridge. N-1 would place light rail in the left lane of Glisan Street and would retain two lanes for automobile traffic on the right. N-2 would extend the light rail alignment past Union Station near Irving Street.

- **South Entry.** *S-1*: This segment connects the Mall alignment with Riverplace. The preferred option would place light rail in a median within Harrison Street.

Second, the CAC considered whether any other option, in addition to the Surface 5th/6th Avenue Transit Mall alignment alternative, should be studied further within the DEIS. The CAC concluded that the proposed Transit Mall alignment adequately addresses the principles and criteria established by Metro Council in December 1994 and by the Downtown Oversight Committee in March 1995. Further, the CAC discussed other surface street alignment options and other subway options and concluded that there were no other promising alignment alternatives within downtown Portland that should be advanced into the DEIS for further study. Therefore, the CAC recommends to the Steering Group that only the Surface Transit Mall alignment alternative with the design options outlined above be carried forward into the DEIS for further study.

In making its recommendations, the CAC noted the wide breadth and high quality of technical analysis that was conducted by the project staff. The CAC was also impressed by the efforts made by the project to involve the downtown community in the study process. Finally, the CAC found that the high level of public comment and attention to the downtown Portland alignment accurately reflects the level of importance of the segment to the downtown community, to the transit system and to the region.

In conclusion, I would like to thank you for your consideration of these recommendations and I look forward to discussing the recommendations and the rationale behind them at your meeting on November 20, 1995. If you have any questions about CAC recommendations prior to that meeting, please contact me at 503/282-3949.

cc: South/North Project Management Group

Appendix F

South/North Steering Group *Resolution of Findings and Recommendations*

I. RESOLUTION OF FINDINGS AND RECOMMENDATIONS CONCERNING THE SOUTH/NORTH LIGHT RAIL ALIGNMENT IN DOWNTOWN PORTLAND

Introduction

In December 1994, the Metro Council and C-TRAN Board of Directors adopted the *South/North Tier I Final Report.* That report identified a surface alternative on the transit mall as the preferred Downtown Portland Light Rail Alignment that should be developed for further study in the Draft Environmental Impact Statement (DEIS). The report further determined that prior to initiating work on the DEIS, the design of the 5th/6th Avenue alignment should be developed in detail to determine whether that alignment adequately addresses various principles also outlined in the report.

The Downtown Portland Oversight Committee was formed in response to those principles to ensure downtown Portland community involvement in developing the surface light rail Transit Mall alignment options for further study and in selecting the locally preferred alternative. In particular, the charge of the oversight committee was to:

- Identify the most promising surface light rail transit (LRT) designs for a surface alignment through downtown Portland within the 5th/6th Avenue Transit Mall between Union Station in the north and I-405 in the south.

- Accomplish this task in accordance with the principles established in the *South/North Tier I Final Report*, including the need to accommodate bus, light rail, auto and pedestrian travel on the Transit Mall.

- Determine whether those most promising alternatives adequately address the established criteria. If the criteria are adequately addressed, then only the surface LRT alternative for downtown Portland will advance into the Tier II Draft Environmental Impact Statement (DEIS) for further study.

- If the criteria are not adequately addressed, then one or more other alternatives within downtown Portland will be developed along with the surface alternative for further study within the Tier II DEIS.

The findings and recommendations of the Oversight Committee were unanimously adopted on June 29, 1995 and are documented in: 1) *Resolution of Findings and Recommendations Concerning the South/North Light Rail Alignment in Downtown Portland: Downtown Portland Oversight Committee*; and 2) *Central Business District, Portland, Oregon, South/North Light Rail Alignment Recommendations Report.* Recommendations for the Downtown Portland Alignment were also adopted by the South/North Project Management Group (PMG) on October 19, 1995 and by the South/North Citizens Advisory Committee (CAC) on November 9, 1995. Those findings and recommendations form the basis of the South/North Steering Group's recommendation for downtown Portland.

In summary, the South/North Steering Group finds that the following combination of alternatives meets the principles established by the Metro Council and the C-TRAN Board and that more detailed study of other tunnel and surface street alignments is not warranted. In addition, the Steering Group makes the following findings and recommendations to the Metro Council. These findings and recommendations are documented in greater detail in the following chapters of this report.

Findings

The South/North Steering Group has found that the recommended surface LRT Transit Mall alternative and design options:

1) Reinforce the goals and objectives of the Central City Plan by supporting existing and future public and private development and investment in a manner that is consistent with commitments dating back to the Downtown Plan which was adopted over 20 years ago;

2) Maintain existing traffic and access patterns on 5th and 6th Avenues and within the Central Business District (CBD) which supports existing and future businesses and retailing and adds to the activity and quality of the streets;

3) Provide fast and convenient transit service to existing and future downtown office and commercial uses, delivering the most people to where they want to go, maximizing the potential for increased transit ridership to and from the Central City;

4) Maintain the current pedestrian character of the Transit Mall by retaining the sidewalk widths, pedestrian amenities and trees currently in place on the Central and North Mall;

5) Improve the role of the Portland Transit Mall as the central pedestrian boulevard and transit spine in the Downtown and CBD by extending it southward and changing its emphasis to light rail;

6) Ensure the least construction impacts and cost by placing light rail in a location where sidewalk reconstruction, street grade changes, utility relocations and other reconstruction work can be minimized and the benefits of past investments in the North and Central Transit Mall utility relocation, strain pole foundations, sidewalk improvements and surface grade adjustments can be utilized;

7) Offer the opportunity to reconfigure the Central City transit circulation plan, utilizing off-mall service (approximately 25-35 buses per hour by 2015) on other streets, most significantly 10th and 11th Avenues, where development can benefit from improved transit connections to the regional system, Central City Streetcar and intra-downtown circulation within Fareless Square;

8) Provide good light rail access to the River District, University District and River Place/South Waterfront area;

9) Reinforce the multi-modal transportation center concept by providing the best opportunity for a good connection at Union Station between light rail, Amtrak, inter- and intra-city buses and future high speed rail;

10) Provide the opportunity to maintain the function of the Portland Transit Mall while improving its aesthetic environment by minimizing the 'sheet metal' affect while simultaneously maximizing its functional passenger capacity;

11) Create the opportunity for coordination of construction and funding of improvements to the Central Mall and a funding source to insure that 5th and 6th Avenues can be enhanced to the original demanding Central Mall design standards; and,

12) Fulfill an objective of the Central Mall business community to enhance the pedestrian environment by reducing items on the street and increasing visibility of retailing along 5th and 6th Avenues by removing over half of the existing bus stops, shelters and related items.

Recommendations

The South/North Steering Group makes the following recommendations to the Metro Council (illustrated in Figure 1):

1) That the South/North Light Rail project, between Clackamas and Clark Counties, be funded and constructed and that South/North Light Rail be extended through downtown Portland;

2) That the A-2 Central Mall, B-3 North Mall, C-1 South Mall, S-1 South Entry and N-1 and N-2 North Entry options meet the principles established by the Metro Council and should be selected for further study within the DEIS;

3) That convenient, readily accessible service be provided to all Central City districts including Riverplace, South Auditorium, Portland State University, Central Business District, Old Town/Chinatown and Union Station. Station stops at these locations should be established even if central city travel time for the LRT is lengthened. (The number and location of stations will be determined following publication of the DEIS and prior to publication of the FEIS.)

4) That Tri-Met, the City of Portland, Metro and the Downtown Portland business community work to develop a plan for the central city streetcar and a central city transit circulation and facility plan that would spread transit access throughout more of the central city area based upon the results of the DEIS and completed in conjunction with the FEIS.

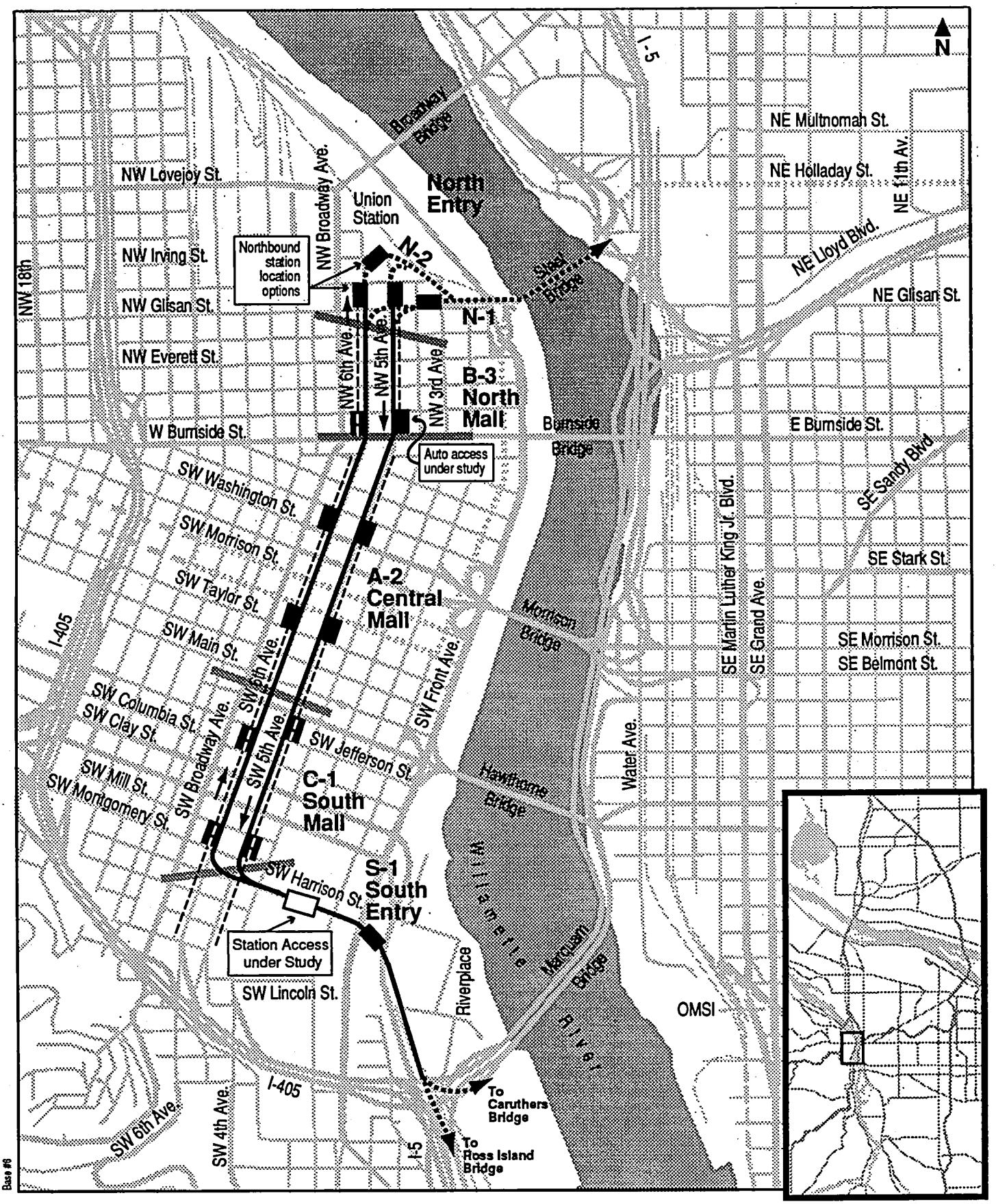
5) That a high-level, urban design standard be developed and implemented guiding the design and construction of the light rail alignment throughout the central city area;

6) That a detailed construction management and mitigation plan be developed for the central city area that would create a *Downtown Portland Construction District.* In addition, a Downtown Portland LRT Committee should be formed to oversee the design, development of contract documents and construction of all work within the Special Downtown Portland Construction District. Alternative contracting methods should be employed so that a contractor would be selected, based upon their experience and qualifications, to address the unique requirements of this project (including but not limited to the need to avoid disruption to adjacent businesses, to minimize the duration of construction and to avoid displacements); consequently, the low bidder may not be selected. Finally, the project should implement a temporary traffic management plan and a variety of special programs to mitigate the construction impacts on the central city.

   These methods should be based on criteria to be established by the Downtown Portland LRT Committee. Criteria to be considered include: a) negotiated rather than low-bid contracting; b) incentive and penalty clause; and, c) use of a single prime contractor for LRT and utility construction.

7) Construction time should be limited to three months per block in the North Mall, four months per block in the Central Mall, and six months per block in the South Mall and south portals. Major parallel sections of SW 5th and 6th Avenues in the Central Mall should not be under construction at the same time.

8) The entire central city construction plan, including major utility reconstruction, should be approved by Portland City Council, such action having been taken after a public hearing.



South North Transit Corridor Study

Recommended Light Rail Design Options:

Downtown Portland

5th/6th Avenue Surface Couplet

November 1995

Figure A

- Light Rail Transit (LRT) alignment
- LRT alignment options
- MAX
- Westside LRT
- Existing railroad
- Mall auto access
- Station with no auto access on mall
- Station with auto access on mall

Note: Alignment, station and park and ride locations are currently under study and may change.

0 1/8 1/4

MILE

Downtown Portland Oversight Committee

Appendix G

Participating Jurisdiction Recommendations

RESOLUTION 95-11-98

RESOLUTION 95-11-98 OF THE TRI-COUNTY METROPOLITAN TRANSPORTATION DISTRICT OF OREGON (TRI-MET) ENDORSING THE STEERING GROUP RECOMMENDATIONS ON DESIGN OPTION NARROWING FOR THE SOUTH/NORTH TRANSIT CORRIDOR STUDY

WHEREAS, In April 1993, the Metro Council adopted Resolution No. 93-1784 and the C-TRAN Board of Directors adopted Resolution BR-93-004 selected the Milwaukie and I-5 North Corridors as the region's next high-capacity transit priority for study and combined them into the South/North Transit Corridor to be studied within a federal Draft Environmental Impact Statement; and

WHEREAS, In October 1993, the Federal Transit Administration approved the South/North application to initiate Alternatives Analysis/Draft Environmental Impact Statement and the South/North Preliminary Work Plan, and issued notification of intent in the *Federal Register* to publish a South/North Environmental Impact Statement; and

WHEREAS, The role of the Steering Group in terminus and alignment alternative narrowing process is to forward its recommendations to participating jurisdictions for their consideration, that participating jurisdictions are to forward their commendations to the C-TRAN Board of Directors and the Metro Council who are to make the final determination of the alternatives to advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, The role of the South/North Steering Group in the design option narrowing for the selected terminus and alignment alternatives is to consider recommendations from the South/North Project Management Group and Citizen Advisory Committee and to finalize which design option(s) will advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, In December 1994, the Metro Council adopted Resolution No. 94-1989 and the C-TRAN Board of Directors adopted Resolution No. BR-94-011 which identified the Phase One terminus alternatives and selected alignment alternatives to advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, In December 1994 within the same resolution the Metro Council and the C-TRAN Board of Directors also determined that within the Portland central business district, a surface light rail transit alternative on 5th and 6th Avenues shall be developed based upon several principles. if prior to initiation of the Draft Environmental Impact Statement it is concluded that a 5th/6th Avenue alignment cannot be developed that addresses those principles, other alternatives will be developed for further study in the Draft Environmental Impact Statement; and

WHEREAS, In March 1995, the South/North Steering Group determined that both the Caruthers and Ross Island Crossing alternatives and that both the I-5 and Interstate Avenue alignment alternatives would advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, In August 1995, the C-TRAN Board of Directors adopted resolution No. 95-048 which amended the Phase One northern terminus from the vicinity of 99th Avenue in Hazel Dell, Washington to the Veterans Administration Hospital/Clark College in Vancouver, Washington; and

WHEREAS, The alignment design options currently under study have been developed and evaluated based upon the criteria and measures from the *Evaluation Methodology Report* and documented within various technical memoranda, including the *South/North Design Option Narrowing Report* and the *Design Option Briefing Document*; and

WHEREAS, A comprehensive public involvement program for the design option narrowing process was developed and implemented by the South/North Study that included, but was not limited to, numerous community meetings, a 45-day public comment period, public meetings for the Steering Group to receive oral comment and an ongoing Citizens Advisory Committee that provided regular public comment opportunities; and

WHEREAS, Various options for a 5th/6th Avenue surface light rail alignment were evaluated by the Downtown Portland Oversight Committee which determined that the recommended design option on 5th/6th Avenues adequately addresses the criteria established by Metro Council, the C-TRAN Board of Directors and the Oversight Committee and should therefore be exclusively studied further within the Draft Environmental Impact Statement; and

WHEREAS, In October and November 1995, the Project Management Group and the Citizens Advisory Committee formed independent design option narrowing recommendations and downtown Portland alignment alternative recommendations and forwarded them to the Steering Group for consideration; and

WHEREAS, In November 1995, the Steering Group adopted the South/North *Design Option Narrowing Final Report* which identifies the design options that best meet the project's adopted goal and objectives and that will advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, In November 1995, the Steering Group adopted the proposed light rail alignment design for 5th/6th Avenues in downtown Portland; and

NOW, THEREFORE BE IT RESOLVED, That the Tri-Met Board supports the Steering Group's recommendation that the downtown Portland design option which would generally retain current automobile access and pedestrian facilities, which would generally provide for a lane of joint bus and light rail operations and a lane of exclusive bus operations on 5th/6th Avenues adequately addresses the criteria

established by Resolution No. 94-1989 as adopted by the Metro Council and the C-TRAN Board of Directors, and should therefore be exclusively studied further within the Draft Environmental Impact Statement and the Steering Group *South/North Tier I Final Recommendation Report* should be adopted by Metro Council as the *South/North Downtown Portland Tier I Final Report.*
And further,

NOW, THEREFORE BE IT RESOLVED, That the Tri-Met Board supports the design options selected by the South/North Steering Group for further study within the Draft Environmental Impact Statement as described in the *Design Option Narrowing Final Report* which are generally as follows:

1. *Minimum Operable Segments.* (a) A full-length project from the vicinity of the Clackamas Regional Center, through downtown Milwaukie, Portland and Vancouver, to the vicinity of the Veterans Administration Hospital/Clark College; (b) a bi-state minimum operable segment from the vicinity of downtown Milwaukie/Market Place station and park-and-ride lot to the vicinity of the Veterans Administration Hospital/Clark College; and (c) three Oregon-only minimum operable segments each with a southern terminus in the vicinity of the Clackamas Regional Center and a northern terminus at : a) the vicinity of the Rose Quarter; b) the vicinity of the Edgar Kaiser Medical Center; or, c) the vicinity of the Expo Center.

2. *South Terminus.* North of Clackamas Town Center alignment with a Sunnyside Park-and-Ride Terminus east of I-205; and, South of Clackamas Town Center alignment with an 93rd Avenue Town Center Area Terminus.

3. *Railroad Avenue/Highway 224.* Alignment adjacent to Railroad Avenue.

4. *Downtown Milwaukie.* McLoughlin Boulevard/Main Street with a Monroe Street Alignment; and, Southern Pacific Branch Line with a Monroe Street alignment.

5. *Ross Island Crossing.* North Ross Island Crossing alignment with a West of McLoughlin Boulevard sub-option.

6. *Caruthers Crossing and Southeast Portland.* Caruthers Modified with a West of Brooklyn Yards alignment.

7. *Steel Bridge to Kaiser.* East I-5/Kerby Avenue alignment; and, Wheeler Avenue/Russell Avenue alignment.

8. *North Portland.* All-I-5 alignment; and, All-Interstate Avenue. (Following completion of the Results Reports for the Draft Environmental Impact Statement, staff will report back to the Project Management Group, the Citizen's Advisory Committee and the Steering Group to determine which crossover warrants further study in the environmental impact statement.

9 *Hayden Island*. West of I-5 (under ramps).

10. *Columbia River Crossing.* Low-level lift span.

11. *Downtown Vancouver.* Two-way on Washington Street.

Dated: November 22, 1995

Presiding Officer

Attest:

Recording Secretary

Approved as to Legal Sufficiency:

Legal Department

RESOLUTION NO. 35473

Adopt the South/North Steering Group's design option recommendations for further study within the Tier II, Draft Environmental Impact Statement Process. (Resolution)

WHEREAS, in April 1993, the Metro Council adopted Resolution No 93-1784 and the C-TRAN Board of Directors adopted Resolution No. BR-93-9404 which selected the Milwaukie and I-5 North Corridors as the region's next high-capacity transit priority for study and combined them into the South/North Transit Corridor to be studied within a federal Draft Environmental Impact Statement; and

WHEREAS, in October 1993, the Federal Transit Administration approved the South/North application to initiate Alternatives Analysis/Draft Environmental Impact Statement and the South/North Preliminary Work Plan, and issued notification of intent in the *Federal Register* to publish a South/North Environmental Impact Statement; and

WHEREAS, the role of the South/North Steering Group in terminus and alignment alternative narrowing process is to forward its recommendations to participating jurisdictions for their consideration, that participating jurisdictions are to forward their commendations to the C-TRAN Board of Directors and the Metro Council who are to make the final determination of the alternatives to advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, the role of the South/North Steering Group in the design option narrowing for the selected terminus and alignment alternatives is to consider recommendations from the South/North Project Management Group and Citizen Advisory Committee and to finalize which design option(s) will advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, in December 1994, the Metro Council adopted Resolution No. 94-1989 and the C-TRAN Board of Directors adopted Resolution No. BR-94-011 which identified the Phase One terminus alternatives and selected most of the alignment alternatives to advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, in December 1994 within the same resolution the Metro Council and the C-TRAN Board of Directors also determined that within the Portland central business district, a surface light rail transit alternative on 5th and 6th Avenues shall be developed based upon several principles and that if prior to initiation of the Draft Environmental Impact Statement it is concluded that a 5th/6th Avenue alignment cannot be developed that addressed those principles, other alternatives will be developed for further study in the Draft Environmental Impact Statement; and

WHEREAS, in March 1995, the South/North Steering Group determined that both the Caruthers and Ross Island Crossing alternatives and that both the I-5 and Interstate Avenue alignment alternatives would advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, in August 1995, the C-TRAN Board of Directors adopted resolution No. 95-048 which amended the Phase One northern terminus from the vicinity of 99th

35473

Avenue in Hazel Dell, Washington to the Veterans Administration Hospital/Clark College in Vancouver, Washington; and

WHEREAS, the alignment design options currently under study have been developed and evaluated based upon the criteria and measures from the *Evaluation Methodology Report* and documented within various technical memoranda, including the *South/North design Option Narrowing Report* and the *Design Option Briefing Document*; and

WHEREAS, a comprehensive public involvement program for the design option narrowing process was developed and implemented by the South/North Study that included, but was not limited to, numerous community meetings, a 45-day public comment period, public meetings for the Steering Group to receive oral comment and an ongoing Citizens Advisory Committee that provided regular public comment opportunities; and

WHEREAS, various options for a 5th/6th Avenue surface light rail alignment were evaluated by the Downtown Portland Oversight Committee which determined that the recommended design option on 5th/6th Avenues adequately addresses the criteria established by Metro Council, the C-TRAN Board of Directors and the Oversight Committee and should therefore be exclusively studied further within the Draft Environmental Impact Statement; and

WHEREAS, in October and November 1995, the Project Management Group and the Citizens Advisory Committee formed independent design option narrowing recommendations and downtown Portland alignment alternative recommendations and forwarded them the Steering Group for consideration; and

WHEREAS, in November 1995, the Steering Group adopted the *South/North Design Option Narrowing Final Report* (Exhibit A) which identifies the design options that best meet the project's adopted goal and objectives and that will advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, in November 1995, the Steering Group adopted the proposed light rail alignment for 5th/6th Avenues in downtown Portland;

THEREFORE, BE IT RESOLVED, by the Council of the City of Portland, a municipal corporation of the State of Oregon, has determined that the downtown Portland design option which would generally retain current automobile access and pedestrian facilities, which would generally provide for a lane of joint bus and light rail operations and a lane of exclusive bus operations on 5th/6th Avenues adequately addresses the criteria established by Resolution No. 94-1989 as adopted by the Metro Council and the C-TRAN Board of Directors and shall therefore be exclusively studied further within the Draft Environmental Impact Statement, and that Exhibit B is adopted as the *South/North Downtown Portland Tier I Final Report*; and

BE IT FURTHER RESOLVED, that the Council supports amending the South/North Phase One northern terminus to be in the vicinity of the Veterans Administration Hospital and Clark College in Vancouver, Washington; and

BE IT FURTHER RESOLVED, that the Council concurs with the design options selected by the South/North Steering Group for further study within the Draft Environmental

35473 !

Impact Statement as described in the *Design Option Narrowing Final Report* (Exhibit A) which are generally as follows:

1. *Minimum Operable Segments*. (a) A full-length project form the vicinity of the Clackamas Regional Center, through downtown Milwaukie, Portland and Vancouver, to the vicinity of the Veterans Administration Hospital/Clark College; (b) a bi-state minimum operable segment form the vicinity of downtown Milwaukie/Market Place station and park-and-ride lot to the vicinity of the Veterans Administration Hospital/Clark College; and (c) three Oregon-only minimum operable segments each with a southern terminus in the vicinity of the Clackamas Regional Center and a northern terminus at: a) the vicinity of the Rose Quarter; b) the vicinity of the Edgar Kaiser Medical Center; or, c) the vicinity of the Expo Center.
2. *South Terminus*. North of Clackamas Town Center alignment with a Sunnyside Park-and-Ride Terminus east of I-205; and, South of Clackamas Town Center alignment to S.E 93rd Avenue Clackamas Town Center area Terminus.
3. *Railroad Avenue/Highway 224*. Alignment adjacent to Railroad Avenue.
4. *Downtown Milwaukie*. McLaughlin Boulevard/Main Street with a Monroe Street Alignment; and, Southern Pacific Branch Line with a Monroe Street alignment.
5. *Ross Island Crossing*. North Ross Island Crossing alignment with a West of McLoughlin Boulevard sub-option.
6. *Caruthers Crossing and Southeast Portland*. Caruthers Modified with a West of Brooklyn Yards alignment.
7. *Steel Bridge to Kaiser*. East 1-5/Kerby Avenue alignment; and, Wheeler Avenue/Russell Avenue alignment.
8. *North Portland*. All-I-5 alignment; and, All-Interstate Avenue (Metro work with Tri-Met and City staff to evaluate, as soon as the technical data for the DEIS is available, which North Portland crossover option warrants further study; and staff will report back to the South/North Project Management Group, Citizen Advisory Committee and Steering Group).
9. *Hayden Island*. West of I-5 (under ramps).
10. *Columbia River Crossing*. Low-level lift span.
11. *Downtown Vancouver*. Two-way on Washington Street; and

Adopted by the Council, DEC 0 7 1995

Commissioner Earl Blumenauer
Stephen Iwata

December 7, 1995

By Auditor of the City of Portland
Linda O'Kan
Deputy

Appendix H

Metro Council Resolution No. 95-2243 and Staff Report

STAFF REPORT

CONSIDERATION OF RESOLUTION NO. 95-2243 FOR THE PURPOSE OF STUDYING THE SOUTH/NORTH DOWNTOWN PORTLAND ALIGNMENT OPTIONS AND AN AMENDED NORTH TERMINUS OPTION IN THE DEIS, CONCURRING WITH THE SOUTH/NORTH STEERING GROUP'S SELECTION OF DESIGN OPTIONS, AND ADOPTING THE MAJOR INVESTMENT STUDY FINAL REPORT

Date: November 30, 1995 Presented by: Richard Brandman

PROPOSED ACTION

Adoption of this resolution would:

1. Determine the alignment alternative and design options within downtown Portland that will be studied further within the Draft Environmental Impact Statement (DEIS);

2. State Metro Council's concurrence with the design options selected by the South/North Steering Group for further study within the DEIS;

3. Determine, consistent with an action previously taken by the C-TRAN Board of Directors, that the Phase One terminus for study within the DEIS will be in the vicinity of the Veterans Administration Hospital and Clark College until the Clark County Transportation Futures process concludes; and

4. Adopt the *Major Investment Study Final Report* documenting the South/North Tier I process, reports and conclusions, which included the locally preferred design concept and scope for the South/North Corridor.

5. Direct staff to prepare travel demand forecasts for the South/North DEIS that use as a basis the 2015 household and employment forecast completed in December 1995 which assumes a 4,000-5,000-acre Urban Growth Boundary (UGB) expansion.

TPAC has reviewed the proposed South/North LRT options and accompanying reports and recommends approval of Resolution No. 95-2243.

The South/North Steering Group unanimously recommends approval of Resolution No. 95-2243.

BACKGROUND

Resolution No. 95-2243 would address four issues related to the South/North Transit Corridor Project: 1) Downtown Portland alignments; 2) Design option narrowing; 3) The northern Phase One

terminus for study in the DEIS; and 4) The *Major Investment Study Final Report*. Following is a discussion of each of those issues as they relate to the proposed resolution.

Downtown Portland Alignments

During the South/North Preliminary Alternatives Analysis, the Scoping Process and Tier I, a wide range of alternatives within downtown Portland was evaluated and screened from further study. That screening process reached a major milestone in December 1994, when the Metro Council and the C-TRAN Board of Directors adopted Resolution No. 94-1989 and Resolution No. BR-94-011, respectively, and the *Tier I Final Report*. Within the *Final Report*, the Metro Council and the C-TRAN Board selected a surface light rail alignment on 5th and 6th Avenues (the Transit Mall) as the alternative alignment within downtown Portland to advance into the DEIS for further study. The Tier I narrowing process also concluded that a subway alternative should be removed from further consideration.

In selecting the surface light rail alignment on 5th and 6th Avenues, Metro Council identified a list of conditions placed upon its action. In summary, it was determined that prior to initiating work on the DEIS, a six-month detailed study of the 5th/6th surface alternative be conducted to ensure that the selected alternative could adequately address various principles, most importantly, that light rail, buses, pedestrians and automobiles could be accommodated on the Transit Mall and that the economic vitality of downtown Portland would be preserved and enhanced. To ensure that a broad base of interests would be addressed in the study, the principles also stated that the downtown alignment study would be performed in close coordination with the downtown Portland community.

In January 1995, the South/North Steering Group initiated the Downtown Portland Alignment Study by appointing the Downtown Portland Oversight Committee. The Oversight Committee was made up of downtown property and business owners and downtown residents. A full listing of the committees' memberships can be found in Exhibit B.

Through the six-month study, the Downtown Oversight Committee adopted criteria and measures, identified design options, developed and evaluated a wide range of technical information on those options, participated in a field trip on the Mall during the peak evening rush hour and conducted a variety of public involvement activities. Details of the study process and results can be found in Exhibit B.

On June 29, 1995, following this extensive and detailed analysis, the Downtown Portland Oversight Committee unanimously adopted its recommendation that the surface light rail alternative on 5th and 6th Avenues be studied within the DEIS and that no other surface street or subway alternatives be studied further. The Committee

also recommended specific design options for each segment of downtown Portland that should be studied in greater detail within the DEIS. A detailed description of those recommended options can be found in Exhibit B.

The Committee based its recommendation on the recognition that the Downtown Portland Plan has been implemented through over 20 years of public and private investments in downtown Portland. Those investments have created a high density spine of development along 5th and 6th Avenues that is designed to be served by the Transit Mall. The Committee also noted strong concern about potential construction impacts. The Committee proposed a wide range of construction management and mitigation techniques that should be considered for inclusion within the South/North construction plan for downtown Portland.

Following the Oversight Committee, the South/North Project Management Group, the Citizens Advisory Committee and the Steering Group unanimously endorsed the Oversight Committee's recommendations. Recommendations from the Tri-Met Board of Directors and the City of Portland are scheduled to be adopted prior to consideration of this resolution by Metro Council.

Design Option Narrowing

The purpose of the design option narrowing process is to define in a higher level of detail the alignment options to be studied further within the DEIS. The corridor has been divided into eleven segments, with two to nine alignment design options in each segment. Data on the design options has been developed that addresses the various criteria and measures for design option narrowing, adopted by the South/North Steering Group in the *Tier I Evaluation Methodology Report* (Metro: December 1993). The methods and data are documented in the *Design Option Narrowing Technical Summary Report* and the *Design Option Narrowing Briefing Document*. The draft *Technical Summary Report* was reviewed by the Expert Review Panel in June 1995. The Panel found that the methods and data are appropriate and adequate for making the narrowing choices within this phase of the project. A listing of the design options considered and a summary of the data on each of the options is included within Exhibit A.

A 45-day public comment period was offered between June 1 and July 15, 1995, which included meetings conducted by the South/North Steering Group to receive public comment. In addition, public comments were received over the Metro Hotline, through the mail, at each of the CAC meetings and through a variety of community meetings held throughout the Corridor. Documentation of comments received concerning design option narrowing can be found in the *Design Option Narrowing Public Comment Report* (Metro: October 1995).

In September 1995, following review of the technical information and public comment, the PMG adopted the *Design Option Narrowing*

Final Recommendation Report which identified the design options within each segment proposed by the PMG to be studied further within the DEIS. The CAC considered the PMG recommendations and adopted its own independent recommendations in October 1995. The Steering Group considered both recommendations, public comment and the technical data and adopted the *Design Option Narrowing Final Report* which identifies the design options to advance into the DEIS for further study.

As indicated in the *Evaluation Methodology Report*, the Steering Group has the responsibility to determine which design options are to advance into the DEIS for further study. However, participating jurisdictions were afforded the opportunity to review and comment on those design options. Metro is one of several participating jurisdictions given the opportunity to review and comment on the *Design Option Narrowing Final Report* (Exhibit A). Approval of Resolution No. 95-2243 would voice Metro Council's concurrence with the set of design options selected by the Steering Group.

A detailed description of the options, the rationale for their selection and a listing of issues associated with the options are included within Exhibit A.

Northern Phase One Terminus

The *Tier I Final Report* identified the terminus options selected by Metro Council and the C-TRAN Board of Directors to be studied within the DEIS. It also noted that the South/North Corridor would be developed in two distinct phases. The Clackamas Town Center Area and the vicinity of 99th Avenue in Hazel Dell were selected as the southern and the northern termini for Phase One. The Phase Two termini were identified as Oregon City in the south and 134th Avenue in the north.

Subsequently, in August 1995, following an extensive public effort to initiate the Clark County Transportation Futures Process, the C-TRAN Board of Directors amended the Phase One terminus for study within the DEIS to be in the vicinity of the Veterans Administration Hospital and Clark College near I-5 just north of downtown Vancouver until the Transportation Futures Process concludes in 1996. The southern termini and the Phase Two northern terminus were unchanged.

MIS Final Report

The South/North Transit Corridor Study was initiated in April 1993 with the selection of the priority corridors by the Metro Council and the C-TRAN Board of Directors. In October 1993, the Federal Transit Administration (FTA) approved Metro's request to advance the Corridor into Alternatives Analysis and issued notification in the *Federal Register* of its intent to publish a South/North DEIS. Subsequently, in November 1993, FTA and FHWA issued the Metropolitan Planning Rule which established

guidelines for the Major Investment Study (MIS) process which replaced the Alternatives Analysis process previously used for light rail planning purposes.

The new guidelines also provided for consultations between local and federal governments to determine how studies initiated under the Alternatives Analysis guidelines (*transitional projects*) should be modified to comply with the MIS requirements. A consultation for the South/North study was held in December 1994, where it was determined that the South/North Study would conclude by addressing the MIS requirements, documented within an *MIS Final Report*. The report would document alternatives previously studied within the Corridor and the locally preferred design concept and scope selected by the study to be included within the Regional Transportation Plan.

The locally preferred design concept and scope was adopted through the Tier I process of Scoping and narrowing of alignment and terminus alternatives. The federally mandated financially constrained Regional Transportation Plan, which includes the locally preferred design concept and scope for the South/North Corridor, was adopted by Metro Council in May 1995.

Resolution No 95-2243 would adopt the *MIS Final Report* (Exhibit C) which documents the Tier I process leading to the selection of the locally preferred design concept and scope for the South/North Corridor, and subsequently included in the Regional Transportation Plan.

2015 Household and Employment Forecast for South/North DEIS

The Metro Growth Management staff have recently completed a month's long process in conjunction with the region's jurisdictions and government agencies to prepare a 2015 household and employment forecast that is consistent with the adopted 2040 Concept Plan. As an initial step, this process identified the overall regional level of household and employment growth and reached a regional consensus on the allocation of this growth to 20 districts throughout the region including Clark County, Washington.

Metro staff then worked closely with jurisdiction staff to further refine the growth allocation from the 20-district level to the 1260 transportation analysis zones (TAZ's) used for the travel demand modeling. This TAZ allocation process was completed in early December 1995 with the assumption of a 4,000-5,000-acre expansion of the UGB. Metro staff will continue to work with jurisdiction staff to develop a second round of TAZ growth allocations that are based on an assumption of no expansion of the UGB.

Metro staff have coordinated the development of a 2015 Clark County growth allocation with staff from the Southwest Washington Regional Transportation Council (RTC). RTC has worked with the

jurisdictions in Clark County to prepare a TAZ allocation that is consistent with the allocation prepared for the Oregon portion of the region.

The South/North DEIS work needs to proceed as quickly as possible in order to meet key federal funding deadlines. A critical early task in the preparation of the DEIS is the production of travel demand forecasts. These forecasts are used in a wide range of analyses including traffic impacts, transit impacts, transit ridership, noise and vibration impacts, energy impacts and air quality impacts. For federal purposes, these forecasts could be considered conservative in that a smaller UGB expansion would slightly increase South/North Corridor transit ridership.

Resolution No. 95-2243 would direct staff to use the December 1995 TAZ allocation as the basis for travel demand forecasting for the South/North DEIS. This direction would apply to all of the evaluation measures in the South/North DEIS but would not apply to any other studies at this time. Use of this forecast for the South/North LRT DEIS would not preclude adoption by Metro Council of a forecast that assumes a smaller expansion of the UGB at a later date. The South/North Project Management Group, which consists of all the participating jurisdictions in the project, unanimously recommends this approach.

BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF STUDYING THE SOUTH/NORTH DOWNTOWN PORTLAND ALIGNMENT OPTIONS AND AN AMENDED NORTH TERMINUS OPTION IN THE DEIS, CONCURRING WITH THE SOUTH/NORTH STEERING GROUP'S SELECTION OF DESIGN OPTIONS, AND ADOPTING THE MAJOR INVESTMENT STUDY FINAL REPORT	) RESOLUTION NO. 95-2243)) Introduced by:) Councilor Monroe))))

WHEREAS, In April 1993, the Metro Council adopted Resolution No. 93-1784 and the C-TRAN Board of Directors adopted Resolution No. BR-93-9404 which selected the Milwaukie and I-5 North Corridors as the region's next high-capacity transit priority for study and combined them into the South/North Transit Corridor to be studied within a federal Draft Environmental Impact Statement; and

WHEREAS, In October 1993, the Federal Transit Administration approved the South/North application to initiate Alternatives Analysis/Draft Environmental Impact Statement and the South/North Preliminary Work Plan, and issued notification of intent in the *Federal Register* to publish a South/North Environmental Impact Statement; and

WHEREAS, In November 1993, the Federal Transit Administration and the Federal Highway Administration jointly issued the Metropolitan Planning Rule which included the Major Investment Study guidelines to replace the Alternatives Analysis guidelines and provided for consultations to determine how projects that had been initiated prior to the new rules would comply under the Major Investment Study guidelines; and

WHEREAS, In December 1994, a Major Investment Study consultation was held between Metro, the Federal Transit Administration and the Federal Highway Administration and it was determined that Tier I of the South/North Transit Corridor Study would conclude by addressing the Major Investment Study guidelines documented in a Major Investment Study Final Report; and

WHEREAS, The role of the Steering Group in the terminus and alignment alternative narrowing process is to forward its recommendations to participating jurisdictions for their consideration, that participating jurisdictions are to forward their recommendations to the C-TRAN Board of Directors and the Metro Council who are to make the final determination of the alternatives to advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, The role of the South/North Steering Group in the design option narrowing process is to consider recommendations from the South/North Project Management Group and Citizen Advisory Committee and to select the design option(s) which will be studied further in the Draft Environmental Impact Statement; and

WHEREAS, In December 1994, the Metro Council adopted Resolution No. 94-1989 and the C-TRAN Board of Directors adopted Resolution No. BR-94-011 which identified the locally preferred design concept and scope for the corridor (light rail transit, the Phase One terminus alternatives and alignment alternatives) to advance into the Draft Environmental Impact Statement and

Preliminary Engineering for further study; and

WHEREAS, In December 1994, within the same resolution, the Metro Council and the C-TRAN Board of Directors also determined that within the Portland central business district, a surface light rail transit alternative on 5th and 6th Avenues shall be developed based upon several principles and that if prior to initiation of the Draft Environmental Impact Statement it is concluded that a 5th/6th Avenue alignment cannot be developed that addresses those principles, other alternatives will be developed for further study in the Draft Environmental Impact Statement; and

WHEREAS, In March 1995, the South/North Steering Group selected both the Caruthers and Ross Island Crossing alternatives and both the I-5 and Interstate Avenue alignment alternatives for further study in the Draft Environmental Impact Statement; and

WHEREAS, In May 1995, Metro Council adopted Resolution No. 95-2138A which approved the federally-required financially constrained Regional Transportation Plan which included the locally preferred design concept and scope for the South/North Corridor; and

WHEREAS, In August 1995, the C-TRAN Board of Directors adopted resolution No. 95-048 which amended the Phase One northern terminus for study in the Draft Environmental Impact Statement from the vicinity of 99th Avenue in Hazel Dell, Washington to the Veterans Administration Hospital/Clark College in Vancouver, Washington until the Clark County Transportation Futures Process concludes; and

WHEREAS, The alignment design options currently under study have been developed and evaluated based upon the criteria and measures from the *Evaluation Methodology Report* and documented within various technical memoranda, including the *South/North Design Option Narrowing Report* and the *Design Option Briefing Document*; and

WHEREAS, A comprehensive public involvement program for the design option narrowing process was developed and implemented by the South/North Study that included, but was not limited to, numerous community meetings, a 45-day public comment period, public meetings for the Steering Group to receive oral comment and an ongoing Citizens Advisory Committee that provided regular public comment opportunities; and

WHEREAS, Various options for a 5th/6th Avenue surface light rail alignment were evaluated by the Downtown Portland Oversight Committee which concluded that the recommended design option on 5th/6th Avenues adequately addresses the criteria established by Metro Council, the C-TRAN Board of Directors and the Oversight Committee and should therefore be exclusively studied further within the Draft Environmental Impact Statement; and

WHEREAS, In October and November 1995, the Project Management Group and the Citizens Advisory Committee formed independent recommendations for both design option narrowing and the downtown Portland alignment alternative and forwarded them to the Steering Group for consideration; and

WHEREAS, In November 1995, the Steering Group adopted the South/North *Design Option Narrowing Final Report* (Exhibit A)

which identifies the design options that best meet the project's adopted goal and objectives and which will advance into the Draft Environmental Impact Statement for further study; and

WHEREAS, In November 1995, the Steering Group adopted the proposed light rail alignment design for 5th/6th Avenues in downtown Portland; and

WHEREAS, In December 1994 Metro adopted Resolution 94-2040C and the 2040 Concept Plan and directed staff to prepare 2015 household and employment forecasts consistent with the 2040 Concept Plan; and

WHEREAS, Metro staff coordinated with regional jurisdictions in the development of household and employment forecasts allocated to 1260 transportation analysis zones (TAZ's) and completed these allocations in December 1995 -- as summarized in Exhibit D; and

WHEREAS, The South/North DEIS must commence immediately in order to ensure timely completion; now, therefore

BE IT RESOLVED:

1. That Exhibit B is hereby adopted as the *South/North Downtown Portland Tier I Final Report*.

2. That the Metro Council has concluded in this *Final Report* that the downtown Portland design options, A-2, B-3, C-1, N-1, N-2, and S-1 described in Exhibit B, would generally retain current automobile access and pedestrian facilities; would generally provide for a lane of joint bus and light rail operations and a lane of exclusive bus operations on 5th/6th Avenues; adequately addresses the criteria established by

Resolution No. 94-1989 as adopted by the Metro Council and the C-TRAN Board of Directors; and shall therefore be exclusively studied further within the Draft Environmental Impact Statement.

3. That the Metro Council concurs with the design options selected by the South/North Steering Group for further study within the Draft Environmental Impact Statement as described in the *Design Option Narrowing Final Report* (Exhibit A) which are generally as follows:

a. *Minimum Operable Segments*. (1) a full-length project from the vicinity of the Clackamas Regional Center, through downtown Milwaukie, Portland and Vancouver, to the vicinity of the Veterans Administration Hospital/ Clark College; (2) a bi-state minimum operable segment from the vicinity of downtown Milwaukie/Market Place station and park-and-ride lot to the vicinity of the Veterans Administration Hospital/Clark College; and (3) three Oregon-only minimum operable segments each with a southern terminus in the vicinity of the Clackamas Regional Center and a northern terminus at: a) the vicinity of the Rose Quarter; b) the vicinity of the Edgar Kaiser Medical Center; or c) the vicinity of the Expo Center.

b. *South Terminus*. North of Clackamas Town Center alignment with a Sunnyside Park-and-Ride Terminus east of I-205; and South of Clackamas Town Center alignment with a 93rd Avenue Town Center Area Terminus.

c. *Railroad Avenue/Highway 224*. Alignment adjacent to

Railroad Avenue.

d. *Downtown Milwaukie*. McLoughlin Boulevard/Main Street with a Monroe Street Alignment; and Southern Pacific Branch Line with a Monroe Street alignment.

e. *Ross Island Crossing*. North Ross Island Crossing alignment with a West of McLoughlin Boulevard sub-option.

f. *Caruthers Crossing and Southeast Portland*. Caruthers Modified with a West of Brooklyn Yards alignment.

g. *Steel Bridge to Kaiser*. East I-5/Kerby Avenue alignment; and Wheeler Avenue/Russell Avenue alignment.

h. *North Portland*. All-I-5 alignment; and All-Interstate Avenue (Metro work with Tri-Met and City staff to evaluate as soon as the technical data for the DEIS is available which North Portland crossover option warrants further study; and staff will report back to the South/North Project Management Group, Citizen Advisory Committee and Steering Group).

i. *Hayden Island*. West of I-5 (under ramps).

j. *Columbia River Crossing*. Low-level lift span.

k. *Downtown Vancouver*. Two-way on Washington Street.

4. That, consistent with an action taken by the C-TRAN Board of Directors in August 1995, the South/North Phase One northern terminus to be studied within the Draft Environmental Impact Statement is amended to be in the vicinity of the Veterans Administration Hospital and Clark College in Vancouver, Washington.

5. That Metro Council adopts the *Major Investment Study Final Report* (Exhibit C) documenting the South/North Tier I process, reports and conclusions which selected the locally preferred design concept and scope for the South/North Corridor and led to its inclusion within the Regional Transportation Plan addressing the federal Metropolitan Planning Rule and Major Investment Study guidelines.

6. Staff will prepare travel demand forecasts for the South/North DEIS that use as a basis the 2015 household and employment forecast completed in December 1995 (Exhibit D) which assumes a 4,000-5,000-acre Urban Growth Boundary expansion.

ADOPTED by the Metro Council this _____ day of _____, 1995.

_____
J. Ruth McFarland, Presiding Officer

Approved as to Form:

_____
Daniel B. Cooper, General Counsel

LS:lmk
95-2243.RES
12-11-95

South North
Transit Corridor Study

Major Investment Study
Final Report

November 28, 1995

Metro

Major Investment Study
Final Report

South/North Transit Corridor Study

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Metro

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

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Overview of the Major Investment Study and its Consistency with Federal Requirements

1.1 Purpose of the Major Investment Study

As indicated in 23 CFR 450.318, the Major Investment Study (MIS) is a subset of the comprehensive metropolitan transportation system planning process. The metropolitan planning process includes initial analyses at a system level which identify regional needs and assess strategies for serving demands at a relatively coarse level of detail. In selected cases there is a need to address transportation needs on a corridor or subarea scale, using more focused analyses to help decision-makers understand the options for addressing corridor or sub-area transportation problems. The Major Investment Study serves this need.

The purpose of this MIS was to select the design concept and scope for the locally preferred alternative for the South/North Corridor. The study included consideration of all reasonable strategies for addressing the South/North Corridor's current and future transportation problems. Quantitative and qualitative information on costs, benefits and impacts were developed, in tiers of increasing levels of detail, to evaluate the likely impacts and consequences of the alternative transportation investment strategies for the South/North Corridor. This provided the information necessary to evaluate and compare alternative improvement strategies for the corridor.

The technical work was paralleled by an open and participatory process consisting of both affected governmental entities and the general public. These technical and participatory processes were employed during each stage of identifying and evaluating alternatives and the ultimate selection of the locally preferred design concept and scope.

Under 23 CFR 450.318(f), the participating agencies have the option of:

(a) Option 1: documenting the results of the MIS in a final report with a subsequent preparation of Preliminary Engineering (PE) and the Draft Environmental Impact Statement (DEIS), or

(b) Option 2: preparing a DEIS as part of the MIS process.

As concluded in the *Transitional Project Consultation* (discussed in Section 1.3 of this report), the South/North Corridor Study has been proceeding under Option 1.

In this context, the *Major Investment Study Final Report* documents the process and results of the multi-tiered effort to select the locally preferred design concept and scope. It documents the range of alternatives considered and the data produced at each stage of the MIS process. It shows that the narrowing decisions were consistent with federal objectives and approval criteria. It also documents the "cooperative and collaborative process" and shows that a "proactive public involvement process" was undertaken which provided: timely information about transportation issues and processes; timely public notice; and, full public access to all key decisions.

1.2 Transitional Projects

The federal Metropolitan Transportation Planning Rule, effective November 11, 1993, provides that major projects seeking federal funding participation must comply with MIS requirements. The rule also established special provisions for projects where the environmental process had been initiated but not completed -- so called "transitional projects". For transitional projects, the Rule provides that the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) "shall be consulted to determine what, if any, changes should be made to the study in order to meet the requirements" of the C.F.R. § 450.318(i).

The South/North Corridor Transit Study was initiated in September 1993 when FTA approved the *Application to Initiate Alternatives Analysis/Draft Environmental Impact Statement* (AA/DEIS) (Metro, June 28, 1993) and the *South/North Preliminary Work Plan* (Metro, June 28, 1993). On October 12, 1993, FTA issued notice in the *Federal Register* of its intent to publish an environmental impact statement for high capacity transit improvements in the South/North Corridor. The notification included a description of the study process, including the tiered approach, which was to be used to narrow the range of alternatives to be examined in the DEIS. On the basis of this notice, the federally-required Scoping Process was undertaken. Because the South/North Corridor Transit Study was initiated but not completed before the effective date of the Rule, the Study is grandfathered under the Rule and subject to the transitional provisions determined in the Consultation.

1.3 Consultation for Transitional Major Investment Studies

On December 12, 1994, the federally-required *Consultation Meeting* was held in the Metro Center. In attendance were representatives of FTA, FHWA, Metro, Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT), Southwestern Washington Regional Transportation Council (RTC), Tri-Metropolitan Transportation District of Oregon (Tri-Met), and Clark County Transportation Benefit Area Authority (C-TRAN).

The meeting started with a detailed explanation of the tiered study process which was previously approved by FTA and had been already begun to be implemented by Metro. It was determined that the approved study met the technical and public participation objectives of the MIS rule. Specifically, it was concluded during the Consultation that adoption of the *Tier I Final Report* would constitute the final step of the MIS requirements, the selection of the locally preferred design concept and scope and would lead to amendments to the regional transportation plans by Metro Council and the Southwest Washington Regional Transportation Councils (RTC), the two metropolitan planning organizations within the study area. It was also concluded that an *MIS Final Report* would be prepared to document the entire Tier I study and would complete the MIS requirements set forth in the Metropolitan Planning Rule.

1.4 Selection of Locally Preferred Design Concept and Scope

The tiered study approach approved for the South/North Corridor was a "funneling" process in which a broad set of mode and alignment options were to be narrowed to a locally preferred design concept and scope in a series of stages of increasing detail. The technical analysis for each stage was developed at the level of detail which was germane to the issues to be resolved at that stage.

Table 1-1 shows the various stages of the MIS and describes their respective roles. These stages included the work of fifteen different governmental entities having some responsibility for the project, including: five cities, four counties, Tri-Met, C-TRAN, Metro, RTC, Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT) and the Port of Portland. The organization, roles and responsibilities of these entities are described later in this report (see Section 4.1.2). Table 1-2 shows the major reports prepared in each of the study stages (which are incorporated herein by reference).

As shown, the Systems Planning and Preliminary Alternatives Analysis stages, which pre-dated the Consultation, identified the current and future problems in the South/North Corridor which serves as the purpose and need for considering light rail alternatives in the Corridor.

The Scoping and Tier I Final Report stages focused on the selection of the locally preferred design concept and scope. By the time the *Tier I Final Report* was recommended for adoption by the Metro Council and the C-TRAN Board of Directors, the design concept and scope: (i) had been subjected to sufficient technical analysis to meet MIS requirements; (ii) had gone through sufficient public and inter-governmental involvement to meet MIS requirements; and, (iii) was sufficiently detailed to meet the EPA requirements of an air quality conformity analysis (40 CFR part 51). On December 15, 1994 the C-TRAN Board enacted Resolution No. BR-94-011 and December 22, 1994 the Metro Council enacted Resolution No. 94-1989 adopting the *Tier I Final Report.* In doing so, they selected the locally preferred design concept and scope for the South/North Corridor.

1.5 Regional Transportation Plan (RTP) Actions and Determinations of Air Quality Conformity

Following the *Tier I Final Report*, Metro and the RTC adopted amended regional transportation plans (RTPs) and transportation improvement programs (TIPs) and prepared the associated air quality conformity determinations. These actions completed the MIS requirements.

Concurrent with the release of the *Tier I Final Report*, the RTC enacted Resolution No. 12-94-30 which adopted the "financially constrained" *Metropolitan Transportation Plan* (MTP) for Clark County. The MTP incorporated the design concept and scope recommended for the South/North Corridor in the *Tier I Report.* The Plan cited the *Tier I Technical Summary Report: Briefing Document* as the technical basis for the project's inclusion. The Plan included a "Clean Air

Table 1-1
Sequence of Stages of the Major Investment Study

Stage in MIS Process	Scope and Purpose	Chapter in MIS Final Report
System Planning	The *System Planning* stage was multi-modal in nature and consisted of a series of studies regarding highway traffic, freight movement, transit deficiencies and land use policies which establish the need to consider high capacity transit options in the South/North Corridor.	2
Pre-AA	The *Pre-AA* stage evaluated and recommended the *Priority Corridor* for the South Study Area and the North Study Area. It also recommended the integration of the two priority corridors into the singular South/North Corridor. It included an early assessment of High Capacity Transit (HCT) options in the corridor.	3
Scoping Process	The *Scoping Process* provided the initial identification and narrowing of modal and alignment alternatives to be examined. The first step in selecting the locally preferred design concept and scope was taken by narrowing the modal alternatives to one, light rail transit.	4
Tier I Final Report	The *Tier I Final Report* stage completed the selection of the locally preferred design concept and scope by determining the preferred terminus and alignment alternatives. While these alternatives were later refined in the Design Option Narrowing stage, the Tier I Final Report defined the locally preferred design concept and scope at sufficient detail to support amendments to the Regional Transportation Plan and the associated air quality conformity analysis. Thus, the analysis at this stage was sufficiently detailed to complete the MIS.	5
RTP/TIP/Air Quality Conformity	At this stage, the Regional Transportation Council's (RTC) RTP and Metro's financially constrained RTP and TIP were amended to incorporate the locally preferred design concept and scope. As required by the Metropolitan Transportation Planning Rule, these RTPs and TIPs were determined to conform with air quality requirements. The conclusion of these activities delineated the completion of the MIS.	1
Design Option Narrowing	The *Design Option Narrowing* stage was a post-MIS phase of Tier I in which selected elements of the South/North Corridor Project were refined within the design concept and scope adopted by the *Tier I Final Report*. Specifically, this stage identified the LRT alignment options; general location of potential light rail stations or transit centers on each of the proposed alignment options and Minimum Operable Segments (MOS) to be evaluated in the DEIS.	6

Table 1-2
Key Reports by Study Stage

Stage In MIS Process	Key Reports Prepared
System and Corridor Planning	- Washington State Legislative Study (1980) - Bi-State LRT Study (1986) - Columbia River Crossing Accessibility Study (1988) - Bi-State Study (1991) - I-205 Corridor Plan (1994)
Pre-AA	- Phase I Technical Reports: Expert Review Panel (ERP) Meeting (Feb. 1993) - Priority Corridor Analysis: Findings and Recommendations (Apr. 1993)
Scoping Process	- Description of Wide Range of Alternatives Report (July 1993) - Public Workshop Report and Survey Appendix - Initial Analysis of Modal Alternatives and Design Options - Preliminary Alternatives Report for Scoping Meeting (October 1993) - Mode and Alignment Workshop Report: Appendix II (October 1993) - Scoping Process Narrowing Report (December 1993) - Scoping Meeting and Public Comment Period - Tier I Description of Alternatives Report (December 1993)
Tier I Final Report	- Tier I Evaluation Methodology (December 1993) - Light Rail Transit Representative Alternatives and Order of Magnitude Cost Estimates (May 1994) - Tier I Technical Summary Report (July 1994) - Briefing Document: Tier I Technical Summary Report (August 1994) - Tier I Final Recommendation Report (September 1994) - Tier I Public Comments Report (September 1994) - Tier I Final Report (December 1994)
RTP/TIP/Air Quality Conformity	- Metropolitan Transportation Plan for Clark County (1994) (Includes Air Quality Conformity Determination) - Portland Area FY 1996 through Post-1999 Transportation Improvement Program (1994) - Federal Regional Transportation Plan (Metro 1995) - Conformity Determination for the Portland Metropolitan Area 1995 RTP and FY 1996 through Post-1999 TIP (1995)
Design Option Narrowing	- Design Option Narrowing Technical Summary Report (June 1995) - South/North Design Option Narrowing Public Comments Report (September 1995) - Downtown Portland Oversight Committee: Central Business District (CBD) South/North LRT Alignment Recommendations (September 1995) - Briefing Document: Design Option Narrowing (October 1995) - Design Option Narrowing: Final Report (November 1995)

Conformity Determination." On January 12, 1995, FHWA and FTA found that the MTP and its associated TIP met conformity regulations.

On January 19, 1995, Metro adopted Resolution No. 95-2058 which amended the regional *Transportation Improvement Program* to include funding for the Tier II DEIS, Final Environmental Impact Statement (FEIS) and Preliminary Engineering (PE) for the South/ North Corridor Project. In March 1995, the Oregon Transportation Commission approved Amendment 95-05 to the Statewide Transportation Improvement Program which incorporated the funding for DEIS/FEIS/PE activities for the South/North Corridor.

On May 25, 1995, the Metro Council adopted Resolution No. 95-2138A which approved the federally-required "financially constrained" *Regional Transportation Plan.* As required by MIS guidelines, the locally preferred design concept and scope for the South/North Corridor Project was incorporated in this plan. On September 28, 1995, the Metro Council enacted Resolution No. 95-2196 which adopted the *Portland-Area (Air Quality) Conformity Determination.* This Determination found that the "financially constrained" *Regional Transportation Plan* and regional *Transportation Improvement Program* conforms with the *State Implementation Plan* (SIP) and all applicable air quality regulations.

With: 1) the adoption of the *Tier I Final Report* specifying a locally preferred design concept and scope for the South/North Corridor; 2) the adoption of applicable regional transportation plans and transportation improvement programs incorporating that design concept scope; and, 3) the determination that those Plans and Programs conform with air quality regulations, the Major Investment Study for the South/North Corridor Project was complete.

1.6 Refinement of the Locally Preferred Design Option and Scope

The Design Option Narrowing stage was a post-MIS phase of Tier I in which the design for the South/North Corridor Project was refined within the adopted design concept and scope. The results of Design Option Narrowing are provided in this report and represent the final information to be developed prior to the commencement of PE/DEIS activities. Further refinement of the design concept and scope will be made as the project progresses through the EIS/PE phase.

1.7 Public Involvement Process for Major Investment Study

A regional public involvement effort has been an integral part of the South/ North Transit Corridor Study since the early planning phase in the summer of 1992. As documented below and further documented throughout this report, this effort provided an early comprehensive opportunity for citizens, interested parties, affected public agencies and private providers of transportation to participate in the study process. As such, the process complied with the requirements of §450.318(b). The communications plan supporting the South/North Corridor MIS is described below.

1.7.1 The Citizens Advisory Committee

In August 1992, a twenty-eight member Citizens Advisory Committee (CAC), with membership representing the McLoughlin, I-5 and I-205 travel sheds was appointed. Following the selection of the Priority Corridor, this committee was restructured to better reflect population and geographical areas within the McLoughlin/I-5 Priority Corridor. This committee has been meeting regularly, forming independent recommendations to the project Steering Group and, as outlined below, providing a constant public forum for dialogue with all the communities within the corridor:

- Monthly (at a minimum) meetings with public comments taken at the beginning and close of each meeting.
- In depth workshops for committee members.
- Tours of the entire study area.
- Participation in Open Houses, Large Community Meetings, Community Workshops, Scoping Meeting, and business association meetings within representative areas
- The meetings are held in wheelchair-accessible meeting rooms and devices for the hearing impaired are available at all CAC meetings.
- Formation of recommendations to the South/North Corridor Steering Group.

1.7.2 Workshops, Open Houses, and Study Wide Community Meetings

Efforts to involve the community began early in the planning process. Since the fall of 1992 nearly one hundred informational meetings or workshops have been held. The following outlines the key meetings held to date:

- *Introductory Study Planning Meetings (Jan-Feb 1993)*: A series of eleven meetings providing early study process, planning, and projected schedule information. A twelve minute audio visual presentation, and large graphic display were among the materials used to introduce the study to the public.
- *Priority Corridor Open Houses (March 1993)*: A series of three, six-hour public meetings were held at the end of the Priority Corridor analysis. Citizens reviewed technical study results with study planning and engineering staff from throughout the study area. Technical summary reports for each of nine technical reports, maps, comparative matrices, background materials and general study information provided the basis for discussion.
- *Mode and Alignment Workshops (Summer 1993)*: A series of eight hands-on meetings where the public was invited to become "citizen planners." Over 400 people attended these workshops. Citizens reviewed and commented on initially identified modes and alignments for

the corridor and suggested new alternatives for suggestion. Several recommended alignments received at these early meetings are included in the design options currently under study.

- *Scoping Meetings (October 1993)*: A series of four Scoping Meetings were held throughout the South/North corridor. These meetings initiated a formal thirty day public comment period and helped to establish which alternatives would be studied further. All comments received from these well attended meetings were recorded and documented.

- *Tier I Informal Open Houses (July 1994)*: A series of four open houses were conducted where technical findings were released on the Tier I terminus and alignment alternatives. One-on-one discussion with the over 300 members of the public who attended was encouraged. Draft technical summary reports, detailed segment maps, and simplified individual area technical fact sheets were provided.

- *Tier I Steering Group Public Comment Meetings (September 1994)*: This series of four meetings before members of the Study Steering Group helped further identify which alternatives held wide public support or opposition, prior to the Group making its final Tier I recommendation to the Metro Council and C-TRAN Board of Directors.

- *Design Option Narrowing Segment Meetings (May 1995)*: Individual segment meetings in four areas were organized to discuss LRT design options being considered for that segment. Notices were mailed to citizens within the geographical areas immediately adjacent to each of the segments and advertisements were placed in neighborhood newspapers.

- *Downtown Oversight Committee Public Comment Meetings (May 1995)*: A public meeting was held by the Downtown Portland Oversight Committee to receive public comment on design options and alignment alternatives being considered for the Portland Central Business District (CBD).

- *Design Option Open Houses (June 1995)*: A series of three regional open houses provided an opportunity for citizens to review technical information and data on the design options being considered for each segment throughout the corridor. Citizens, using county based *Light Rail Workbooks* and *Tech Fact Sheets* with user friendly technical information, were able to compare and assess each of the options under review.

- *Design Option Narrowing Public Comment Meetings (June 1995)*: Citizens submitted written and oral testimony to members of the South/North Steering Group at two formal public comment meetings. For the first time, citizens had the opportunity to call in comments directly to the meeting.

1.7.3 Community Meetings and Presentations

- Hundreds of meetings have been held with neighborhood groups, citizen planning organizations, business associations, community service organizations and other interested groups.

- Study staff has met with potentially impacted businesses, individual residents, special interest groups, property owners or their designated representatives on nearly a daily basis.

1.7.4 Jurisdictional Community Groups

- The Cities of Milwaukie, Portland and Vancouver each have developed *Citizen Working Groups* to help identify the opinions and concerns of local constituencies. Many of these groups have held design forums, walking tours, and working meetings.

- Jurisdictional public meetings and hearings have been held with Planning Commissions and City and County Commissions at key intervals throughout the life of the study.

1.7.5 Informational Materials

- The Study newsletter the *South/North News* and Study-wide *Meeting Notices* have been published and distributed.

- The Study has produced Fact Sheets, *Tech Facts* - user-friendly technical summary documents, maps, *Light Rail Workbooks* for each of the counties, an introductory *"How do I get involved"* brochure, technical reports and documents (each with simplified executive summaries), compilations of comments/letters received, meeting notices mailed to targeted communities, and other written support information, including materials for children.

- Two slide presentations, photographs, slides, computer generated images, site-specific renderings, maps, table top displays, and free standing informational displays used in public spaces such as malls and at special events have been prepared.

- Draft and final versions of the Scoping Process *Wide Range of Alternatives Report*, the *Tier I Technical Summary Report*, the *Tier I Briefing Document*, the *Design Option Narrowing Technical Summary Report* and the *Design Option Narrowing Briefing Document* were distributed for public and CAC review.

- The Study helps to maintain a *Transportation Hotline* that advertises meeting dates and informational material available for public review. The Hotline was also used as a public comment forum during the Design Option Narrowing Process. Public comments on the options were recorded on the Hotline and summaries of the comments were included in the *Design Option Narrowing Summary of Public Comment Report.*

- Summaries of public comment received during Scoping, during the Tier I Final Report Stage and during the Design Option Narrowing Process were prepared and distributed to committees and jurisdictions prior to adoption of recommendations and reports,

1.7.6 Study Mailing List/Speakers Bureau

- The Study has maintained a mailing list which currently contains over 23,000 interested citizens.
- The Study has implemented a *speakers bureau* for citizen, businesses and community groups.

1.7.7 Media Outreach

- Several of the neighborhood publications carried a special monthly column, written by Metro staff, providing regular updates on issues relating to transportation.
- News releases and advisories accompanied major meetings and all key decision points.
- Editorial briefings and updates were provided regularly.
- Informational materials and special media opportunities to review and assess technical information were provided.

1.7.8 Advertisements

- Paid advertisements in the regional, local, and community newspapers have supported each of the primary public meetings, workshops or hearings.
- The study published regular notices regarding CAC meetings, segment meetings and other decision making meetings.
- In keeping with federal guidelines, 30 day notices were published prior to any public comment meeting or key decision point.

1.8 Organization of the Report

This report is organized in accordance with the study stages. As shown in Table 1-2, the stages are summarized on a chapter-by-chapter basis. Each of these chapters include a description of the alternatives considered, data prepared, public involvement undertaken and conclusions reached during the stage focused on in that chapter. Chapter 6 also includes a summary of the ridership estimates, benefits and impacts of the locally preferred design concept and scope proposed for the DEIS/PE stage. Chapter 7 describes the costs and financing plan for that design concept and scope.

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System Analyses Establishing the Need to Evaluate HCT Alternatives in the South/North Corridor

2.1 Overview

The justification for considering high capacity transit (HCT) options for the South/North Corridor stems from a series of system and corridor studies of transportation and air quality problems, growth in the corridor and the growing dependence of the land use and economic development goals of the bi-state region on the implementation of a regional HCT system.
The following sub-sections explain these results.

2.2 Transportation Plans and Issues

2.2.1 Transportation Plans and Policies

Regional transportation planning, which began locally in 1959, has shifted from an emphasis on accommodating automobiles to a broader approach aimed at maximizing the efficient use of land and the transportation system. In 1973, a Governor's Task Force was formed to clarify the transportation decision-making within the region. The *Regional Transportation Plan* in 1982 noted that "This Task Force made landmark recommendations ... with far-reaching implications ... Fiscal and environmental realities made it impractical to rely solely upon new freeways as the solution for urban travel needs ... Transit and highway planning should be done together, with shared rights-of-way and preferential treatment for transit in the major travel corridors ... As a result of the recommendations, regional leaders decided to ... assign most of the new commuter growth to transit ..."

The shift in regional transportation planning priorities was cemented on May 3, 1976, when the U.S. Department of Transportation formally approved the withdrawal of the proposed Mt. Hood Freeway from the Interstate System. This was followed by the withdrawal of the I-505 Freeway in Northwest Portland in 1979. These actions initially made approximately $200 million and ultimately about $500 million available to the urban portion of the Portland-Vancouver SMSA for substitute transportation projects. On May 10, 1976, the Governor of Oregon sent a letter to the Columbia Region Association of Governments (which was composed of local elected officials from the Oregon and Washington portions of the region) which requested the Board's assistance in allocating the funds and prioritized "Regional Transit Corridor Projects" for the use of the funds.

The importance of this decision to the future of transportation and land use development in the Portland region cannot be overemphasized. This action symbolized the regional policy that new major radial highway capacity would no longer be constructed in the region. Instead, the future

capacity and level of service on major radial corridors would be primarily dependent on high capacity transit. Highway improvements would primarily be employed to fix bottlenecks, balance the system and respond to safety and weave problems.

There were also secondary implications. The decision to prioritize major regional transit corridors meant that the rest of the transportation system would be sized and designed on that basis, the pattern and type of development in the Portland region would be dependent on high capacity transit and the comprehensive plans of the counties and cities in the region would be based on that assumption. In retrospect, this policy fundamentally affected almost every major planning and development decision in the region over the past seventeen years.

Over the 15 years following the withdrawal of the Mt. Hood Freeway, there were a series of major transportation analyses and policies implementing the basic policy shift. In 1978, the Columbia Region Council of Governments (CRAG) adopted the *Regional Transportation Corridor Improvement Strategy*, which identified the need to consider transitways in the major radial corridors in the region. In 1980, the *Southern Corridor Improvement Strategy*, a multi-modal analysis of the corridor connecting downtown Portland and Clackamas County, concluded with improvements to a number of bottlenecks along McLoughlin Boulevard and expansions to the area's transit service and rideshare programs.

Between 1977 - 1979, a Washington State Legislative Study concluded that congestion would reappear on the I-5 bridge by the year 2000 (even with the then yet-to-be-opened I-205 bridge) and defined six potential locations for a third river crossing. In 1979, the FHWA Feasibility Study narrowed the list of potential third bridge locations to one (just west of the I-5 bridge) and determined that a third bridge was not economically justified at the time. In 1980, another Washington State Legislative Study re-examined the potential for a third bridge crossing and concluded that the a third bridge was not economically feasible, instead Transportation System Management (TSM) measures (such as ramp metering) would handle the immediate problems on the freeway, and transit improvements should be considered to meet travel demand beyond the year 2000.

In 1981, a Governors' Bi-State Task Force on Transportation for the Portland-Vancouver Corridor studied the I-5 and I-205 connections between Oregon and Washington. It concluded that a third highway bridge was not a cost-effective solution and that transportation objectives could better be met through expansion of transit service and rideshare programs in the I-5 and I-205 corridors. It also concluded that " ... as part of the development of the Regional Transportation Plan, the potential of a transitway to produce greater operating cost savings should be examined" (Metropolitan Service District (MSD) July 1981).

In July 1982, MSD adopted its first *Regional Transportation Plan.* Regarding the major radial corridors in the region, including that which is now known as the South/North Corridor, this Plan concluded that " ... adding significant highway capacity to existing major routes beyond the improvements recommended in this plan would violate two established regional policies ... adequate transportation capacity to meet growth in travel demand in the radial corridors must be

provided by selective highway improvements to remove bottlenecks and 'balance' the capacity of the overall highway system together with a major expansion in transit ... ".

The 1982 Plan identified several highway improvements to address "bottlenecks" in the North and South Corridors, including the I-5/Slough Bridge, the Delta Park/Jantzen Beach interchange reconstructions, the Greeley ramps (to provide freight access to the industrial sanctuary in North Portland), arterial improvements to the airport (also for freight access to newly planned industrial uses), selected widenings along McLoughlin Boulevard and the Oregon City Bypass. It also determined that a phased approach to implementing the third priority transitway (after the Banfield and Westside LRTs) be undertaken in which "Phase I ... will ... identify the next corridor that warrants consideration of a transitway investment ... Phase II will ... examine alternatives in detail and select the one that is most cost-effective ... (and) conclude with an Environmental Impact Statement".

Between 1984 and 1986, Metro, in cooperation with its regional partners, conducted a Phase I study of transitway alternatives in the region. This system-level planning effort included several elements including the *Milwaukie Corridor Study*, the *I-205 Corridor Study* and the *Bi-State Light Rail Study*. These studies were system level evaluations which compared light rail alternatives to no-build and TSM alternatives within these corridors. These Phase I studies recommended that Phase II studies of light rail be undertaken in the I-5, McLoughlin and I-205 corridors.

In 1988, the Washington Legislature called for a *Columbia River Accessibility Study* to examine the "economic feasibility of constructing a bridge across the Columbia River to Oregon". The results of the study determined there was a capacity deficiency across the Columbia River, but recommended that a transit solution be pursued, not another highway crossing. Following the transmittal of the final report to the legislature, the IRC (the predecessor agency to RTC) and Metro signed a joint resolution establishing the *Bi-State Transportation Study*. The Bi-State Study found that: (i) projected growth of traffic on I-5 would result in unacceptable levels of service; and, (ii) the location and number of interchanges at both ends of the I-5 bridge result in extensive "merge/weave" activities which contribute to the congestion being experienced on the freeway. It concluded that high capacity transit was the feasible solution in these corridors.

Taken together, the decade of studies described above provided a wealth of information and past policy direction regarding the current and future transportation problems and opportunities in the South/North Corridor. These problems and opportunities, described below, establish the purpose and need for the high capacity transit and light rail alternatives studied in the South/North Major Investment Study and documented herein.

2.2.2 Transportation Problems

Topographic features, suburbanization, a deficient road network and public policies encouraging growth in Clark and Clackamas Counties have combined to make congested traffic conditions typical of daily travel to, from and within the South/North Corridor. In the future, transportation problems in the Corridor will worsen from projected growth.

Traffic in the southern portion of the South/North Corridor is exceeding the capacity of the highway system. The last comprehensive analysis of McLoughlin Boulevard prepared by ODOT was in 1986 and used 1980 as the base year. The results of that analysis is shown in Table 2-1. As shown, McLoughlin was exhibiting Level-of-Service E for the entire segment between S.E. Holgate in Portland and Highway 224 in Milwaukie. Table 2-2 shows growth in Average Daily Traffic (ADT) at various points along McLoughlin Boulevard. As shown, traffic on McLoughlin Blvd. continued to grow between 1981 and 1991. In the areas shown in Table 2-1 to have an LOS E, Table 2-2 shows that ADT grew by 6% - 18% between 1981 and 1991, adding to the already poor LOS. In Milwaukie, where 1980 LOS on McLoughlin Boulevard was D, ADT grew by 9% - 41% between 1981 and 1991. Even greater traffic growth between 1981 and 1991 was exhibited in the southern part of the corridor.

A sketch analysis of 1990 and 2010 conditions on McLoughlin Boulevard was prepared during the Pre-AA study. The results are shown in Table 2-3 which indicates that McLoughlin Boulevard was exhibiting 1990 Levels of Service E or F at all representative points tested. Even with the committed highway improvements, year 2010 conditions are not expected to improve.

Good accessibility between the Vancouver and Portland portions of the region has always been a key to the economy and quality of life of the region. The first bridge across the Columbia River opened in 1917, with its twin structure being completed in 1958. To address problems in the I-5 corridor, the I-205 Glen Jackson Bridge was built between 1979 - 1982 and opened to traffic in 1983, providing the second connection between the two portions of the region. At about the same time as the Jackson Bridge was opened, portions of I-5 were widened and interchanges were altered to address bottlenecks on I-5. Together, the I-5 improvements and the second bridge crossing were expected to provide sufficient capacity to allow desired levels of service in the North Study Area. However, traffic in the North Study Area has grown at such a rate as to exhibit traffic volumes on I-5 that are closing in on what they were a decade ago, prior to the opening of the Jackson Bridge.

Table 2-4 summarizes trends in the traffic volumes crossing the Columbia River. As shown, traffic crossing the state line has uniformly grown 25-33% every five years since 1970. By 1990, traffic on the I-5 Bridge had once again approached 95,000 daily trips. As a result, many segments of I-5 in the North Study Area are at or above capacity (see Table 2-5). Even with the committed improvements to I-5, significant problems are projected for the future (see Table 2-6). High levels of traffic growth are also expected on the major arterials serving the corridor. Between 1990 and 2010, peak-hour traffic is expected to grow by 33% on SR 500, 26% on Fourth Plain, 46% on Mill Plain and 50% on Columbia Boulevard.

The I-5 corridor provides a vital link between freight distribution centers and port facilities that not only serve the western United States, but markets for trade worldwide. The continuation of current traffic congestion trends will seriously impair the movement of goods between Washington and Oregon. A balanced approach is required in order to maintain freight access between the two states.

Table 2-1
1980 Service Levels on McLoughlin Boulevard

Segment of McLoughlin Boulevard	P.M. Peak-Hour LOS
Ross Island Bridge to S.E. Holgate	D
S.E. Holgate to S.E. 17th	D-E
S.E. 17th to S.E. Reedway	E
S.E. Reedway to S.E. Tacoma	F
S.E. Tacoma to S.E. Ochoco	E
S.E. Ochoco to Highway 224	E
Highway 224 to S.E. River Road/17th	D
S.E. River Road/17th to S.E. Harrison	D

Source: Metro 1994

Table 2-2
Historic Growth in Traffic Volumes on McLoughlin Boulevard

McLoughlin Boulevard at:	1971 ADT	1981 ADT	71-81 Growth	1991 ADT	81-91 Growth
North of Ross Island Bridge	39,900	43,700	10%	46,700	7%
South of Ross Island Bridge	51,400	55,800	9%	62,500	12%
S.E. 17th	37,200	40,500	9%	47,900	18%
S.E. Tacoma	36,600	42,200	15%	44,700	6%
Southern City Limit of Portland	36,100	42,100	17%	44,700	6%
Highway 224	30,300	32,600	8%	45,900	41%
S.E. Jefferson	29,800	33,100	11%	40,800	23%
Southern City Limit of Milwaukie	29,400	31,000	5%	33,700	9%
S.E. Concord	23,600	29,900	27%	37,200	24%
Northern City Limit of Gladstone	24,200	27,100	12%	31,200	15%
Southern City Limit of Gladstone	25,300	28,000	11%	35,500	27%
I-205	22,200	27,700	25%	36,000	30%
10th Street, Oregon City	20,000	21,800	9%	26,600	22%
Southern City Limit of Oregon City	8,600	8,800	2%	16,100	83%

Source: Metro 1994

Table 2-3
Levels of Service[1] in the McLoughlin Segment
at Representative Sites

Location	1990 V/C Ratio	2010 V/C Ratio[2]
McLoughlin at Holgate	0.87	0.96
McLoughlin at Tacoma	1.08	0.91
Sellwood Bridge	1.21	1.40
McLoughlin at Milport	1.17	1.17
224th at Lake Road	0.47	0.99
Sunnyside at 82nd	0.60	0.48

[1] P.M. Peak Hour, Peak Direction
[2] Forecast. Includes committed highway improvements.
Source: Metro 1994

Table 2-4
Average Weekday Traffic Crossing the Columbia River into Portland

YEAR	I-5	I-205	TOTAL	FIVE YEAR GROWTH
1970	69,151	NA	69,151	NA
1975	87,225	NA	87,225	26%
1980	108,616	NA	108,616	25%
1985	92,301	52,568	144,869	33%
1990	94,574	88,606	183,180	26%

Source: Bi-State Transportation Study, TM No.1, Kittleson & Assoc., July 1991

Table 2-5
Existing Level of Service on I-5
P.M. Peak Hour

Location	Northbound	Southbound[1]
179th-134th Street	OK	OK
134th-78th Street	OK	OK
78th-Highway 99	At-Capacity	OK
Highway 99-SR 500	At-Capacity	OK
SR 500-4th Plain	At-Capacity	OK
4th Plain-Mill Plain	OK	OK
Mill Plain-SR 14	OK	OK
SR 14-Hayden Island	Over-Capacity	At-Capacity
Hayden Island-Marine Drive	Over-Capacity	OK
Marine Drive-Denver Avenue	At-Capacity	OK
Denver Ave.-Columbia Blvd	Over-Capacity	At-Capacity
Columbia Blvd-Lombard St.	Over-Capacity	OK
Lombard St.-Portland Blvd	OK	OK
Portland Blvd-Going St.	At-Capacity	At-Capacity
Going St.-Freemont Bridge	Over-Capacity	At-Capacity
Fremont Bridge-Broadway	Over-Capacity	At-Capacity
Broadway-I-84	Over-Capacity	Over-Capacity

[1] OK means volumes are below capacity and Level of Service is D or better.
Source: Bi-State Transportation Study, TM No.1, Kittleson & Assoc., July 1991

Table 2-6
Future (Year 2005) Levels of Service on I-5
P.M. Peak Hour

Location	Northbound	Southbound[1]
179th-134th Street	OK	OK
134th-78th Street	OK	OK
78th-Highway 99	OK	OK
Highway 99-SR 500	Marginal	OK
SR 500-4th Plain	Marginal	OK
4th Plain-Mill Plain	OK	OK
Mill Plain-SR 14	Over-Capacity	OK
SR 14-Hayden Island	Over-Capacity	Marginal
Hayden Island-Marine Drive	Over-Capacity	OK
Marine Drive-Denver Avenue	Marginal	OK
Denver Ave.-Columbia Blvd	Over-Capacity	OK
Columbia Blvd-Lombard St.	Over-Capacity	OK
Lombard St.-Portland Blvd	Over-Capacity	OK
Portland Blvd-Going St.	Marginal	OK
Going St.-Freemont Bridge	Over-Capacity	OK
Freemont Bridge-Broadway	Marginal	OK
Broadway-I-84	OK	Marginal

[1] OK means volumes are below capacity and Level of Service is D or better. Assumes all committed projects.
Source: Bi-State Transportation Study, TM No.2, Kittleson & Assoc., July 1991.

Tri-Met operates several trunk routes on McLoughlin Boulevard between Oregon City and the Portland CBD. As shown earlier, traffic congestion has worsened in the past ten years, resulting in slower travel speeds on McLoughlin Boulevard. As a result, transit travel times between Oregon City and the Portland CBD have increased by five minutes and service hours and the number of buses serving the segment have had to increase just to provide the same level of service.

As congestion and travel times worsen along McLoughlin Boulevard, schedule reliability also degrades. Timed-transfer operations are particularly sensitive to trunk line reliability. As a result, the operations of the Milwaukie Transit Center, Clackamas Town Center Transit Center and the Oregon City Transit Center will become less reliable.

Bus service in the North segment of the Corridor is provided by Tri-Met (Portland) and C-TRAN (Clark County). The services these two systems provide are quite different. For example, while the C-TRAN system provides mostly local service in Clark County, it primarily provides express service along its routes in Portland. C-TRAN coverage is limited, and park-and-rides provide a significant amount of the access to the system. In contrast, Tri-Met's routes in the north segment are all local in nature (no express bus service) and are primarily accessed by walk-ons.

As seen in Table 2-7, both systems suffer from the same problem -- poor travel times. For the most part, the express buses between Clark County and Portland travel at speeds below 30 miles per hour in the peak-hour -- quite poor for service which have very few or no stops along the way. The Tri-Met service in the north segment exhibits peak-hour speeds in the 10 -15 mile per hour range. Tri-Met's *Five Year Transit Development Plan* identifies the north segment (other than the Interstate Avenue line) as having the worst transit/auto travel time ratio anywhere in their district other than part of Eastern Multnomah County.

2.3 Land Use Plans and Issues

As seen in Tables 2-8 and 2-9, the South/North Corridor encompasses portions of two rapidly developing counties. Between 1970 and 1990, population in the region grew by 40 percent. In comparison, Clackamas County population grew by 68 percent and Clark County grew by 86 percent. Between 1970 and 1990, employment in the region grew by 93 percent. In comparison, Clackamas County employment grew by 131 percent and Clark County grew by 136 percent. Looking towards the next twenty years, both Clackamas and Clark Counties will continue to be high growth areas (both population and employment) compared to the region as a whole.

Both state and federal policy establish land use as a critical consideration in the evaluation of major transit investments. Oregon and Washington land use laws require transportation projects to achieve specific land use and economic objectives and explicitly consider certain land use and economic development factors. These issues are described below.

Table 2-7
Peak-Hour Bus Service in the North Segment of the South/North Corridor

ROUTE NO.	ROUTE NAME	PK. HR. SPEED	NO. OF STOPS
5	I-5 Express	28.0	0
14	Camas/Washougal Express	26.9	2
75	Evergreen Express	29.5	1
76	Vancouver Mall Express	22.2	0
134	Salmon Creek Express	38.1	0
1	Greeley	14.0	Local
4	Fendessen	13.4	Local
5	Interstate	15.2	Local
6	MLK	11.8	Local
8	NE 15th Avenue	10.1	Local
40	Mocks Crest	11.9	Local

Source: Tri-Met 1994

Table 2-8
Population Growth in the South/North Corridor

County	1970	1980	1990	2010[1]
Clackamas County	166,088	241,903	278,850	367,907
Clark County	128,454	192,206	238,053	353,067
Four County Total	1,009,129	1,241,895	1,412,344	1,789,428

[1] Forecast
Source: Metro 1994

Table 2-9
Employment Growth in the South/North Corridor

County	1970	1980	1990	2010[1]
Clark County	38,948	62,072	92,153	136,849
Clackamas County	35,312	50,993	80,866	113,390
Four County Total	366,808	520,746	707,456	929,390

[1] Forecast
Source: Metro 1994

2.3.1 Land Use Goals and Plans in Oregon

In 1974, the Oregon Legislature enacted statewide Land Conservation and Development goals and required cities and counties to adopt enforceable comprehensive plans which comply with the state goals. Each comprehensive plan includes a land use plan with parcel-by-parcel designations showing the type, level and location of development adopted by the community. Transportation elements are required which support the specific land uses. The comprehensive plan also establishes policies and implementation measures aimed at meeting the jurisdiction's development objectives.

To comply with the state law regarding urbanization, Metro adopted a regional Urban Growth Boundary (UGB) in 1976 that circumscribed the area in which urban development and urban investment would occur in the Oregon portion of the Portland metropolitan region. State law requires that the UGB contain sufficient land to accommodate growth for twenty years and that there be sufficient land for various uses to ensure market choice. Outside the UGB, state law and county governments have prohibited or sharply restricted urban level development. Inside the UGB, local plans were required to assure that they made adequate provision of the urban services required for the development envisioned in the UGB assumptions.

A detailed analysis of the provisions of the regional and local land use plans which affect the North and South Corridors is documented in the *North/South Transit Corridor Study Phase I Technical Report: Land Use and Economic Development, Metro, February 1993*. These plans were initially developed, at least in part, on the basis of the transportation policies first set in 1976 and refined since. As a result:

(a) land use designations, patterns and policies in Clackamas County, the City of Portland, Oregon City and the City of Milwaukie have been established on the basis of a high capacity transit in the radial corridors; and

(b) water, sewer, transportation and other infrastructure plans in these jurisdictions have been prepared to support such development.

Given the enormous public and private investments made on the basis of these plans; land use, development and high capacity transit have become inextricably and irreversibly linked.

In April 1991, the Land Conservation and Development Commission (LCDC) promulgated rules on how to implement the state goal regarding transportation. Cities and counties are required to amend their subdivision, code regulations and comprehensive plans to comply with the requirements of the rule which includes the following:

(a) local governments must consider changes to land use densities and designs as a way to meet transportation needs. Consideration of land use changes includes setting higher residential and commercial densities and similar measures as a means of reducing demand for transportation improvements. Local governments are also required to consider establishing maximum parking limits for commercial development.

(b) local governments must adopt changes to their subdivision and development ordinances to encourage more transit, pedestrian and bicycle friendly development and street patterns. Specifically, local governments must adopt land use and subdivision regulations to require:

1) Facilities providing pedestrian access within and from new subdivisions, planned developments, shopping centers and industrial parks to nearby transit stops.

2) Design of transit routes and transit facilities to support transit use through provision of bus stops, pullouts and shelters, optimum road geometrics, on-road parking restrictions and similar facilities, as appropriate.

3) New retail, office and institutional buildings at or near existing or planned transit stops to provide preferential access to transit.

4) A 10% reduction in the number of parking spaces per capita.

5) All major industrial, institutional, retail and office developments to provide either a transit stop on site or connection to a transit stop along a transit trunk route when the transit operator requires such an improvement.

(c) Metro is required to plan for a reduction in vehicle miles traveled per capita. The targets are for a three-step reduction over thirty years: no increase over ten years, a 10% reduction over twenty years and a 20% reduction over thirty years.

(d) Plan amendments must be reviewed to assure that the transportation system is adequate to support planned land uses. In turn, land use changes will need to be reviewed to assure that they do not exceed the capacity of the planned transportation system.

(e) Local governments must amend their comprehensive plans to allow transit oriented developments (TOD) on lands along transit routes. A TOD is defined as a mix of residential, retail and office uses and a supporting network of roads, bicycle and pedestrian ways focused on a major transit stop designed to support a high level of transit use.

The effect of this rule is that it will tie land use, development and transit even closer together. Furthermore, it accelerates the need to know the mode, alignment and timing of the transit improvements in the South and North Corridors to ensure that the updated land use plans, which are required by the rule, maximize the benefit of an investment in transit.

2.3.2 Land Use Goals and Plans in Washington

In 1990, the Washington State legislature passed the Growth Management Act to guide development and land use in the state. The Act requires all counties of 50,000 people or more that grew 10 percent in the past decade (or counties that grew 20 percent in the last decade,

notwithstanding their population) and the cities within such counties to prepare and adopt comprehensive plans. The Act established thirteen goals for comprehensive plans and the development regulations and capital facilities plans which implement them. The most pertinent goals to this analysis include:

(a) Encourage development in urban areas where adequate public facilities exist or can be provided in an efficient manner.

(b) Encourage efficient multi-modal transportation systems that are based on regional priorities and coordinated with comprehensive plans.

(c) Ensure that those public facilities and services which are necessary to support development are adequate (current service levels are not decreased below locally established minimum standards) and available at the time a new development is available for occupancy.

Each comprehensive plan must (i) designate the urban growth area, (ii) include land use, housing, utilities, and transportation elements, and (iii) a capital facilities plan. The urban growth area must include sufficient land area and densities to permit the amount of growth projected for that area. The capital facilities plan must include a six-year financial plan with clearly specifies funding sources for implementing the capital facilities called for in the plan. The plan must also include a requirement to reassess the land use element, capital facilities plan and financing plan if probable funding falls short of that which is specified in the financing plan.

The transportation element must include:

(a) Specific levels of service standards for arterials and transit routes. These become the standards by which compliance with Goal (c), above, is judged.

(b) Specific actions and requirements for bringing into compliance any facility or service which falls below the adopted service standards.

(c) A multi-year financing plan which serves as the basis for the six-year financing element of the capital facilities plan. The transportation element must include a requirement to determine, if probable funding falls short of that which is specified in the multi-year financing plan, how additional funds will be raised or how land use assumptions will be reassessed to ensure level of service standards are met.

After adoption of the comprehensive plan, cities and counties must adopt and enforce ordinances which prohibit the approval of proposed developments which cause levels of service to fall below the adopted standards *unless* transportation improvements or strategies to accommodate these impacts are made *concurrent* with the development. Concurrency, as it relates to the transportation element, means that either the strategies are in place at the time of development or

that a financial commitment is in place to complete the improvements or strategies within six years.

The State of Washington's Commute Trip Reduction Law was adopted by the 1991 Legislature and incorporated into the Washington Clean Air Act. Its intent is to improve air quality and reduce traffic congestion through employer-based programs that encourage the use of alternatives to the single-occupant vehicle (SOV) for commute trips.

The law applies to "major employers" with one hundred or more full-time employees at a work-site, who are scheduled to begin their work on weekdays between 6:00 and 9:00 a.m. and are located in counties with over 150,000 population. The law establishes goals for reducing the amount of vehicle miles traveled for commute trips by employees of affected employers. These goals include a 15 percent reduction by 1995, a 25 percent reduction by 1997 and a 35 percent reduction by 1999 as compared against the 1992 average for the area in question.

Each county and city which includes a major employer must adopt a commute trip reduction plan and ordinance which is consistent with comprehensive plans and includes, among other requirements:

(a) Goals for reductions in the proportion of SOV commute trips and the vehicle miles traveled for commute trips per employee.

(b) Requirements for major public and private employers to implement commute trip reduction programs for employees.

(c) A review of local parking policies and a determination of any revision which may be necessary to comply with the commute trip reduction goals.

After a jurisdiction adopts its commute trip reduction plan and ordinance, each major employer within that jurisdiction must develop a commute trip reduction program which is consistent with the plan and submit it to the jurisdiction for their review. The employer's program must be aimed at meeting the reduction goals established by the jurisdiction. If the plan is unacceptable to the jurisdiction, then the jurisdiction can require the employer to make necessary changes. Cities and counties may impose civil penalties for employers who fail to implement an acceptable trip reduction program.

Clark County, the City of Vancouver, Regional Transportation Commission (RTC) and C-TRAN are currently intensely involved in regional and local efforts to respond to the Growth Management and Trip Reduction Acts. A fundamental product of these efforts is the draft "Community Framework Plan" which serves as the guide for preparing the detailed comprehensive plans of the county and its cities.

The framework plan concentrates growth in urban centers in the county, each center being separate and distinct from the others. While these centers are different in size and contain different types of developments, each is to provide a place to live, work and learn within a small

enough area to maintain a sense of community. To accomplish this goal, development would have to occur at 11 units per acre, a higher average density than currently exists. Consistent with the requirements of the Growth Management Act and the Trip Reduction Act, the fundamental transportation policy in the Community Framework Plan is to reduce reliance on the single-occupant vehicle. The Framework Plan is dependent on high capacity transit to provide connections between activity centers.

Concurrent with the preparation of the Framework Plan, Clark County, Vancouver, RTC and C-TRAN are working toward meeting the requirements of the Commute Trip Reduction Act. In early 1993, Clark County and Vancouver enacted Commute Trip Reduction ordinances. C-TRAN is continuing to coordinate and implement a transportation demand management strategy, including the development and approval of employer programs.

These activities in Clark County are reminiscent of those a decade ago in the tri-county area. By structuring the city and county comprehensive plans on the basis of state goals set forth in the Growth Management Act and Trip Reduction Act:

(a) land use designations, patterns and policies in Clark County and the City of Vancouver are being established on the basis of a high capacity transit in corridors between major regional activity centers; and

(b) water, sewer, transportation and other infrastructure plans in these jurisdictions are being prepared to support such development.

If the resulting transit plans are not achieved, the economic vision, development goals and land use plans for the county and its cities will have to be revised. As more and more public and private investment is made based on these goals and plans, it will become more and more difficult, if not impossible, to turn-back on the plan. And akin to the situation that exists on the Oregon-side of the region, land use, development and high capacity transit will become inextricably and irreversibly linked.

2.4 Air Quality Plans and Issues

The Portland/Vancouver region has been classified as a non-attainment area for air quality under the U.S. Environmental Protection Agency (EPA) standards. EPA has designated the region's violations as "marginal" for ozone and "moderate" for carbon monoxide. These ratings represent improvements in air quality which have primarily been achieved through technological innovations during the past two decades. However, with relatively large population growth anticipated for the future and without the promise of commensurate technological advances, the region has to look towards behavioral and market solutions to reach and maintain national ambient air quality standards.

Transit expansion is a critical component of the State Implementation Plan (SIP) for air quality and the proposed Air Quality Maintenance Plan (AQMP) for the Portland region. In order to be

approved by EPA, the AQMP must demonstrate a 32% reduction in Volatile Organic Compound (VOC) emissions and a 15% reduction in Nitric Oxide (NOX) emissions by the year 2007. The transit expansion program, including the associated implementation of transit-supportive land uses, is projected to yield almost 20% of the required reduction in VOC and almost 30% of the required reduction in NOX.

Without an EPA approved AQMP, all new industries and businesses which emit CO, VOC or NOX must use the "Lowest Achievable Emission Reduction (LAER)" technologies to meet federal requirements, which tend (depending on types of emissions and other specifics) to cost in the $20,000 - 25,000 per ton of emission range. With an approved AQMP, new business and industries would be allowed to used "Best Available Technology (BACT)" to meet federal requirements. Since BACT methods tend to cost in the $5,000 per ton of emission range, the existence of an approved AQMP reduces the air quality-related costs of new industry and business by roughly $20,000 per ton of emission.

Over the past few years, during which business development has been slow, there has be roughly a 100 ton per year increase in new business related pollutant emissions. Thus, an approved AQMP would save new industry about $2 million per year. It is generally expected that as industry begins to expand at more normal rates, an approved AQMP would save new industries about $6 - $10 million per year. Evidence of this level of emission increases can be observed from recently reviewed applications (neither project was implemented) for an Intel plant (which would have emitted 200 tons of VOC) and a US Steel plant (which would have emitted 1000 tons of CO). Averaging all of these factors, transit expansion could save new industry about $2 million per year (1990 dollars) in air quality clean-up costs.

2.5 Purpose and Need Summary

In summary, the purpose and need for evaluating high capacity transit in the South/North Corridor stems from the following:

(a) Over the past seventeen years, there has been a continuous progression of regional and local policy and investment decisions, both on the Oregon and Washington sides of the region, aimed at establishing growth corridors and activity centers which are supported by high capacity transit.

(b) In 1976, the region established high capacity transit corridors as the spine of the regional transportation system. Since that time about $1 billion in transportation improvements have been sited, sized and designed on the basis of this policy. In the next five years that figure will roughly double.

(c) Since 1976, all applicable local and regional land use policies on the Oregon side of the region; including the Clackamas County, Oregon City, Milwaukie and Portland Comprehensive Plans, Metro's Urban Growth Boundary, Metro's Regional Urban Growth Goals and Objectives (RUGGO) and the Regional Transportation Plan; have

been formulated on the basis of high capacity transit in regional corridors. As a result, for almost two decades, land use designations; zoning patterns; and water, sewer and other infrastructure investments, in each of these jurisdictions, have been located and sized on the basis of high capacity transit corridors.

(d) The recent adoption of the Oregon's Transportation Planning Rule requires even greater attention to transit and transit-related land use than that contemplated by existing regional and local plans -- thus, tightening the linkage between land use and transit development.

(e) Historically, South/North Corridor population and employment is growing at a faster rate than the region as a whole. This trend is projected to continue into the future. The existing and programmed South/North Corridor transit systems will provide inadequate service (coverage, reliability, frequency and speed). There are indications that the highway network will not be able to accommodate future growth in these corridors. Additional capacity deficiencies are projected on arterials and highways.

(f) There is growing concern that reduced accessibility to the South/North Corridor may reduce their ability to attract industrial and commercial development in the future. This emerging problem adds to the existing concern in Clark County regarding the relative loss of per capita income which may result in an unstable or deficient tax base in the county. The income associated with Clark County commuters to Oregon is significant to the quality and stability of the County's economy and tax base.

(g) The recently enacted Growth Management Act and Commute Trip Reduction Act in Washington require the preparation of comprehensive plans and transportation demand management strategies in Clark County and Vancouver. In response to the state goals, the Community Framework Plan and enacted Trip Reduction ordinance are based on a reduced reliance on single-occupant vehicles and the implementation of a high capacity transit strategy.

As a result, all applicable local and regional land use policies in Clark County, including the detailed county and city comprehensive plans and the Regional Transportation Plan; will be formulated on the basis of high capacity transit in regional corridors. Akin to what occurred in Oregon, land use and economic development will become inextricably linked to the implementation of high capacity transit corridors.

(h) If the resulting transit plans are not achieved, the economic vision, development goals and land use plans for the county and its cities will have to be revised. As more and more public and private investment is made based on these goals and plans, it will become more and more difficult, if not impossible, to turn-back on the plan. And akin to the situation that exists on the Oregon-side of the region, development and high capacity transit will become inextricably and irreversibly linked.

(i) Given the growing linkage in the region between land use, economic development and high capacity transit, as well as the growing public and private investment in support of these policies; it has become essential at this time to determine if and when a fixed guideway project can be pursued in the South/North Corridor.

~3~

The Preliminary Alternatives Analysis Stage: Selection of the Priority Corridor

3.1 Background

The system/sub-area planning studies summarized in Chapter 2 concluded that there was a need to examine high capacity transit options in both the South and North corridors. As a result, Metro, C-TRAN and eleven affected state and local jurisdictions embarked on a multi-staged study to determine if and where HCT options could prove to be cost-effective. The "Preliminary Alternatives Analysis" (Pre-AA) was the first stage of this study. This chapter summarizes the analysis and results of the Pre-AA study (for complete details see *Priority Corridor Analysis: Findings and Recommendations, Metro, April 1993*).

The primary purpose of the Pre-AA study was to evaluate and recommend the *Priority Corridor* for the South Study Area and the North Study Area. The *Priority Corridor* designation had two implications, it was the local determination that:

(a) more detailed analysis of HCT options in the corridor was warranted, and

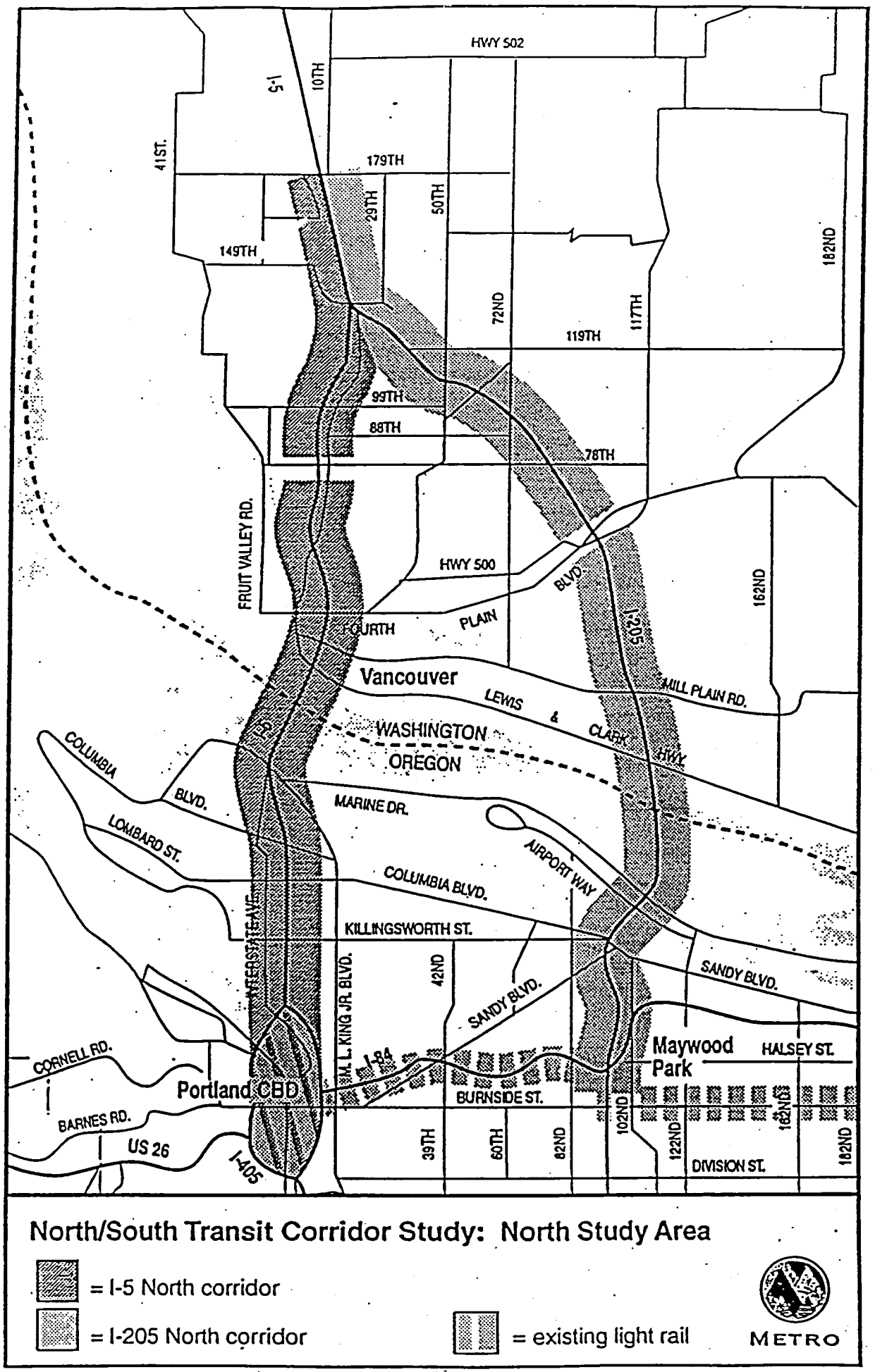
(b) the selected corridor was the next corridor (after the Westside-Hillsboro Corridor Project) for which the region would seek federal HCT funds (e.g., Section 3 "New Start" funds).

A second major purpose of Pre-AA was to define the relationship between the Priority Corridors for the North and South Study Areas. Specifically, the Pre-AA study considered whether the South *Priority Corridor* should proceed into the AA/DEIS stage ahead of the North *Priority Corridor*, as was then prescribed by adopted regional policy, or if they should be integrated into a singular *Priority Corridor* and proceed concurrently.

While not directly relevant to this MIS report, it should be noted that the Pre-AA report also recommended the preparation of improvement strategies for those corridors which were <u>not</u> selected as *Priority Corridors*. Improvement strategies for these corridors were ultimately adopted via a study process which paralleled the one reported herein.

3.2 Definition of Priority Corridor Options

Two options for the North *Priority Corridor* were evaluated (see Figure 3-1):



North/South Transit Corridor Study: North Study Area

= I-5 North corridor

= I-205 North corridor

= existing light rail

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Figure 3-1

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(a) **I-5 North Corridor**: which was represented by an LRT alignment between downtown Portland and 179th Street in Clark County. The analysis also showed results for a shorter alignment terminating in North Vancouver (78th Street).

(b) **I-205 North Corridor**: which was represented by a Busway alignment between the Gateway Transit Center and 179th Street in Clark County. The analysis also showed results for a shorter alignment terminating at the Vancouver Mall. It is important to note that while the I-5 North Corridor analysis assumed an LRT and the I-205 North Corridor analysis assumed a busway; the issue *at this stage in the planning process* was *not* choice of mode. These differences in modal assumptions resulted from previous studies which found a busway to be potentially more suitable in the I-205 North Corridor than LRT. The issue at hand was, regardless of the type of HCT option, which corridor most merits further investigation.

It is also important to note that while data is shown for shorter alignment options in both corridors, the issue *at this stage in the planning process* was *not* the selection of a terminus. The data for the various termini was shown to demonstrate that the conclusions being drawn are generally independent of the ultimate selection of the terminus. Terminus options were later investigated in the Tier I stage of the MIS.

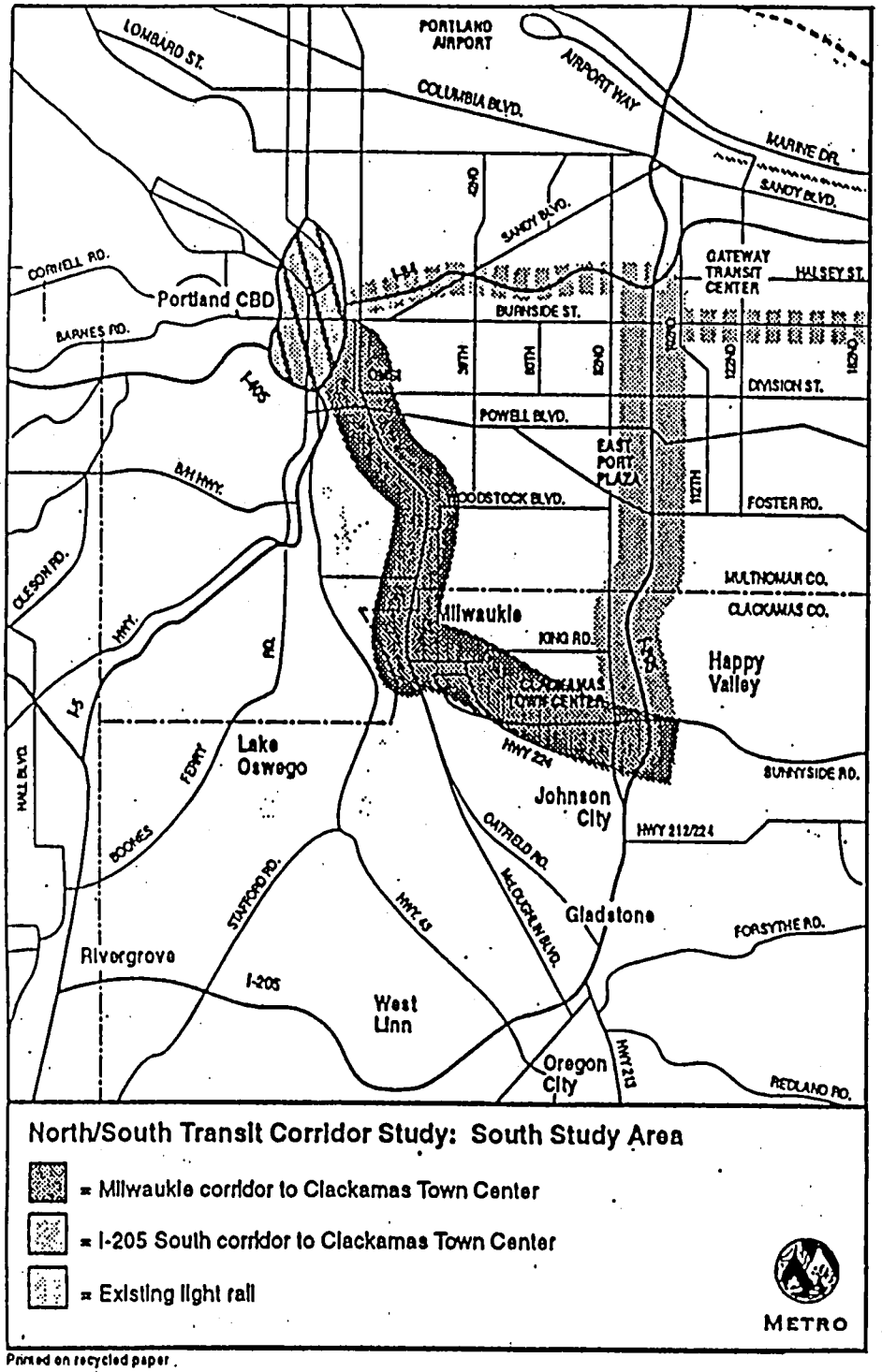
Two options for the South *Priority Corridor* were evaluated (see Figure 3-2):

(a) **Milwaukie Corridor**: which was represented by an LRT alignment connecting downtown Portland, Milwaukie, Clackamas Town Center, and Oregon City. The analysis also showed results for shorter alignments including one terminating in Milwaukie and one terminating at the Clackamas Town Center. Again, the data on the short alignment options was for comparative purposes, *not (at this point)* to select a terminus.

(b) **I-205 South Corridor**: which was represented by an LRT alignment connecting downtown Portland, Clackamas Town Center and Oregon City via the existing MAX line between downtown Portland and Gateway and a new alignment on I-205 from Gateway south. The analysis also showed results for a shorter alignment terminating at the Town Center.

The **I-205 South Corridor** was initially analyzed as a continuous alignment between Oregon City and the Airport intersecting with the existing MAX line at the Gateway Transit Center. That analysis found that only 10 percent of the trips in the corridor actually continued through the Gateway Transit Center, 90 percent of the trips in the corridor between Oregon City and the Gateway Transit Center either disembarked at the Gateway Transit Center or continued on the Banfield segment to points west or east. The same was true for trips in the segment between the Airport and the Gateway Transit Center.

Thus, it was determined to be most appropriate to consider the I-205 Corridor as two distinct corridors: one from Oregon City to Gateway to downtown Portland; and a second from the



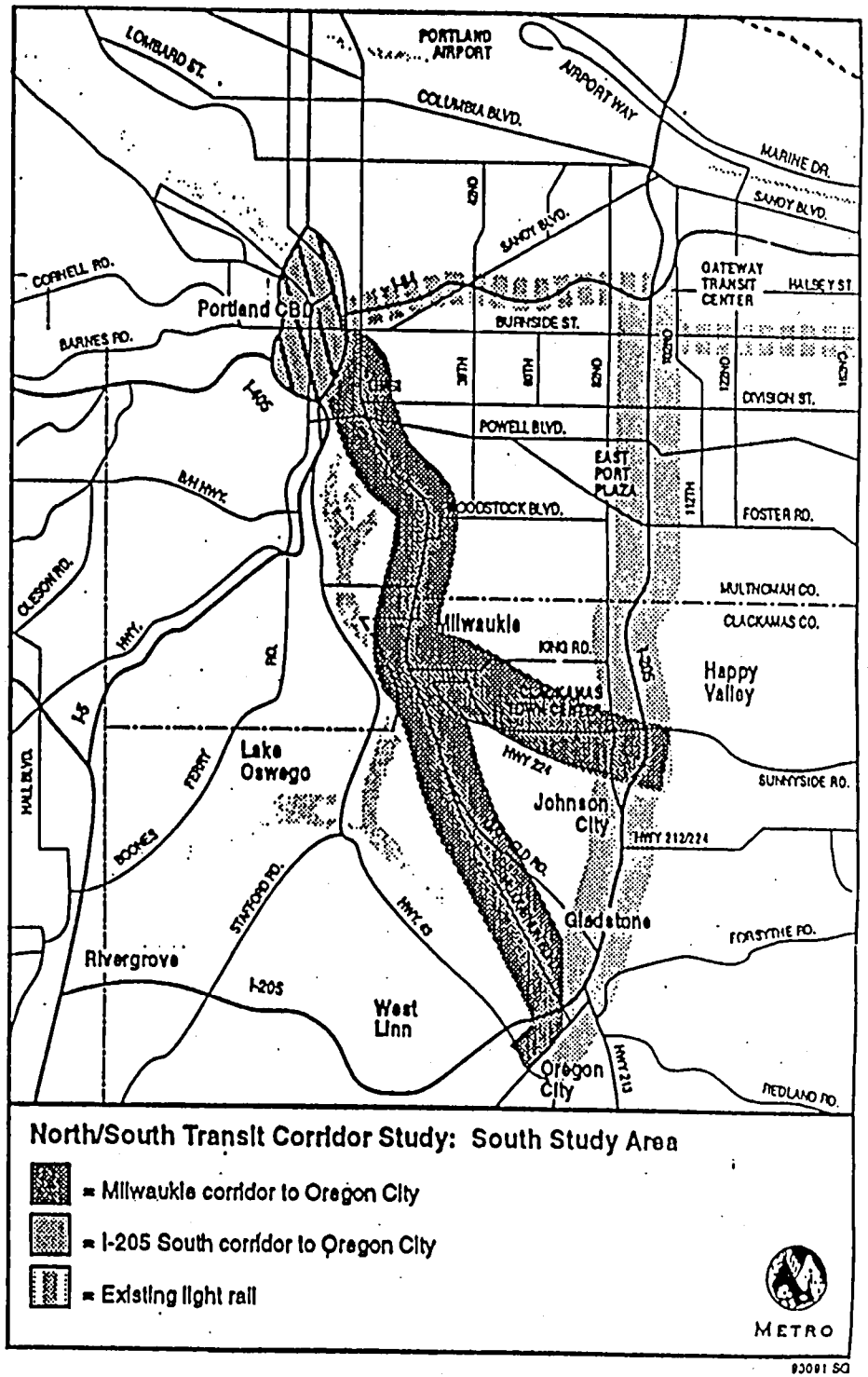


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Figure 3-2

Airport to Gateway to downtown Portland. The corridor segment between Oregon City, Gateway and downtown Portland was defined as the I-205 South Corridor and was evaluated as an option to the Milwaukie Corridor. The Airport Study Area between the Airport and the Gateway Transit Center was evaluated on its own merits and ultimately proceeded along a study track which was parallel to the MIS.

3.3 Evaluation Methodology

Staff evaluated each corridor in each study area on the basis of nine criteria:

(a) Traffic and Transit Ridership

(b) Land Use and Economic Development

(c) Operations & Maintenance Cost

(d) Capital Cost

(e) Environmental Sensitivity

(f) Equity

(g) Cost Effectiveness

(h) Public Opinion

(i) Funding Options

Each of these criteria were measured in accordance with technical methodologies and data approved by an Expert Review Panel.

3.4 Public Involvement

Public Opinion was one of the nine criteria by which the corridor options were evaluated. The Pre-AA stage included an extensive public involvement program which consisted of newsletters nine CAC meetings and:

- *Introductory Study Planning Meetings (Jan-Feb 1993)*: A series of eleven meetings providing early study process, planning, and projected schedule information. A twelve minute audio visual presentation, and large graphic display were among the materials used to introduce the study to the public.

- *Priority Corridor Open Houses (March 1993)*: A series of three, six-hour public meetings were held at the end of the Priority Corridor analysis. Citizens reviewed technical study results with study planning and engineering staff from throughout the study area. Technical summary reports for each of nine technical reports, maps, comparative matrices, background materials and general study information provided the basis for discussion.

3.5 Results of Analysis

The following sub-sections summarize the results of the Pre-AA study for the South and North study areas. Summary statistics for the South Corridor are shown in Table 3-1 and for the North

TABLE 3-1
SUMMARY STATISTICS FOR THE SOUTH CORRIDOR

FACTOR/TERMINUS OPTION	MILWAUKIE CORRIDOR	I-205 SOUTH CORRIDOR
NUMBER OF HOUSEHOLDS (2010)		
Full[1]	31,300	21,200
Short[2]	23,600	14,100
CORRIDOR EMPLOYMENT (2010)		
Full	65,800	50,900
Short	58,200	30,600
CORRIDOR CONGESTION: 2010-NO BUILD (PEAK HOUR V/C RATIOS IN CORRIDOR)	0.91 - 1.40	0.54 - 0.88
CORRIDOR HCT RIDERSHIP (2010)		
Full	19,100	9,500
Short	16,800	6,700
CAPITAL COST: WITH DOWNTOWN IMPVTS. $1993, Millions		
Full	$ 864	$ 707
Short	$ 599	$ 467
NET ANNUAL OPERATING COST (2010)		
Full	$ 6.51	$ 7.33
Short	$ 3.95	$ 3.63
FAREBOX RECOVERY RATIO (2010)		
Full	29.4%	15.5%
Short	39.1%	20.7%

[1] HCT line between Downtown Portland, Clackamas Town Center and Oregon City
[2] HCT line between Downtown Portland and Clackamas Town Center
Source: *Phase I Technical Reports: ERP Meeting* (Metro 1993)

TABLE 3-2
SUMMARY STATISTICS FOR THE NORTH CORRIDOR

FACTOR/TERMINUS OPTION	I-5 NORTH CORRIDOR	I-205 NORTH CORRIDOR
NUMBER OF HOUSEHOLDS (2010)		
Full[1]	35,700	33,000
Short[2]	24,900	19,200
CORRIDOR EMPLOYMENT (2010)		
Full	74,400	30,700
Short	67,700	23,000
CORRIDOR CONGESTION: 2010 NO-BUILD PEAK HOUR V/C RATIOS IN CORRIDOR	0.77 - 1.21	0.69 - 0.85
CORRIDOR HCT RIDERSHIP (2010)		
Full	21,800	10,900
Short	19,300	9,300
CAPITAL COST:WITH DOWNTOWN IMPVTS. ($1993, Millions)	LRT	BUSWAY
Full	$ 914	$ 383
Short	$ 709	$ 288
NET ANNUAL OPERATING COST (2010)	LRT	BUSWAY
Full	$ 7.00	$ 4.13
Short	$ 4.33	$ 3.64
FAREBOX RECOVERY RATIO (2010)		
Full	31 %	27 %
Short	39 %	27 %

[1] HCT line between Downtown Portland and 179th Street in Clark County
[2] HCT line between Downtown Portland and North Vancouver (78th Street/Vancouver Mall)
Source: *Phase I Technical Reports: ERP Meeting* (Metro 1993)

Corridor in Table 3-2. More detailed data is provided in *Phase I Technical Reports: ERP Meeting* (Metro 1993). The reader should note that while these data were appropriate for the *Priority Corridor* decision, they have been superseded by more refined data generated during later stages of the MIS.

3.5.1 Analysis of South Study Area Alternatives

Land Use and Economic Development: The Milwaukie Corridor contains more existing and year 2010 population and employment than the I-205 South Corridor. The Milwaukie Corridor, due to its longer length, contains more developable and redevelopable land than the I-205 South Corridor.

Traffic and Transit Ridership: McLoughlin Blvd. is currently and will continue to be more congested than I-205. All of the representative highway segments analyzed on McLoughlin Boulevard are at or approaching Level of Service E, while all of the representative segments on I-205 are well below capacity. In the year 2010, the Milwaukie Corridor is projected to attract over twice as many HCT daily riders as the I-205 South Corridor. Year 2010 peak-hour, peak direction riders in the Milwaukie Corridor are projected to be 2.3 - 5.0 (depending on the location) times greater than in the I-205 South Corridor.

Environmental Sensitivity: In overall terms, the Milwaukie Corridor has a greater potential for environmental risks than does the I-205 South Corridor.

Equity: The Milwaukie Corridor serves a larger population of minority, poor, youth and elderly than does the I-205 South Corridor.

Operating Costs and Efficiencies: The Milwaukie Corridor is projected to exhibit almost twice the Farebox Recovery Rate of that in the I-205 South Corridor. The Milwaukie Corridor provides greater long-term HCT capacity than does the I-205 South Corridor.

Capital Costs: The capital cost of the full-length (Clackamas Town Center and Oregon City) system is 22 percent higher in the Milwaukie Corridor than in the I-205 South Corridor. For the $157 million premium, the Milwaukie Corridor serves Milwaukie directly while the I-205 South Corridor does not.

Cost Effectiveness: The total annualized cost-per-HCT rider in the Milwaukie Corridor is almost 60 percent better than in the I-205 South Corridor.

3.5.2 Analysis of North Study Area Alternatives

Land Use and Economic Development: The I-5 North Corridor contains more existing and year 2010 population and employment than the I-205 North Corridor. The I-205 North Corridor contains more developable and redevelopable land than the I-5 North Corridor.

Traffic and Transit Ridership: I-5 is currently and will continue to be more congested than I-205. By the year 2010, almost all of the representative highway segments analyzed on I-5 are approaching or exceeding Level of Service (LOS) E, while almost all of the representative segments on I-205 are at LOS D or better. The I-5 North Corridor is projected to attract twice as many HCT daily riders, in the year 2010, as the I-205 North Corridor. Year 2010 p.m. peak-hour, peak direction riders in the I-5 North Corridor are projected to be 85 percent more than in the I-205 North Corridor.

Environmental Sensitivity: In overall terms, the I-5 North Corridor has a greater number of environmentally sensitive sites than the I-205 North Corridor, although the I-205 North Corridor has greater ecosystem risks.

Equity: The I-5 North Corridor serves a larger population of minority, poor and elderly than does the I-205 North Corridor. The amount of "youth" in both full-length corridors is roughly the same.

Operating Costs and Efficiencies: LRT in the I-5 North Corridor is projected to exhibit a 10 percent better Farebox Recovery Rate of than a Busway in the I-205 North Corridor. The I-5 North Corridor provides greater long-term HCT capacity than does the I-205 North Corridor.

Capital Costs: The capital cost of the full-length I-5 North LRT is substantially higher than the I-205 North Busway. This difference is due to the different mode assumed for the I-205 North Corridor, not the location, configuration or characteristics of the corridor itself.

Cost Effectiveness: In spite of its higher capital cost, the total annualized cost-per-HCT rider in the full-length I-5 North Corridor is almost 20 percent less than in the I-205 North Corridor. The difference is even greater with a North Vancouver terminus option.

3.6 Preliminary Alternatives Analysis Conclusions

3.6.1 Priority Corridor Designation

In April 1993 (Resolution No. 93-1784), based on the findings summarized in Section 3.6.1, the Metro Council selected the Milwaukie Corridor as the "South" Priority Corridor and, based on the findings summarized in Section 3.6.2, the I-5 North Corridor as the "North" Priority Corridor.

Furthermore, the Metro and RTC resolutions enacted an Action Plan to merge the Milwaukie and I-5 North Corridors into a singular South/North Corridor for the purpose of:

(a) Preparing a singular Alternatives Analysis/Draft Environmental Impact Statement;

(b) Securing capital financing for a singular South/North HCT project; and

(c) Securing sufficient funds to operate a South/North HCT project and related bus feeder system.

As a result, staff was directed to refine and analyze alignment, station and terminus options in the integrated South (Milwaukie)/North (I-5 North) Corridor and return to JPACT with a recommendation on a small set of promising options for preparation of a Draft Environmental Impact Statement.

3.6.2 Non-Priority Corridor Action Plan

The Metro Council determined that the Airport Corridor, which runs along I-205 between the Gateway Transit Center and Portland International Airport, would be pursued as a non-Priority Corridor. Staff was directed to determine the design and possible funding sources for constructing and operating an HCT corridor to the Portland International Airport and to return to JPACT with a recommendation. Staff was also directed to prepare an intermediate-term improvement strategy for the I-205 South and I-205 North (in Clark County) Corridors which do not include HCT improvements.

~4~
Scoping Mode and Alignment Alternatives

4.1 Background

4.1.1 Overview of Study Process

After completion of the Preliminary Alternatives Analysis (Pre-AA) study, Metro requested and received FTA approval of the *Application to Initiate Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS)* (Metro, June 28, 1993) and the *South/North Preliminary Work Plan* (Metro, June 28, 1993). The South/North Corridor Transit Study was initiated in September 1993. On October 12, 1993, FTA issued notice in the *Federal Register* of its intent to publish an environmental impact statement for high capacity transit improvements in the South/North Corridor. The notification included a description of the study process, including the tiered approach, which was to be used to narrow the range of alternatives to be examined in the DEIS.

The approved Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) process included a:

(a) Tier I stage in which the preferred mode and study termini would be selected and alignment alternatives would be narrowed; and a

(b) Tier II stage in which a DEIS and Preliminary Engineering (PE) would be prepared on the preferred mode and a narrowed set of alignment alternatives.

Four basic study selections were intended to be made in Tier I:

(a) Narrow the modal alternatives to be included in the South/North Corridor DEIS to a No-Build Alternative, a Transportation System Management (TSM) Alternative (based on later conversations with FTA, the TSM Alternative was determined to be unnecessary and was, therefore, eliminated from further consideration) and one High Capacity Transit (HCT) modal alternative;

(b) Narrow the number of HCT alignment alternatives (major route choices such as McLoughlin Boulevard versus the Macadam Avenue) to be included in the DEIS to one-or-two per segment, if possible;

(c) Narrow the number of HCT design options (secondary routing choices such as, for example, alignments variations along Macadam Avenue) to be included in the DEIS to one-or-two per alternative, if possible; and

(d) Select the study termini to be addressed in the DEIS.

There were two points during Tier I at which alternatives were narrowed:

(a) *Scoping Process*: Modal alternatives were narrowed during the Scoping Process, at the beginning of Tier I. The Scoping Process also identified alignment options to be examined in later stages. This chapter focuses on the Scoping Process stage of the MIS.

(b) *Tier I Final Report*: Alignment alternatives and options and terminus alternatives were narrowed during the Tier I Final Report stage, as discussed in Chapter 5.

4.1.2 Study Organization

At the beginning of Tier I, the South/North Corridor Steering Group adopted the *Tier I Evaluation Methodology Report* which defined the criteria and study organization to be used during Tier I. While similar to that used in Pre-AA, the adopted organization formalized the roles of the affected parties. Table 4-1 shows the roles of the oversight bodies in the Tier I evaluation process. The following paragraphs explain the oversight bodies.

Metro/JPACT/TPAC: Metro is the lead agency for Tier I and Tier II of the South/North AA/DEIS. Major study decisions must be approved by the Metro Council, the MPO for the Oregon portion of the corridor. Recommendations to the Metro Council come through the Joint Policy Advisory Committee on Transportation (JPACT) which is composed of elected officials and agency directors. The Transportation Policy Alternatives Committee (TPAC) is a senior staff level committee which makes recommendations to JPACT.

RTC/JRPC/C-TRAN: Major study decisions must also be approved by the RTC, the MPO for the Washington portion of the corridor and C-TRAN, the local transit district in Clark County. The Washington State HCT Act requires that a policy forum, or Joint Regional Policy Committee (JRPC) be formed to qualify projects for State of Washington funds. In 1991, C-TRAN established a JRPC to ensure that the study adheres to state requirements.

Steering Group: The South/North Steering Group is made up of one policy-level person from each of the participating jurisdictions and Metro. The Steering Group provides policy direction to the study and forwards recommendations to the participating jurisdictions, JPACT, Metro, RTC, JRPC and C-TRAN.

Project Management Group (PMG): The PMG consists of senior management staff from the participating jurisdictions. The PMG oversees the general management of the study. Staff recommendations to the Steering Group are made through the PMG.

Table 4-1
Tier I Study Organization

Study Organization\Product	Preliminary Alternatives Report for Scoping Meeting	Tier I Description of Alternatives Report	Tier I Final Report	Narrow Design Options
Technical Advisory Committee	Review	Review	Review	Review
Project Management Group	Approve	Recommend to Steering Group	Recommend to Steering Group	Approve or Recommend to Steering Group
Expert Review Panel	NA	Technical Validity Review	Technical Validity Review	NA
Citizens Advisory Committee	Review	Recommend to Steering Group	Recommend to Steering Group	Review
Steering Group	NA	Approve	Recommend to Participating Jurisdictions	NA or Approve per PMG Action
Participating Jurisdictions	NA	NA	Recommend to RTC, JRPC, C-TRAN, JPACT, Metro	Review and Concur
RTC/JRPC/C-TRAN	NA	NA	Approve	NA
TPAC/JPACT/Metro	NA	NA	Approve	NA

Source: *South/North Tier I Evaluation Methodology Report*, Metro, December 1993.

Citizens Advisory Committee (CAC: The CAC is comprised of citizens from throughout the South/North Corridor. The CAC receives all materials transmitted to the Steering Group and prepares independent (from staff) recommendations on Steering Group actions. The CAC also provides regularly scheduled, on-going opportunity for public testimony.

Expert Review Panel (ERP): The ERP consists of about ten outside experts, some local and some from throughout the country. The membership includes transit industry officials, academicians and other specialized professional backgrounds. The purpose of the ERP is to review all major study products for technical validity and sufficiency. The results of its reviews are sent to the governors of both states, the TAC, PMG and Steering Group.

Technical Advisory Committee (TAC): The South/North TAC is composed of technical staff from all of the participating agencies and jurisdictions who monitor the technical aspects of the study and reports its findings to the PMG.

4.1.3 Scoping Process Overview

This chapter focuses on the analysis and decision-making involved in the Scoping Process stage. It summarizes the findings included in the following reports:

- *Description of Wide Range of Alternatives Report (July 20, 1993)*
- *Initial Analysis of Modal Alternatives and Design Options (1993)*
- *Preliminary Alternatives Report for Scoping Meeting (October 25, 1993)*
- *Mode and Alignment Workshop Report: Appendix II (October 25, 1993)*
- *Scoping Process Narrowing Report (December 17, 1993)*
- *Scoping Process Narrowing Report: Appendix I (December 17, 1993)*
- *Scoping Meeting and Public Comment Period (1993)*
- *Tier I Description of Alternatives Report (December 17, 1993)*

The Tier I Scoping Process stage is diagramed in Figure 4-1. The criteria used in the Scoping Process are shown in Table 4-1.

4.2 Initial "Wide Range of Alternatives"

Six alternatives were initially identified for consideration in the *Scoping Process*. A summary description of those alternatives are included below. A more detailed description of the initial alternatives and options may be found in the *Draft Description of Wide Range of Alternatives Report, Metro, July 1993*.

4.2.1 No-Build Alternative/Transportation System Management Alternative

The definition and use of the No-Build and Transportation System Management (TSM) alternatives were discussed at the December 1994 *Transitional Project Consultation Meeting*. It was determined that, because the Tier I process concluded with the selection of a locally preferred design concept and scope, the TSM Alternative would not have to be examined in the DEIS. However, a TSM Alternative would be developed for the purpose of calculating a cost-effectiveness index during Tier I. The TSM alternative was to include a major expansion of bus service with a network configuration of trunk lines served by feeder lines.

Figure 4-1

Scoping Process Reports

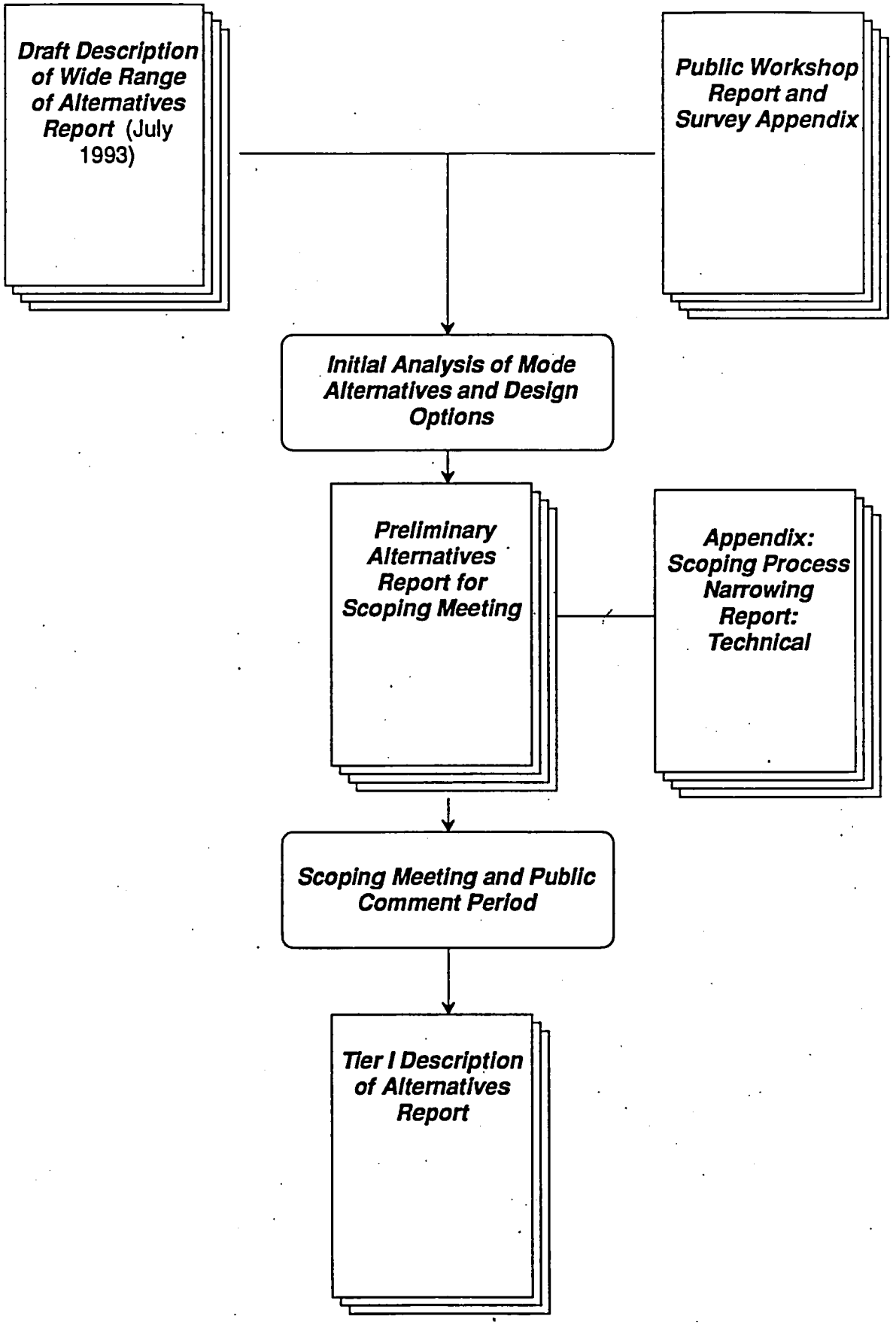

Table 4-1
Evaluation Criteria for Scoping Process

NARROW MODAL ALTERNATIVES	NARROW ALIGNMENT ALTERNATIVES	NARROW DESIGN OPTIONS	NARROW STUDY TERMINI ALTERNATIVES
Transit Service -- *Ease of Access* -- *Transferability* -- *Travel Times* -- *Reliability* -- *Ridership*	Alignment Alternatives will not be narrowed during the Scoping Process	Transit Service -- *Ease of Access* -- *Transferability*	Study Termini Alternatives will not be narrowed during the Scoping Process
Transit Operations -- *Modal Compatibility*		Transit Operations -- NA --	
Ability to Accommodate Growth -- *Design Capacity* -- *Future Expansion Capability*		Ability to Accommodate Growth -- NA --	
Minimize Traffic and Neighborhood Infiltration -- NA --		Minimize Traffic and Neighborhood Infiltration -- NA --	
Promote Land Use Desired Patterns and Development -- *Support Major Activity Centers* -- *Support Bi-State Policies*		Promote Land Use Desired Patterns and Development -- *Support Major Activity Centers* -- *Support Bi-State Policies*	
Fiscal Stability and Efficiency -- *Cost*		Fiscal Stability and Efficiency -- *Cost*	
Engineering Efficiency and Environmental Sensitivity -- *Environmental Impacts*		Engineering Efficiency and Environmental Sensitivity -- *Environmental Impacts* -- *Design Considerations*	

To comply with FTA regulations, a transit network was prepared for inclusion in the "financially constrained" *Regional Transportation Plan.* It was thought that this transit network would also serve as the No-Build Alternative in the DEIS. This "financially constrained" transit network included all service increases and TSM measures which would be affordable within existing transit revenue sources. Thus, it became evident that the "financially constrained" transit network contained the elements of a archetypal TSM alternative, as used in cost-effectiveness computations. Based on discussions with FTA, it was agreed that: (i) this network was an appropriate baseline alternative for calculating the cost-effectiveness indices for the LRT alternatives; and, (ii) if it was so used, there was no need for preparing and modeling a separate TSM Alternative. Thus, the "financially constrained" transit network assumed in the RTP will be evaluated in the DEIS as the No-Build Alternative and serve, in lieu of the TSM Alternative, as the baseline for calculating the federal cost-effectiveness index.

4.2.2 Busway Alternative

This alternative included the construction of an exclusive busway facility primarily along McLoughlin Boulevard and the I-5 freeway with potential branch lines along Highway 224 to the Clackamas Town Center and along SR-500 to Vancouver Mall. The alternative would improve the point-to-point travel times by including access ramps at key locations to improve bus operations. Bus service would be substantially increased, transit coverages will be improved, headways would be shortened and new park-and-ride lots would be added.

4.2.3 Commuter Rail Alternatives

Commuter Rail would operate as passenger train service between the core and periphery of the metropolitan region and usually runs on existing railroads ROW. The South/North Corridor is served by two major rail carriers:

Southern Pacific (SP): The Valley Line is the SP mainline between Portland and Eugene. From Eugene, the line runs north through the Willamette Valley serving Junction City, Harrisburg, Albany, Jefferson, Salem, Woodburn, Canby and, in the Portland metropolitan area, Oregon City, Milwaukie and Portland. The line is maintained to standards which allow passenger trains to operate at 70 miles per hour (though some communities restrict top speeds to lower levels). The line is currently used daily by one Amtrak train in each direction. The proposed commuter rail line would extend between Canby, Oregon City, Milwaukie and Union Station.

Burlington Northern (BN): This is the BN mainline between Portland and Vancouver, B.C. The BN would connect with the SP line serving the southern segment of the corridor at Union Station. The line would then extend north to the west of downtown Vancouver using the exclusive railroad bridges to cross both the Willamette and Columbia Rivers. From Vancouver, the line would extend north to Ridgefield.

In total, the line would be about 47 miles long. The existing railroad lines would be upgraded as necessary to achieve the desired speeds. Passenger stations and maintenance facilities would also be added. High capacity passenger coaches and diesel locomotives would operate bi-

directionally. Initially, trains would run only in the peak-hour to serve primarily work trips between the Portland CBD and its suburbs. Trains may be operated by Tri-Met or by a contractor such as Amtrak or a freight railroad.

4.2.4 River Transit Alternatives

The Columbia and the Willamette Rivers are navigable rivers which traverse the South/North Corridor and, thus, provide the opportunity for river transit alternatives. River transit is regularly scheduled, passenger-only boats which would operate over a defined route which connects a series of landings located to serve trips to work and other destinations. The alternatives considered for the South/North Corridor would employ certain aspects of the RiverBus system in London, England, the Parramatta system in Australia and the Seabus system in Vancouver, Canada.

The conceptual system evaluated included a system running from Vancouver, Washington to Oregon City, Oregon and would include eight stops in between at: St. Johns, Swan Island, Old Town, Riverplace, John's Landing, Sellwood, Milwaukie, and Lake Oswego.

4.2.5 LRT Alternative

This alternative would provide high capacity light rail transit service generally separated from traffic congestion and an expanded feeder bus network to residential areas and employment sites in Clark County, North/Northeast Portland and Clackamas County. The South/North LRT line would connect with the Westside LRT line in downtown Portland and the Banfield LRT line at the Rose Quarter Station in Northeast Portland.

A number of light rail options were identified which included various combinations of alignment alternatives and terminus alternatives. The major alternatives identified in the *Wide Range of Alternatives Report* are summarized below by segment.

4.2.5.1 Study Termini Alternatives

Study Termini define the limits of the Corridor. They should not be mistaken for Minimum Operable Segments (MOS) which will be addressed in the DEIS. The Scoping Process identified three terminus options for the southern portion of the Corridor:

(a) South of Milwaukie CBD

(b) Clackamas Town Center

(c) Oregon City

and three terminus options for the northern portion of the Corridor:

(a) North of Vancouver CBD (N.E. 88th Street)

(b) Vancouver Mall

(c) N.E. 179th Street

4.2.5.2 Alignment Alternatives and Design Options

Alignment alternatives represent the major route choices to be investigated in Tier I. Alignment alternatives are sufficiently different from each other to require separate forecasts of travel times, ridership, and network statistics. Design options represent secondary routing choices which are not sufficiently different from each other to necessitate separate network analyses. The following subsections describe the LRT alignment alternatives and options identified in the *Scoping Process*.

Oregon City to Milwaukie/Clackamas Town Center: The southernmost terminus alternative for the South/North LRT is Oregon City. There are four alignment alternatives to Oregon City which can be divided into two main categories: those that connect Milwaukie and Oregon City and those that connect the Clackamas Town Center and Oregon City. From Milwaukie, two fundamental alternatives were identified: one which follows McLoughlin Boulevard and one which follows the PTC ROW. From Clackamas Town Center, two fundamental alternatives were identified: one which follows I-205 and one which follows an SP ROW in the vicinity of I-205. In addition, a series of options were defined which would start along McLoughlin Boulevard, cut through Gladstone, connect with the SP ROW near I-205 and traverse to Oregon City.

Clackamas Town Center to Milwaukie: Another possible southern terminus for the South/North LRT is the area east of the Clackamas Town Center area. Several alignment options between central Milwaukie and the Clackamas Town Center were identified, including alignments along Highway 224, Harmony Road, Lake Road and Railroad Avenue.

Milwaukie to Portland CBD: A Macadam Avenue alignment alternative was identified which would head south from the Portland CBD along the west bank of the Willamette River generally along an abandoned Southern Pacific (SP) right-of-way (ROW). The alignment may leave the SP ROW and swing over to Macadam Avenue for several blocks in order to avoid a complex of multi-family units. The alignment would cross the Willamette River in the vicinity of the Sellwood Bridge. From the bridge it would join the Portland Traction Company (PTC) ROW and, utilizing one of a number of alignment sub-options, traverse to the City of Milwaukie and, depending on the terminus option, other points in Clackamas County.

In addition, a PTC ROW alignment alternative was identified which would head east from the Portland CBD and cross the Hawthorne Bridge. It would then head south via the PTC ROW along the east bank of the Willamette River to Sellwood, the City of Milwaukie and, depending on the terminus option, other points in Clackamas County.

In addition, a McLoughlin Boulevard alignment alternative was identified which would head east from the Portland CBD and cross the Hawthorne Bridge. It would then head south via McLoughlin Boulevard to Sellwood, Milwaukie Market Place and, depending on the terminus option, other points in Clackamas County.

Portland CBD Segment: In downtown Portland, a north/south LRT alignment was identified along S.W. 5th Avenue and/or S.W. 6th Avenue. In addition, a sub-surface option was identified (the tunnel would run north-south in a yet-to-be determined alignment between S.W. 4th Avenue and S.W. Broadway). A variety of sub-options were identified for the south entry into downtown, including: S.W. Jefferson, S.W. Columbia, S.W. Harrison, S.W. Madison and/or S.W. Main Streets. Several sub-options were identified for the north entry into downtown that access the Steel Bridge or a parallel LRT bridge.

Steel Bridge (Portland) to Vancouver CBD: In this segment, two crossings of the Willamette River were identified. These include the existing LRT tracks on the Steel Bridge and a new bridge, parallel to and north of the Steel Bridge, which would be exclusively dedicated to LRT.

From the Steel Bridge, the alignment would traverse around the Oregon Arena Complex and then head north along I-5. In the vicinity of Kaiser Hospital two alignment options were identified: either to continue to proceed northerly along I-5 or diverge onto Interstate Avenue and proceed north.

In the vicinity of N.E. Lombard Avenue, several sub-options were identified on how to proceed north across Jantzen Beach and the Columbia River to the Vancouver CBD. These options include using I-5 or Pacific Highway west to access the Columbia River bridge. Several options for crossing the Columbia River were identified, including a tunnel, new bridge and an addition to the existing bridge.

North of the Columbia River, several alignment options through the Vancouver CBD were identified including: Washington Street, McLoughlin Boulevard, 28th Street, Main Street.

Vancouver CBD to N.E. 179th Street Segment: The northernmost terminus option identified was N.E. 179th Street near the proposed Washington State University campus and the Clark County Fairgrounds. From the Vancouver CBD, the LRT alignment would proceed north along one of two alignment options: either it would follow Main Street and Highway 99 to N.E. 179th or it would follow the eastside of I-5 to N.E. 179th.

Vancouver CBD to Vancouver Mall Segment: Another terminus option identified in Clark County was the Vancouver Mall vicinity. From the Vancouver CBD, the LRT alignment would proceed around the perimeter of either Clark College or Fort Vancouver and then connect with SR-500. The alignment would then proceed northwesterly along SR-500 to the Vancouver Mall area.

4.3 Public Workshops and Scoping Meetings

In June and July 1993, Metro, in cooperation with the participating jurisdictions, conducted a series of mode and alignment workshops. These workshops were part of a broad public involvement effort to narrow the potential alternatives identified in the *Wide Range of*

Alternatives Report (or to identify options which were missed) for more detailed examination in the Tier I Final Report stage. These public involvement activities included:

- A special issue of the study's newsletter entitled *The South/North News* which focused on the workshop issues. This special newsletter was distributed to 5,000 households;
- Press releases and a press conference on the workshop;
- Notice in the *Oregonian* and in other publications serving the corridor;
- Eight Mode and Alignment Workshops open to the general public, located in various segments of the corridor and at varying times of day to ensure convenient access. Over 400 people attended the workshops;
- Additional meetings with individual neighborhood groups, business organizations, affected businesses and elected officials;
- Surveys completed by attendees at the workshops;
- Written comments and recommendations provided by public participants; and
- An issue of *The South/North News* describing the results of the workshops.

The report entitled *Mode and Alignment Workshop Report: Appendix II (October 25, 1993)* provides specific comments for each of the individual workshops. The Mode and Alignment Workshops and initial technical analyses by staff of the wide range of alternatives led to an initial PMG recommendation on the scope of the alternatives to be focused upon at the Scoping Meeting. Those recommendations were documented in the *Scoping Packet, South/North News* and the *Preliminary Alternatives Report for Scoping Meeting.*

The FTA's intent to publish an environmental impact statement for the South/North Transit Corridor was issued in the *Federal Register* on October 12, 1993. The information referenced above was presented to the public at four Scoping Meetings in October 1993. Metro received comment on those initial recommendations at the Scoping Meetings, during a 30-day public comment period (October 12, 1993 through November 12, 1993) and at the November 1993 and December 1993 meetings of the CAC.

The Scoping Meetings identified three major issues that caused the PMG to request additional technical analyses before making its final recommendation to the Steering Group. These issues included: the Eastside Connector Design Option, the PTC Alignment south of Milwaukie and the Busway Alternative.

4.4 Conclusion of Scoping: Tier I Description of Alternatives Report

Final PMG and CAC recommendations were adopted in December 1993 and forwarded to the Steering Group. In December 1993, the Steering Group approved the *Tier I Description of Alternatives Report*, which defined the alternatives to be advanced for further study.

The approval of the *Tier I Description of Alternatives Report* marked the end of the Scoping Process. Therein, three modal alternatives were eliminated from further consideration:

(a) *River Transit*: Analyses undertaken during the Scoping Process determined that River Transit would have poor access to jobs, residences and activity centers. Moreover, it was determined that River Transit would not be consistent with regional growth and land use policies. In addition, serious operational issues were detected including River Transit's lack of reliability in bad weather and bad river conditions, its inability to carry large volumes of passengers, and its poor travel times. There were also serious issues regarding the environmental impacts of River Transit.

(b) *Commuter Rail*: Analyses undertaken during the Scoping Process determined that Commuter Rail did not provide adequate access to jobs, residences or activity centers. As a result, Commuter Rail exhibited very low levels of ridership and poor cost-effectiveness. In addition, it was determined that Commuter Rail would not be consistent with regional growth and land use policies.

(c) *Busway*: Based on the *Busway Evaluation Technical Memorandum* prepared during the Scoping Process, it was determined that the Busway would attract significantly lower ridership than LRT at roughly the same capital cost and with higher operating costs. In addition, it was determined that the Busway would not achieve the land use and economic development benefits of LRT.

The *Tier I Description of Alternatives Report* also eliminated some light rail alignment alternatives from further study, most relevantly the *Central Eastside Connector*. Based on the analysis documented in the *Central Eastside Connector Technical Memorandum*, it was determined not to advance the Connector either configured as staying completely on the eastside of the Willamette River with transfers to downtown or as a split line serving both the Central Eastside and Downtown Portland. The general reasons for this determination included: the need to serve the high employment area in Downtown with the highest quality service, the loss of ridership associated with forcing transfers to Downtown, and the operational problems and high costs associated with running a split line. However, it was also determined that designs for South/North light rail would be prepared to allow for the future addition of an eastside transit connection.

Based on analyses and public input provided through Scoping, the high capacity transit alternatives were narrowed to one mode -- light rail transit. The Scoping Process (as amended by the Steering Group in May 1994) also identified:

- Four south (Clackamas County) and five north (Clark County) *Terminus Alternatives* for the LRT.
- Two or more *Alignment Alternatives* for each of the defined segments of the LRT alignment.
- Detailed *Design Options* for several of the LRT alignment alternatives.

These alternatives were advanced for further study into the *Tier I Final Report* stage of the MIS.

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Tier I Final Report/RTP-TIP Adoption Stages: the Completion of the MIS

5.1 Background

The Scoping stage started the MIS by narrowing the range of "build" modes to one, light rail transit. The *Tier I Final Report* stage focused on the terminus and alignment alternatives. By their adoption of the *Tier I Final Report*, the Metro Council and C-TRAN Board completed the selection of the locally preferred design concept and scope. Following the adoption of the *Tier I Final Report*, both Metro and the RTC amended their RTPs and TIPs and prepared the associated air quality conformity determinations. With the adoption of those Plans, Programs and Determinations, the Major Investment Study for the South/North Corridor Project was complete. While the alignment/terminus alternatives were later refined in the Design Option Narrowing stage, that was a post-MIS analysis in which the project specifications were refined within the design concept and scope adopted in the *Tier I Final Report.*

5.2 Analysis of Transportation Impacts, Environmental Impacts and Comparative Costs and Benefits

After Scoping, staff prepared technical analyses of the terminus and alignment alternatives. The criteria used in the *Tier I Final Report* was established in the *Tier I Evaluation Methodology Report* and is shown in Table 5-1. It should be noted that these measures comprehensively address the transportation impacts, environmental consequences and the comparative benefits and costs at the level of detail needed to make the "design concept and scope" determination.

The Tier I Final Report stage technical analyses are documented in the following reports which are incorporated in this *MIS Report* by reference:

- *Light Rail Transit Representative Alternatives and Order of Magnitude Cost Estimates* (May 1994)
- *Tier I Technical Summary Report* (July 1994)
- *Briefing Document: Tier I Technical Summary Report* (August 1994)
- *Tier I Final Recommendation Report* (September 1994)
- *Tier I Final Report* (December 1994)

Table 5-2 assesses the comparative costs and benefits of the alignment alternatives and terminus alternatives considered in the *Tier I Final Report* based on the data presented in the above referenced reports.

Table 5-1
Evaluation Criteria to be Used in the *Tier I Final Report*

NARROW MODAL ALTERNATIVES	NARROW ALIGNMENT ALTERNATIVES	NARROW DESIGN OPTIONS	NARROW STUDY TERMINI ALTERNATIVES
Transit Service -- *Ease of Access* -- *Transferability* -- *Travel Times* -- *Reliability* -- *Ridership*	Transit Service -- *Ease of Access* -- *Transferability* -- *Travel Times* -- *Reliability* -- *Ridership*	Transit Service -- *Ease of Access*	Transit Service -- *Ease of Access* -- *Transferability* -- *Travel Times* -- *Reliability* -- *Ridership*
Transit Operations -- *Modal Compatibility* -- *Downtown Portland Ops*	Transit Operations -- NA --	Transit Operations -- NA --	Transit Operations -- NA --
Ability to Accommodate Growth -- *Design Capacity* -- *Future Expansion Capability*	Ability to Accommodate Growth -- *Design Capacity* -- *Future Expansion Capability*	Ability to Accommodate Growth -- NA --	Ability to Accommodate Growth -- *Design Capacity* -- *Future Expansion Capability*
Minimize Traffic and Neighborhood Infiltration -- NA --	Minimize Traffic and Neighborhood Infiltration -- *Highway System Use* -- *Traffic/Neighborhood Infiltration Relief*	Minimize Traffic and Neighborhood Infiltration -- NA --	Minimize Traffic and Neighborhood Infiltration -- *Highway System Use* -- *Traffic/Neighborhood Infiltration Relief*
Promote Land Use Desired Patterns and Development -- *Support Major Activity Centers* -- *Support Bi-State Policies*	Promote Land Use Desired Patterns and Development -- *Support Major Activity Centers* -- *Support Bi-State Policies*	Promote Land Use Desired Patterns and Development -- *Support Major Activity Centers* -- *Support Bi-State Policies*	Promote Land Use Desired Patterns and Development -- *Support Major Activity Centers* -- *Support Bi-State Policies*
Fiscal Stability and Efficiency -- *Cost*	Fiscal Stability and Efficiency -- *Cost* -- *Cost-Effectiveness* -- *Feasibility*	Fiscal Stability and Efficiency -- *Cost*	Fiscal Stability and Efficiency -- *Cost* -- *Cost-Effectiveness* -- *Feasibility*
Engineering Efficiency and Environmental Sensitivity -- *Environmental Impacts*	Engineering Efficiency and Environmental Sensitivity -- *Environmental Impacts* -- *Design Considerations*	Engineering Efficiency and Environmental Sensitivity -- *Environmental Impacts* -- *Design Considerations*	Engineering Efficiency and Environmental Sensitivity -- NA --

Table 5-2

Summary of Measurement Criteria
South Study Terminus Alternatives

Criteria	Measure	Milwaukie	Clackamas TC	OC via McLoughlin	OC via I-205
Transit Service	Peak hour accessibility				
Ease of Access	Households within 45 minutes by transit to:				
	Milwaukie	101,890	103,370	103,720	102,710
	Clackamas Town Center	116,820	105,920	108,520	101,930
	Oregon City	60,370	57,460	56,610	54,380
	Employment within 45 minutes by transit to:				
	Milwaukie	381,350	384,780	380,290	383,250
	Clackamas Town Center	260,300	321,640	199,410	310,920
	Oregon City	85,710	80,770	166,270	96,630
Transferability	Mode of Access (south of Portland CBD)				
	Walk on	30%	34%	40%	35%
	Transfer	24%	25%	21%	26%
	Park-and-ride	46%	41%	39%	39%
Travel Time	Total Travel Time, PM Peak Hour (in minutes)				
	Transit from Portland CBD to Milwaukie (auto = 27)	26	26	26	26
	Transit from Portland CBD to Clackamas TC (auto = 37)	43	36	45	36
	Transit from Portland CBD to Oregon City (auto = 47)	64	64	45	53
Reliability	Miles of Reserved or Separate ROW; S of Pioneer Square	6.2	11.6	13.5	17.5
	% of Corridor Passenger-miles on Reserved ROW	28.8%	32.1%	35.0%	35.0%
Ridership	Weekday Corridor Transit Trips	129,200	129,800	131,750	131,350
	Weekday S/N LRT Trips	56,900	59,400	61,900	62,750
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:				
Highway Use	Milwaukie, S of Monroe (Hwy 224, Lake, McL.)	1.24	1.14	1.10	1.14
	S of Sunnyside (I-205, 82nd)	0.91	0.91	0.92	0.92
	N of Roethe (McL., Oatfield, River)	0.84	0.79	0.83	0.80
	S of Arlington (I-205, McL.)	1.12	1.09	1.09	1.09
	At Boundary (Corbett, Macadam)	1.01	1.01	1.02	1.04
Traffic Issues		P&R volumes in Milwaukie	At grade crossings	At grade crossings Left turn restrictions	At grade crossings

Criteria	Measure	Milwaukie	Clackamas TC	OC via McLoughlin	OC via I-205
Fiscal Efficiency	Capital Cost (1994 $); Pioneer Square south	$424.0	$711.5	$800.1	$1,062.0
Cost	Capital Cost (YOE $); Pioneer Square south	$674.2	$1,131.2	$1,272.1	$1,688.6
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$12.87	$15.60	$16.59	$18.20
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.00	$2.66	$3.24	$2.62
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.69	$0.66	$0.66	$0.76
	Cost Effectiveness Ratio	6.72	7.48	7.50	8.40
Promote Desired Land Use	Major Activity Centers Served	Milwaukie CBD	Milwaukie CBD, Clackamas TC	Milwaukie CBD, Oregon City CBD	Milwaukie CBD, Clackamas TC, Oregon City CBD
Support Major Activity Centers					
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes	yes	yes

Notes:

All data is for year 2015, unless otherwise noted.
Data assumes LRT from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
Bus O&M savings represents cost reduction from highest bus cost alternative.
Additional Park-and-Ride capacity may be required to accomodate anticipated demand at a cost of up to the following amounts for the corresponding terminus alternative: Milwaukie CBD $28.3 million; Clackamas TC $13 million; OC via McLoughlin $20.3 million; OC via I-205 $6 million.

Summary of Measurement Criteria
North Study Terminus Alternatives

Criteria	Measure	39th St.	88th St.	134th St.	179th St.	Van Mall
Transit Service	Peak Hour Accessibility					
Ease of Access	Households within 45 minutes by transit to:					
	Vancouver CBD	138,440	137,840	138,100	137,020	142,040
	134th St.	57,280	56,180	87,200	87,110	89,210
	Vancouver Mall	97,210	96,670	99,390	99,390	108,000
	Employment within 45 minutes by transit to:					
	Vancouver CBD	307,690	307,020	306,970	295,800	308,220
	134th St.	68,400	66,280	121,900	119,190	108,430
	Vancouver Mall	120,080	120,280	119,500	119,500	139,910
Transferability	Mode of Access (North of Coliseum TC)					
	Walk on	27%	31%	31%	33%	32%
	Transfer	49%	43%	46%	45%	45%
	Park-and-ride	24%	22%	23%	22%	23%
Travel Time	Total Travel Time, PM Peak Hour (in minutes)					
	Transit from Portland CBD to Vancouver CBD (auto = 40)	38	38	38	38	38
	Transit from Portland CBD to 88th St. (auto = 45)	53	46	46	46	55
	Transit from Portland CBD to 134th St. (auto = 48)	59	59	51	51	54
	Transit from Portland CBD to 179th St. (auto = 52)	74	75	63	55	68
	Transit from Portland CBD to Van Mall (auto = 44)	60	60	60	60	52
Reliability	Miles of Reserved or Separate ROW; N of Pioneer Square	10.2	13.1	15.4	17.5	16.4
	% of Corridor Passenger-miles on Reserved ROW	35.1%	37.7%	37.6%	38.0%	37.7%
Ridership	Weekday Corridor Transit Trips	130,000	131,150	131,300	131,350	130,700
	Weekday S/N LRT Trips	60,050	61,600	62,200	62,800	62,450
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:					
Highway Use	N of Mill Plain (I-5, Main, Broadway, Ft. Van.)	0.54	0.54	0.54	0.54	0.54
	N of 39th (15th, Main, I-5)	0.84	0.78	0.78	0.79	0.84
	S of 78th (Hwy 99, Hazel Dell Ave., I-205)	0.69	0.62	0.63	0.63	0.67
	W of Andreson (18th, 40th, 4th Plain, SR 500)	0.74	0.73	0.73	0.67	0.72
	I-5 Bridge	1.31	1.30	1.30	1.31	1.30
	W of I-205 (4th Plain, 63rd, Burton, SR 500)	0.89	0.89	0.88	0.88	0.87
	I-205 Bridge	0.94	0.94	0.94	0.94	0.94
Traffic Issues		P&R volumes in Vancouver	Main St.	Main St.	Main St.	At grade Xings P&R volumes

Criteria	Measure	39th St.	88th St.	134th St.	179th St.	Van Mall
Fiscal Efficiency	Capital Cost (1994 $); Pioneer Square north	$753.9	$895.2	$982.9	$1,065.1	$1,044.0
Cost	Capital Cost (YOE $) Pioneer Square north	$1,198.7	$1,423.4	$1,562.8	$1,693.6	$1,659.9
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$15.27	$16.21	$17.33	$18.20	$17.96
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.00	$0.41	$0.86	$0.65	$0.36
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.78	$0.78	$0.81	$0.85	$0.86
	Cost Effectiveness Ratio	7.65	7.98	8.23	8.48	8.47
Promote Desired Land Use	Major Activity Centers Served	Vancouver CBD	Vancouver CBD	Vancouver CBD, Salmon Creek/ WSU	Vancouver CBD, Salmon Creek/ WSU	Vancouver CBD, Vancouver Mall
Support Major Activity Centers						
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes	yes	May encourage expansion	yes

Notes:

All data is for year 2015, unless otherwise noted.
Data assumes LRT from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
Bus O&M savings represents cost reduction from highest bus cost alternative.
Additional Park-and-Ride capacity may be required to meet anticipated demand at a cost of up to the following amounts for the corresponding terminus alternative: Vancouver CBD/39th Street $44.9 million; 88th Street $29.6 million; 134th Street $23.3 million; 179th Street $4 million; Van Mall/Orchards $5.4 million.

Summary of Measurement Criteria
Portland CBD to Milwaukie CBD South River Crossing Alternatives

Criteria	Measure	Hawthorne	Caruthers	Ross Island	Sellwood
Transit Service	Peak Hour Accessibility				
Ease of Access	Households within 45 minutes by transit to:				
	OMSI	160,400	167,950	169,300	168,200
	John's Landing	97,700	97,920	99,330	124,950
	Milwaukie	102,710	106,760	102,440	82,410
	Employment within 45 minutes by transit to:				
	OMSI	538,450	534,100	495,540	487,550
	John's Landing	353,570	350,990	350,070	449,110
	Milwaukie	385,150	393,090	389,130	348,490
Transferability	Mode of Access				
	Walk on	36.4%	35.8%	35.2%	34.1%
	Transfer	28.8%	28.1%	28.7%	32.2%
	Park-and-ride	34.8%	36.2%	36.1%	33.8%
Travel Time	Total Travel Time, PM Peak Hour (in minutes)				
	Transit from Portland CBD to Milwaukie (auto = 27)	27	27	27	32
	Transit from Portland CBD to Clackamas TC (auto = 37)	36	36	36	41
	Transit from Portland CBD to Oregon City (auto = 46)	53	53	53	58
Reliability	Miles of Reserved or Separated ROW, S of Pioneer Square	35.0	35.5	35.3	35.9
	% of Corridor Passenger-miles on Reserved ROW	36.7%	35.1%	32.0%	32.1%
Ridership	Weekday Corridor Transit Trips	131,350	132,200	131,400	130,750
	Weekday S/N LRT Trips	61,800	62,800	62,300	61,400
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:				
Highway Use	River Crossings (Fremont - Ross Island)	1.07	1.07	1.06	1.07
	River Crossings (Sellwood Bridge)	1.23	1.23	1.23	1.23
	N of Prescott (Denver, I-5, Interstate, MLK, Vancouver)	0.76	0.76	0.76	0.76
	At Boundary (Macadam, Corbett)	1.04	1.03	1.02	1.03
Traffic Issues		Bridge lanes Main/Madison Sts.	Harrison St. Moody St.	Harrison St. Moody St.	Moody St. At grade Xings

Criteria	Measure	Hawthorne	Caruthers	Ross Island	Sellwood
Fiscal Efficiency	Capital Cost (1994 $) Pioneer Square to Milwaukie	$424	$465	$461	$465
Cost	Capital Cost (YOE $) Pioneer Square to Milwaukie	$674	$739	$733	$739
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$18.70	$18.17	$18.19	$19.12
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.27	$0.24	$0.26	$0.0
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.87	$0.87	$0.88	$0.95
	Cost Effectiveness Ratio	8.72	8.64	8.70	8.90
Promote Desired Land Use	Major Activity Centers Served	CEIC, OMSI SE Neighborhoods, Milwaukie CBD	PSU, Riverplace, OMSI, SE Portland Neighborhoods, Milwaukie CBD	PSU, Riverplace N Macadam, SE Neighborhoods, Milwaukie CBD	PSU, Riverplace N Macadam, John's Landing Milwaukie CBD
Support Major Activity Centers					
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes	yes	yes
Environmental Sensitivity	Possible Displacements	47, commercial and residential	41, commercial and residential	64, mostly commercial/industrial	27, mostly commercial/industrial
	Noise Impact Areas				Moody St., John's Landing, Sellwood
	Ecosystem Impacts	Willamette Xing	Willamette Xing	Willamette Xing	Willamette Xing
	Historical and Cultural Impacts	Existing bridge, Brooklyn Nh.	Brooklyn Nh.	Existing bridge, Brooklyn Nh.	Existing bridge, Sellwood Nh.

Notes:

All data is for year 2015, unless otherwise noted.
Data assumes LRT from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
Bus O&M savings represents cost reduction from highest bus cost alternative.
Displacement data based on preliminary design without specific efforts to mitigate possible impacts.

Summary of Measurement Criteria
Portland CBD to Milwaukie CBD Eastbank Alignment Alternatives

Criteria	Measure	PTC	McLoughlin
Transit Service	Peak Hour Accessibility		
Ease of Access	Households within 45 minutes by transit to:		
	OMSI	153,290	159,700
	Milwaukie	88,420	102,710
	Clackamas Town Center	92,760	101,930
	Oregon City CBD	52,020	54,380
	Employment within 45 minutes by transit to:		
	OMSI	531,860	538,450
	Milwaukie	368,720	383,250
	Clackamas Town Center	292,500	310,920
	Oregon City CBD	90,810	96,630
Transferability	Mode of Access; Milwaukie to OMSI		
	Walk on	36%	42%
	Transfer	27%	26%
	Park-and-ride	38%	32%
Travel Time	Total Travel Time, PM Peak Hour (in minutes)		
	Transit from Portland CBD to Milwaukie (auto = 27)	28	27
	Transit from Portland CBD to Clackamas TC (auto = 37)	38	36
	Transit from Portland CBD to Oregon City (auto = 46)	55	53
Reliability	Miles of Reserved or Separate ROW	7.1	6.2
	% of Corridor Passenger-miles on Reserved ROW	28.9%	35.0%
Ridership	Weekday Corridor Transit Trips	131,050	131,350
	Weekday S/N LRT Trips	58,250	62,750
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:		
Highway Use	River Crossings (Fremont - Ross Island)	1.07	1.07
	River Crossings (Sellwood Bridge)	1.24	1.23
	Milwaukie, S of Monroe (Hwy 224, Lake, McL)	1.14	1.14
	N of Roethe (McL., Oatfield, River)	0.79	0.80
Traffic Issues		New freight spur across McLoughlin	Signal coordination on McLoughlin, close some local access to McLoughlin

Criteria	Measure	PTC	McLoughlin
Fiscal Efficiency	Capital Cost (1994 $); Pioneer Square to Milwaukie	$437.20	$424.0
Cost	Capital Cost (YOE $); Pioneer Square to Milwaukie	$695.20	$674.20
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$18.76	$18.20
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.00	$0.01
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.98	$0.88
	Cost Effectiveness Ratio	9.26	8.52
Promote Desired Land Use	Major Activity Centers Served	Milwaukie CBD	SE Neighborhoods, Milwaukie CBD
Support Major Activity Centers			
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes
Environmental Sensitivity	Possible Displacements (Residential/Commercial)	20+ commercial/indust. Existing freight line	50+, commercial and residential
	Noise Impacts	Greater risks due to lower existing noise	
	Ecosystem Impacts	Wetlands & wildlife habitat	
	Historical and Cultural Impacts		Greater risk due to more displacements

Notes:

All data is for year 2015, unless otherwise noted.
Data assumes LRT from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
Bus O&M savings represents cost reduction from highest bus cost alternative.
Displacement data based on preliminary design without specific efforts to mitigate possible impacts.

Summary of Measurement Criteria
Portland CBD Alignment Alternatives

Criteria	Measure	Surface	Subway
Transit Service	Peak Hour Accessibility		
Ease of Access	Households within 45 minutes by transit to:		
	Vancouver CBD	114,750	143,710
	Portland CBD	219,150	234,580
	Milwaukie CBD	82,410	103,630
	Employment within 45 minutes by transit to:		
	Vancouver CBD	306,970	344,300
	Portland CBD	579,600	598,400
	Milwaukie CBD	348,490	382,970
Travel Time	Total Travel Time, PM Peak Hour (in minutes)		
	Transit from Portland CBD to Milwaukie (auto = 27)	32	28
	Transit from Portland CBD to Vancouver CBD (auto = 39)	38	36
Reliability	Miles of Reserved or Separate ROW	35.3	35.2
	% of Corridor Passenger-miles on Reserved ROW	25.3%	23.7%
Ridership	Weekday Corridor Transit Trips	130,750	132,850
	Weekday S/N LRT Trips	61,400	64,900
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:		
Highway Use	River Crossings (Fremont - Ross Island)	1.07	1.07
	River Crossings (Sellwood Bridge)	1.27	1.27
	N of Prescott (Denver, I-5, Interstate, MLK Blvd., Vancouver)	0.76	0.76
	At Boundary (Macadam, Corbett)	1.04	1.03
Traffic Issues		At grade crossings	Portal impacts

Criteria	Measure	Surface	Subway
Fiscal Efficiency	Capital Cost (1994 $); South Waterfront to Union Station	$180.8 - $194.4	$353.2 - $367.3
Cost	Capital Cost (YOE $); South Waterfront to Union Station	$287.5 - $309.1	$551.0 - $584.0
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$19.12	$20.93
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.00	$0.02
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.95	$0.98
	Cost Effectiveness Ratio	8.90	9.07
Promote Desired Land Use	Major Activity Centers Served	Portland CBD	Portland CBD
Support Major Activity Centers			
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes
Environmental Sensitivity	Possible Displacements (Residential/Commercial)	Potential at mall connections	Potential at portals.
	Noise Impacts	Possible vibrations	Potential at portals.
	Ecosystem Impacts	No significant impacts	No significant impacts
	Historical and Cultural Impacts	Potential Impacts	Potential at portals

Notes:

All data is for year 2015, unless otherwise noted.
Data assumes LRT from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
Bus O&M savings represents cost reduction from highest bus cost alternative.

Summary of Measurement Criteria
Portland CBD to Vancouver CBD Alignment Alternatives

Criteria	Measure	Interstate Ave.	I-5
Transit Service	Peak Hour Accessibility		
Ease of Access	Households within 45 minutes by transit to:		
	Swan Island	126,840	131,810
	Kenton	178,050	184,810
	Hayden Island	163,300	170,270
	Vancouver CBD	138,650	150,000
	Employment within 45 minutes by transit to:		
	Swan Island	369,490	377,770
	Kenton	450,430	472,540
	Hayden Island	402,300	408,530
	Vancouver CBD	310,400	337,200
Transferability	Mode of Access		
	Walk on	60%	61%
	Transfer	40%	39%
	Park-and-ride	0%	0%
Travel Time	Total Travel Time, PM Peak Hour (in minutes)		
	Transit from Portland CBD to Swan Island (auto = 17)	29	28
	Transit from Portland CBD to Kenton (auto = 20)	26	24
	Transit from Portland CBD to Hayden Island (auto = 28)	33	31
	Transit from Portland CBD to Vancouver CBD (auto = 40)	38	36
Reliability	Miles of Reserved or Separated ROW	10.2	10.1
	% of Corridor Passenger-miles on Reserved ROW	38.0%	40.4%
Ridership	Weekday Corridor Transit Trips	131,350	132,800
	Weekday S/N LRT Trips	64,000	65,400
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:		
Highway Use	Columbia River Crossing (I-5 Bridge)	1.31	1.30
	N of Columbia (I-5, Interstate, MLK Blvd.)	0.70	0.69
	N of Prescott (Denver, I-5, Interstate, MLK Blvd., Vancouver)	0.76	0.76
	River Crossings (Fremont - Ross Island)	1.07	1.07
Local Traffic		At grade crossings Changes street design Removes some parking	Ramp Impacts Removes some parking

Criteria	Measure	Interstate Ave.	I-5
Fiscal Efficiency	Capital Cost (1994 $)	$753.9	$682.2
Cost	Capital Cost (YOE $)	$1,198.7	$1,084.7
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$18.20	$18.02
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.06	$0.00
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.86	$0.84
	Cost Effectiveness Ratio	8.36	7.94
Promote Desired Land Use	Major Activity Centers Served	Coliseum, N/NE Neighborhoods, Vancouver CBD	Coliseum, N/NE Neighborhoods, Vancouver CBD
Support Major Activity Centers			
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes
Environmental Sensitivity	Possible Displacements (Residential/Commercial)	65+, mostly commercial	65+, almost all residential
	Noise Impacts	More difficult to mitigate	Replace existing and new noise wall
	Ecosystem Impacts	Columbia Slough and River Xing	Columbia Slough and River Xing
	Historical and Cultural Impacts	Slightly higher risk of impacts	

Notes:

All data is for year 2015, unless otherwise noted.
Data represents build out from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
Bus O&M savings represents cost reduction from highest bus cost alternative.
Displacement data based on preliminary design without specific efforts to mitigate possible impacts.
Note capital costs and cost effectiveness for Interstate Avenue are for the two-lane/four-lane hybrid option.

Summary of Measurement Criteria
39th to 179th Street Alignment Alternatives

Criteria	Measure	Highway 99	I-5
Transit Service	Peak Hour Accessibility		
Ease of Access	Households within 45 minutes by transit to:		
	Vancouver CBD	136,040	137,020
	134th St.	80,240	87,110
	Vancouver Mall	97,010	99,390
	Employment within 45 minutes by transit to:		
	Vancouver CBD	304,760	295,800
	134th St.	103,560	119,190
	Vancouver Mall	117,290	119,500
Transferability	Mode of Access; Vancouver CBD to 179th St.		
	Walk on	23%	23%
	Transfer	45%	45%
	Park-and-ride	32%	32%
Travel Time	Total Travel Time, PM Peak Hour (in minutes)		
	Transit from Portland CBD to Vancouver CBD (auto = 39)	38	38
	Transit from Portland CBD to 88th St. (auto = 44)	48	46
	Transit from Portland CBD to 134th St. (auto = 48)	54	51
	Transit from Portland CBD to 179th St. (auto = 52)	58	55
	Transit from Portland CBD to Vancouver Mall (auto = 44)	60	60
Reliability	Miles of Reserved or Separate ROW	34.8	34.7
	% of Corridor Passenger-miles on Reserved ROW	37.7%	38.0%
Ridership	Weekday Corridor Transit Trips	130,100	131,350
	Weekday S/N LRT Trips	61,600	62,750
Traffic	PM Peak Hour, Peak Direction V/C Ratio at:		
Highway Use	Between Mill & 4th Plain (I-5, Main, Broadway, Ft. Van.)	0.54	0.54
	N of 39th (15th, Main, I-5)	0.79	0.79
	S of 78th (Hwy 99, Hazel Dell Ave., I-205)	0.63	0.63
	St. Johns/Andreson (18th, 40th, 4th Plain, SR 500)	0.72	0.72
Traffic Issues		Restricted left turns	

Criteria	Measure	Highway 99	I-5
Fiscal Efficiency	Capital Cost (1994 $); 39th to 134th	$334	$229
Cost	Capital Cost (YOE $); 39th to 134th	$531	$364
(in millions of $)	Annual LRT Operating and Maintenance Cost (1994 $)	$18.59	$18.20
	Annual Bus Operating and Maintenance Savings (1994 $)	$0.28	$0.00
Cost Effectiveness	Effective LRT Operating Cost per Rider	$0.91	$0.88
	Cost Effectiveness Ratio	9.05	8.52
Promote Desired Land Use	Major Activity Centers Served	Vancouver CBD, Salmon Creek/WSU	Vancouver CBD, Salmon Creek/WSU
Support Major Activity Centers			
Support Bi-State Policies	Maintain Urban Growth Boundaries	yes	yes
Environmental Sensitivity	Possible Displacements (Residential/Commercial)	100+, mostly commercial	80+, commercial and residential
	Noise Impacts	More difficult to mitigate	Can mitigate with noise walls
	Ecosystem Impacts	Salmon Creek Xing	Salmon Creek Xing
	Historical and Cultural Impacts	No difference	

Notes:

All data is for year 2015, unless otherwise noted.
Data assumes LRT from Oregon City via I-205 to 179th St. in Clark County, unless otherwise noted.
Costs are in millions of $.
I-5 data assumes an east of I-5 alignment.
Bus O&M savings represents cost reduction from highest bus cost alternative.
Displacement data based on preliminary design without specific efforts to mitigate possible impacts.

5.3 Public Involvement

In addition to the comprehensive technical analysis, an extensive public involvement process on the alternatives and options was conducted. The combination of the technical data and public input served as the basis for the preparation of the *Tier I Final Report.*

The adoption of the *Tier I Final Report* by the Metro Council and C-TRAN Board followed a lengthy period and numerous opportunities for public review of Tier I technical information and public comments on the Tier I alternatives. The public comment period began in July 1994 with the notice of availability of drafts of the *Tier I Technical Summary Report*, the *Briefing Document* and *Tech Facts*. The public was also invited to attend four public open houses to review the Tier I technical information and alternatives with project and participating jurisdiction staff. In July and August, 1994, meetings were held with individual neighborhood and business associations throughout the Corridor.

In August 1994, the *Briefing Document* and *Tech Facts* were amended to reflect new or corrected information. Four public meetings were held to allow the Steering Group to receive public testimony. Oral and written comments were received at the meetings, and written comments were received throughout the comment period which ended on September 13, 1994. These comments were compiled and summarized in the report entitled: *Narrowing the Options: Summary of Tier I Public Meetings and Comments*. A supplement of the comments report was issued describing comments received after the closing of the comment period.

On September 14, 1994 following the conclusion of the Tier I public comment period, the PMG adopted its final Tier I recommendations. The South/North CAC adopted its recommendations on September 29, 1994. Both the PMG and CAC recommendations were forwarded to the South/North Steering Group which adopted its final recommendation on October 6, 1994. Next the participating jurisdictions and agencies reviewed the Steering Group recommendations and adopted their independent recommendations in November and December 1994. Those recommendations were forwarded to the C-TRAN Board and Metro Council for final adoption of the *Tier I Final Report.*

5.4 Tier I Final Report Overview

The C-TRAN Board of Directors and Metro Council adopted the *Tier I Final Report* at their regular meetings in December 1994. In doing so, they:

- Defined a two-phase study approach for pursuing the proposed project. The phases are explained in subsection 5.5.

- Identified the Terminus Alternatives to be advanced for further study. The Terminus Alternatives, including their definition and justification, are explained in subsection 5.6.

- Identified the Alignment Alternatives to be advanced for further study. The Alignment Alternatives, including their definition and justification, are explained in subsections 5.7 through 5.11.

The justifications in these subsections are based on the data summarized in Table 5-2.

5.5 Project Phasing

The *Tier I Final Report* established a two-phase implementation program:

(a) Phase I would consider an LRT alternative between the Clackamas Town Center area (CTC) and the 99th Street area in Clark County. (The reader should note that the northern terminus was later amended to be in the V.A. Hospital/Clark College vicinity).

(b) Phase II would consider an extension of the Phase I LRT Project south to Oregon City and north to 134th Street.

The study phases would be implemented as follows:

(a) Preparation of the Draft Environmental Impact Statement (DEIS) and funding plan for the Phase I project would begin immediately. In compliance with FTA requirements, Minimum Operable Segment(s) for Phase I will be identified in the Design Option Narrowing stage.

(b) Metro would incorporate policies in the Regional Transportation Plan (RTP) and Regional Framework Plan which designate a Phase II extension of the South/North LRT Alternative to Oregon City.

(c) Metro and RTC would incorporate policies in their respective Regional Transportation Plans and Clark County would incorporate policies in its Growth Management Plan which designate a Phase II extension of the South/North LRT Alternative to 134th Street/WSU area.

5.6 Comparative Costs and Benefits of Phase I Termini Alternatives

5.6.1 Evaluation

The Clackamas Town Center terminus alternative exhibits lower costs, greater cost-effectiveness and greater consistency with existing regional policy than the Oregon City terminus alternatives.

The CTC terminus alternative is approximately $140 - $560 million (in inflated dollars) less expensive to construct than an Oregon City terminus alternative. In addition, the CTC terminus alternative is estimated to cost $1 - $2.6 million per year less to operate than an Oregon City

terminus. As a result, the Tier I measure of cost-effectiveness for the CTC terminus is 1% - 12% better than that for an Oregon City terminus.

Metro's Regional Transportation Plan (RTP) has identified a light rail line to CTC as the region's next LRT priority after the Hillsboro extension. The transportation and land use benefits associated with Oregon City are not sufficient to modify this long-standing policy.

The 99th Street north terminus alternative exhibits lower costs and greater cost-effectiveness than the 134th Street/WSU Area, 179th Street and Vancouver Mall terminus alternatives.

The 99th Street terminus is approximately $139 million (in inflated dollars) less expensive to construct and $1.1 million per year less expensive to operate than the 134th Street terminus. As a result, the Tier I measure of cost-effectiveness for the 99th Street terminus is 4% better than that for the 134th Street terminus.

The 99th Street terminus is approximately $236 million (in inflated dollars) less expensive to construct than the Vancouver Mall terminus alternative (which includes the Orchards extension). In addition, the 99th Street terminus alternative is estimated to cost $1.8 million per year less to operate than a Vancouver Mall terminus. As a result, the Tier I measure of cost-effectiveness for the 99th Street terminus is 4% better than that for a Vancouver Mall terminus.

The 99th Street terminus is approximately $270 million (in inflated dollars) less expensive to construct and $2.0 million per year less to expensive to operate than the 179th Street terminus. As a result, the Tier I measure of cost-effectiveness for the 99th Street terminus is 6% better than that for the 179th Street terminus.

An LRT line with termini in the vicinity of the Milwaukie CBD and 39th Street in Vancouver would barely penetrate into Clackamas or Clark Counties, providing insufficient coverage to accomplish land use or transportation objectives.

To best achieve the land use and transportation objectives established for the project, the South/North LRT alternative should serve regional and intra-county trips in both Clark and Clackamas Counties. The Milwaukie CBD and 39th Street terminus alternatives do not accommodate intra-county trips. Furthermore, there are significant opportunities for encouraging transit-oriented land uses not far beyond these termini. These transit-oriented land use opportunities are worthy of consideration within the DEIS process.

5.6.2 Proposed Phase I Termini

The *Clackamas Town Center* area is proposed to be the Phase I South Terminus of the South/North LRT Alternative in the Draft Environmental Impact Statement (DEIS). The specific location of the Phase I terminus within the Clackamas Town Center area and the associated alignment, station locations and park-and-ride location within the area need further analysis. These issues are to be addressed in the *Design Option Narrowing Report.*

The *99th Street* area is recommended to be the Phase I North Terminus for the South/North LRT Alternative in the DEIS. The specific terminus and park-and-ride lot locations within the 78th Street to 99th Street area need further analysis to determine whether the Phase I terminus should be further north to accommodate growth management objectives. These issues are to be addressed in the *Design Option Narrowing Report.* The reader should note that the Design Option Narrowing refined the northern terminus by moving it to the VA Hospital/Clark College area in Vancouver.

5.7 Comparative Costs and Benefits of Design Options in the Clackamas Town Center to/through Milwaukie CBD Segments

While several "design options" existed in the CTC to Milwaukie segment, including Railroad Avenue and two options along Highway 224, and in central Milwaukie, including S.E. Washington St., S.E. Monroe St. and S.E. Harrison St., the differences between them did not embody a difference in "design concept and scope". The choice between these options was made in the Design Option Narrowing stage and is summarized in Section 6 of this *MIS Report.*

5.8 Comparative Costs and Benefits of Alternatives in the Portland CBD to Milwaukie/South Willamette River Crossing Segment

5.8.1 Evaluation

The Hawthorne Bridge River Crossing Alternative was eliminated from further consideration because it exhibited substantial reliability and operations problems caused by numerous bridge openings and did not provide LRT access to PSU or the southern portion of the Portland CBD.

The frequency of openings associated with the Hawthorne Bridge is considered to be a significant disadvantage of this alternative. A bridge opening during the peak-hour would likely disrupt the train schedule for the entire peak-period. Effective travel times would increase and reliability would suffer. As a result, ridership would decline, operating costs would increase and the cost-effectiveness of the alternative would deteriorate over time. Further, an alignment using the Hawthorne Bridge provides a station for PSU, a major attractor, which is seven blocks from the campus.

The Ross Island Bridge River Crossing alternative would exhibit lower operating costs, higher ridership and higher cost-effectiveness than the Sellwood Bridge alternative. Thus, the Sellwood Bridge alternative was eliminated from further consideration.

The Ross Island Bridge alternative would be approximately $6 million (in inflated dollars) less expensive to construct and $930,000 per year less expensive to operate than the Sellwood Bridge alternative. In addition, the Ross Island Bridge alternative would provide a five-minute travel time advantage and serve 300,000 more annual LRT riders than the Sellwood Bridge alternative.

As a result, the Tier I measure of cost-effectiveness for the Ross Island Bridge alternative is better than that for the Sellwood Bridge alternative.

The Ross Island Bridge River Crossing Alternative generally exhibits the same costs and transportation benefits as the Caruthers Bridge alternative, and it may exhibit superior land use and development benefits.

The Ross Island Bridge alternative would be approximately $6 million (in inflated dollars) less expensive to construct, $200,000 more per year to operate and serve 160,000 less LRT riders per year than the Caruthers Bridge alternative. In combination, these cost and ridership factors are not considered decisive.

The choice between these two alignment alternatives hinges on determining which is the most important development area to be served by light rail: OMSI and its surrounding area or the North Macadam Area. Because of its amount of vacant developable and redevelopable land, its proximity to downtown and its unique ability to support housing, the land use benefits of LRT on the North Macadam Area may to be greater than in the OMSI vicinity. Thus, the Ross Island Bridge alignment is recommended for further consideration, while the Caruthers Bridge alternative will be examined further to determine if it should be carried into the DEIS.

The McLoughlin Alignment Alternative exhibits less cost, greater ridership, higher cost effectiveness and less environmental impact than the Portland Traction (PTC) alternative.

Within this segment, the McLoughlin alignment alternative is approximately $21 million (in inflated dollars) less expensive to construct and $560,000 per year less expensive to operate than the PTC alternative. In addition, the McLoughlin alternative serves almost 1.5 million annual LRT riders more than the PTC alternative. As a result, the Tier I measure of cost-effectiveness for the McLoughlin alignment is 7% better than that for the PTC alternative. Furthermore, the PTC alignment would traverse Oaks Bottom -- a very sensitive wetlands and wildlife area.

5.8.2 Proposed Alignment Alternative

The *Ross Island Bridge Crossing* and *McLoughlin Boulevard Alignment Alternative* were recommended to be advanced into the DEIS. The *Caruthers Crossing* was to be evaluated further to determine whether it should also be advanced into the DEIS. The precise location of the river crossing, bridgeheads and stations in this segment will be subjected to further analysis.

5.9 Comparative Costs and Benefits of Alternatives in the Portland CBD

At the time of the adoption of the *Tier I Final Report*, the location of the downtown alignment had been narrowed to one couplet -- S.W. Fifth and S.W. Sixth Avenues. It had also been decided to maintain a surface option through the DEIS. However, the PMG decided it was premature to narrow to one option until additional information was completed on both the Surface and Subway alignments. A special study process was created for the downtown

alignment which would dovetail with the Design Option Narrowing recommendations. The results are reported in Section 6 of this *MIS Final Report.*

5.10 Comparative Costs and Benefits of Alternatives in the Portland CBD to Vancouver CBD Alignment Segment

5.10.1 Evaluation

While the Interstate Avenue alignment alternative costs more than the I-5 alternative, further analysis was needed to determine if the land use and development benefits of the Interstate alignment outweigh its additional cost.

The I-5 alignment alternative in this segment is approximately $114 million (in inflated dollars) less expensive to construct, $120,000 per year less expensive to operate and serves 460,000 more LRT riders per year than the Interstate Avenue alternative. However, the relative land use and development benefits associated with the two alignment alternatives are not yet clear. These benefits are of critical importance to the N/NE neighborhoods and the City of Portland and, therefore, merited additional consideration before a recommendation is proposed.

Further public input was needed to determine community preferences.

5.10.2 Proposed Alignment Alternative

At the time of the *Tier I Final Report,* additional information was needed to determine the preferred alignment between the Portland CBD and Vancouver CBD. Additionally, an analysis of modified alternatives which merge the I-5 alignment with portions of the Interstate Avenue alignment was to be undertaken. The Columbia River Crossing design option (bridge or tunnel) was to be addressed in the *Design Option Narrowing Report.*

5.11 Comparative Costs and Benefits of Alternatives in the Vancouver CBD to 99th Street Area Alignment Segment

5.11.2 Evaluation

The I-5 Alignment East Alternative exhibits less cost, greater ridership and higher cost effectiveness than the Highway 99 alternative.

The I-5 East alignment alternative is approximately $167 million (in inflated dollars) less expensive to construct between 39th and 134th Streets than the Highway 99 alternative. In addition, the I-5 East alignment alternative is estimated to cost $190,000 per year less to operate than the Highway 99 alternative. Furthermore, the I-5 East alternative serves 400,000 annual LRT riders more than the Highway 99 alternative. As a result, the Tier I measure of cost-effectiveness for the I-5 alignment is 11% better than that for the Highway 99 alternative.

5.11.2 Proposed Alignment Alternatives

The *I-5 East Alignment Alternative* is the selected alignment alternative in the Vancouver CBD to 99th Street segment for the purpose of preparing the DEIS. The *I-5 East Alignment Alternative* is also the selected alignment between 99th Street and 134th Street/WSU area for inclusion in the RTP and Growth Management Plan policies regarding the Phase II extension of the South/North LRT. The alignment through the Vancouver CBD was to be recommended in the *Design Option Narrowing Report.*

5.12 Final Approvals and the Completion of the Major Investment Study

By the time the *Tier I Final Report* was recommended for adoption by the Metro Council and the C-TRAN Board of Directors, the design concept and scope: (i) had been subjected to sufficient technical analysis to meet MIS requirements; (ii) had gone through sufficient public and inter-governmental involvement to meet MIS requirements; and (iii) was sufficiently detailed to meet the EPA requirements of an air quality conformity analysis (40 CFR part 51). On December 15, 1994 the C-TRAN Board adopted Resolution No. BR-94-011 and December 22, 1994 the Metro Council adopted Resolution No. 94-1989 both of which selected the locally preferred design concept and scope for the South/North Corridor.

Concurrently, the RTC enacted Resolution No. 12-94-30 which adopted the "financially constrained" *Metropolitan Transportation Plan* for Clark County. The Plan incorporated the design concept and scope selected for the South/North Corridor with adoption of the *Tier I Report.* The Plan cited the *Tier I Technical Summary Report: Briefing Document* as the technical basis for the project's inclusion. Appendix A to the Plan exhibited the "Clean Air Conformity Determination" analysis for the Plan. On January 12, 1995, FHWA and FTA found that the Plan and its associated TIP met conformity regulations.

On January 19, 1995, Metro adopted Resolution No. 95-2058 which amended the regional *Transportation Improvement Program* to include funding for the Tier II DEIS, FEIS and Preliminary Engineering for the South/ North Corridor Project. In March 1995, the Oregon Transportation Commission approved Amendment 95-05 to the Statewide Transportation Improvement Program which incorporated the funding for DEIS/FEIS/PE activities for the South/North Corridor.

On May 25, 1995, the Metro Council adopted Resolution No. 95-2138A which approved the federally-required "financially constrained" *Regional Transportation Plan.* As required by MIS guidelines, the locally preferred design concept and scope for the South/North Corridor Project was incorporated in this plan. On September 28, 1995, the Metro Council enacted Resolution No. 95-2196 which adopted the *Portland-Area (Air Quality) Conformity Determination.* This Determination found that the "financially constrained" *Regional Transportation Plan* and regional *Transportation Improvement Program* conforms with the *State Implementation Plan* (SIP) and all applicable air quality regulations.

~6~
Design Option Narrowing Stage: Refinement of Design Concept

6.1 Background

The *Design Option Narrowing* stage was a post-MIS stage of Tier I in which the design for the South/North Corridor Project was refined within the adopted design concept and scope. Specifically, this stage refined the LRT alignment options and general location of potential light rail stations or transit centers and identified Minimum Operable Segments (MOS) to be evaluated in the DEIS.

After the adoption of the *Tier I Final Report*, project staff engaged in identifying, engineering, costing, projecting ridership of and assessing the impacts of design options in various segments of the corridor. These design options all fell within the adopted design concept and scope resulting from the *Tier I Final Report.* The technical results are documented in the *South/North Design Option Narrowing Briefing Document* and the *South/North Design Option Narrowing Technical Summary Report.*

This chapter summarizes the *Design Option Narrowing Final Report* which documents the final determination of the light rail transit options to be examined in the Draft Environmental Impact Statement. Specifically, this chapter describes the:

(a) LRT alignment options;

(b) general location of potential light rail stations or transit centers on each of the proposed alignment options; and

(c) "Minimum Operable Segments (MOS)";

to be evaluated in the Draft Environmental Impact Statement.

The *Design Option Narrowing Final Recommendation Report* also identified "Issues" regarding the selected options which These "Issues", which are not addressed in this report, represent areas for further study during the interim between the *Design Option Narrowing Final Report* and the commencement of the DEIS.

6.2 Public Involvement Process

There were a myriad of public forums and hearings, Citizen Advisory Committee meetings and Expert Review Panel meetings concerning design options. The key meetings included:

- *Design Option Narrowing Segment Meetings (May 1995)*: Individual segment meetings in four areas were organized to discuss LRT design options being considered for that segment. Notices were mailed to citizens within the geographical areas immediately adjacent to each of the segments and ads were placed in neighborhood newspapers.

- *Local Jurisdiction Working Groups*: Working groups were established by the City of Portland and the City of Milwaukie to provide additional citizen input into the South/North planning process. Metro worked with those jurisdictions to provide an opportunity to review and comment on the design options being considered within the jurisdiction and working group boundary.

- *Downtown Oversight Committee Public Comment Meetings (May 1995)*: A public meeting was held by the Downtown Portland Oversight Committee to receive public comment on design options and alignment alternatives being considered for the Portland CBD.

- *Design Option Open Houses (June 1995)*: A series of three regional open houses provided an opportunity for citizens to review technical information and data on the design options being considered for each segment throughout the corridor. Citizens, using county based *Light Rail Workbooks* and *Tech Fact Sheets* with user friendly technical information, were able to compare and assess each of the options under review.

- *Design Option Narrowing Public Comment Meetings (June 1995)*: Citizens submitted written and oral testimony to members of the Study Steering Group at two formal public comment meetings. For the first time, citizens had the opportunity to call in comments directly to the meeting.

Hundreds of public comments were received, catalogued and distributed to project staff and policy-makers. Those public comments are included within the *South/North Design Option Narrowing Public Comments Report.*

In October 1995, based on the results of these technical and public involvement activities, the PMG and CAC independently established recommendations which were forwarded to the Steering Group. In November 1995, the *Design Option Narrowing Final Report* was adopted and released by the Steering Group to the governing bodies of the participating jurisdictions for their concurrence. After receipt of comments from the jurisdictions, the Steering Group adopted the *Design Option Narrowing Final Report.*

6.3 Minimum Operable Segments/Terminus Options

In August 1995, during the Design Option Narrowing stage, the C-TRAN Board of Directors, with the concurrence of the South/North Steering Group and Metro Council, determined that the northern Phase I terminus that should be studied within the DEIS until the Clark County Transportation Futures Process is complete should be at the Veterans Administration (VA) Hospital/ Clark College.

As a result, the full-length light rail alternative to be examined in the DEIS would run between the vicinity of the Clackamas Town Center in Oregon and the vicinity of the Veterans Administration (VA) Hospital/Clark College in Vancouver, Washington. Minimum Operable Segments (MOSs) were identified for each light rail alternative to:

(a) assess whether project objectives can be equally or more cost-effectively met by *MOSs* than the more expensive full-length alternatives;

(b) ensure that there are alternatives which could be constructed if funding sources provide less revenues than initially expected or desired; and

(c) ensure that there are options which could be built in sequence, over time, if cash flow requirements dictate phased-construction.

(d) examine different permanent termini in North Portland if the Clark County transportation futures process determines that light rail is not an appropriate mode in Clark County at this time.

The Design Option Narrowing analysis identified four MOS's to be evaluated in the DEIS:

1. Milwaukie Park-and-Ride to V.A. Hospital/Clark College (Vancouver)

2. Clackamas Town Center Vicinity to Rose Quarter Vicinity

3. Clackamas Town Center Vicinity to Kaiser Clinic Vicinity

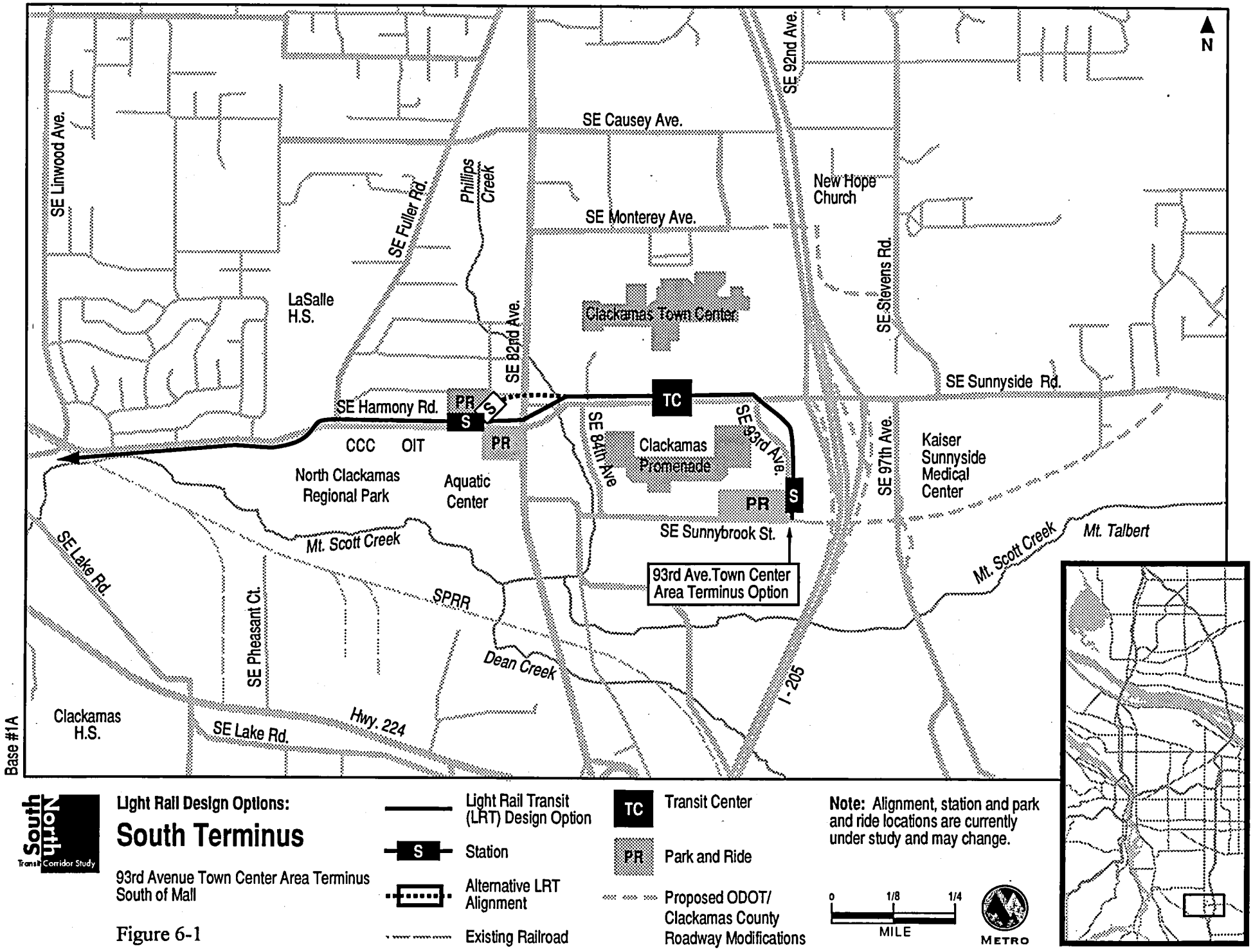
4. Clackamas Town Center Vicinity to Expo Center Vicinity

6.4 Design Options to be Included in the DEIS

6.4.1 Clackamas Town Center Vicinity

In this segment, two design options are recommended to be examined in the DEIS (see Figures 6-1 and 6-2):

North of Clackamas Town Center Alignment to Sunnyside Area Terminus: From the S.E. Fuller Road/S.E. Harmony Road vicinity, the alignment would run along the west and north circumference of the Southgate community. It would then cross S.E. 82nd Avenue on an elevated structure and head eastward in the vicinity of S.E. Monterey Avenue to a transit center serving the CTC. From there, the alignment would continue eastward, crossing I-205 on a new structure, to a park-and-ride near the New Hope Church. From the Church, the alignment would run southward, paralleling I-205, crossing S.E. Sunnyside Road and then proceeding eastward to a park-and-ride terminus station.



South North Transit Corridor Study

Light Rail Design Options:

South Terminus

93rd Avenue Town Center Area Terminus South of Mall

Figure 6-1

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride
- Proposed ODOT/ Clackamas County Roadway Modifications

Note: Alignment, station and park and ride locations are currently under study and may change.

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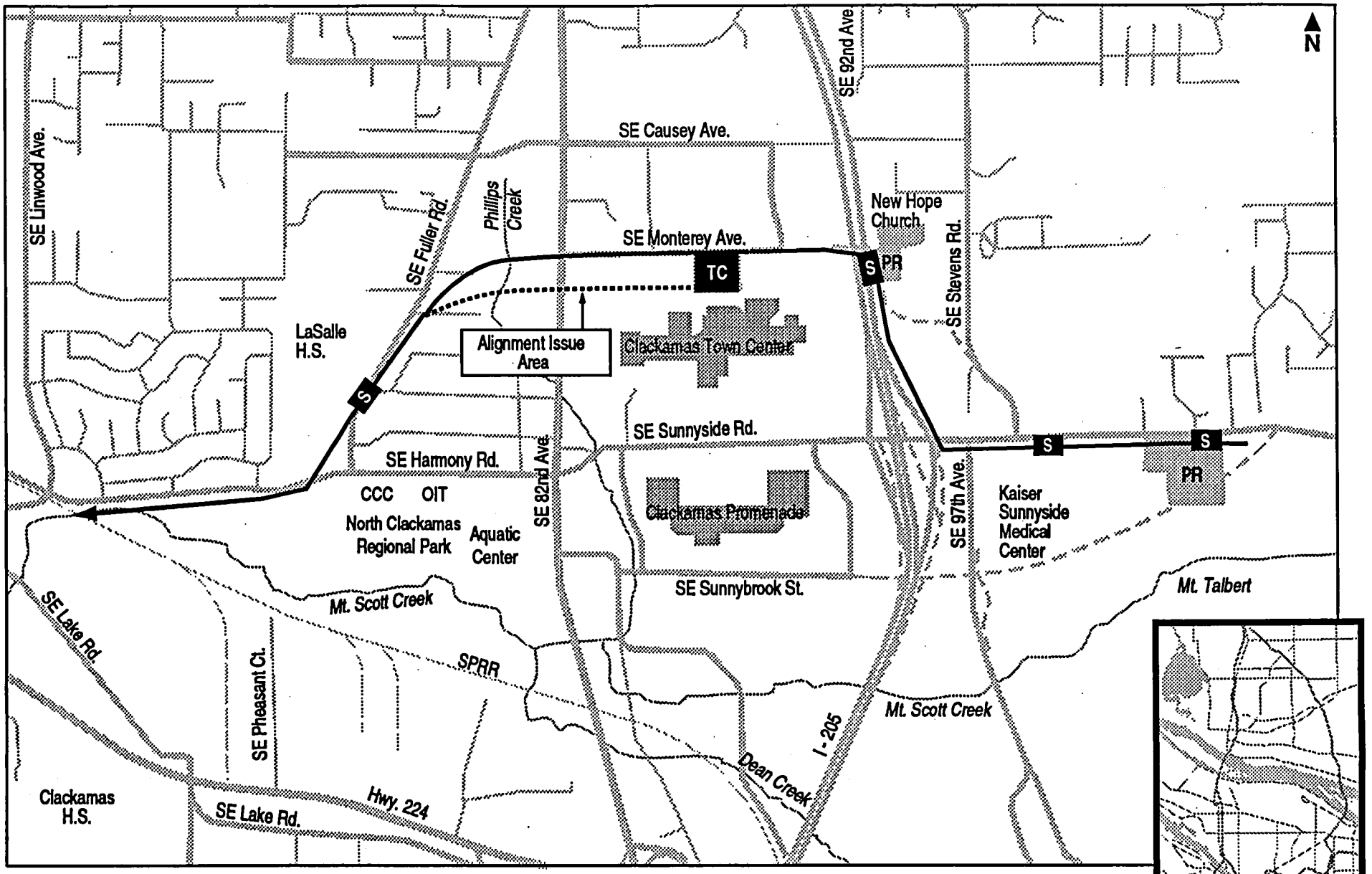
METRO



South North Transit Corridor Study

Light Rail Design Options:

South Terminus

Sunnyside Area Terminus North of Mall

Figure 6-2

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride
- Proposed ODOT/ Clackamas County Roadway Modifications

Note: Alignment, station and park and ride locations are currently under study and may change.

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METRO

South of Clackamas Town Center Alignment to S.E. 93rd Avenue Town Center Area Terminus: From the S.E. Fuller Road/S.E. Harmony Road vicinity, the alignment would run eastward along S.E. Harmony Road, to a park-and-ride station just west of S.E. 82nd Avenue. This station would also serve walk-ons from the Southgate community, Aquatic Center and Oregon Institute of Technology. The alignment would then curve slightly northwards to a point near the northern border of S.E. Sunnyside Road, cross S.E. 82nd Avenue and head eastward a short distance to a station and transit center in the CTC parking lot south of Meier & Frank. The alignment would then extend east and cross Sunnyside Road between 93rd Avenue and I-205, extending south to a terminus station and park-and-ride lot at 93rd Avenue and Sunnybrook Road.

Rationale

Because, the "South of the Mall" design options are shorter, they are less expensive to build and operate and faster than the "North of the Mall" design options. However, the "North of the Mall" options may better serve land use objectives by assisting in the redevelopment of Southgate area, serving the existing multi-family residential areas to the north of the mall and the potentially rezoned lands just east of I-205.

The recommended design options in the Clackamas Town Center (CTC) segment are proposed to frame the fundamental issue in this segment: are the land use benefits of the "North of the Mall" and "east of I-205 terminus" options worth their greater costs and longer travel times? To best assess this issue in the DEIS, the best "North of the Mall" option should be compared against the best "South of the Mall" option.

The S.E. 93rd Avenue (CTC) Terminus is the recommended "South of the Mall" option because:

(a) It would be $34 - $124 million ($YOE) less expensive than the other "South of the Mall" options with a terminus east of or south of the Clackamas Town Center..

(b) It would provide an additional park-and-ride lot opportunity for the south of CTC alignment over the 84th Avenue CTC terminus option.

(d) It would be capable of being extended to the south at a future date, if so desired.

The Sunnyside Terminus is the recommended "North of the Mall" option because:

(a) It would serve the major growth area along S.E. Sunnyside Road east of I-205, where the other options would not.

(b) Its number of light rail boardings in the CTC segment would be 64% - 89% greater than the other "North of the Mall" options.

(c) It would be $106 million ($YOE) less expensive to construct, $180,000 per year less expensive to operate and faster to operate than the Highway 212/224 Terminus option.

(d) It would be capable of being extended to the south at a future date, if so desired.

6.4.2 CTC to Milwaukie

In this segment, one design option is recommended to be examined further in the DEIS (see Figure 6-3):

Railroad Avenue: From the south side of S.E. Harmony Road, the light rail alignment would cross under S.E. Harmony Road east of its intersection with S.E. Linwood and S.E. Railroad Avenues. A potential park-and-ride station would be located at S.E. Harmony Road/S.E. Linwood Avenue. The alignment would proceed westward on the south side of S.E. Railroad Avenue in the public right-of-way adjacent to the Southern Pacific main line. Railroad Avenue would be reconstructed to accommodate the light rail alignment. A station could be located near S.E. Home Avenue to serve the residential area to the north and the industrial area to the south. The alignment would continue adjacent to the SP main line until crossing over the main line in the vicinity of S.E. Oak and S.E. Myrtle Streets, just west of the Milwaukie Market Place. A station would serve the area and a potential park-and-ride lot. The structure would overpass Highway 224, landing on S.E. Monroe Street.

Rationale

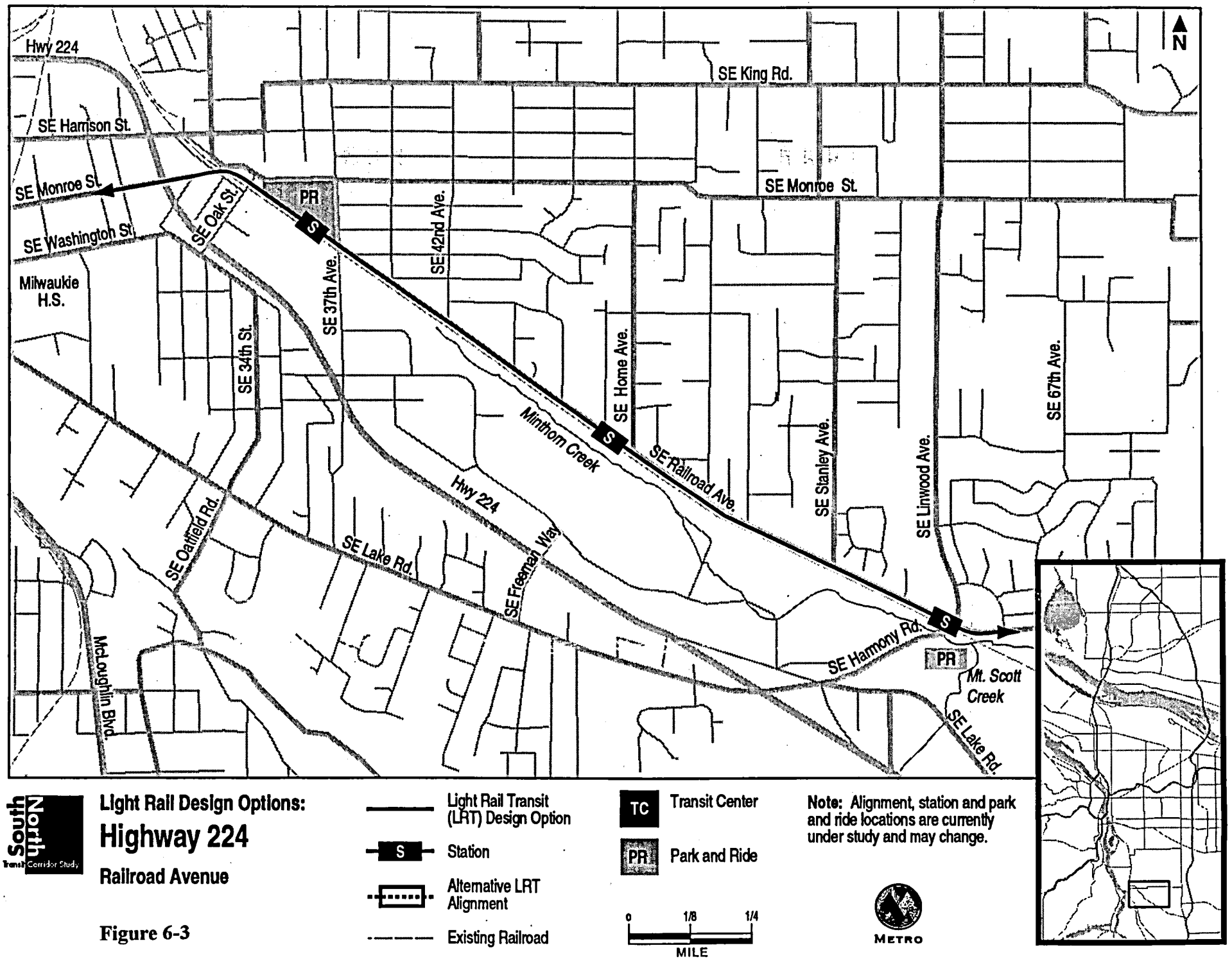
The S.E. Railroad Avenue option is recommended option in the CTC to Milwaukie segment for inclusion in the DEIS because:

(a) It would be $8 to $23 million ($YOE) less expensive to construct than the Highway 224 options.

(b) It would be slightly faster (8 - 19 seconds) to operate and would attract slightly more light rail boardings (30 - 60 per day) in the CTC to Milwaukie segment than the Highway 224 options.

(c) Its comparative ratio would be 13% to 32% better than the Highway 224 options.

(d) It would allow for a park-and-ride facility east of the Milwaukie CBD (in the vicinity of S.E. Railroad Avenue and S.E. Oak Street) which would serve the travel shed for the residential area north of S.E. Railroad Avenue. The station also would provide walk-on access to portions of the residential area north of S.E. Railroad Avenue.



South North Transit Corridor Study

Light Rail Design Options:

Highway 224

Railroad Avenue

Figure 6-3

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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Note: Alignment, station and park and ride locations are currently under study and may change.

METRO

6.4.3 Milwaukie

In this segment, two design options are recommended to be examined in the DEIS (see Figure 6-4):

S.E. Monroe Street to East of the Southern Pacific Tillamook Branch Line: From the Highway 224 over-crossing, the alignment would proceed westerly on S.E. Monroe Street. S.E. Monroe Street would be configured to operate two tracks of light rail and one westbound traffic lane between S.E. 25th and S.E. 9th Streets.

The alignment would curve northerly in the vicinity of S.E. 25th Street to a transit center just east of the S.P. branch line between S.E. Monroe and S.E. Harrison Streets. The alignment would then proceed adjacent to the east side of the S.P. Branch line, through an existing underpass of Highway 224 and on structure over to the westside of the branch line, to a potential park-and-ride station at S.E. Ochoco Street. The alignment would then continue northerly along the branch line to about S.E. Umatilla Street where it would veer towards S.E. McLoughlin Boulevard as it continues northerly.

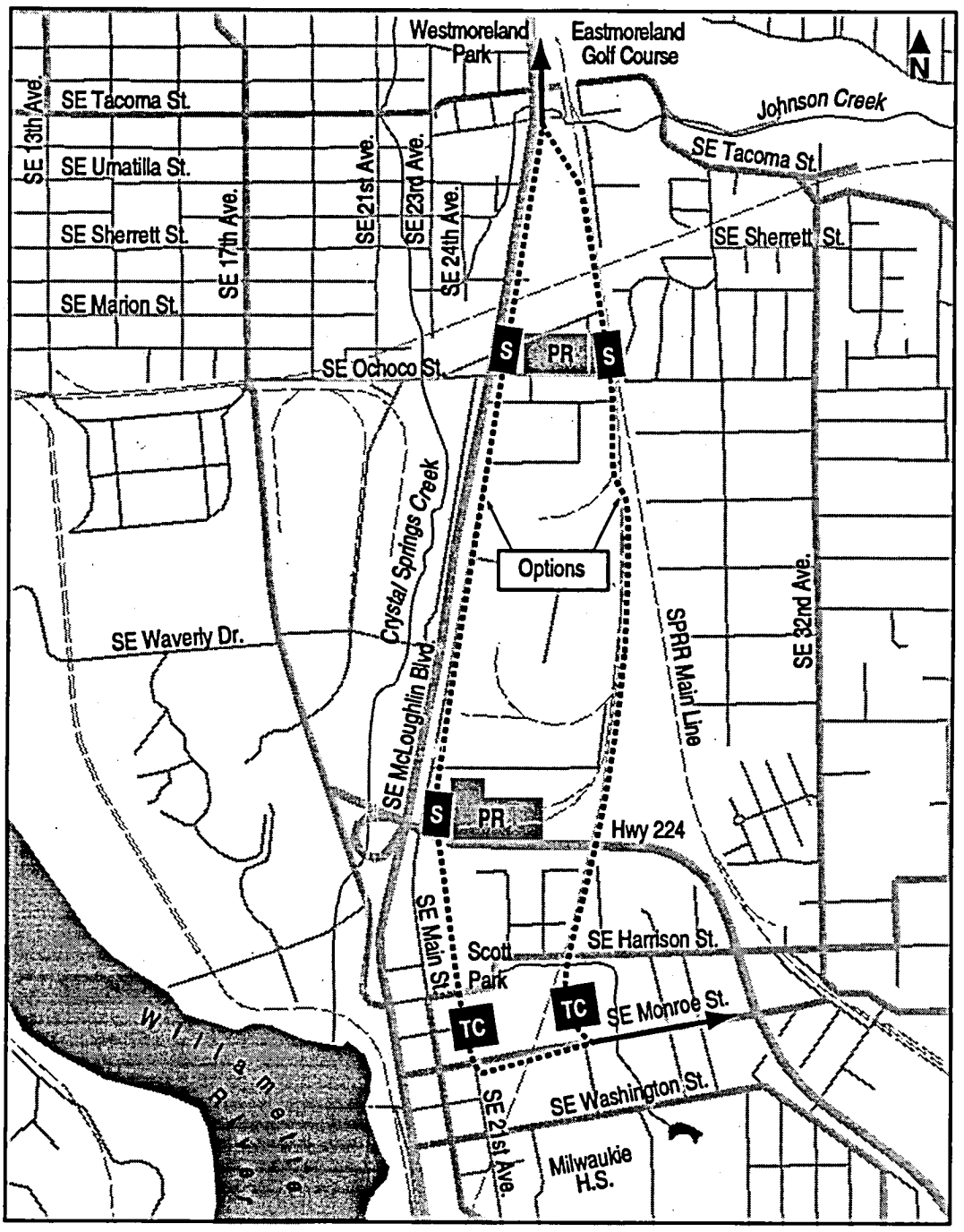
S.E. Monroe to S.E. 21st Avenue/S.E. McLoughlin Boulevard: From the over-crossing of Highway 224, the alignment would proceed westerly on S.E. Monroe Street. S.E. Monroe Street would be configured to operate two tracks of light rail and one westbound traffic lane between S.E. 25th and S.E. 9th Avenues.

The alignment would pass under the SP branch line and proceed to a transit center at S.E. 21st Avenue. The alignment would then proceed northward to McLoughlin Boulevard, crossing underneath Highway 224 where there could be a park-and-ride station. It would then continue northerly paralleling McLoughlin Boulevard to a park-and-ride station at S.E. Ochoco Street and then continue north.

Rationale

One of the fundamental objectives of the South/North LRT Project is to serve the central Milwaukie business district. Two of the options examined in this segment, the SP Main Line option and the Milwaukie Expressway option, would bypass the Milwaukie central business district. As a result, these options fundamentally fail to meet a primary objective of the project and, therefore, are recommended to be eliminated from further consideration.

Each of the three remaining "east-west" alignment options (S.E. Harrison Street, S.E. Washington Street and S.E. Monroe Street) has two "north-south" sub-options (the East of the SP Branch Line option and the S.E. 21st/Main Street/McLoughlin Boulevard option). For each of the "east-west" alignment options, the following relationship holds for the north-south sub-option:



South North Transit Corridor Study

Light Rail Design Options:

Milwaukie

Monroe Street

October 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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MILE

METRO

Figure 6-4

(a) The SP Branch Line option would be shorter, less expensive to build and operate and faster than the S.E. 21st Street/McLoughlin Boulevard option.

(b) The S.E. 21st/Main Street/McLoughlin Boulevard option may better serve City of Milwaukie land use objectives by assisting in the redevelopment of the central business district.

As a result, irrespective of which "east-west" option(s) are recommended in the Milwaukie segment, a fundamental issue in this segment is: are the land use benefits of the S.E. 21st/Main Street/McLoughlin Boulevard sub-option worth its greater costs and longer travel times? To best assess this issue, it is recommended that the DEIS examine both "north-south" sub-options for whichever "east-west" sub-option(s) are proposed. Regarding the "east-west" sub-options in the Milwaukie segment, the S.E. Monroe Street option is recommended for inclusion in the DEIS because:

(a) It would provide better access and wider coverage to the central business district than the S.E. Harrison Street option.

(b) It would be $22 - $28 million ($YOE) less expensive to construct than the S.E. Washington Street option (depending on the north-south sub-option selected) and $4 million ($YOE) less expensive to construct than the S.E. Harrison Street - S.E. Main Street/McLoughlin Boulevard option (the SP Main Line sub-option would be $14 million ($YOE) less expensive with the S.E. Harrison Street option).

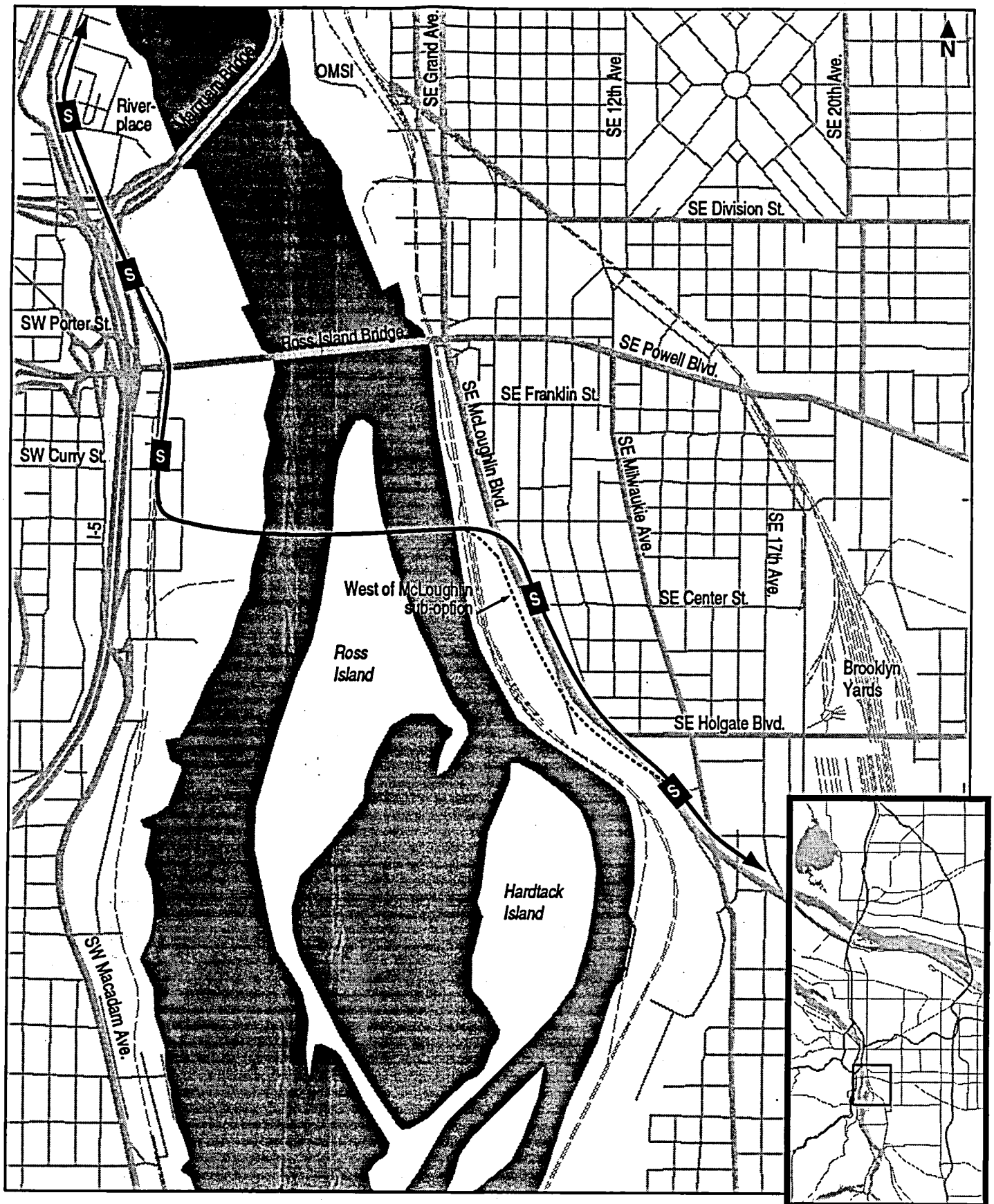
(c) It would be $360,000 per year less expensive to operate than the McLoughlin Boulevard/21st Avenue and S.E. Washington Street option (depending on the north-south sub-option selected) and $650,000 - $710,000 per year less expensive to operate than the S.E. Harrison Street options.

(d) It would be 70 - 88 seconds faster (depending on the north-south sub-option), attract 170-190 more boardings per day and exhibit a 17-20% better comparative ratio than the S.E. Washington Street option.

6.4.4 Milwaukie to Portland CBD

The Steering Group determined that both East side/Caruthers Crossing option(s) and Ross Island Crossing option(s) will be carried forward into the DEIS. Thus, the Design Option Narrowing analysis focused on determining the best Eastside/ Caruthers Crossing option and the best Ross Island Crossing option. Based on that analysis, the following options are recommended to be examined in the DEIS (see Figure 6-5 and 6-6):

West Brooklyn Yards to Caruthers Modified River Crossing: From the park-and-ride station at S.E. Ochoco Street, the light rail would proceed parallel to McLoughlin Boulevard (between the existing trees and the S.P. railroad) to a potential station at S.E. Bybee



South North Transit Corridor Study

Light Rail Design Options:

South Willamette River Crossing

North Ross Island

Figure 6-5

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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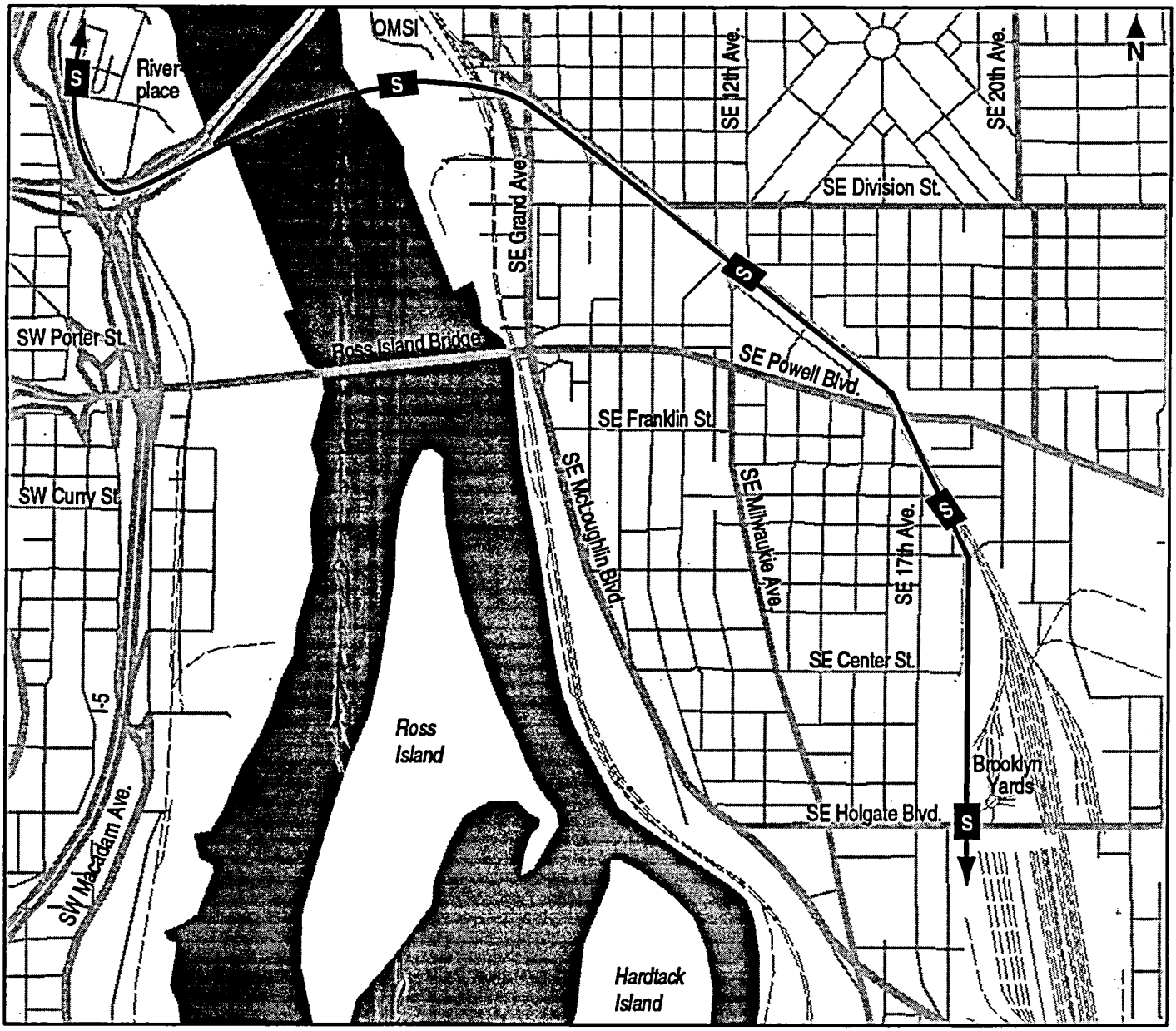
Note: Alignment, station and park and ride locations are currently under study and may change.

METRO



South North Transit Corridor Study

Light Rail Design Options:

South Willamette River Crossing

Caruthers Modified - West Brooklyn Yards

October 1995

Light Rail Transit (LRT) Design Option

S Station

Alternative LRT Alignment

Existing Railroad

TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO

Figure 6-6

Boulevard. The alignment would continue along S.E. McLoughlin to the vicinity of S.E. Harold Street where it would turn and follow the western boundary of the Brooklyn Yards. A station may be located near S.E. Holgate Boulevard. From there the alignment would continue to follow the west side of the Yards to a potential station in the vicinity of S.E. Rhine/Lafayette Street with pedestrian access across the Brooklyn Yards to the East Brooklyn neighborhood.

The alignment would continue north, crossing S.E. Powell Boulevard on an elevated structure. The alignment would parallel the existing railroad tracks, passing over S.E. 11th/12th Avenues, where the would be a potential station. From there, it would continue parallel to the existing railroad tracks to a potential elevated station just south of OMSI.

From the OMSI station, the Caruthers Modified River Crossing would leave the East bank of the Willamette River in the vicinity of Water Avenue and continue on structure to the west side of S.W. Moody Avenue. The alignment would weave between columns supporting the Marquam Bridge towards a station at Riverplace.

North Ross Island River Crossing: From the park-and-ride station at S.E. Ochoco Street, the light rail alignment would proceed parallel to McLoughlin Boulevard (between the trees and the railroad right-of-way) to potential stations at S.E. Bybee Boulevard, the vicinity of S.E. 16th and S.E. Milwaukie Avenues and S.E. Center Street and McLoughlin Boulevard. From the Center Street station, the alignment would continue north along S.E. McLoughlin a short distance to S.E. Bush Street, cross under S.E. McLoughlin Boulevard and cross the Willamette River on structure in the vicinity of the northern tip of Ross Island. The light rail bridge would land on the west side of S.W. Moody Avenue with a potential station in the vicinity of S.W. Curry Street. The alignment would follow the west side of S.W. Moody Avenue to a S.W. Porter Street station and then proceed towards a station at Riverplace.

Rationale

The West Brooklyn Yards to Modified Caruthers Bridge option is recommended for inclusion in the DEIS because:

(a) In comparison to the PTC/McLoughlin Boulevard option, the Brooklyn Yard options would provide significantly better transit access and service to the inner east side neighborhoods, offer five minute walk access to 4,100 - 4,600 more employees (in the year 2015), attract 1,400 - 1,600 more light rail boardings in this segment and exhibit 42% - 57% better comparative ratios.

(b) The West Brooklyn Yard option would be $42 million ($YOE) less expensive to construct, impact less commercial and residential buildings, and exhibit a 10% better comparative ratio than the East Brooklyn Yard option.

(c) The Caruthers Modified option would cost $18 million ($YOE) less to construct, $370,000 per year less to operate and would be over 1 minute faster than the Caruthers "S" option.

(d) While estimated to cost $8 - $9 million ($YOE) more to construct than the Caruthers and Caruthers/Marquam options, the Caruthers Modified option would have the least negative impacts on the redevelopment property south of the Marquam Bridge and avoids significant adverse impacts on PDC's two remaining parcels in Riverplace and privately-owned properties south of the Marquam Bridge.

The North Ross Island option is recommended for inclusion in the DEIS because:

(a) The North Ross Island option would provide the best combination of (re)development potential, ridership and cost of the Ross Island crossing options. This is exhibited by the North Ross Island option having the lowest (best) comparative ratio.

(b) The South Parallel Ross Island option could have an adverse visual impact on the Ross Island Bridge which is eligible for the National Register of Historic Places. As such, there could be Section 106 (historical resources) problems with the South Parallel Ross Island option.

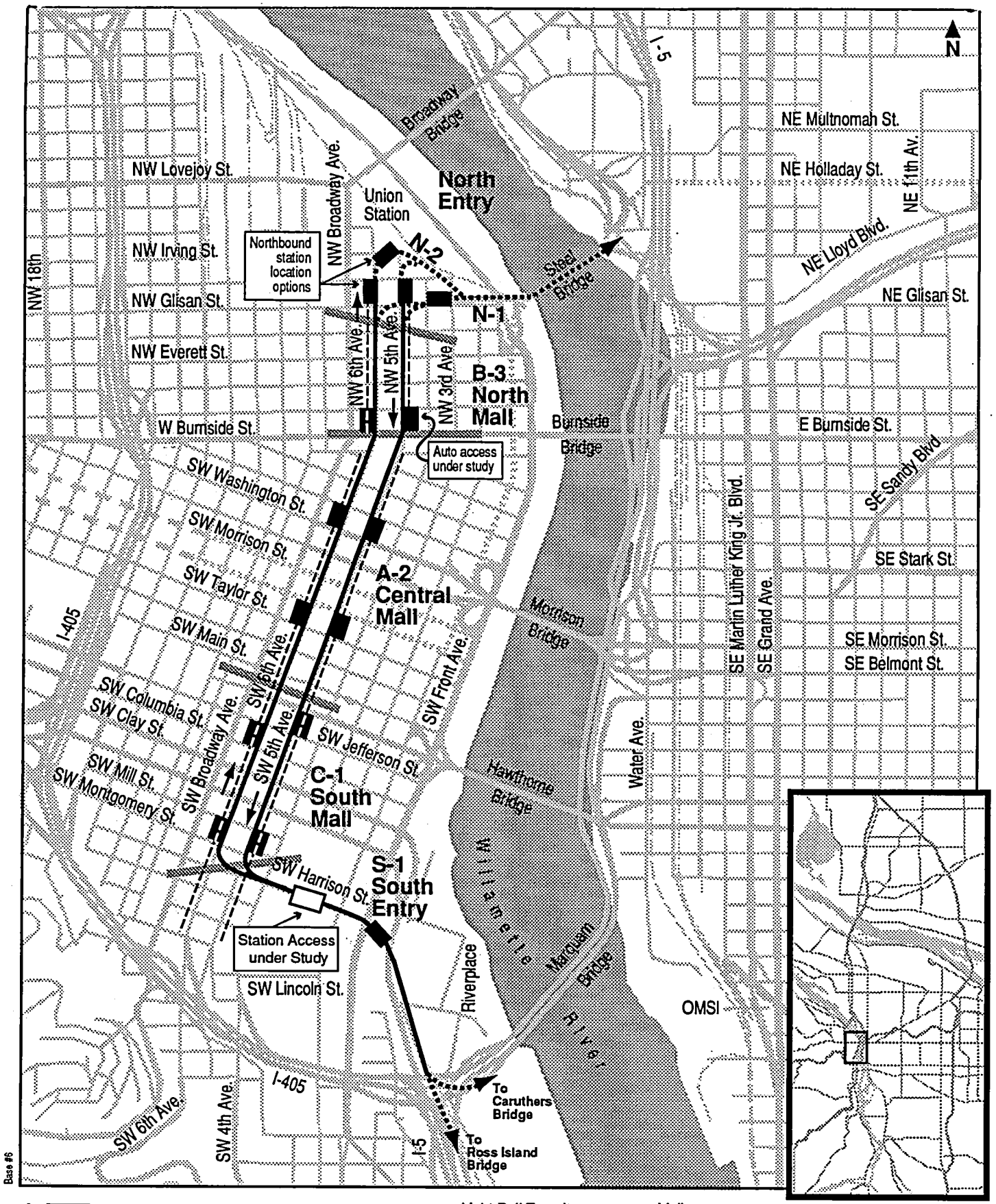
(c) The South Parallel Ross Island option would not provide a station in the North Macadam District, the station would have to be north of the existing Ross Island Bridge. In addition, it would attract less 1,800 - 2,000 daily LRT segment boardings, impact 28 - 45 more residential units and exhibit a 31% poorer comparative ratio than the other Ross Island Crossing options.

(d) The Mid Ross Island Crossing option would cost $54 million ($YOE) more to construct than the North Ross Island Crossing option. In addition, the construction of the Mid-Ross Island Crossing option raises a higher risk of negatively impacting the Great Blue Heron rookery buffer area on Ross Island. The North Ross Island crossing would potentially have less impact on the Willamette River ecosystem due to fewer piers in the river as compared to the South Parallel option.

6.4.5 Portland CBD

In this segment, one design option is recommended to be examined in the DEIS (see Figure 6-7):

Mall (A-2) Surface Alignment with the Harrison (S-1) South Entry, C-1 South Mall, B-3 North Mall and Glisan (N-1) and Union Station (N-2) North Entry sub-options: From the north Macadam area, the alignment would proceed along the extension of Moody Avenue entering S.W. Harrison Street on an elevated structure over S.W. Harbor Drive. A potential station would be located on the structure over S.W. Harbor Drive with direct pedestrian access to Riverplace and S.W. Harrison Street. The alignment would cross S.W. Front and S.W. First Avenues



South North Transit Corridor Study

Recommended Light Rail Design Options:

Downtown Portland

5th/6th Avenue Surface Couplet

November 1995

Figure 6-7

- Light Rail Transit (LRT) alignment
- LRT alignment options
- MAX
- Westside LRT
- Existing railroad
- Mall auto access
- Station with no auto access on mall
- Station with auto access on mall

Note: Alignment, station and park and ride locations are currently under study and may change.

0 1/8 1/4 MILE

Downtown Portland Oversight Committee

at-grade on the north side of S.W. Harrison Street. S.W. Harrison Street would be reconstructed to four or five lanes realigned slightly to the south.

The alignment would proceed along S.W. Harrison Street to S.W. Fifth and Sixth Avenues where it would proceed northerly in a couplet design. S.W. Fifth and Sixth Avenues would be rebuilt between S.W. Harrison and S.W. Madison Streets to include one light rail lane on the left side of the street, two traffic lanes and one parking lane on the right side of the street. An alternative design may include one additional traffic lane instead of the parking lane. Potential light rail stations would be located between S.W. Mill and S.W. Montgomery on both S.W. Fifth and S.W. Sixth Avenues, between S.W. Madison and S.W. Jefferson on S.W. Fifth Avenue and between S.W. Jefferson and S.W. Columbia on S.W. Sixth Avenue.

Between S.W. Madison and W. Burnside, the width of S.W. Fifth and S.W. Sixth Avenues would remain as they are today. However, the lane configuration of both streets would consist of one light rail lane (which could be used by buses when not being used by light rail), one bus lane and, where they currently exist, one traffic lane. At light rail station streets, the lane configuration would consist of one light rail lane and one bus lane, only. Stations would be located on both S.W. Fifth and S.W. Sixth Avenues between S.W. Taylor and S.W. Yamhill and S.W. Washington and S.W. Alder Streets.

Between W. Burnside and N.W. Glisan or N.W. Irving Streets (depending on the option selected for approaching the Steel Bridge), the street widths of S.W. Fifth and S.W. Sixth Avenues would remains as they are today. The left lane would be used by light rail and buses, when light rail was not present. The right lane would be used by buses and auto in a mixed-traffic operation. A station would be located on the left side of the both S.W. Fifth and S.W. Sixth Avenues between W. Burnside and N.W. Couch Street.

From the northern boundary of the Mall, two options would be examined. One option would proceed to Union Station. It would then angle back towards the Steel Bridge, cutting diagonally from the Glisan Street ramp. The other option would proceed along the south side of N.W. Glisan to the bridge. Depending on the option selected, stations could be located in the vicinity of the Greyhound Building or on N.W. Glisan between N.W. Third and N.W. Fourth Avenues.

Rationale

The Downtown Portland Oversight Committee recommended this option because, in total, it:

(a) Reinforces the goals of the Central City Plan,

(b) Maintains existing traffic and access patterns on S.W. Fifth and Sixth Avenues which supports existing and future businesses,

(c) Provides fast and convenient transit service to existing and future downtown office and commercial uses,

(d) Maintains the current pedestrian character of the Transit Mall,

(e) Ensures the least construction impacts,

(f) Provides good access to all of the River District, University District and Riverplace/ South Waterfront area, and

(g) Offers the opportunity to reconfigure the bus circulation patterns in desirable ways.

The A-2 Central Mall option was specifically recommended because it would entail the least construction impacts and least cost of the central mall options while providing for the most efficient use of all four modes serving downtown: light rail, bus, auto and pedestrians.

The S.W. Harrison Street South Entry options (S-1) was specifically recommended because it would provide the best service to the University District, South Auditorium area and Riverplace/South Waterfront area at the least cost and fastest operating times.

The B-3 North Mall options was recommended because it provides the greatest amount of multi-modal access along the North Mall without creating significant operational problems.

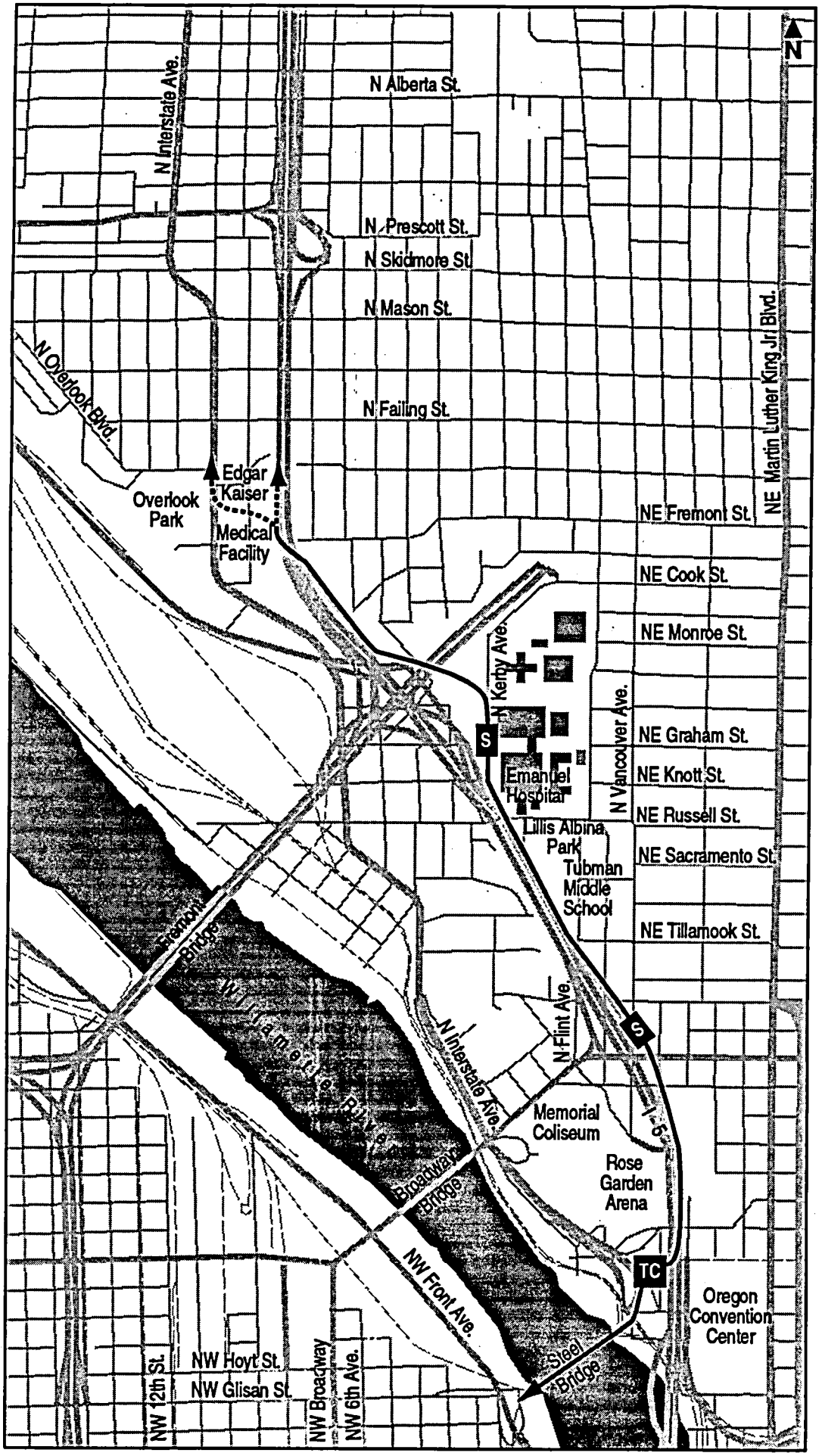
Both the N-1 and N-2 North Entry options are recommended because further analysis is needed to chose between them.

6.4.6 Steel Bridge to Kaiser Medical Facility Vicinity

In this segment, two design options are recommended to be examined in the DEIS (see Figure 8 and Figure 9):

East I-5/N. Kerby Avenue: The alignment would proceed eastward from a slightly relocated Rose Garden transit station, run underneath the I-5 freeway and turn north along the eastern edge of I-5. It would then run along the edge of I-5 to a transit station serving the N.E. Broadway area and adjacent Eliot neighborhood. The alignment would continue along the east edge of I-5, behind the Harriet Tubman Middle School, crossing N. Russell Street on structure, to a station on N. Kerby Avenue between N. Graham and N. Stanton Streets at Emanuel Hospital. The alignment would curve westward, passing over I-5 on structure to a location just west of the freeway and then proceed northerly to the Edgar Kaiser clinic.

N. Wheeler Avenue/N. Russell Street: The alignment would pass along the eastern edge of the Rose Garden Arena with a potential station north of the arena near N. Weidler. It would cross N. Broadway and N. Weidler at street level and proceed north along the east side of N. Flint Avenue. The alignment would turn westerly at N. Russell Street with a potential station on Russell Street at the south end of the Emanuel Hospital campus. It would elevate on a structure and pass over N. Kerby Avenue, Stanton Yard and N. Mississippi Avenue. The alignment would then curve westward, passing over I-5 on structure to a location just west of the freeway and then proceed north to the Kaiser clinic.



South North Transit Corridor Study

Light Rail Design Options:

Steel Bridge to Kaiser

East I-5 / Kerby

September 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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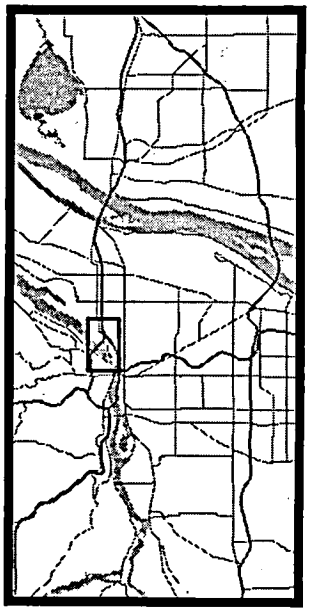
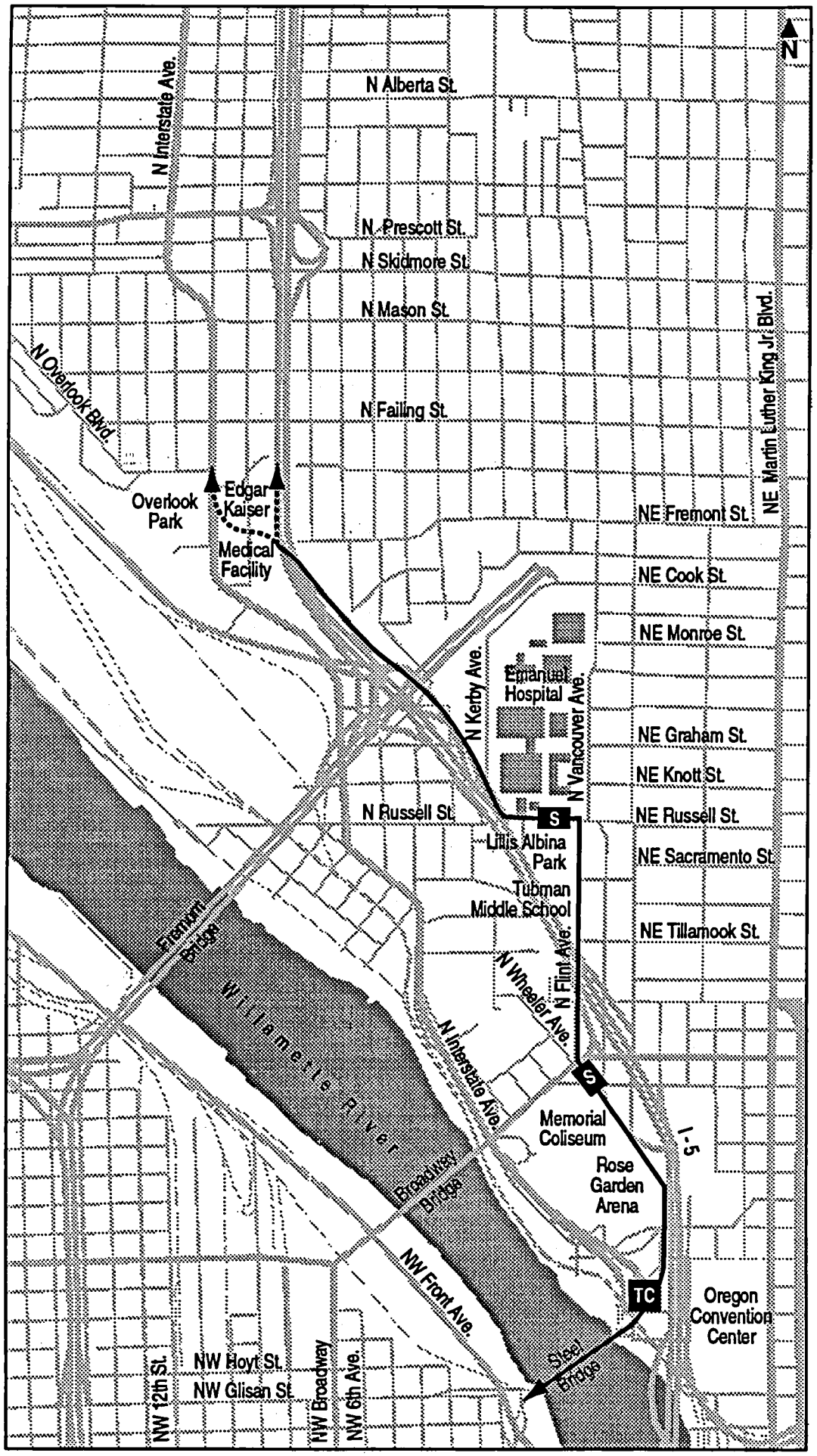
MILE



METRO

Figure 6-8



South North Transit Corridor Study

Light Rail Design Options:

Steel Bridge to Kaiser

Wheeler / Russell

September 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

0 1/8 1/4
MILE

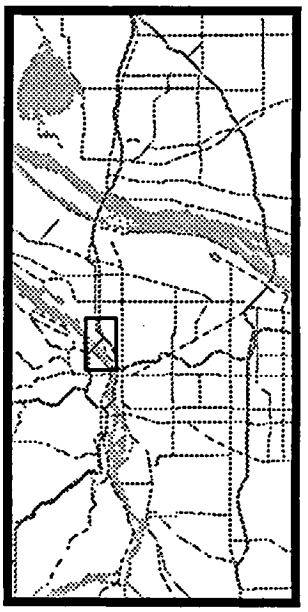


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Figure 6-9

Rationale

The East I-5/N. Kerby Avenue and N. Wheeler Avenue/N. Russell Street options are recommended for inclusion in the DEIS because:

(a) The East I-5/N. Kerby Avenue provides the best combination of cost, ridership, travel time and light rail access as evidenced by having the lowest (best) comparative ratio. It would provide stations which would serve both the Eliot neighborhood and the Emanuel Hospital campus. In addition, it would attract the highest light rail boardings in this segment amongst all of the alignment options.

(b) The N. Wheeler/N. Russell Street option may provide the best access to the Eliot neighborhood and the best redevelopment opportunities amongst all options in this segment. It also provides more flexibility in the station placement within the Eliot neighborhood than would the N. Wheeler/N. Flint option.

(c) The West I-5 option, while would serve the industrial sanctuary between I-5 and the Willamette River, is not recommended for further study because it would not adequately serve the Eliot neighborhood or Emanuel Hospital which are the priority areas to be served. Light rail users wishing to access Emanuel Hospital or the Eliot neighborhood from the N. Graham Street station would have to walk-up an eighty foot elevation change. Moreover, by servicing the industrial sanctuary, the West I-5 option may create non-industrial redevelopment pressures which contradict City objectives for this area.

6.4.7 Kaiser Medical Facility to Expo Center

The South/North Steering Group determined that an Interstate Avenue and an I-5 alignment alternative would be advanced into the DEIS. One design option for each alignment alternative is recommended (see Figure 10 and Figure 11):

All I-5 Alignment: From Emanuel Hospital, the light rail alignment would pass beneath the I-405 ramps and climb-up along the eastern edge of I-5. From the potential station at the Kaiser clinic, the light rail alignment would proceed north along the top of the western bank of the I-5 freeway to a station south of N. Skidmore Street.

It would then continue north, passing beneath N. Going Street in a box structure, then running above the freeway along N. Minnesota Avenue (west of the freeway ramps) from N. Going Street to a potential station at N. Killingsworth Street. It would then proceed along the top of the freeway bank and then curve west along the freeway ramps to a potential station on the south side of N. Portland Boulevard. The alignment would cross N. Portland Boulevard at street level and continue north along the west bank of the freeway to a potential station on the south side of N. Lombard Street. It would then pass over N. Lombard and the adjacent freeway ramps on a structure and proceed northerly to a potential Kenton station at N. Kilpatrick Street.

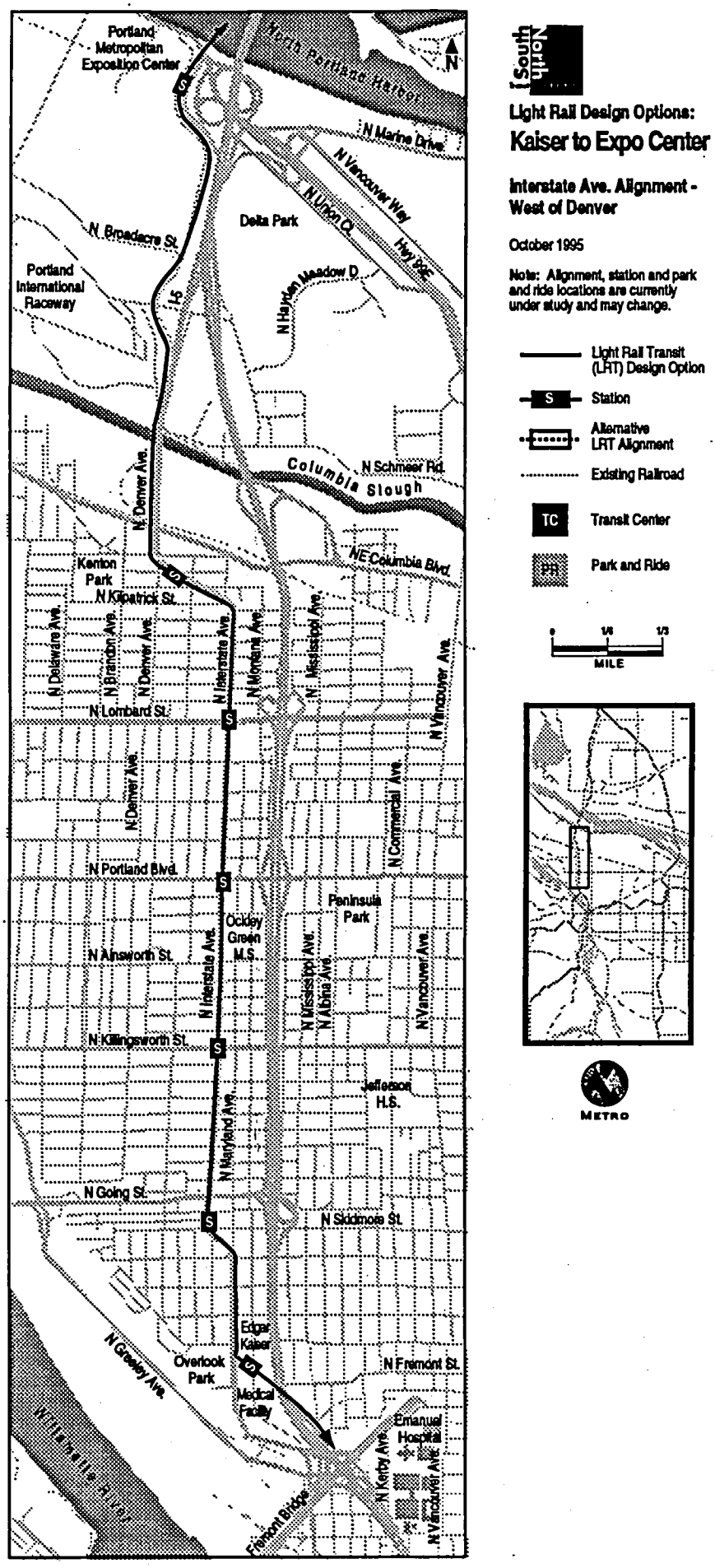
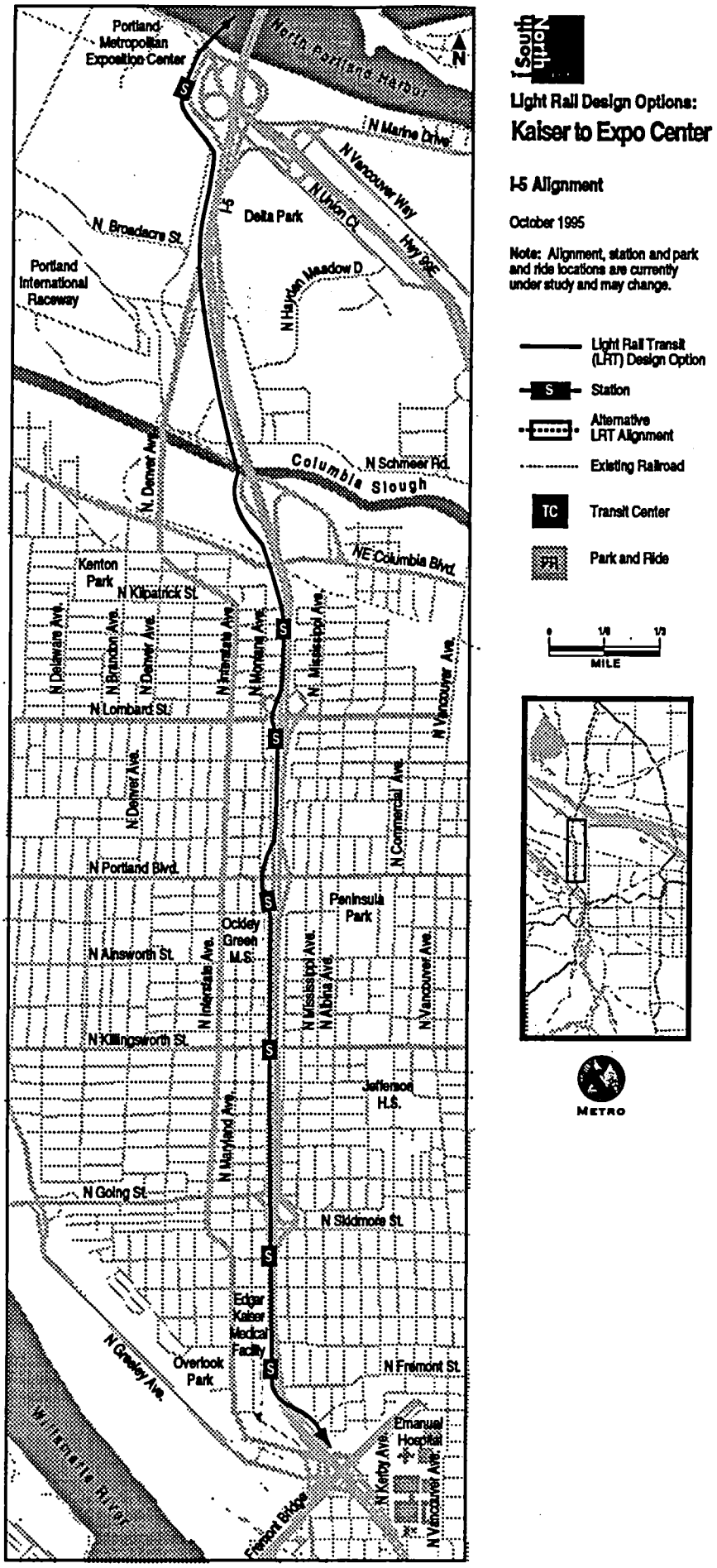

Portland Metropolitan Exposition Center
North Portland Harbor
N
N Marine Drive
N Vancouver Way
N Union Ct
Hwy 99E
Delta Park
N Broadacre St
Portland International Raceway
I-5
N Hayden Meadow D
Columbia Slough
N Schmeer Rd
N Denver Ave.
NE Columbia Blvd
Kenton Park
N Kilpatrick St
N Delaware Ave.
N Brandon Ave.
N Denver Ave.
N Interstate Ave.
N Montana Ave.
N. Mississippi Ave.
N Vancouver Ave.
N Lombard St
N Commercial Ave.
N Portland Blvd
Peninsula Park
Ockley Green M.S.
N Ainsworth St
N Alberta Ave.
N Killingsworth St
Jefferson H.S.
N Maryland Ave.
N Going St
N Skidmore St
Edgar Kaiser Medical Facility
Overlook Park
N Greeley Ave.
N Fremont St
Willamette River
Emanuel Hospital
N Kerby Ave.
Fremont Bridge
South
North
Light Rail Design Options:
Kaiser to Expo Center
Interstate Ave. Alignment - West of Denver
October 1995
Note: Alignment, station and park and ride locations are currently under study and may change.
Light Rail Transit (LRT) Design Option
S
Station
Alternative LRT Alignment
Existing Railroad
TC
Transit Center
PR
Park and Ride
0
1/8
1/3
MILE
METRO

Figure 6-10



South North

Light Rail Design Options:

Kaiser to Expo Center

I-5 Alignment

October 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- P+R — Park and Ride

0 1/8 1/3 MILE

METRO

Figure 6-11

From the Kenton station, the alignment would proceed northerly along the west side of the I-5 freeway. It would cross over N. Columbia Boulevard and the Columbia Slough on a bridge, and then lower to ground level. It would then pass Delta Park and begin to elevate for about 1/2 mile and crossover Highway 99 adjacent to Expo Road. An elevated potential station would be located near the Expo Center parking lot.

All Interstate Avenue and West of Denver Avenue Alignment: From Emanuel Hospital, the light rail alignment would pass beneath the I-405 ramps and climb-up along the eastern edge of I-5. It would crossover I-5 on a structure near N. Fremont Street and then proceed across the Kaiser campus with a street level station near the existing Town Hall building.
The alignment would then turn onto N. Interstate Avenue near N. Overlook Boulevard. From there, the alignment would proceed northerly in the center of N. Interstate Avenue. One lane of auto traffic in each direction would be provided except at the approaches to N. Going Street and N. Lombard Street where two lanes of traffic in each direction would be provided. All intersections would be crossed at street level. Potential stations would be located at N. Skidmore Street, N. Killingsworth Street, N. Portland Boulevard, N. Lombard Street and the Kenton commercial district.

From the Kenton station, the alignment would follow the west side of N. Denver Avenue viaduct (the "West of Denver" option). It would proceed northerly across N. Columbia Boulevard and the Columbia Slough on a bridge, pass West Delta Park and follow Expo Road to an elevated potential station near the Expo Center parking lot.

Rationale

The Interstate Avenue option would provide a light rail alignment that is more centrally located in North Portland neighborhoods than the I-5 option and may enhance certain land use opportunities. Conversely, the I-5 option would cost less to construct, would provide faster travel speeds to more users, provide better access to neighborhoods east of I-5 and may not be subject to the operational and traffic problems inherent in the Interstate Avenue option. These are key trade-offs for which information is not yet available to forge a consensus decision. Thus, it is essential that both options be further examined in the DEIS.

The desirability and preferred location for a crossover between the I-5 alignment and the Interstate Avenue alignment has not been determined as part of the Tier I process. At this time, it is recommended that no crossover option be proposed for inclusion in the DEIS. In making this recommendation, the PMG proposes that the DEIS focus on the key issue in this segment -- the relative merits and impacts of the Interstate Avenue and I-5 alignment options. The project will evaluate crossover issues and opportunities if results from the DEIS analysis and station area and economic development studies indicate that development of a crossover option is warranted.

6.4.8 Expo Center to V.A. Hospital/Clark College Vicinity

In this segment, one design option is recommended to be examined in the DEIS (see Figures 12, 13 and 14):

West of I-5/Lift Span Bridge/Washington Street (2-way)/E. McLoughlin Boulevard: From the Expo Center, the alignment would proceed north over N. Marine Drive, North Portland Harbor and N. Jantzen Avenue on a bridge structure. The alignment would pass under the I-5 ramps (Sub-option B: Under the I-5 Ramps), then continue northerly along the westside of the freeway to a new lift span bridge crossing the Columbia River. The light rail bridge would parallel the westside of the existing I-5 bridge and would be approximately the same height above the river. The bridge would pass over Columbia Way in Vancouver and then would cross under the railroad berm before connecting with Washington Street.

Washington Street would operate in a two-way light rail configuration (2-Way on Washington Option). The light rail alignment would proceed northerly on Washington Street to stations at W. 7th Street, between W. 11th and W. 12th Streets and between W. 16th and W. 17th Streets. At McLoughlin Boulevard, the alignment would curve easterly, proceeding along E. McLoughlin Boulevard to the east side of I-5. A station would be potentially located on E. McLoughlin Boulevard between "D" and "E" Streets.

The alignment would cross under I-5 and then turn northerly and proceed along the east side of I-5 to a park-and-ride station in the vicinity of the Veterans Hospital. The alignment would then turn easterly, proceeding to the terminus station west of Fort Vancouver Way.

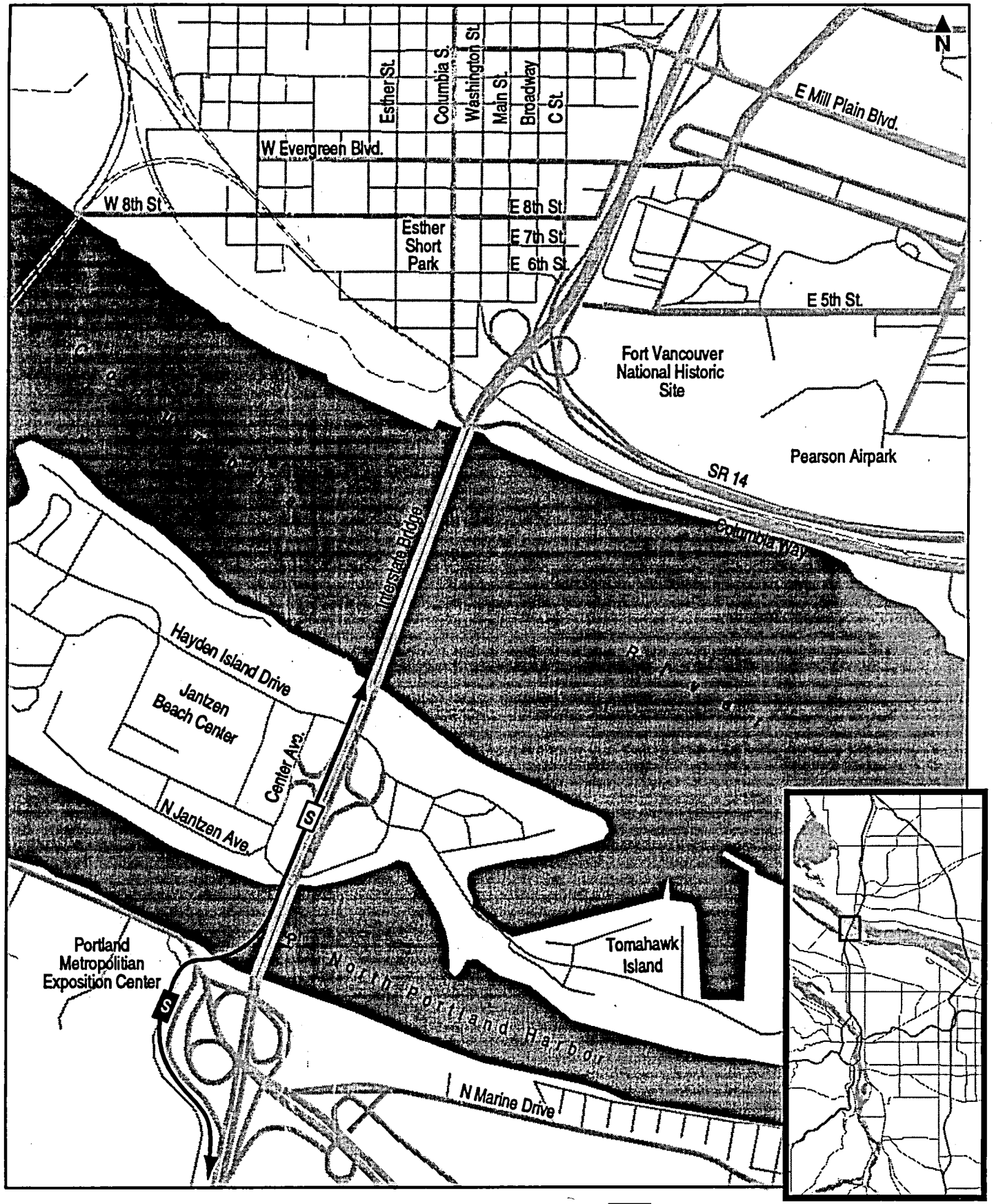
Rationale

The West of I-5/Lift Span Bridge/Washington Street (2-way)/E. McLoughlin Boulevard alignment is recommended to be included in the DEIS because:

(a) Between Expo Center and Hayden Island, the West of I-5 Under the Ramps option is recommended for inclusion in the DEIS because it would be the least expensive of the West of I-5 options, it would not create a barrier which divides Hayden Island as do the Center Street and Adjacent to Jantzen Beach Center options and would have the minimum traffic impacts.

(b) The Lift Span bridge is recommended for inclusion in the DEIS over the Bored Tunnel option because it would be $101 million ($YOE) less expensive, would have considerably less adverse impacts on Hayden Island and downtown Vancouver and would provide centrally located access through downtown Vancouver and which would be in proximity to major redevelopment sites. The LRT bridge can be built using techniques that would minimize effects on the Columbia River ecosystem.

(c) The Two-Way on Washington Street Option is recommended for inclusion in the DEIS because, compared to the other Vancouver CBD alignment options, it would be the least expensive to construct, would exhibit the fastest travel times, would attract the highest ridership, has the highest level of public support and would be the most consistent with the development and redevelopment objectives in downtown Vancouver.



South North Transit Corridor Study

Light Rail Design Options:

Expo Center to Hayden Island

West of I-5 (under ramps)

Figure 6-12

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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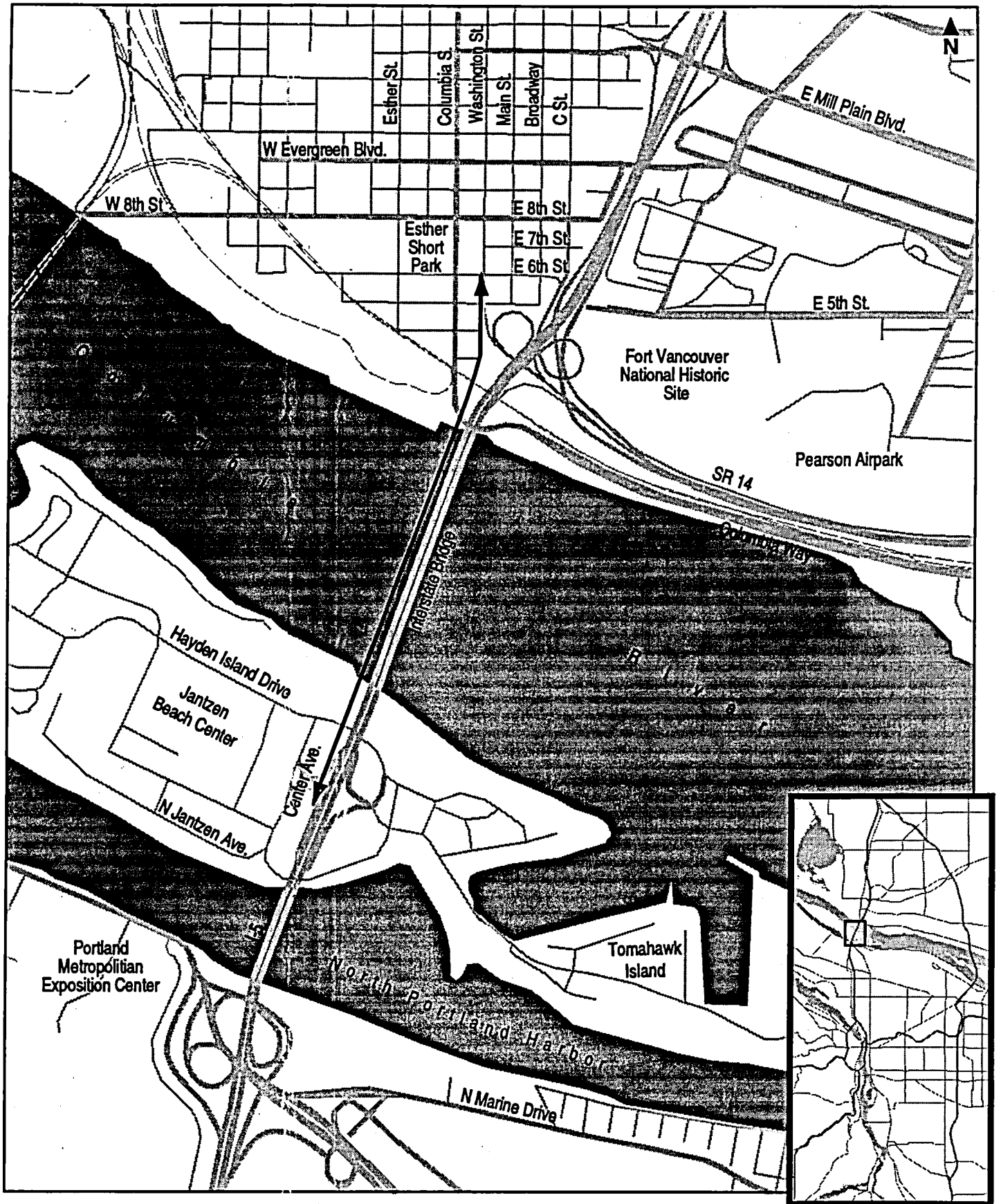
Note: Alignment, station and park and ride locations are currently under study and may change.

METRO



South North Transit Corridor Study

Light Rail Design Options:

Columbia River Crossing

Lift Span Bridge

Figure 6-13

Light Rail Transit (LRT) Design Option

S Station

Alternative LRT Alignment

Existing Railroad

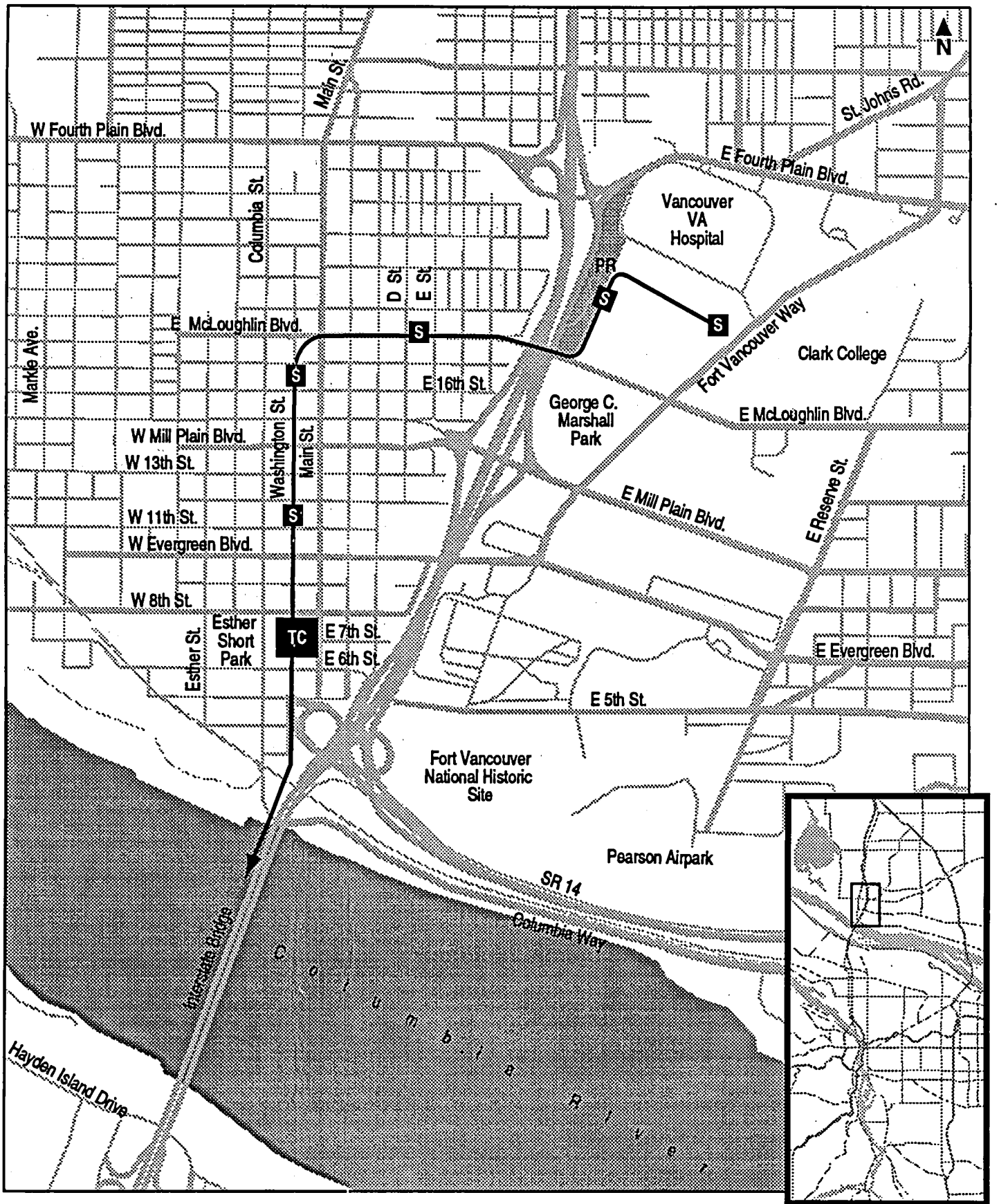
TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO



South North Transit Corridor Study

Light Rail Design Options: Downtown Vancouver to VA Hospital/ Clark College

2-Way on Washington

Figure 6-14

Light Rail Transit (LRT) Design Option

S Station

Alternative LRT Alignment

Existing Railroad

TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO

6.5 Transportation and Environmental Impacts and Cost-Effectiveness

6.5.1 Overview

This section provides a preliminary assessment of the light rail project proposed for the DEIS. A detailed analysis of vacant and redevelopable land, households and employment within walking area, land use policies, walk market area, transferability, reliability, traffic impacts, capital and operating costs, potential displacements, noise impacts, ecosystems, visual impacts, historic impacts, parks and hazardous materials impacts is provided in *Design Option Narrowing Technical Summary Report* (Metro June 1995). This report is incorporated herein by reference. The summary below outlines the results for several key factors emphasized by ISTEA.

The reader should note that these estimates are preliminary and will change during the more refined DEIS/PE analyses.

6.5.2 Ridership

Metro estimates that the full-length LRT line would carry about 68,000 daily riders or 22.2 million annual riders in the year 2015. This is approximately 30,000 more daily transit riders or 9.8 million annual transit riders than are projected for the Corridor with the "financially constrained" transit network.

6.5.3 Mobility Improvements

The South/North LRT would serve the congested I-5 and McLoughlin Boulevard travel markets, improving traffic service levels and providing mobility benefits to major concentrations of transportation disadvantaged persons.

Travel times would be approximately 33% quicker between the Portland CBD and the major activity centers located within the Corridor as compared to an all-bus system. For example, the transit travel time between the Milwaukie CBD and the Portland CBD would be 28 minutes with an all-bus network and 18 minutes with South/North LRT.

The full-length South/North LRT would produce over $2 million in annual travel time savings to existing transit riders compared to an all-bus network in the Corridor.

6.5.4 Land Use

Transit supportive land use controls, including growth boundaries to constrain sprawl, are in place in both Oregon and Washington portions of the Corridor. These were detailed earlier in Section 2 of this *MIS Report.*

There are transit-supportive comprehensive plans in all jurisdictions along the Corridor. Parking controls are in effect in downtown Portland. Station area planning activities are currently underway for all station areas in the Corridor.

6.5.5 Operating Efficiencies

South/North LRT would cost $0.92 per rider to operate. Comparatively, system-wide operating costs per transit passenger would be $1.51 with an all-bus network in the South/North Corridor and $1.48 with South/North LRT.

6.5.6 Cost Effectiveness

The full-length South/North project would exhibit a $4.73 federal Cost Effectiveness Index (CEI) assuming the discount rates and value of travel time recently provided by FTA.

6.5.7 Environmental

The Portland/Vancouver Metropolitan region is currently in non-attainment for both ozone and carbon monoxide. 40% of the emissions reduction required to maintain air quality standards must come from transportation sources. 20% of that reduction is estimated to come from the South/North LRT and related land use densities. The project is estimated to account for a reduction of 720 tons of air contaminants per year.

~7~

Cost and Financial Analysis

7.1 Introduction

During the Tier I Final Report stage, capital cost estimates were made and were documented in *Light Rail Transit Representative Alternatives Conceptual Design and Order of Magnitude* (BRW, 1994). Prototypical construction schedules were developed and used to estimate capital costs in year of expenditure dollars. These estimates were then used to prepare a capital cost financing plan for the design concept and scope adopted with the *Tier I Final Report.* This capital cost financing plan was used as the basis for Tri-Met's General Obligation Bond initiative and was adopted by Metro as the basis for the funding request to the state legislature. The plan was assumed in the preparation of the Regional Transportation Plan. The capital financing plan may change as the project is refined through future analyses.

Also during the Tier I Final Report stage, operating costs were developed for each alternative and were documented in the *Tier I Technical Summary Report* and the *Tier I Technical Summary Report Briefing Document* (Metro, 1994). These projections were compared against projected system wide operating revenues. This system wide operating plan may change as the project is refined through future analyses.

7.2 Capital Costs

The capital cost for the design concept and scope documented in the *Tier I Final Report* is estimated to be $1.9 billion in $1994 or $2.85 billion in year-of-expenditure dollars. Year-of-expenditure dollars were calculated from a 1994-dollar capital cost estimate using a construction scheduling computer model developed for the Westside LRT project. The preliminary schedule assumes a full funding contract with the Federal Transit Administration would be executed in early 1998, a least-time construction schedule would be followed and construction would be completed in 2007.

It must be noted that the capital cost estimates are based on a pre-Preliminary Engineering level-of-detail. The capital cost estimate will be adjusted to reflect refinements to the design, construction schedule and financing plan resulting from the on-going study process.

7.3 Capital Financing Plan

7.3.1 Overview

The current funding plan for the South/North Project is based on the phased construction of the design concept and scope defined in the *Tier I Final Report.* Subsections 7.3.2 through 7.3.5,

below, describe the proposed revenue sources. Subsection 7.3.6 describes the construction segmentation and related cost and revenue cash-flow requirements for the project.

7.3.2 Federal Funding Participation

Tri-Met will seek a 50% federal share for the South/North LRT project. Based on current estimates, this will amount to $1.425 billion. This amount will be too large to achieve in one federal authorization bill. The plan is to obtain this commitment over two federal authorization bills. As a result, the project will have to be constructed in two "Segments". To secure the commitment for such funds, Tri-Met would seek a $750 million authorization of Section 3 funds for Segment-1 and a $675 million "contingent commitment" for Segment-2 in the upcoming authorization bill.

7.3.3 C-TRAN/State of Washington Funding Participation

During the Tier I Final Report stage, it was concluded that the relative funding contributions of Oregon and Washington would be based on the relative benefits of the South/North Project between the two states. For the design concept and scope documented in the *Tier I Final Report*, the funding plan proposes that the State of Washington cover one-sixth of the capital cost and that the state and C-TRAN would evenly split this funding requirement. These assumptions will be refined during PE/DEIS activities based on more detailed analyses of alignments, capital costs and relative benefits.

7.3.4 Tri-Met Funding Participation

It is proposed that Tri-Met would contribute one-sixth of the total project capital cost. Tri-Met's share would be paid from the $475 million bond measure recently approved by 65% of the region's voters. This analysis assumes that these bonds would be issued in their entirety at the beginning of the construction period.

7.3.5 State of Oregon Funding Participation

It was proposed that the State of Oregon would contribute one-sixth of the total project cost or, based on current estimates for a bi-state project, $475 million. The 1995 Legislative Assembly approved an initial contribution of $375 million for a Segment-1 project. It is understood that the Portland region would return to the Legislature to request an additional $100 million for the project at such time as funds are committed for a Clark County extension.

The existing $375 million authorization required the legislature to establish a total lottery commitment to Tri-Met's light rail transit system of $32 million per year beginning in FY 2000. Until FY 2000, the State would continue its current $10 million per year commitment to the Westside LRT. Beginning in FY 2000, the $32 million per year stream of funds would be used to pay the State's share of both the Westside LRT and the South/North LRT. The State's commitment to the Westside LRT Project would continue to be $10 million per year until FY 2009 when the Westside LRT bonds are repaid. The remaining funds would be made available to

the South/North LRT and would be used to support a cash contribution to the project and to repay a bond.

7.3.6 Capital Financing Plan: Implementation Framework

After the Final Environmental Impact Statement is completed and the Record of Decision (ROD) is issued, Tri-Met will seek a Full Funding Grant Agreement with FTA. The Full Funding Grant Agreement would define the scope of the project, its construction segments and funding commitments.

The financing plan is premised on executing a Full Funding Grant Agreement (FFGA) which allows for the staged implementation of the South/North LRT. If C-TRAN/Washington funds are committed to the project by the start of these negotiations the Full Funding Grant Agreement requested would encompass a Segment-1 project between downtown Vancouver and downtown Milwaukie. The estimated cost for this segment is $2.1 billion -- which equals the total of state and local funds proposed to be committed to the project and the federal funds to be requested in the upcoming authorization bill.

Table 1 illustrates the financing plan which assumes the state and local shares described above and:

(a) Construction of Segment-1 between Milwaukie CBD and Vancouver CBD starts in 1998 and ends in 2005 and the construction of the Segment-2 extensions would start in the year 2004 and be completed in the year 2007.

(b) Section 3 funds would be appropriated to the project at a 50% rate of $100 million per year until the year 2008 when the federal appropriation begins to rise to a maximum of $115 million per year.

(c) State and local funds are advanced to the project to allow it to maintain its schedule. After they are fully expended, interim borrowing is used to meet cash-flow needs.

(d) The Full Funding Grant Agreement requested would provide for Segment-2 extensions funded with the federal funds "contingently committed" in the Full Funding Grant Agreement. No additional local or state funds would be needed because the local funds advanced in Segment-1 would serve as the local match for Segment-2.

If C-TRAN/Washington funds are not committed to the project by the start of these negotiations:

(a) The FFGA requested would encompass an Oregon-only project for Segment-1.

Table 7-2a: South/North LRT Construction Costs:
Bi-State Project is First Construction Segment
Millions of Dollars (Year-of-Expenditure Dollars)

Federal FY:	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	Total
Milwaukie-Vancouver	$ 20	$ 88	$260	$515	$496	$315	$226	$123								$2,042
Segment-2 Extensions							$ 77	$288	$272	$ 89						$ 675
Interim Financing					$ 1	$ 1	$ 2	$ 8	$ 19	$ 27	$ 25	$ 21	$ 16	$ 10	$ 2	$ 133
Total Cost	$ 20	$ 88	$260	$515	$497	$316	$305	$369	$291	$116	$ 25	$ 21	$ 16	$ 10	$ 2	$2,850

Table 7-2b : South/North LRT Financing Plan:
Bi-State Project is First Construction Segment
Millions of Dollars (Year-of-Expenditure Dollars)

	ISTEA II				ISTEA III		ISTEA IV									
Federal FY:	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	Total
Section 3	$ 10	$ 45	$100	$100	$100	$100	$100	$100	$100	$100	$110	$115	$115	$115	$115	$1,425
C-TRAN	$238															$ 238
Washington	$ 24	$ 24	$ 24	$ 24	$ 24	$ 24	$ 24	$ 23	$ 23	$ 23						$ 237
Tri-Met	$475															$ 475
State: Lottery					$475[1]											$ 475
Total Revenues	$747	$ 69	$156	$156	$535	$124	$124	$123	$123	$123	$110	$115	$115	$115	$115	$2,850

(b) Tri-Met would seek a provision in the Full Funding Grant Agreement which would allow for a future amendment to include an extension north and would seek a "contingent commitment" of federal funds for such an extension.

(c] The maximum commitment of state funds obligated to the Segment-1 project in the Full Funding Grant Agreement would be $375 million. At such time as it would be needed for the Segment-2 extension, Tri-Met would seek a commitment of up to $100 million more of State of Oregon funds to the South/North Project.

7.4 Operating Plan

Operating costs for the light rail project were documented in the *Tier I Technical Summary Report* (Metro, July 1994). The operating cost for the adopted design concept and scope (project) was about $16 million per year. When viewed in the context of an overall system fiscal feasibility study, operating revenues were found to be potentially slightly lower than needed. However, the difference was so small that it was concluded to not be a problem at this stage of the analysis. A more detailed study will be prepared during the DEIS stage, at which time an operating revenue plan will be prepared if it is determined to be necessary.

South North
Transit Corridor Study

Design Option Narrowing Final Report

South/North Steering Group

November 20, 1995

METRO

Design Option Narrowing Final Report

South/North Transit Corridor Study

South/North Steering Group

November 20, 1995

Metro

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

TABLE OF CONTENTS

1.0 Introduction

1.1 PURPOSE OF THE REPORT

This report documents the light rail transit options selected by the South/North Steering Group to be studied further in the Draft Environmental Impact Statement (DEIS).

It is important to understand the context of this report. Earlier in Tier I, during the *Scoping Process*, it was determined that the DEIS will address two transportation alternatives for the South/North Corridor: (i) the No-Build Alternative; and, (ii) the Light Rail Transit (LRT) Alternative. Further, in December 1994, with the adoption of the *Tier I Final Report* (Metro: December 1994), Metro Council and the C-TRAN Board of Directors adopted the Phase One Termini and most of the Corridor's alignment alternatives to advance into the Tier II DEIS for further study. Later in the spring of 1995, the alignment alternatives in the remaining segments of the corridor (the south Willamette River crossings and the North Portland alignments) were narrowed. Then finally, in August 1995, following an extensive effort to involve the public in the creation of the Clark County and City of Vancouver Transportation Futures process, C-TRAN amended the northern Phase I terminus (from 99th Street to Veterans Administration (VA) Hospital/Clark College).

This report establishes the:

[a] LRT alignment design options;

[b] general location of potential light rail stations, transit centers and park-and-ride lots on each of the proposed alignment options; and

[c] "Minimum Operable Segments (MOS)";

which will be addressed in the Draft Environmental Impact Statement.

This report also includes listings of *Issues* regarding the identified options. Many of these *Issues* identify major areas for further study that may occur between the time this report is approved and the time DEIS analysis begins. These activities may result in refinements to the recommended alignment, station location and MOS options. Refinements may also occur during the DEIS and the FEIS. Thus, the options set forth in this report are a starting point, not a final proposal.

1.2 STUDY, PUBLIC INVOLVEMENT AND DECISION-MAKING PROCESS

Tier I of the South/North Corridor Transit Study began in April 1993. The bi-state study has included the work of 15 different governmental entities having some responsibility for the project, including: five cities, four counties, Tri-Met, C-TRAN, Metro, RTC, ODOT, WSDOT and the Port of Portland.

In December 1993, the South/North Steering Group adopted the *Tier I Evaluation Methodology Report* (Metro: December 1993). The *Methodology Report* includes the adopted Goal for the South/North Project: "To implement a major transit expansion program in the South/North Corridor that supports bi-state land use goals, optimizes the transportation system, is environmentally sensitive, reflects community values and is fiscally responsive." The report also adopted the criteria and measures and process to be used to narrow design options that will advance into the DEIS for further study. Appendix A includes a diagram of the Design Option Narrowing process and Appendix B includes a summary table of the Design Option Narrowing Criteria and Measures.

Over the past 12 months, project staff have been engaged in identifying, engineering, costing, projecting ridership and assessing the impacts of alignment design options identified at the beginning of or during Tier I. The results of that work are documented in the *South/North Design Option Narrowing Briefing Document* and the *South/North Design Option Narrowing Technical Summary Report* (Metro: October 1995).

In addition, there has been a myriad of public forums and hearings, Citizen Advisory Committee meetings, Expert Review Panel meetings and technical meetings concerning design options. Hundreds of public comments have been received, catalogued and distributed to project staff and policy-makers. Those public comments are included within the *South/North Design Option Narrowing Public Comments Report* (Metro: September 1995).

The design options identified in this report for further study within the DEIS are based on the results of these technical and public involvement activities, as well as the consideration of recommendations independently proposed by the South/North Citizens Advisory Committee and the South/North Project Management Group.

The *Design Option Narrowing Final Report*, as adopted by the Steering Group, will be distributed to the governing body of each of the participating governmental entities. Tier I will conclude when the Steering Group and participating jurisdictions reach a consensus on the design options to advance into the DEIS for further study. Subsequently, the preparation of the DEIS will begin and the process of evaluating and refining the options will continue to occur, this time at a more detailed level of analysis.

1.3 ORGANIZATION OF THE REPORT

Chapter Two of this report defines the two termini for the full length light rail alternative and four potential minimum operable segments. It also identifies the major issues regarding the *MOS's* which still need resolution.

Chapter Three defines one or two alignment options for each of eight segments encompassing the full-length light rail alignment. Potential station locations and major outstanding issues are also identified in each segment.

2.0 Minimum Operable Segments/Terminus Options

2.1 BACKGROUND

The full-length light rail alternative to be examined in the DEIS would run between the vicinity of the Clackamas Town Center in Oregon and the vicinity of the Veterans Administration (VA) Hospital/Clark College in Vancouver, Washington. This alternative is premised on the assumption that:

[a] the Clark County transportation futures study incorporates a continued interest to examine bi-state light rail options; and

[b] 50% federal funding for such an option would be secured over two federal authorization cycles requiring the full-length project to be built in two construction segments.

FTA requires that all DEISs include an examination of Minimum Operable Segments (MOS's) for each light rail alternative. MOS's are light rail alignments which are:

[a] segments of the full length alternative;

[b] can be operated successfully on an interim or long-term basis; and

[c] can be extended into the full-length alternative at a later time.

FTA requires MOS's to be studied to:

[a] assess whether project objectives can be equally or more cost-effectively met by *MOS's* than the more expensive full-length alternatives;

[b] ensure that there are alternatives which could be constructed if funding sources provide less revenues than initially expected or desired; and

[c] ensure that there are options which could be built in sequence, over time, if cash flow requirements dictate phased-construction.

In addition, the MOS's provide the opportunity to examine different permanent termini in North Portland if the Clark County transportation futures process determines that light rail is not an appropriate mode in Clark County at this time.

2.2 SELECTED MOS's

These conditions lead to defining a series of MOS's which include:

[a] One MOS providing a bi-state segment:

1. **Milwaukie CBD/Marketplace Park-and-Ride to V.A. Hospital/Clark College (Vancouver)**

[b] Three Oregon-only MOS's providing various length extensions into N/NE Portland:

2. **Clackamas Town Center Vicinity to Rose Quarter Vicinity**

3. **Clackamas Town Center Vicinity to Kaiser Clinic Vicinity**

4. **Clackamas Town Center Vicinity to Expo Center Vicinity**

2.3 MOS ISSUES

Four issues regarding MOS's require continued investigation at this time:

1. *Design of MOS termini:* The location and design of the three MOS termini in North Portland (Rose Quarter, Kaiser Clinic and Expo Center), including the station and trackage, need to be refined over the next two months.

2. *Bus service:* The bus configuration serving the North Portland MOS termini (in the CTC to North Portland MOS's) and the Milwaukie terminus (in the Milwaukie to Vancouver MOS) also need to be defined over the next two months.

3. *Park-and-ride configurations:* The configuration of the Expo Center park-and-ride (in the CTC to Expo Center MOS) and the Milwaukie park-and-ride (in the Milwaukie to Vancouver MOS) need to be refined over the next two months.

4. *MOS funding plans:* As part of the DEIS, a funding plan will be prepared for each of the MOS options.

3.0 Design Options

3.1 CLACKAMAS TOWN CENTER VICINITY

3.1.1 Clackamas Town Center Vicinity: Recommended Options (See Figures 1 & 2)

In this segment, two design options will be examined in the DEIS:

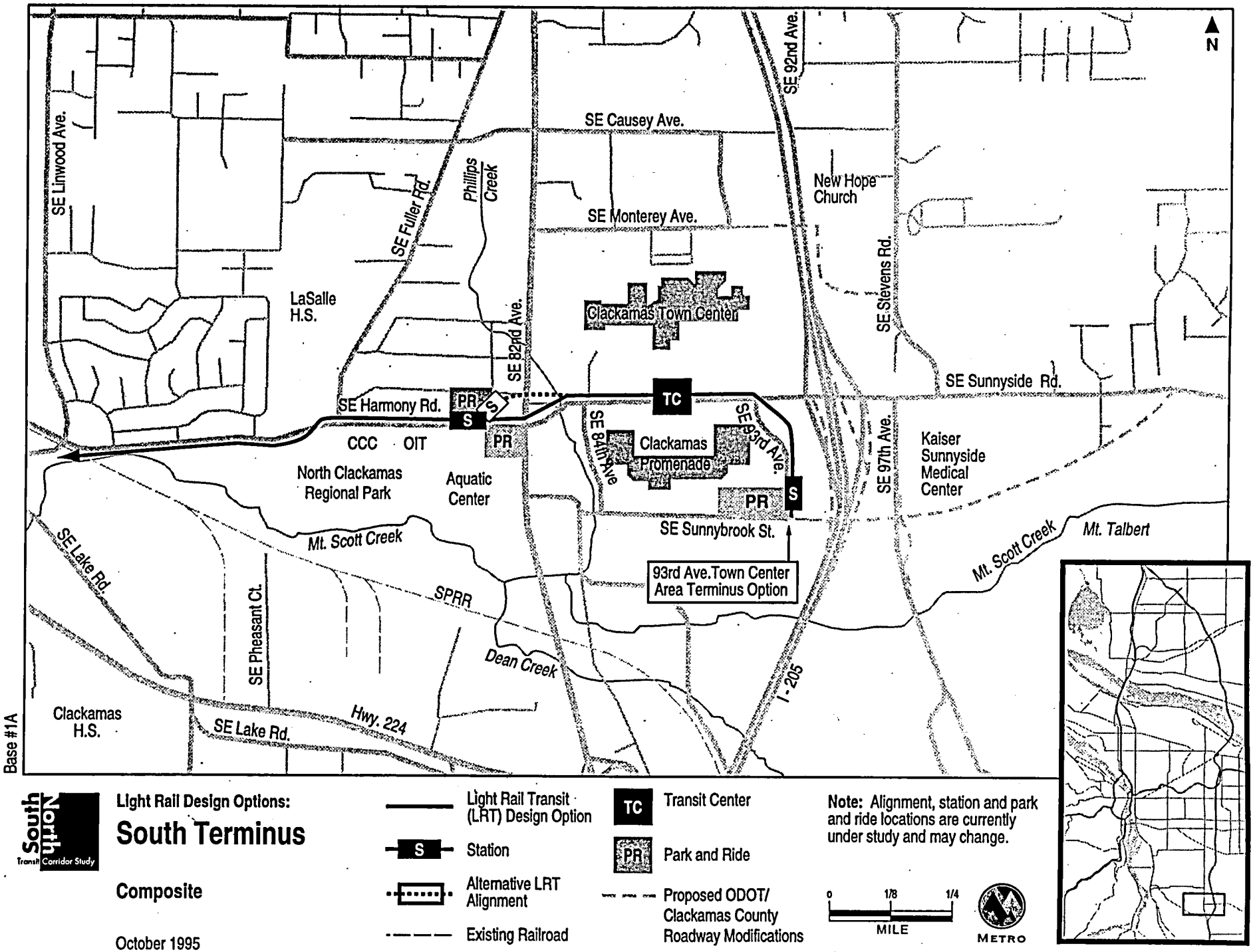
1. *North of Clackamas Town Center Alignment to Sunnyside Area Terminus*: From the S.E. Fuller Road/S.E. Harmony Road vicinity, the alignment would run along the west and north circumference of the Southgate community. It would then cross S.E. 82nd Avenue on an elevated structure and head eastward in the vicinity of S.E. Monterey Avenue to a transit center serving the CTC. From there, the alignment would continue eastward, crossing I-205 on a new structure, to a park-and-ride near the New Hope Church. From the Church, the alignment would run southward, paralleling I-205, crossing S.E. Sunnyside Road and then proceeding eastward to a park-and-ride terminus station.

2. *South of Clackamas Town Center Alignment to S.E. 93rd Avenue Town Center Area Terminus:* From the S.E. Fuller Road/S.E. Harmony Road vicinity, the alignment would run eastward along S.E. Harmony Road, to a park-and-ride station just west of S.E. 82nd Avenue. This station would also serve walk-ons from the Southgate community, Aquatic Center and Oregon Institute of Technology. The alignment would then curve slightly northwards to a point near the northern border of S.E. Sunnyside Road, cross S.E. 82nd Avenue and head eastward to a transit center south of the Clackamas Town Center. Bus improvements providing access to the transit center would also be included. The LRT alignment would extend east and cross Sunnyside Road above grade and extend south, parallel to and east of I-205, to a terminus station and park-and-ride lot in the vicinity of 93rd Avenue and Sunny Brook Street.

3.1.2 Clackamas Town Center Vicinity: Issues

Several issues require continued investigation in this area. As explained earlier, the Town Center area is recommended as the southern terminus of the South/North LRT Project for two primary reasons: (i) the general Town Center area is proposed to be a Regional Center in the Region 2040 Plan and (ii) the Town Center mall itself is a high-transit-ridership node. The Town Center area terminus works best if these opportunities are realized and its success depends on the integration of the LRT alignment with an on-the-ground transit-supportive land use pattern and related (re)development site plans. Six issues need to be resolved which, depending on how they are resolved, may result in changes to the design options in the CTC vicinity:

1. *Southgate community redevelopment*: As part of its urban renewal planning effort, Clackamas County should determine if and how light rail fits into the redevelopment of the Southgate residential area. The current design calls for an LRT alignment which skirts the



South North Transit Corridor Study

Light Rail Design Options:

South Terminus

Composite

October 1995

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride
- Proposed ODOT/ Clackamas County Roadway Modifications

Note: Alignment, station and park and ride locations are currently under study and may change.

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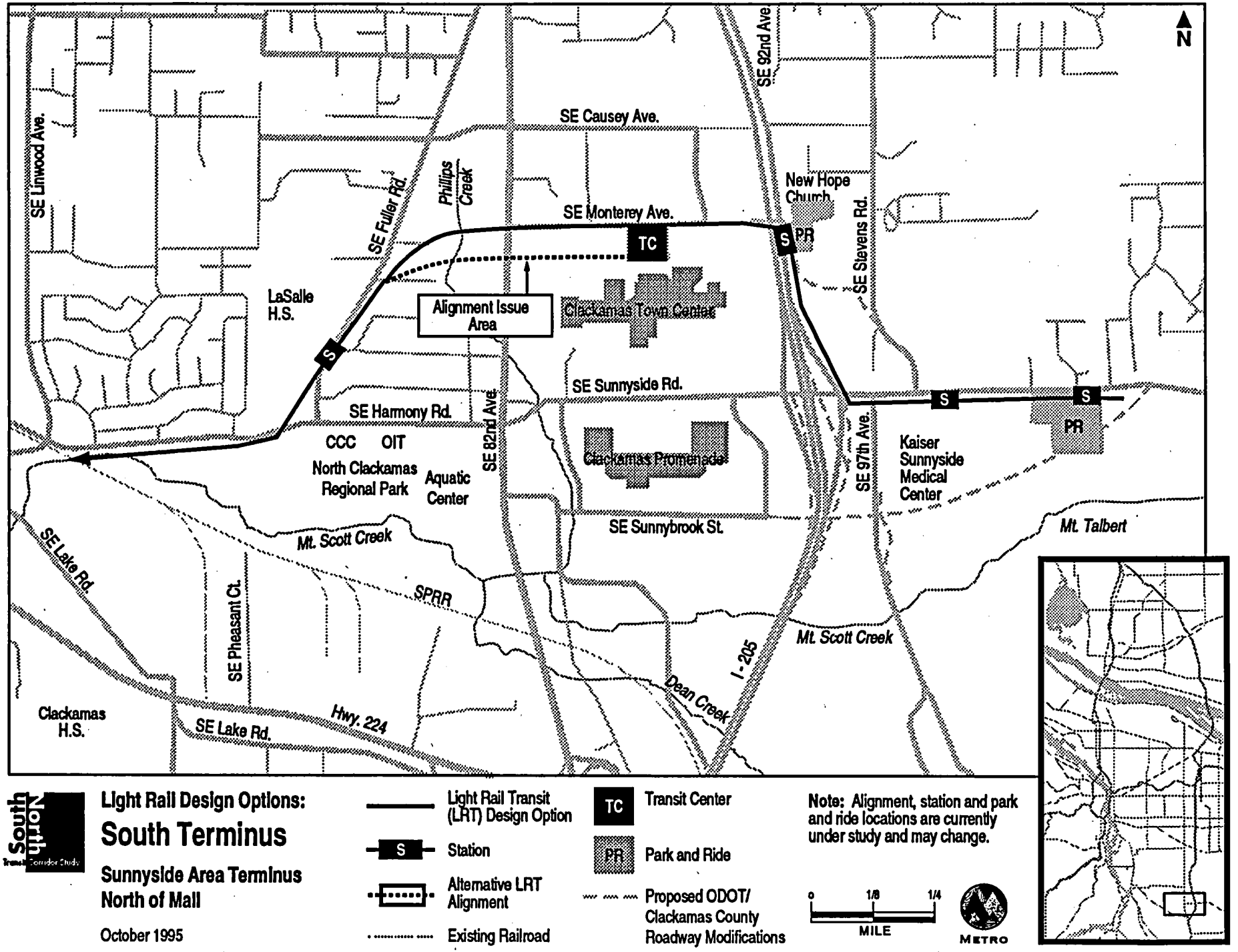
METRO

Figure 2



South North Transit Corridor Study

Light Rail Design Options:
South Terminus
Sunnyside Area Terminus North of Mall

October 1995

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride
- Proposed ODOT/ Clackamas County Roadway Modifications

Note: Alignment, station and park and ride locations are currently under study and may change.

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METRO

residential area. If Clackamas County recommends the adoption of a redevelopment plan for the Southgate area which (i) increases residential or mixed-use densities in the area and (ii) calls for a modified LRT alignment through the Southgate area which does not require an inordinate increase in residential displacement, the Steering Group will consider adding such an alignment option to the EIS[1]. The Steering Group's action will be viewed in concert with the resolution of the other issues listed in this sub-section.

2. *Future development of the Clackamas Town Center*: The North of Town Center alignment recommended to be included in the DEIS would run along the northern edge of the Town Center parking area parallel to S.E. Monterey Avenue. This alignment is predicated on the expansion of the Town Center northerly towards the proposed LRT station, either by expanding the Mall and/or developing transit-supportive, free-standing buildings on perimeter sites. If plans for such an expansion are not agreed-upon prior to the completion of the DEIS or are not likely to be realized in the foreseeable future, an alignment slightly south of S.E. Monterey Avenue, closer to the existing Mall, will be considered for inclusion in the EIS[1] in lieu of or addition to the current alignment.

   A similar course-of-action will be taken for the South of Town Center alignment. The expansion plans for the Clackamas Town Center mall currently call for the addition of an anchor store at the southern end of the mall between Sears and Meier & Frank. The entrance to this planned expansion could be in the vicinity of the proposed light rail station associated with the South of the Mall alignment. If plans for the mall expansion are not agreed-upon in the foreseeable future, an alignment closer to an entrance to the existing Mall will be considered for inclusion in the EIS[1].

3. *Redevelopment of the area between the New Hope Church and the Sunnyside Medical Center*: The current alignment in this area would run parallel to and in the vicinity of I-205. An area just to the east of the proposed alignment is currently designated as open space. If Clackamas County (i) recommends that a significant portion of this area be redesignated as a transit-supportive residential or mixed-use area and (ii) calls for a modified LRT alignment through the area, the Steering Group will consider adding such an alignment option to the EIS[1]. The Steering Group's action will be viewed in concert with the resolution of the other issues listed in this sub-section.

4. *Extension/expansion of the urban renewal district:* Clackamas County has begun to evaluate whether the existing Clackamas Town Center Urban Renewal Area (CTC URA) should be extended in time (it is now slated to terminate June 30, 1998) and expanded in geographic area (an expansion of approximately 100 acres is statutorily permitted). In order to resolve these issues, the Steering Group recommends that Clackamas County consider amending the CTC urban renewal plan to provide redevelopment and light rail-related design features to achieve the purposes of the 2040 Plan and the South/North Project.

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[1] The term "EIS" is used here to denote either the DEIS or FEIS, whichever is found most appropriate.

5. *Tax increment financing of localized alignment and design features in the Town Center area*: The recommended North of Town Center alignment/Sunnyside Terminus option is currently estimated to cost $55 million more than the recommended South of Town Center alignment/S.E. 93rd Avenue Town Center Area terminus option. As studies proceed on the issues mentioned above, the cost of both alignment options may change, as might the cost differential between the options. Given (i) the cost differences between the CTC options and (ii) the shared objectives between the South/North Project and an amended urban renewal plan (if one is adopted), the Steering Group recommends that Clackamas County consider the use of tax increment funds from the amended plan and/or other local funding sources for a portion of the light rail costs in this area.

6. *Future light rail alignment to Oregon City*: Pursuant to the Tier I decision, an effort parallel to the DEIS process will consider alternative ways to extend the South/North LRT to Oregon City in a Phase II project. Two basic alignment options will be considered: the McLoughlin Boulevard corridor from downtown Milwaukie and the I-205 corridor from the CTC vicinity. This study may result in refinements/ modifications to the light rail alignments, station locations and terminus sites/designs in the CTC vicinity which are incorporated in the EIS[1].

7. *Location of the 82nd Avenue and Harmony Road park-and-ride with the "South of Clackamas Town Center" option and design of the alignment, stations, transit center and terminus park-and-ride lot east of 82nd Avenue:* The precise location of the alignment, station and park-and-ride lot just west of S.E. 82nd Avenue on/near S.E. Harmony Road needs to be refined over the next two months. Options to be considered include locations on both the north and south sides of S.E. Harmony Road. The precise location of the alignment, stations, transit center and terminus park-and-ride lot east of 82nd Avenue needs to be refined over the next two months.

3.1.3 Clackamas Town Center Vicinity: Rationale

Because, the "South of the Mall" design options are shorter, they are less expensive to build and operate and faster for through-travel than the "North of the Mall" design options. However, the "North of the Mall" options may better serve land use objectives by assisting in the redevelopment of Southgate area, serving the existing multi-family residential areas to the north of the mall and (as discussed in the *Issues* section) the potentially rezoned lands just east of I-205.

The recommended design options in the Clackamas Town Center (CTC) segment are proposed to frame the fundamental issue in this segment: are the land use benefits of the "North of the Mall" and "east of I-205 terminus" options worth their greater costs and longer travel times? To best assess this issue in the DEIS, the best "North of the Mall" option should be compared against the best "South of the Mall" option.

The S.E. 93rd Avenue Town Center Area Terminus is the selected "South of the Mall" option because:

[a] It would be $34 and $124 million ($YOE) less expensive than the "South of the Mall" options that connect to the Sunnyside Terminus or the Highway 212/224 Terminus options.

[b] It would provide an additional park-and-ride lot opportunity for the south of CTC alignment over the 84th Avenue CTC terminus option.

[c] It would be capable of being extended south at a future date, if so desired.

The Sunnyside Terminus is the selected "North of the Mall" option because:

[a] It would serve the major growth area along S.E. Sunnyside Road east of I-205, where the other options would not.

[b] Its number of light rail boardings in the CTC segment would be 64% - 89% greater than the other "North of the Mall" options.

[c] It would be $106 million ($YOE) less expensive to construct, $180,000 per year less expensive to operate and faster to operate than the Highway 212/224 Terminus option.

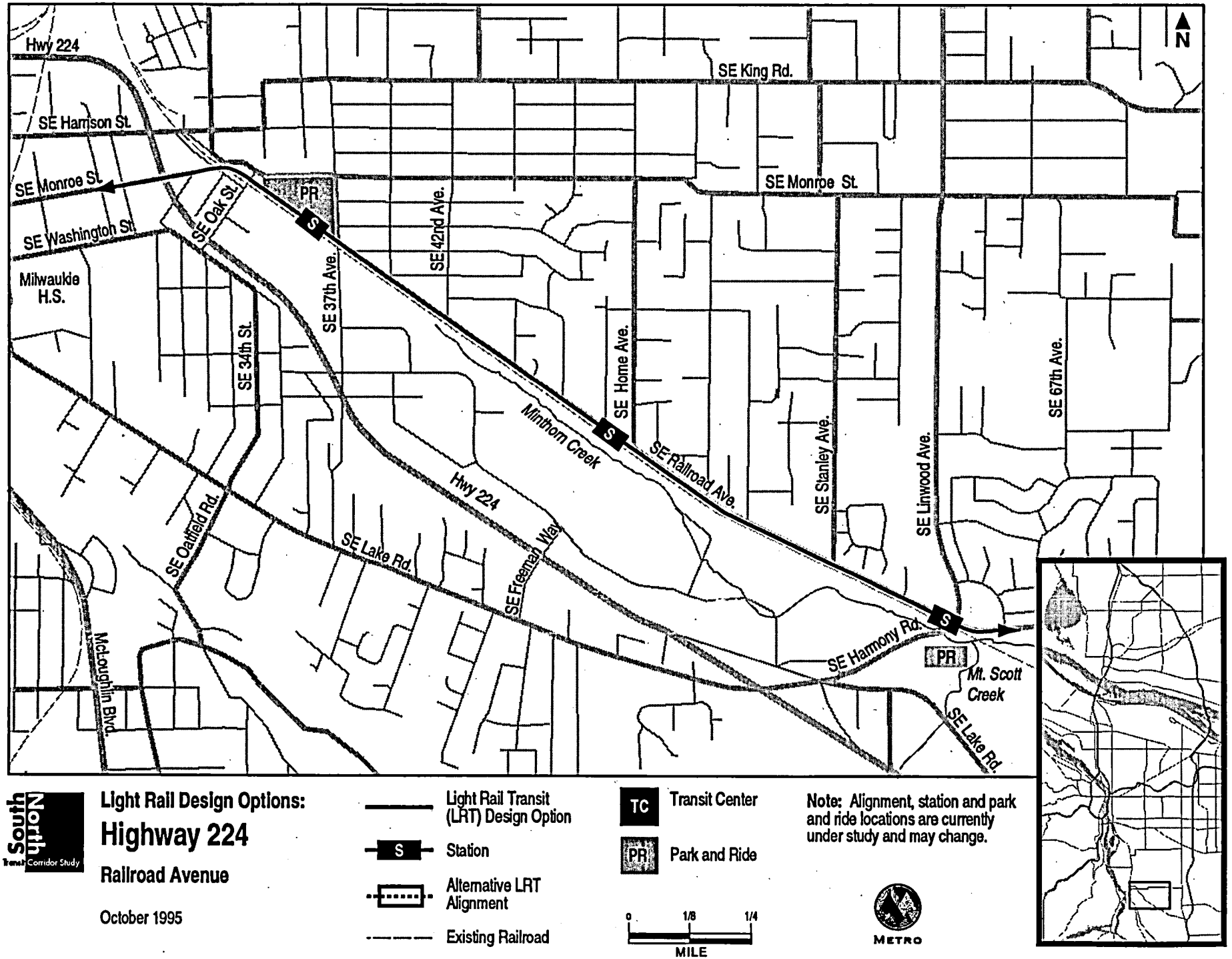
[d] It would be capable of being extended to the south at a future date, if so desired.

3.2 CTC TO MILWAUKIE

3.2.1 CTC to Milwaukie: Selected Options (See Figure 3)

In this segment, one design option is selected to be examined further in the DEIS:

1. *Railroad Avenue:* From the south side of S.E. Harmony Road, the light rail alignment would cross under S.E. Harmony Road east of its intersection with S.E. Linwood and S.E. Railroad Avenues. A potential park-and-ride station would be located at S.E. Harmony Road/S.E. Linwood Avenue. The alignment would proceed westward on the south side of S.E. Railroad Avenue in the public right-of-way adjacent to the Southern Pacific main line. Railroad Avenue would be reconstructed to accommodate the light rail alignment. A station could be located near S.E. Home Avenue to serve the residential area to the north and the industrial area to the south. The alignment would continue adjacent to the SP main line until crossing over the main line in the vicinity of S.E. Oak and S.E. Myrtle


Hwy 224
SE King Rd.
SE Harrison St.
SE Monroe St.
SE Monroe St.
SE Washington St.
SE Oak St.
PR
S
SE 42nd Ave.
SE 37th Ave.
Milwaukie H.S.
SE 34th St.
SE Home Ave.
Minthorn Creek
S
SE Railroad Ave.
SE Stanley Ave.
SE Linwood Ave.
SE 67th Ave.
Hwy 224
SE Oatfield Rd.
SE Lake Rd.
SE Freeman Way
S
SE Harmony Rd.
PR
Mt. Scott Creek
SE Lake Rd.
McLoughlin Blvd.
N
South North Transit Corridor Study
Light Rail Design Options:
Highway 224
Railroad Avenue
October 1995
Light Rail Transit (LRT) Design Option
S Station
Alternative LRT Alignment
Existing Railroad
TC Transit Center
PR Park and Ride
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MILE
Note: Alignment, station and park and ride locations are currently under study and may change.
METRO

Figure 3

Streets, just west of the Milwaukie Market Place. A station would serve the area and a potential park-and-ride lot. The structure would overpass Highway 224, landing on S.E. Monroe Street.

3.2.2 CTC to Milwaukie: Issues

Three issues require continued investigation in this area:

1. *Design of Railroad Avenue Collector:* The initial design of the Railroad Avenue option required substantial residential displacement and, as a result, relatively high capital cost due to the relocation and reconstruction of Railroad Avenue. A modified option providing for a Railroad Avenue reconstructed as a "collector" is now proposed. This modification would reduce the possible displacement impacts and capital costs of the option. As the EIS is prepared, project staff will investigate the possibility of using Southern Pacific right-of-way as a method to further reduce possible displacements and costs.

2. *Access to industrial area*: Railroad Avenue parallels the north side of major employment centers along Highway 224. Special consideration will be given to the alignment, station locations and access ways in this segment to ensure that light rail is accessible is to these centers.

3. *Location and design of station in the vicinity of S.E. Railroad Avenue and S.E. Oak Street:* The design and location of the Milwaukie Market Place station will be refined over the next two months to improve its auto access, neighborhood access and cost.

3.2.3 CTC to Milwaukie: Rationale

The S.E. Railroad Avenue option is the selected option in the CTC to Milwaukie segment for inclusion in the DEIS because:

[a] It would be $8 to $23 million ($YOE) less expensive to construct than the Highway 224 options.

[b] It would be slightly faster (8 - 19 seconds) to operate and would attract slightly more light rail boardings (30 - 60 per day) in the CTC to Milwaukie segment than the Highway 224 options.

[c] Its comparative ratio would be 13% to 32% better than the Highway 224 options.

[d] It would allow for a park-and-ride facility east of the Milwaukie CBD (in the vicinity of S.E. Railroad Avenue and S.E. Oak Street) which would serve the travel shed for the residential area north of S.E. Railroad Avenue. The station also would provide walk-on access to portions of the residential area north of S.E. Railroad Avenue.

3.3 MILWAUKIE

3.3.1 Milwaukie: Selected Options (See Figure 4)

In this segment, two design options are selected to be examined in the DEIS:

1. *S.E. Monroe Street to East of the Southern Pacific Tillamook Branch Line:* From the Highway 224 overcrossing, the alignment would proceed westerly on S.E. Monroe Street. S.E. Monroe Street would be configured to operate two tracks of light rail and one westbound traffic lane between S.E. 25th and S.E. 9th Streets.

   The alignment would curve northerly in the vicinity of S.E. 25th Street to a transit center just east of the S.P. branch line between S.E. Monroe and S.E. Harrison Streets. The alignment would then proceed adjacent to the east side of the S.P. Branch line, through an existing underpass of Highway 224 and on structure over to the westside of the branch line, to a potential park-and-ride station at S.E. Ochoco Street. The alignment would then continue northerly along the branch line to about S.E. Umatilla Street where it would veer towards S.E. McLoughlin Boulevard as it continues northerly.

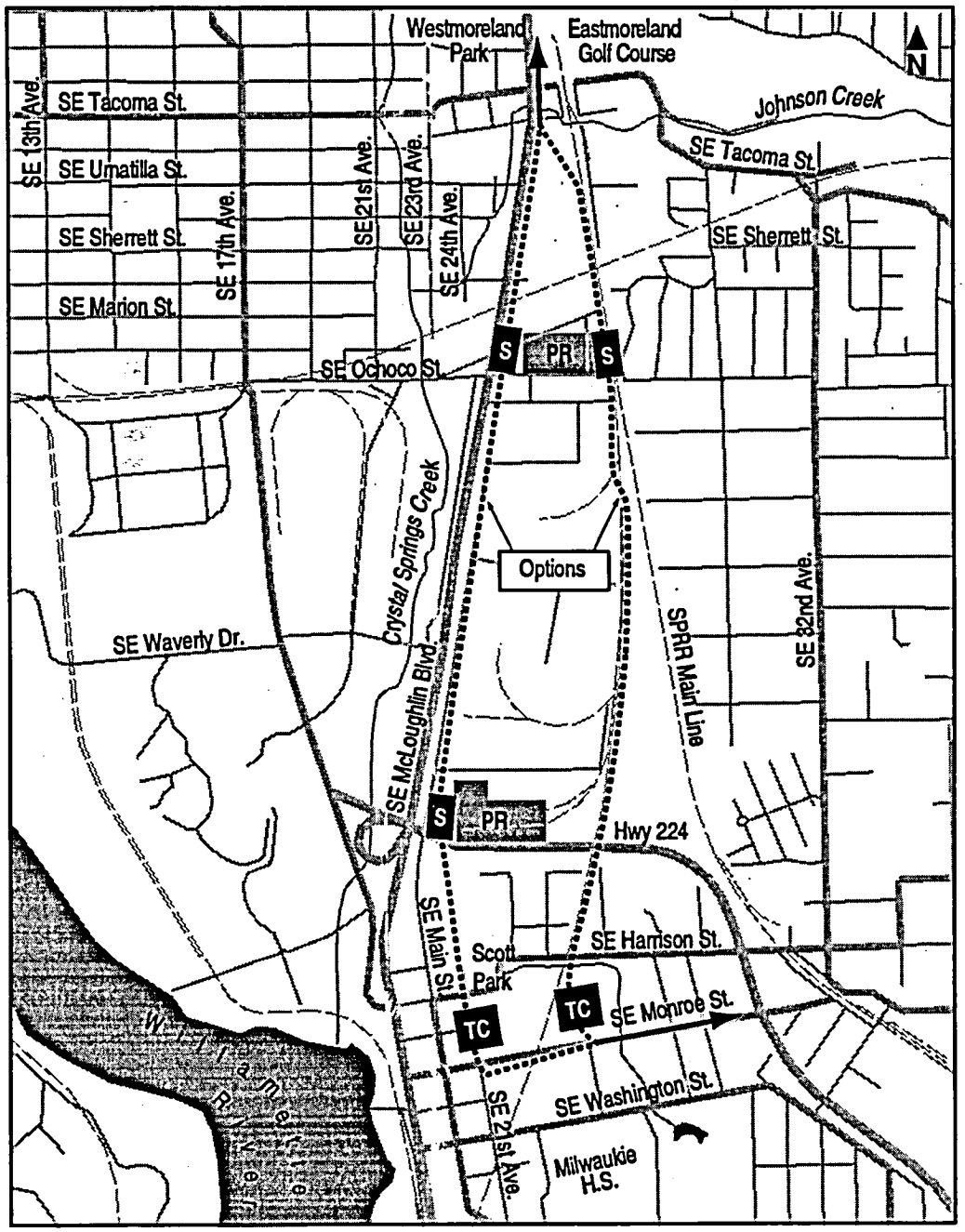
2. *S.E. Monroe to S.E. 21st Avenue/S.E. McLoughlin Boulevard:* From the overcrossing of Highway 224, the alignment would proceed westerly on S.E. Monroe Street. S.E. Monroe Street would be configured to operate two tracks of light rail and one westbound traffic lane between S.E. 25th and S.E. 9th Avenues.

   The alignment would pass under the SP branch line and proceed to a transit center at S.E. 21st Avenue. The alignment would then proceed northward to McLoughlin Boulevard, crossing underneath Highway 224 where there could be a park-and-ride station. It would then continue northerly paralleling McLoughlin Boulevard to a park-and-ride station at S.E. Ochoco Street and then continue north.

3.3.2 Milwaukie: Issues

Six issues require continued investigation in this area:

1. *Changes in Comprehensive Plan:* The central Milwaukie area is proposed to be a Regional Center in the Region 2040 Plan. The success of the South/North Project depends, in part, on the integration of the LRT alignment with an on-the-ground transit-supportive land use pattern and related (re)development site plans in Central Milwaukie. As a result, the planning currently underway regarding the Regional Center concept and transportation system plan in Milwaukie may result in changes to the alignment and design options.



South North Transit Corridor Study

Light Rail Design Options:

Milwaukie

Monroe Street

October 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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MILE

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Figure 4

2. *Design and location of Milwaukie Transit Center options*: Notwithstanding land use changes resulting from the Regional Center designation, the design and location of the Milwaukie Transit Center for both the S.E. Monroe Street to East of the Southern Pacific Tillamook Branch Line option and the S.E. Monroe to S.E. 21st Avenue option need to be refined over the next two months to maximize local access and to mitigate displacement and traffic impacts.

3. *Extension to Oregon City:* Pursuant to the Tier I decision, an effort parallel to the DEIS process will consider alternative ways to extend the South/North LRT to Oregon City in a Phase II project. One of the options to be considered would use the McLoughlin Boulevard corridor from downtown Milwaukie. This study may result in refinements/modifications to the light rail alignments, station locations and station sites/designs in central Milwaukie which are incorporated in the EIS[1].

4. *Need to consider land use integration in selecting the preferred alignment through central Milwaukie:* The central Milwaukie alignment is predicated on its integration with a Regional Center plan for the area. If such a plan is not agreed upon by the City of Milwaukie prior to the completion of the DEIS or is not likely to be realized in the foreseeable future, less expensive alignment options serving central Milwaukie will be considered for inclusion in the EIS[1] in lieu of or addition to the currently recommended alignments.

5. *Park-and-ride lot location north of Milwaukie:* A special study of park-and-ride lot locations and capacity will be undertaken for the north Milwaukie area between Highway 224 and S.E. Tacoma Street. The study will identify potential park-and-ride sites which meet the anticipated demand and will use DEIS-level data to select site(s) for inclusion in the EIS[1]. This study will be coordinated with the study proposed under issue 6.

6. *Maintenance facility location north of Milwaukie:* A special study of maintenance facility locations and designs will be undertaken for the north Milwaukie and other areas. The study will identify potential maintenance facility sites and designs which meet the anticipated South/North LRT needs and will use DEIS-level data to select site(s)/design(s) for inclusion in the EIS[1].

3.3.3 Milwaukie: Rationale

One of the fundamental objectives of the South/North LRT Project is to serve the central Milwaukie business district. Two of the options examined in this segment, the SP Main Line option and the Milwaukie Expressway option, would bypass the Milwaukie central business district. As a result, these options fundamentally fail to meet a primary objective of the project and, therefore, are recommended to be eliminated from further consideration.

Each of the three remaining "east-west" alignment options (S.E. Harrison Street, S.E. Washington Street and S.E. Monroe Street) has two "north-south" sub-options (the East of the SP Branch

Line option and the S.E. 21st/Main Street/McLoughlin Boulevard option). For each of the "east-west" alignment options, the following relationship holds for the "north-south" sub-option:

[a] The SP Branch Line option would be shorter, less expensive to build and operate and faster than the S.E. 21st Street/McLoughlin Boulevard option.

[b] The S.E. 21st/Main Street/McLoughlin Boulevard option may better serve City of Milwaukie land use objectives by assisting in the redevelopment of the central business district.

As a result, irrespective of which "east-west" option(s) are recommended in the Milwaukie segment, a fundamental issue in this segment is: are the land use benefits of the S.E. 21st/Main Street/McLoughlin Boulevard sub-option worth its greater costs and longer travel times? To best assess this issue, it is recommended that the DEIS examine both "north-south" sub-options for whichever "east-west" sub-option(s) are proposed.

Regarding the "east-west" sub-options in the Milwaukie segment, the S.E. Monroe Street option is selected for inclusion in the DEIS because:

[a] It would provide better access and wider coverage to the central business district than the S.E. Harrison Street option.

[b] It would be $22 - $28 million ($YOE) less expensive to construct than the S.E. Washington Street option (depending on the north-south sub-option selected) and $4 million ($YOE) less expensive to construct than the S.E. Harrison Street - S.E. Main Street/McLoughlin Boulevard option (the SP Main Line sub-option would be $14 million ($YOE) less expensive with the S.E. Harrison Street option).

[c] It would be $360,000 per year less expensive to operate than the McLoughlin Boulevard/21st Avenue and S.E. Washington Street option (depending on the north-south sub-option selected) and $650,000 - $710,000 per year less expensive to operate than the S.E. Harrison Street options.

[d] It would be 70 - 88 seconds faster (depending on the north-south sub-option), attract 170-190 more boardings per day and exhibit a 17-20% better comparative ratio than the S.E. Washington Street option.

[e] It has greater community support than the other options.

3.4 MILWAUKIE TO PORTLAND CBD

3.4.1 Milwaukie to Portland CBD: Selected Options (See Figures 5 & 6)

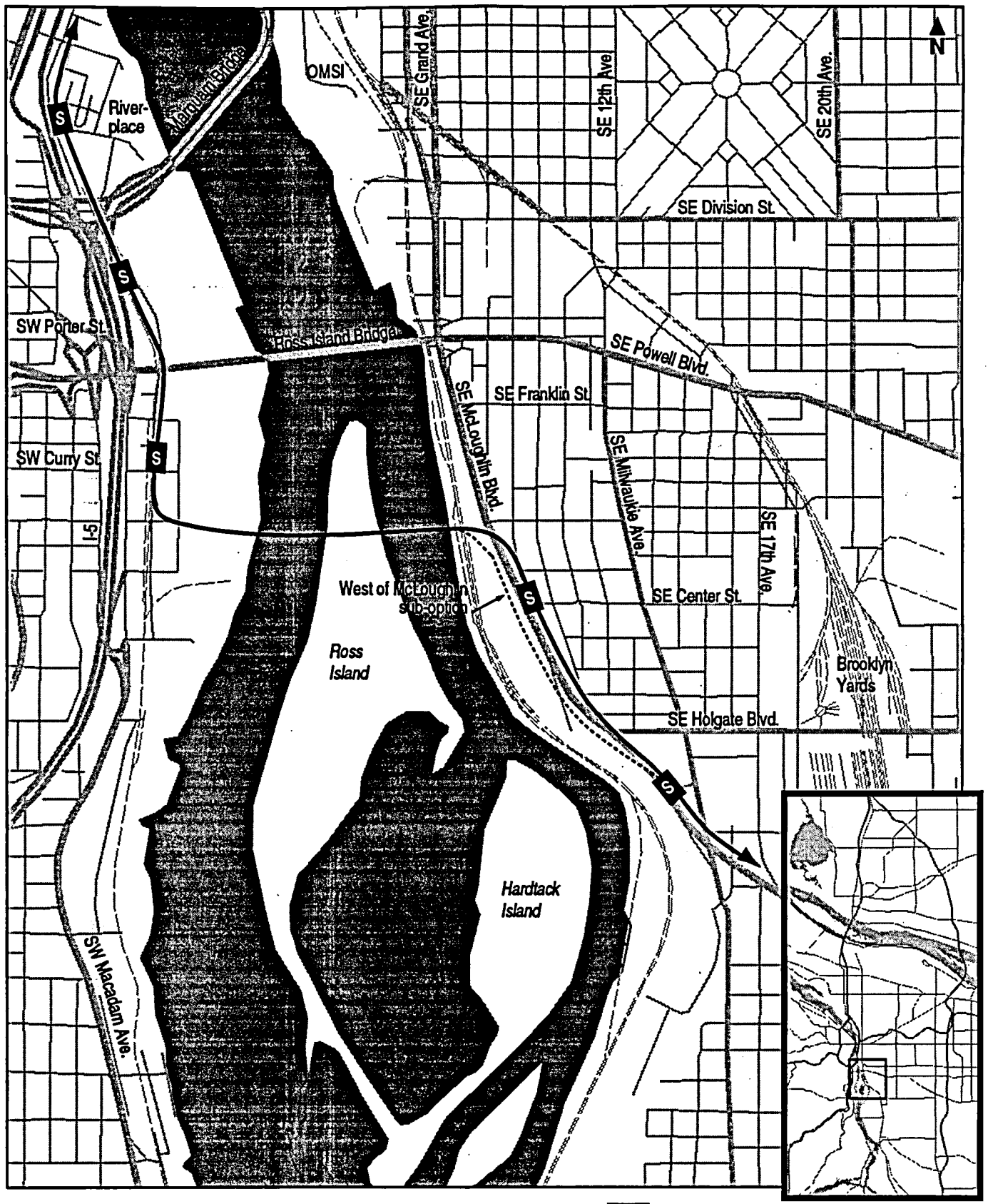
The South/North Project Steering Group determined during the Tier I decision process that both East side/Caruthers Crossing option(s) and Ross Island Crossing option(s) will be carried forward into the DEIS. Thus, the issue at hand is to determine the best Eastside/Caruthers Crossing option and the best Ross Island Crossing option. Based on the Steering Groups direction, two design options are selected to be examined in the DEIS in this segment:

1. *West Brooklyn Yards to Caruthers Modified River Crossing:* From the park-and-ride station at S.E. Ochoco Street, the light rail would proceed parallel to McLoughlin Boulevard (between the existing trees and the S.P. railroad) to a potential station at S.E. Bybee Boulevard. The alignment would continue along S.E. McLoughlin to the vicinity of S.E. Harold Street where it would turn and follow the western boundary of the Brooklyn Yards. A station may be located near S.E. Holgate Boulevard. From there the alignment would continue to follow the west side of the Yards to a potential station in the vicinity of S.E. Rhine/Lafayette Street with pedestrian access across the Brooklyn Yards to the East Brooklyn neighborhood.

   The alignment would continue north, crossing S.E. Powell Boulevard on an elevated structure. The alignment would parallel the existing railroad tracks, passing over S.E. 11th/12th Avenues, where the would be a potential station. From there, it would continue parallel to the existing railroad tracks to a potential elevated station just south of OMSI.

   From the OMSI station, the Caruthers Modified River Crossing would leave the east bank of the Willamette River in the vicinity of Water Avenue and continue on structure to the west side of S.W. Moody Avenue. The alignment would weave between columns supporting the Marquam Bridge towards a station at Riverplace.

2. *North Ross Island River Crossing:* From the park-and-ride station at S.E. Ochoco Street, the light rail alignment would proceed parallel to McLoughlin Boulevard (between the trees and the railroad right-of-way) to potential stations at S.E. Bybee Boulevard, the vicinity of S.E. 16th and S.E. Milwaukie Avenues and S.E. Center Street and McLoughlin Boulevard. From the Center Street station, the alignment would continue north along S.E. McLoughlin a short distance to S.E. Bush Street, cross under S.E. McLoughlin Boulevard and cross the Willamette River on structure in the vicinity of the northern tip of Ross Island. The light rail bridge would land on the west side of S.W. Moody Avenue with a potential station in the vicinity of S.W. Curry Street. The alignment would then follow the west side of S.W. Moody Avenue to a S.W. Porter Street station and then proceed towards a station at Riverplace.



South North Transit Corridor Study

Light Rail Design Options:

South Willamette River Crossing

North Ross Island

Figure 5

Light Rail Transit (LRT) Design Option

S Station

Alternative LRT Alignment

Existing Railroad

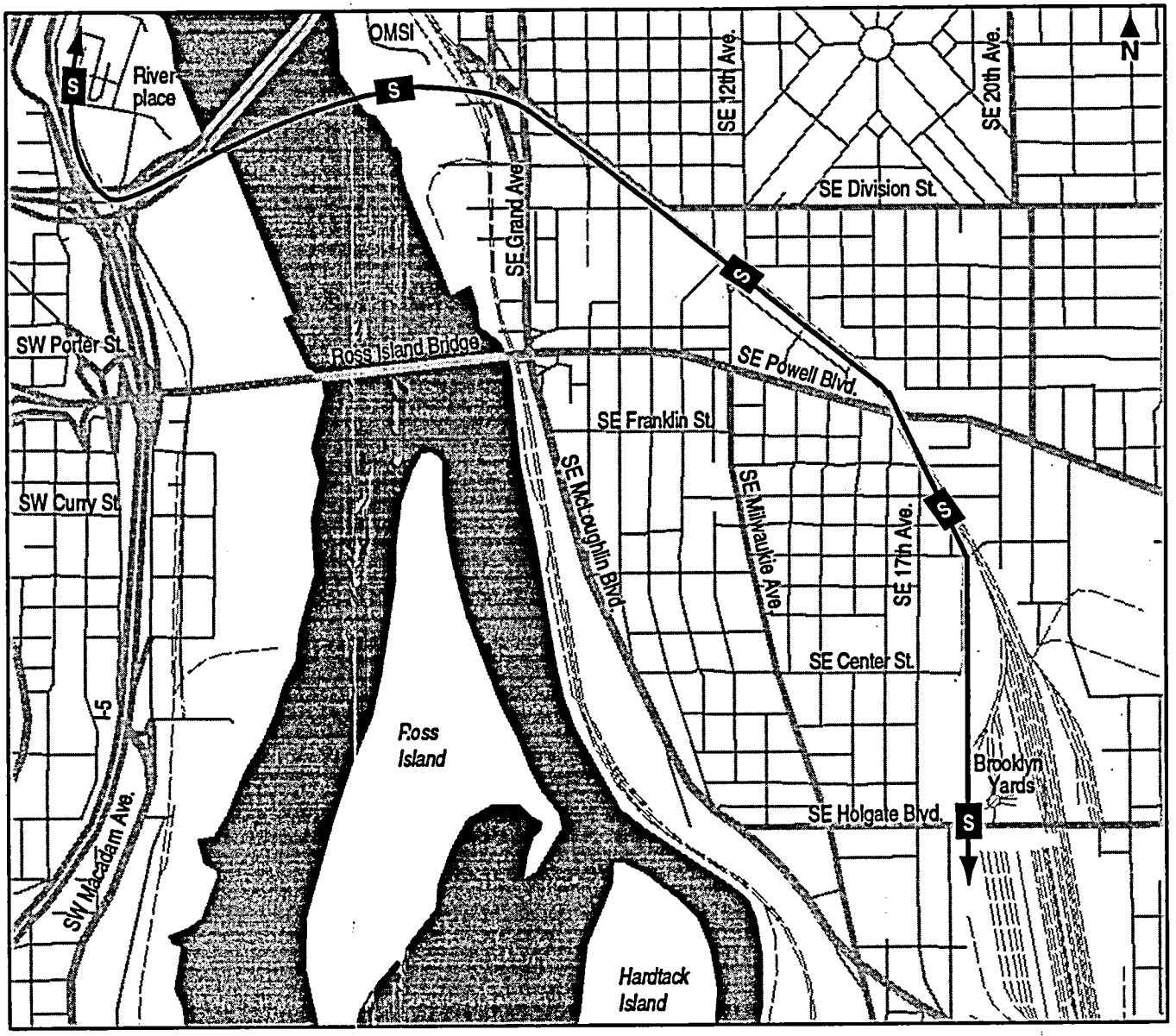
TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO



South North Transit Corridor Study

Light Rail Design Options:

South Willamette River Crossing

Caruthers Modified - West Brooklyn Yards

October 1995

Light Rail Transit (LRT) Design Option

S Station

Alternative LRT Alignment

Existing Railroad

TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO

Figure 6

3.4.2 Milwaukie to Portland CBD: Issues

Three issues require continued investigation in this segment:

1. *Actual location of the North Ross Island Crossing:* While drawings to date have shown the North Ross Island Crossing option to follow S.W. Gaines Street in the North Macadam area, it is possible that it might be located within a narrow band south of that location. Project staff will work with interested parties to determine an appropriate location to include in the DEIS.

2. *Alternate North Ross Island alignment (West of McLoughlin Boulevard Sub-Option):* A variation on the North Ross Island option would have the light rail alignment proceed north of a potential station at S.E. Holgate Boulevard on the west side of S.E. McLoughlin Boulevard to about S.E. Rhone Street where the light rail alignment would begin to elevate and curve to the west. The North Ross Island bridge would be in the same general vicinity as described above. This sub-option would have additional expense and lower ridership, but could also have less potential residential property displacement in the Brooklyn neighborhood. The West of McLoughlin sub-option will be further developed in parallel to the EIS process.

3. *Choice between the North Ross Island crossing alternative and the West Brooklyn Yards/Caruthers crossing alternative:* This choice will be one of the major issues to be resolved during the DEIS process. An important basis for making this determination will focus on the progress that has been made along both options to plan and develop transit-oriented land uses. Issues of density, timing and certainty of development, parking, integration of light rail with major attractors and similar factors will be taken into consideration.

3.4.3 Milwaukie to Portland CBD: Rationale

The West Brooklyn Yards to Modified Caruthers Bridge option is selected for inclusion in the DEIS because:

[a] In comparison to the PTC/McLoughlin Boulevard option, the Brooklyn Yard options would provide significantly better transit access and service to the inner east side neighborhoods, offer five minute walk access to 4,100 - 4,600 more employees (in the year 2015), attract 1,400 - 1,600 more light rail boardings in this segment and exhibit 42% - 57% better comparative ratios.

[b] The West Brooklyn Yard option would be $42 million ($YOE) less expensive to construct, impact less commercial and residential buildings, and exhibit a 10% better comparative ratio than the East Brooklyn Yard option.

[c] The Caruthers Modified option would cost $18 million ($YOE) less to construct, $370,000 per year less to operate and would be over 1 minute faster than the Caruthers "S" option.

[d] While estimated to cost $8 - $9 million ($YOE) more to construct than the Caruthers and Caruthers/Marquam options, the Caruthers Modified option would have the least negative impacts on the redevelopment property south of the Marquam Bridge and avoids significant adverse impacts on PDC's two remaining parcels in Riverplace and privately-owned properties south of the Marquam Bridge.

The North Ross Island option is selected for inclusion in the DEIS because:

[a] The North Ross Island option would provide the best combination of (re)development potential, ridership and cost of the Ross Island crossing options. This is exhibited by the North Ross Island option having the lowest (best) comparative ratio.

[b] The South Parallel Ross Island option could have an adverse visual impact on the Ross Island Bridge which is eligible for the National Register of Historic Places. As such, there could be Section 106 (historical resources) problems with the South Parallel Ross Island option.

[c] The South Parallel Ross Island option would not provide a station in the North Macadam District, the station would have to be north of the existing Ross Island Bridge. In addition, it would attract less 1,800 - 2,000 daily LRT segment boardings, impact 28 - 45 more residential units and exhibit a 31% poorer comparative ratio than the other Ross Island Crossing options.

[d] The Mid Ross Island Crossing option would cost $54 million ($YOE) more to construct than the North Ross Island Crossing option. In addition, the construction of the Mid-Ross Island Crossing option raises a higher risk of negatively impacting the Great Blue Heron rookery buffer area on Ross Island. The North Ross Island crossing would potentially have less impact on the Willamette River ecosystem due to fewer piers in the river as compared to the South Parallel option.

[e] There is generally stronger community support for the North Ross Island Crossing than for the other Ross Island crossing options.

3.5 PORTLAND CBD

3.5.1 Portland CBD Options

The Portland CBD alignment and station locations to be carried forward into the DEIS are recommended under separate cover.

3.6 STEEL BRIDGE TO KAISER MEDICAL FACILITY VICINITY

3.6.1 Steel Bridge to Kaiser Medical Facility Vicinity: Selected Options (See Figures 7& 8)

In this segment, two design options are selected to be examined in the DEIS:

1. *East I-5/N. Kerby Avenue:* The alignment would proceed eastward from a slightly relocated Rose Garden transit station, run underneath the I-5 freeway and turn north along the eastern edge of I-5. It would then run along the edge of I-5 to a transit station serving the N.E. Broadway area and adjacent Eliot neighborhood. The alignment would continue along the east edge of I-5, behind the Harriet Tubman Middle School, crossing N. Russell Street on structure, to a station on N. Kerby Avenue between N. Graham and N. Stanton Streets at Emanuel Hospital. The alignment would curve westward, passing over I-5 on structure to a location just west of the freeway and then proceed northerly to the Edgar Kaiser clinic.

2. *N. Wheeler Avenue/N. Russell Street:* The alignment would pass along the eastern edge of the Rose Garden Arena with a potential station north of the arena near N. Weidler. It would cross N. Broadway and N. Weidler at street level and proceed north along the east side of N. Flint Avenue. The alignment would turn westerly at N. Russell Street with a potential station on Russell Street at the south end of the Emanuel Hospital campus. It would elevate on a structure and pass over N. Kerby Avenue, Stanton Yard and N. Mississippi Avenue. The alignment would then curve westward, passing over I-5 on structure to a location just west of the freeway and then proceed north to the Edgar Kaiser clinic.

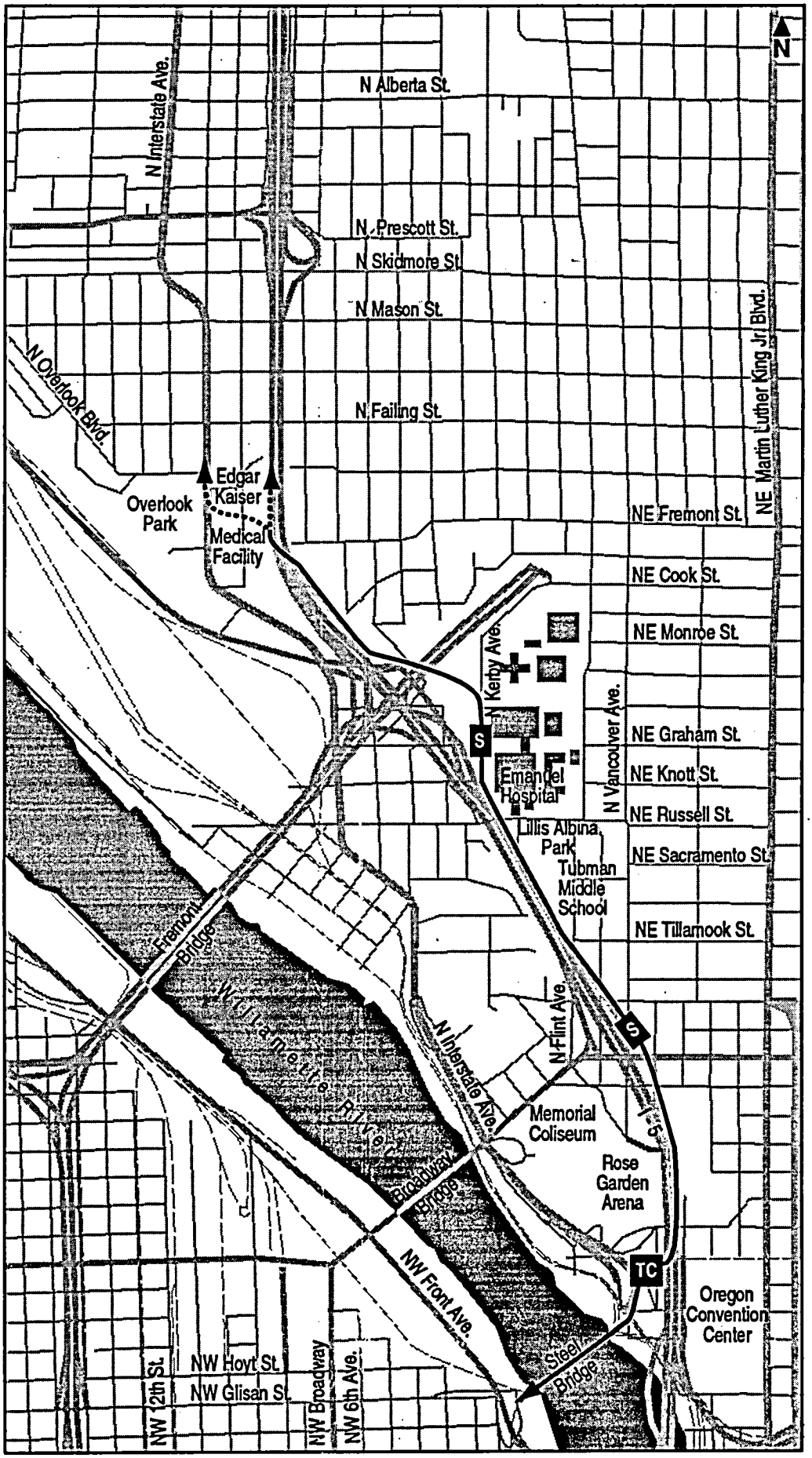
3.6.2 Steel Bridge to Kaiser Medical Facility: Issues

Three issues require continued investigation in this area:

1. *Design of the N.E. Broadway Station with the East I-5 option:* Initial designs for this station were below-grade (and may not provide a pleasant environment for users or good pedestrian connections between Broadway and the Rose Quarter). Project staff will investigate refined designs which mitigate these concerns.

2. *Design and location of stations on the N. Wheeler Avenue/N. Russell Street:* The station locations along this alignment should be refined during the next two months to ensure that access into the Eliot neighborhood and Emanuel Hospital is maximized.

3. *Mitigate operational issues associated with the N. Wheeler/N. Russell and East I-5 options:* The N. Wheeler Avenue/N. Russell Street and East I-5 options could present difficult operational problems and conflicts between light rail, auto traffic and/or



South North Transit Corridor Study

Light Rail Design Options:

Steel Bridge to Kaiser

East I-5 / Kerby

September 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

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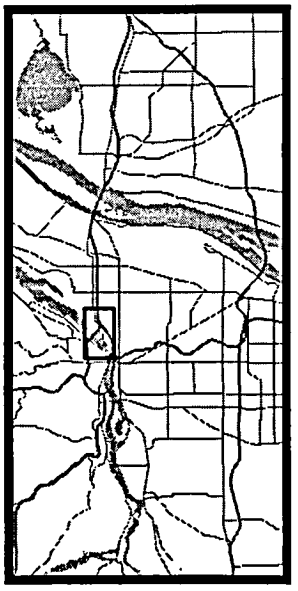
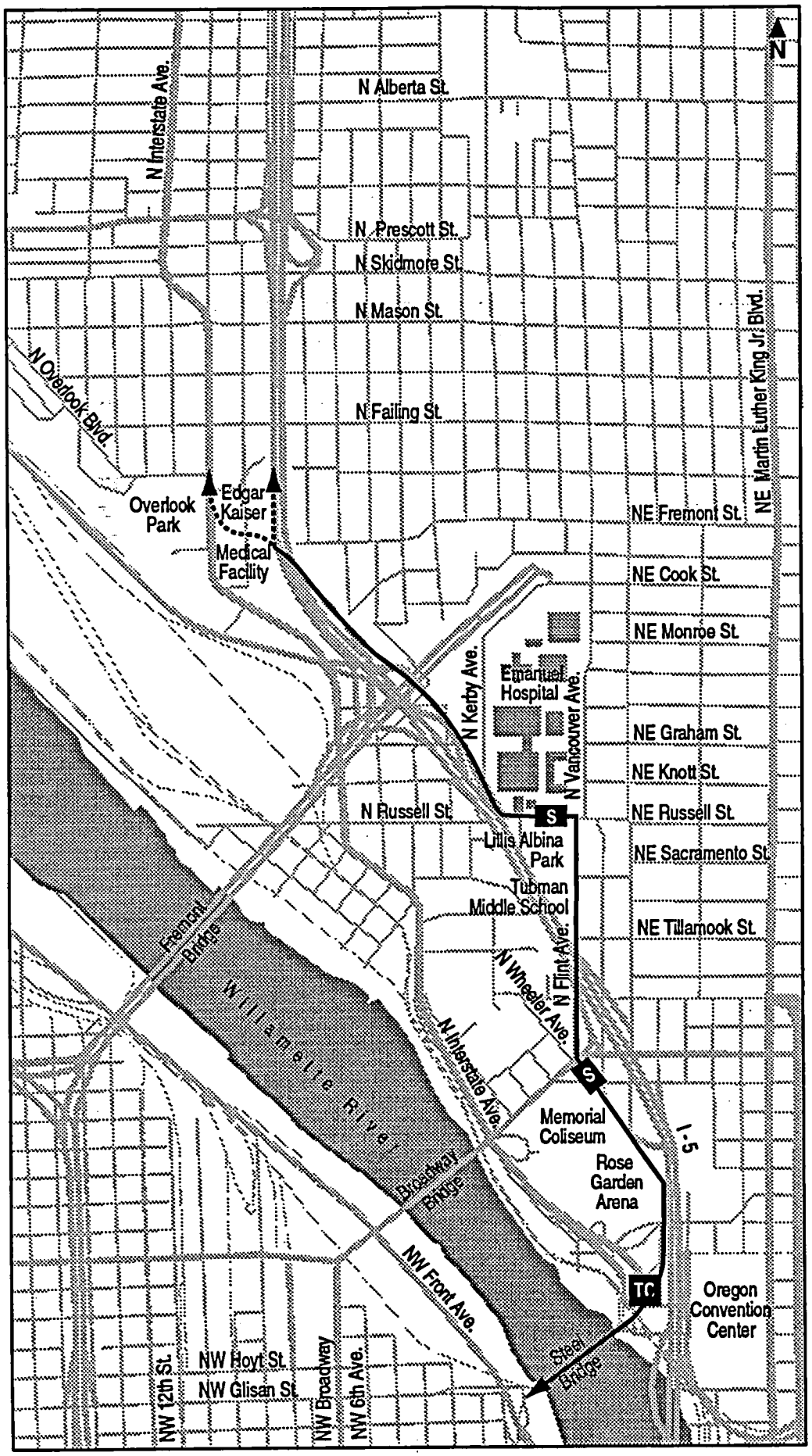


METRO

Figure 7



South North Transit Corridor Study

Light Rail Design Options:

Steel Bridge to Kaiser

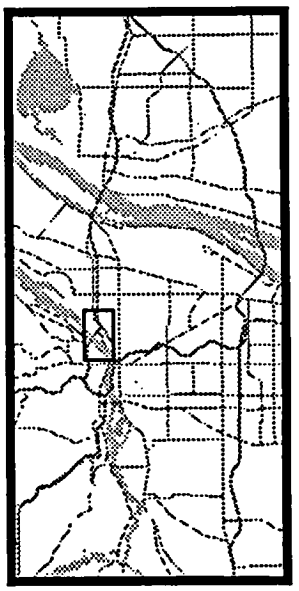
Wheeler / Russell

September 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

0 1/8 1/4 MILE



METRO

Figure 8

pedestrians. Methods to mitigate these potential problems will be analyzed prior to and during the DEIS process.

4. *In the Broadway/Weidler Interchange Area:* Alignment options for light rail should be incorporated into an integrated design with I-5 and street system impropements in order to improve circulation for automobiles, pedestrian and bicycles and which would optimize bus and LRT operations.

3.6.3 Steel Bridge to Kaiser Medical Facility: Rationale

The East I-5/N. Kerby Avenue and N. Wheeler Avenue/N. Russell Street options are selected for inclusion in the DEIS because:

[a] The East I-5/N. Kerby Avenue provides the best combination of cost, ridership, travel time and light rail access as evidenced by having the lowest (best) comparative ratio. It would provide stations which would serve both the Eliot neighborhood and the Emanuel Hospital campus. In addition, it would attract the highest light rail boardings in this segment amongst all of the alignment options.

[b] The N. Wheeler/N. Russell Street option may provide the best access to the Eliot neighborhood and the best redevelopment opportunities amongst all options in this segment. It also provides more flexibility in the station placement within the Eliot neighborhood than would the N. Wheeler/N. Flint option.

[c] The West I-5 option, while would serve the industrial sanctuary between I-5 and the Willamette River, is not selected for further study because it would not adequately serve the Eliot neighborhood or Emanuel Hospital which are the priority areas to be served. Light rail users wishing to access Emanuel Hospital or the Eliot neighborhood from the N. Graham Street station would have to walk-up an eighty foot elevation change. Moreover, by servicing the industrial sanctuary, the West I-5 option may create non-industrial redevelopment pressures which contradict City objectives for this area.

3.7 KAISER MEDICAL FACILITY TO EXPO CENTER

3.7.1 Kaiser Medical Facility to Expo Center: Selected Options (See Figures 9 & 10)

The South/North Steering Group determined that an Interstate Avenue and an I-5 alignment alternative would be advanced into the DEIS for further study and that various design options and crossover combinations of the alignment alternatives would be developed, evaluated and narrowed within the Design Option Narrowing Process.

One design option for each alignment alternative is selected for further study within the DEIS:

1. *All I-5 Alignment:* From Emanuel Hospital, the light rail alignment would pass beneath the I-405 ramps and climb-up along the eastern edge of I-5. From the potential station at the Kaiser clinic, the light rail alignment would proceed north along the top of the western bank of the I-5 freeway to a station south of N. Skidmore Street.

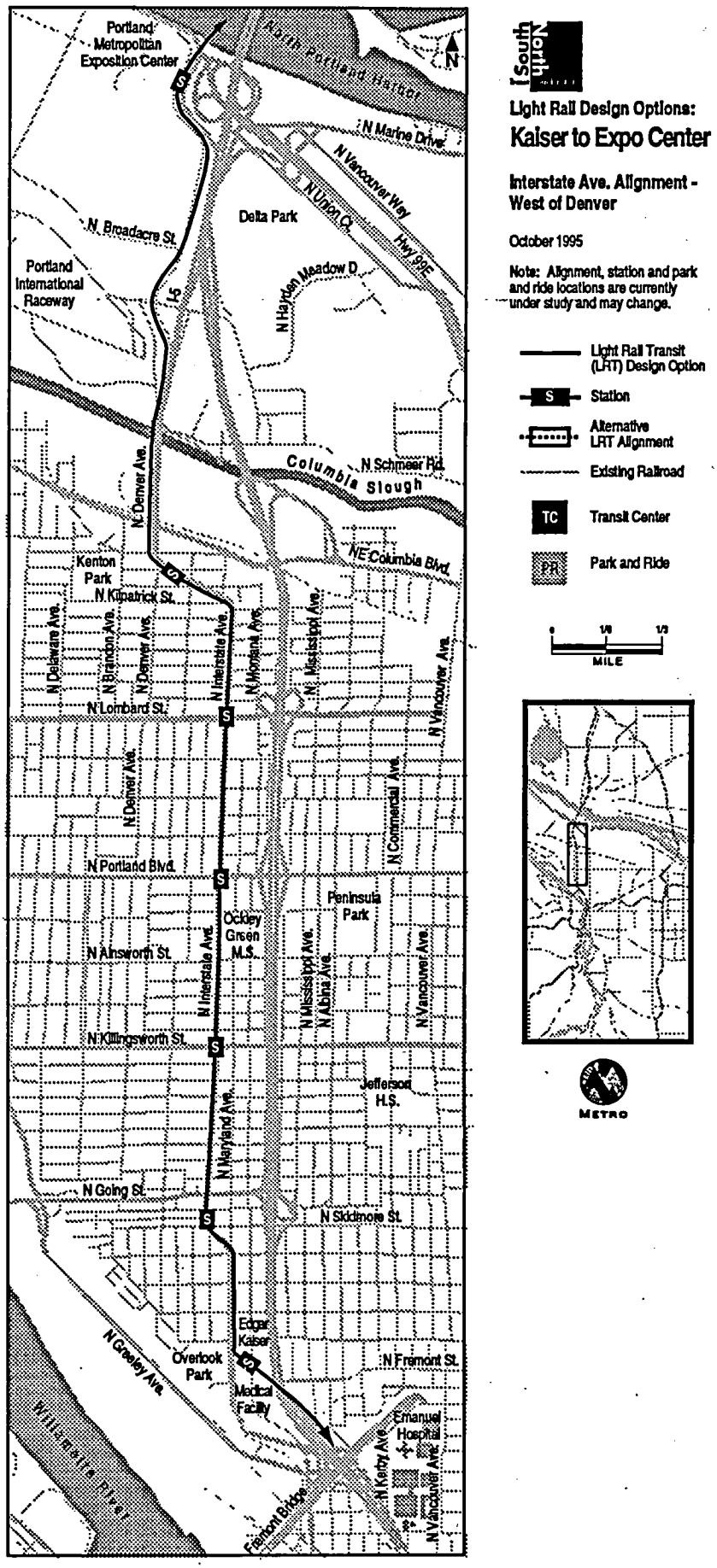
   It would then continue north, passing beneath N. Going Street in a box structure, then running above the freeway along N. Minnesota Avenue (west of the freeway ramps) from N. Going Street to a potential station at N. Killingsworth Street. It would then proceed along the top of the freeway bank and then curve west along the freeway ramps to a potential station on the south side of N. Portland Boulevard. The alignment would cross N. Portland Boulevard at street level and continue north along the west bank of the freeway to a potential station on the south side of N. Lombard Street. It would then pass over N. Lombard and the adjacent freeway ramps on a structure and proceed northerly to a potential Kenton station at N. Kilpatrick Street.

   From the Kenton station, the alignment would proceed northerly along the west side of the I-5 freeway. It would cross over N. Columbia Boulevard and the Columbia Slough on a bridge, and then lower to ground level. It would then pass Delta Park and begin to elevate for about 1/2 mile and crossover Highway 99 adjacent to Expo Road. An elevated potential station would be located near the Expo Center parking lot.

2. *All Interstate Avenue and West of Denver Avenue Alignment:* From Emanuel Hospital, the light rail alignment would pass beneath the I-405 ramps and climb-up along the eastern edge of I-5. It would crossover I-5 on a structure near N. Fremont Street and then proceed across the Kaiser campus with a diagonal street level station near the existing Town Hall building.

   The alignment would then turn onto N. Interstate Avenue near N. Overlook Boulevard. From there, the alignment would proceed northerly in the center of N. Interstate Avenue. One lane of auto traffic in each direction would be provided except at the approaches to N. Going Street and N. Lombard Street where two lanes of traffic in each direction would be provided. All intersections would be crossed at street level. Potential stations would be located at N. Skidmore Street, N. Killingsworth Street, N. Portland Boulevard, N. Lombard Street and the Kenton commercial district.

   From the Kenton station, the alignment would follow the west side of N. Denver Avenue viaduct (the "West of Denver" option). It would proceed northerly across N. Columbia Boulevard and the Columbia Slough on a bridge, pass West Delta Park and follow Expo Road to an elevated potential station near the Expo Center parking lot.



South North

Light Rail Design Options:

Kaiser to Expo Center

Interstate Ave. Alignment - West of Denver

October 1995

Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

0 1/8 1/3 MILE

METRO

Figure 9

3.7.2 Kaiser Medical Facility to Expo Center: Issues

Four issues require continued investigation in this area:

1. *Design of Interstate Avenue option for auto traffic:* The configuration and operation of the traffic lanes on and intersecting Interstate Avenue (in the Interstate Avenue option) will be refined during the next two months.

2. *Choice between the I-5 option and the Interstate Avenue option:* This choice will be one of the major issues to be resolved during the DEIS process. An important basis for making this determination will focus on the ability to plan and develop transit-oriented land uses around stations. Issues of density, timing and certainty of development, parking, integration of light rail with major attractors, equity, capital cost, light rail travel speed/time, reliability, ridership, neighborhood cohesiveness and similar factors will be taken into consideration when evaluating these two options.

3. *Design and location of stations in the Kaiser Medical Facility to Expo Center segment:* The station locations along this segment will be refined during the next two months to ensure that access into the neighborhood is maximized and feeder bus service is efficiently provided.

4. *Crossovers:* The desirability and preferred location for a crossover between the I-5 alignment and the Interstate Avenue alignment has not been determined as part of the Tier I process. At this time, no crossover option will be studied in the DEIS. In making this determination, the Steering Group notes that the DEIS will focus on the key issue in this segment -- the relative merits and impacts of the Interstate Avenue and I-5 alignment options. Following completion of the results reports for the DEIS, staff will report back to the PMG, CAC and Steering Group to determine which crossover warrants further study.

5. *Expo Center and Portland International Raceway Stations:* Through the information developed for the DEIS, an assessment will be made as to the cost-effectiveness of the Expo Center Station. If that analysis concludes that and Expo Center station is not warranted, the alignment over Marine Drive may be redesigned. In addition, a possible future station serving the Portland International Raceway may be included within the design if future analysis indicates that it would be warranted.

3.7.3 Kaiser Medical Facility to Expo Center: Rationale

The Interstate Avenue option would provide a light rail alignment that is more centrally located in North Portland neighborhoods than the I-5 option and may enhance certain land use opportunities. Conversely, the I-5 option would cost less to construct, would provide faster travel speeds to more users, provide better access to neighborhoods east of I-5 and may not be subject to the operational and traffic problems inherent in the Interstate Avenue option. These are

key trade-offs for which information is not yet available to forge a consensus decision. Thus, it is essential that both options be further examined in the DEIS.

3.8 EXPO CENTER TO V.A. HOSPITAL/CLARK COLLEGE VICINITY

3.8.1 Expo Center to V.A. Hospital/Clark College Vicinity: Selected Options (See Figures 11, 12 & 13)

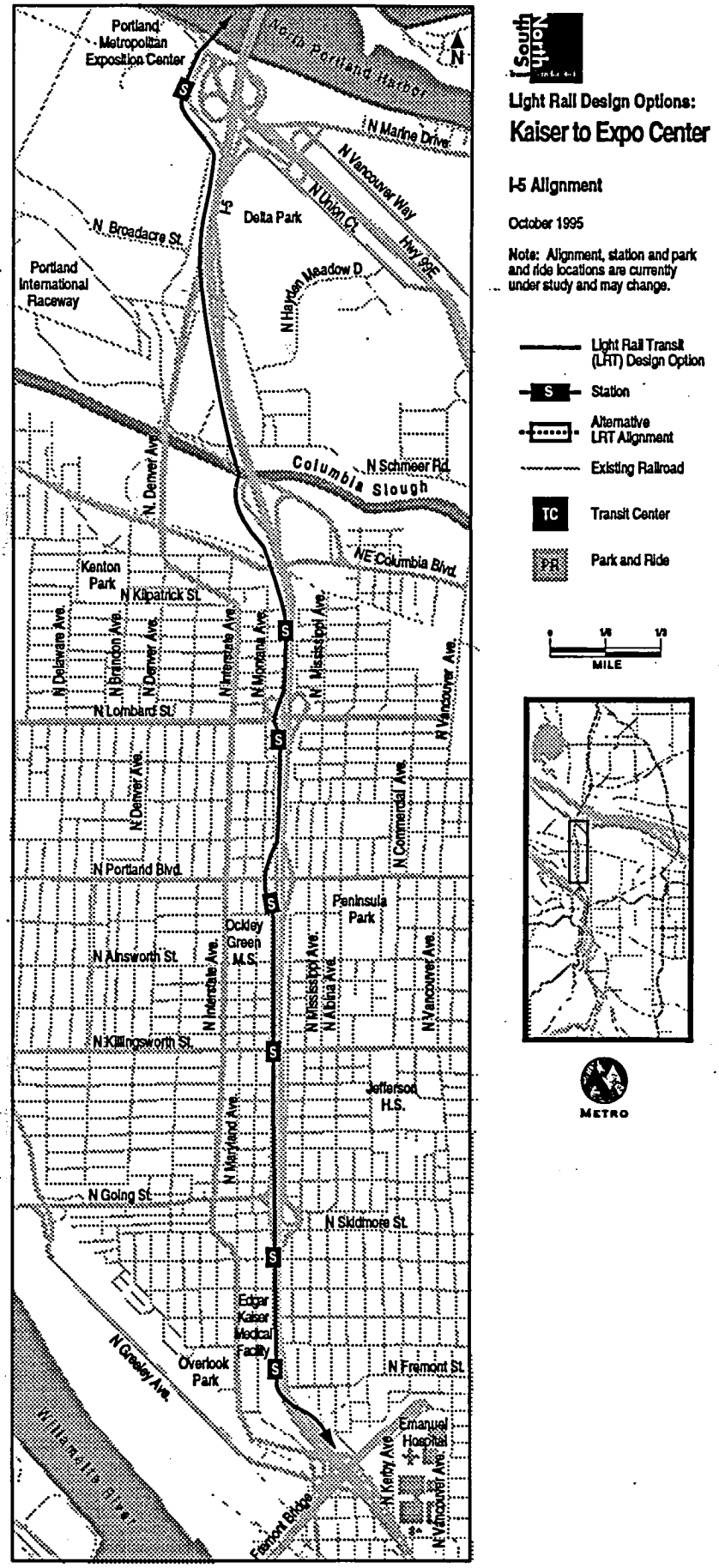
In this segment, one design option is selected to be examined in the DEIS:

1. *West of I-5/Lift Span Bridge/Washington Street (2-way)/E. McLoughlin Boulevard:* From the Expo Center, the alignment would proceed north over N. Marine Drive, North Portland Harbor and N. Jantzen Avenue on a bridge structure. The alignment would pass under the I-5 ramps (Sub-option B: Under the I-5 Ramps), then continue northerly along the westside of the freeway to a new lift span bridge crossing the Columbia River. The light rail bridge would parallel the westside of the existing I-5 bridge and would be approximately the same height above the river. The bridge would pass over Columbia Way in Vancouver and then would cross under the railroad berm before connecting with Washington Street. Washington Street would operate in a two-way light rail configuration (2-Way on Washington Option). The light rail alignment would proceed northerly on Washington Street to stations at W. 7th Street, between W. 11th and W. 12th Streets and between W. 16th and W. 17th Streets. At McLoughlin Boulevard, the alignment would curve easterly, proceeding along E. McLoughlin Boulevard to the east side of I-5. A station would be potentially located on E. McLoughlin Boulevard between "D" and "E" Streets. The alignment would cross under I-5 and then turn northerly and proceed along the east side of I-5 to a park-and-ride station in the vicinity of the Veterans Hospital. The alignment would then turn easterly, proceeding to the terminus station west of Fort Vancouver Way.

3.8.2 Expo Center to V.A. Hospital/Clark College Vicinity: Issues

One issue requires continued investigation in this area:

1. Clark County Transportation Futures Process: The outcome of Clark County's "Transportation Futures" study may necessitate changes to the light rail alignment, station locations, park-and-ride facility design(s) and location(s) and terminus in this segment.



South North

Light Rail Design Options:

Kaiser to Expo Center

I-5 Alignment

October 1995

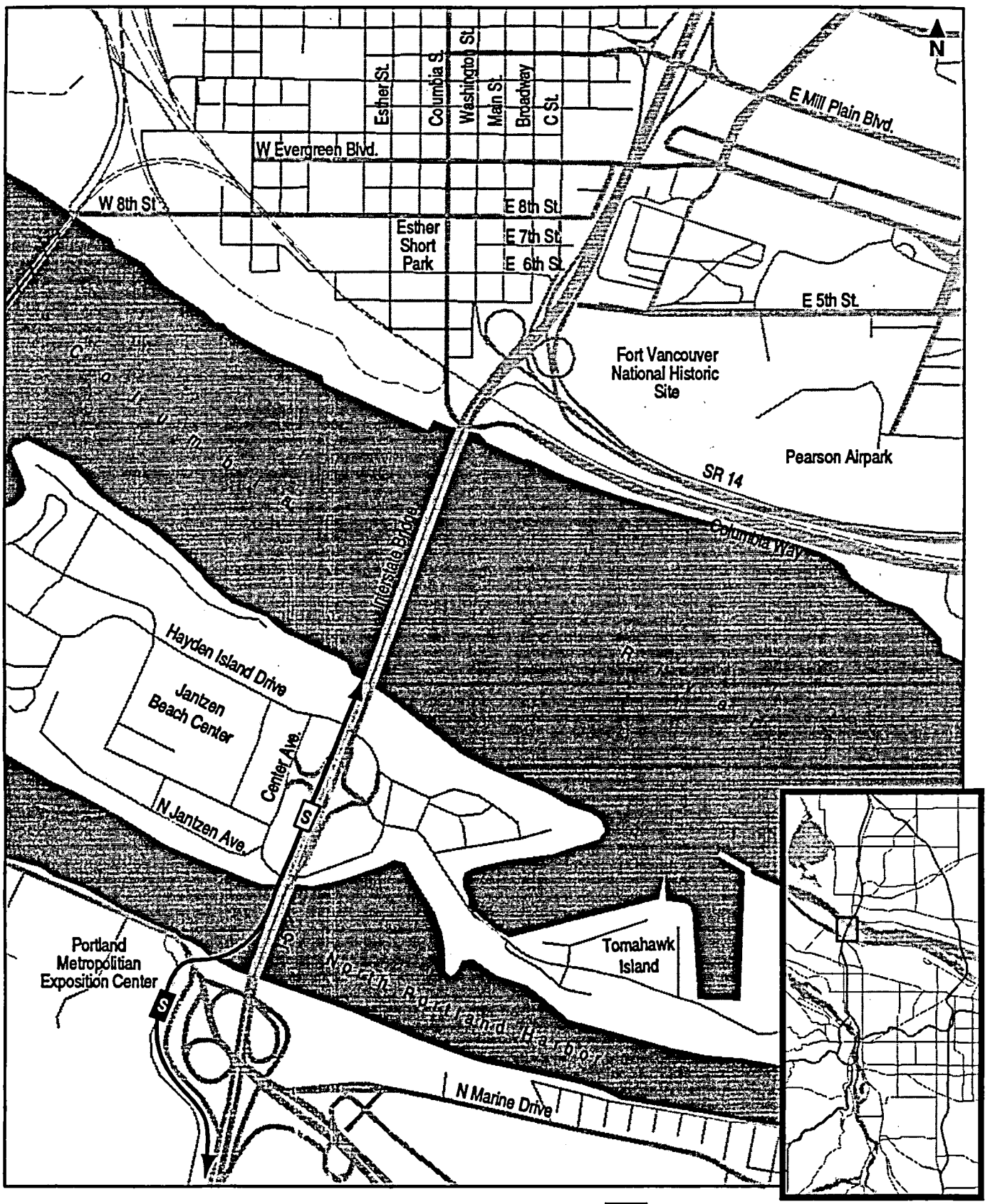
Note: Alignment, station and park and ride locations are currently under study and may change.

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- P+R — Park and Ride

0 1/8 1/3 MILE

METRO

Figure 10



South North Transit Corridor Study

Light Rail Design Options:

Expo Center to Hayden Island

West of I-5 (under ramps)

Figure 11

Light Rail Transit (LRT) Design Option

S Station

Alternative LRT Alignment

Existing Railroad

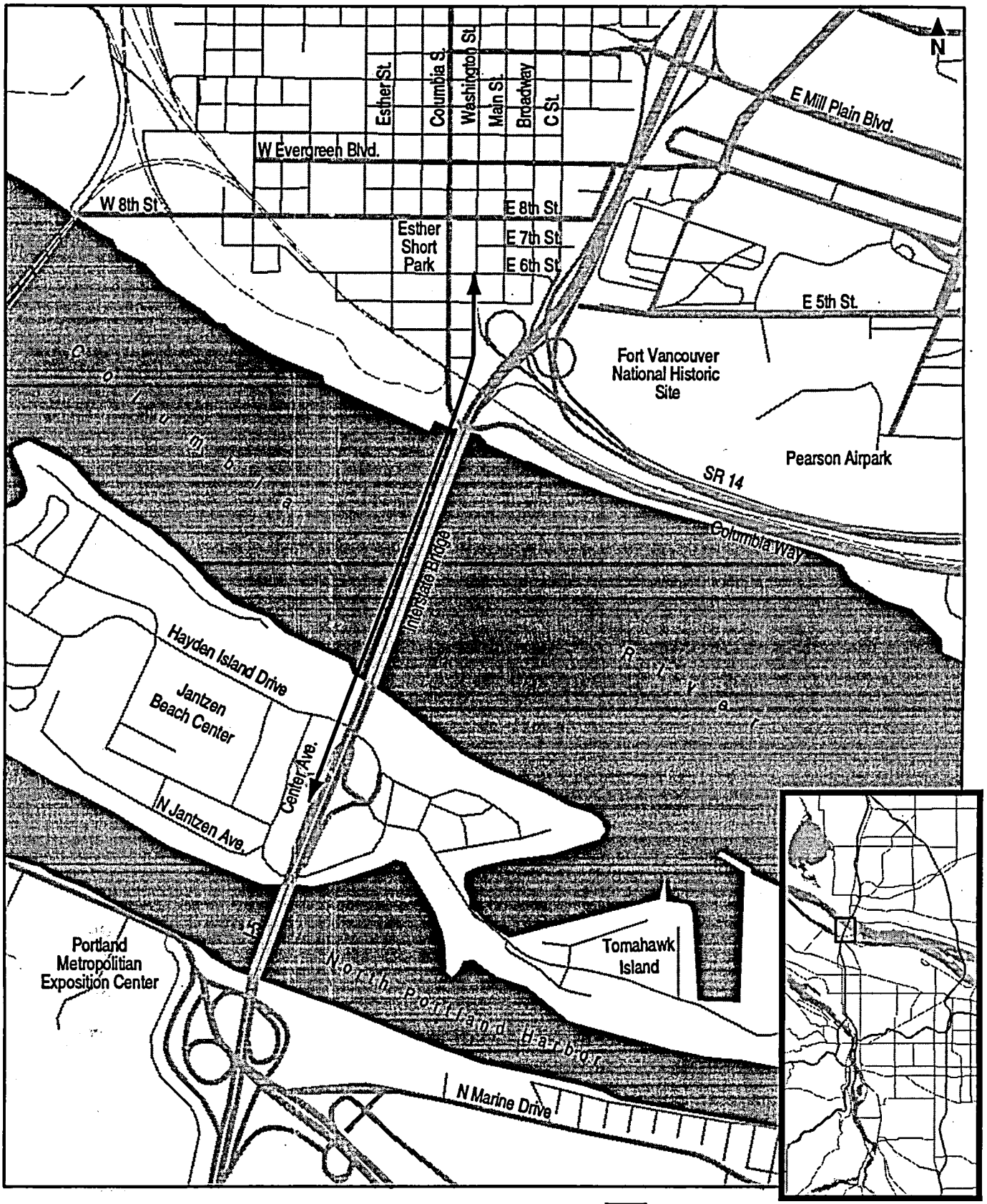
TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO



South North Transit Corridor Study

Light Rail Design Options:

Columbia River Crossing

Lift Span Bridge

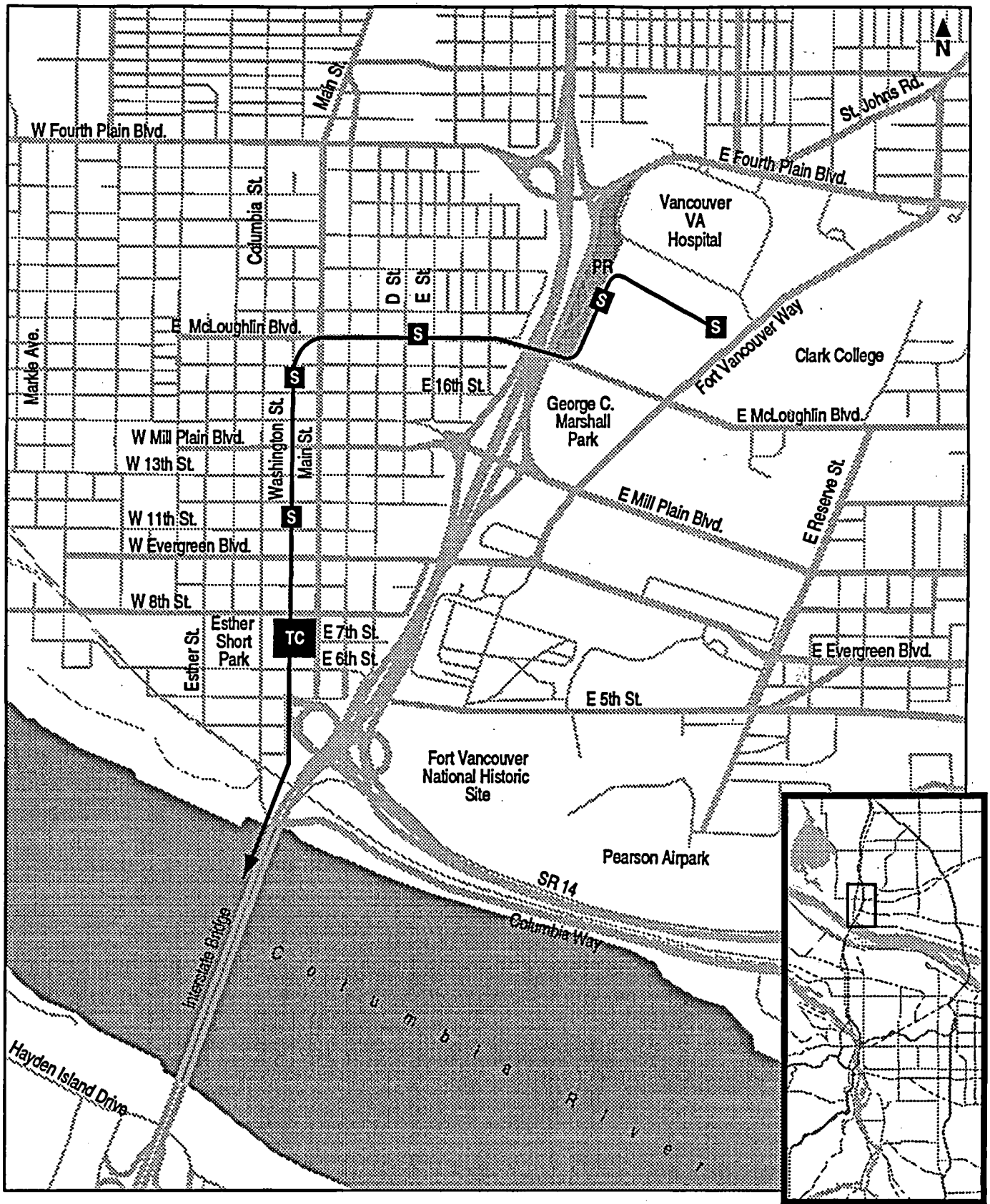
Figure 12

- Light Rail Transit (LRT) Design Option
- S — Station
- Alternative LRT Alignment
- Existing Railroad
- TC — Transit Center
- PR — Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO



South North Transit Corridor Study

Light Rail Design Options:

Downtown Vancouver to VA Hospital/ Clark College

2-Way on Washington

Light Rail Transit (LRT) Design Option

Station

Alternative LRT Alignment

Existing Railroad

TC Transit Center

PR Park and Ride

0 1/8 1/4 MILE

Note: Alignment, station and park and ride locations are currently under study and may change.

METRO

Figure 13

33.8.3 Expo Center to V.A. Hospital/Clark College Vicinity: Rationale

The West of I-5/Lift Span Bridge/Washington Street (2-way)/E. McLoughlin Boulevard alignment is selected to be included in the DEIS because:

[a] Between Expo Center and Hayden Island, the West of I-5 Under the Ramps option is selected for inclusion in the DEIS because it would be the least expensive of the West of I-5 options, it would not create a barrier which divides Hayden Island as do the Center Street and Adjacent to Jantzen Beach Center options and would have the minimum traffic impacts.

[b] The Lift Span bridge is selected for inclusion in the DEIS over the Bored Tunnel option because it would be $101 million ($YOE) less expensive, would have considerably less adverse impacts on Hayden Island and downtown Vancouver and would provide centrally located access through downtown Vancouver and which would be in proximity to major redevelopment sites. The LRT bridge can be built using techniques that would minimize effects on the Columbia River ecosystem.

[c] The Two-Way on Washington Street Option is selected for inclusion in the DEIS because, compared to the other Vancouver CBD alignment options, it would be the least expensive to construct, would exhibit the fastest travel times, would attract the highest ridership, has the highest level of public support and would be the most consistent with the development and redevelopment objectives in downtown Vancouver.

South North
Transit Corridor Study

Appendix A

Design Options Considered

Design Option Narrowing by Segment

The following provides a quick look at the Project Management Group recommendations. Refer to the maps inside to locate specific design options selected by the group for further study.

1. South Terminus (end point)

Terminus
- Sunnyside area
- 84th Avenue CTC
- 93rd Avenue Town Center area
- Highway 212/224

CTC Alignment
- North of CTC
- South of CTC

2. Railroad Avenue/Highway 224:

- Railroad Avenue
- North of Highway 224
- South of Highway 224

3. Central Milwaukie

- Monroe Street and 21st /McLoughlin
- Monroe Street and SP branch line
- Washington to 21st/McLoughlin
- Washington Street and SP branch line
- Harrison Street and 21st Street/McLoughlin
- Harrison Street and SP branch line
- Clackamas Highway
- Southern Pacific main line

Between the Milwaukie and River Crossing segments, only a SE McLoughlin Boulevard option is being considered.

4. South Willamette River Crossing

Caruthers Eastside
- West Brooklyn Yards
- PTC/McLoughlin Boulevard
- East Brooklyn Yards

Caruthers Crossing
- Caruthers Modified
- Caruthers "S"
- Caruthers
- Caruthers/Marquam

Ross Island Crossing
- North Ross Island
- South Parallel Ross Island
- Mid Ross Island

6. Steel Bridge to Kaiser Clinic

- East I-5 and Kerby Street station
- Wheeler Avenue and Russell Street station
- Wheeler Avenue and Flint Street station
- West of I-5 Alignment and Graham Street station

7. Kaiser Clinic to Expo Center

- All Interstate Avenue alternative
- All I-5 alternative
- North Killingsworth crossover
- North Portland Blvd. crossover
- Kenton area crossover

8. Expo Center to Hayden Island

- West of I-5 freeway (under ramps)
- West of I-5 (over ramps)
- Adjacent to Jantzen Beach Center
- Center Avenue

9. Columbia River Crossing

- Lift span bridge
- Bored tunnel

10. Downtown Vancouver to VA Hospital/Clark College

- Two-way on Washington Street
- Washington/Main Street couplet

In August 1995, following an extensive effort to involve the public in the creation of the Clark County and Vancouver Transportation Futures process, C-TRAN amended the northern Phase I terminus from 99th Street to Veterans Administration Hospital/Clark College. Design options previously developed for the North Vancouver and Clark County segments will be narrowed as part of the future phase two extension process.

11. North Vancouver

- Two-way on Main Street
- Main/Broadway Street couplet to two-way on Main
- Two-way on Broadway to two-way on Main
- McLoughlin Boulevard to East of I-5 freeway

12. Clark County

- Stations at 63rd, 72nd, 88th and 105th streets
- Stations at 63rd, 78th, 88th and 105th streets
- Stations at 63rd, 88th and 105th streets
- Stations at 63rd, 72nd, 82nd and 95th streets
- Stations at 63rd, 82nd and 95th streets

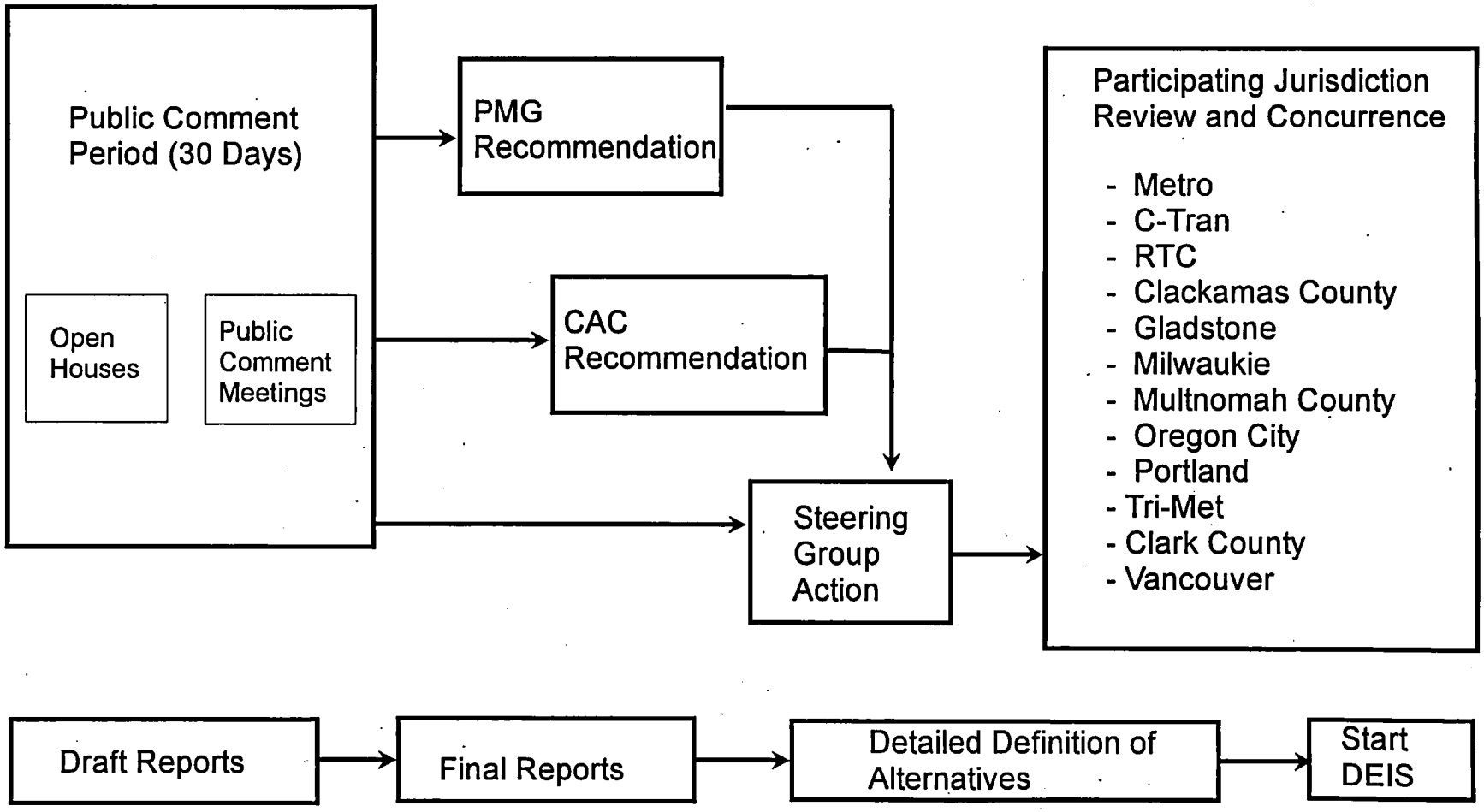
South North
Transit Corridor Study

Appendix B

Design Option Narrowing Process

South/North

Design Option Narrowing Process



South North
Transit Corridor Study

Appendix C

Design Options Narrowing Criteria and Measures

Criteria for Evaluating Design Options During Tier I

NARROW MODAL ALTERNATIVES	NARROW ALIGNMENT ALTERNATIVES	NARROW DESIGN OPTIONS	NARROW STUDY TERMINI ALTERNATIVES
Modal Alternatives which result from the Scoping Process will be carried through Tier I	Alignment Alternatives which result from the Scoping Process will be carried through Tier I	Transit Service – *Ease of Access* – *Transferability* Transit Operations – *Modal Compatibility* Ability to Accommodate Growth – NA – Minimize Traffic and Neighborhood Infiltration – NA – Promote Land Use Desired Patterns and Development – *Support Major Activity Centers* – *Support Bi-State Policies* Fiscal Stability and Efficiency – *Cost* Engineering Efficiency and Environmental Sensitivity – *Environmental Impacts* – *Design Considerations*	Study Termini Alternatives which resulted from the Pre-AA Process will be carried through Tier I

Summary of Measurement Criteria
CTC Mall Alignment

Criteria	Measure	South of Mall	North of Mall
Promote Desired Land Use and Development			
Service to Activity Centers	Current and Planned Land Use Context	Direct access to CCC/OIT, Aquatic Center on Harmony Road	Closer to CTC public facilities
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):		
	Within 5 minute walk of LRT stations		
	Sunnyside Terminus	6 / 30 / 0	10 / 16 / 0
	93rd Ave Town Center Area Terminus	1 / 33 / 0	5 / 19 / 0
	Between 5 & 10 min. walk of LRT stations		
	Sunnyside Terminus	76 / 191 / 77	60 / 52 / 40
	93rd Ave Town Center Area Terminus	18 / 73 / 41	36 / 87 / 44
	Households/Employment:		
	Within 5 minute walk of LRT stations		
	Hwy. 212/224	400 / 4,340	860 / 3,400
	Sunnyside Terminus	1,120 / 5820	1,930 / 4,980
	93rd Ave Town Center Area Terminus	390 / 3,820	840 / 2,870
	Between 5 & 10 min. walk of LRT stations		
	Hwy. 212/224	1,000 / 7,350	2,130 / 9,510
	Sunnyside Terminus	1,450 / 7,680	2,340 / 6,990
	93rd Ave Town Center Area Terminus	840 / 6,040	1,980 / 8,270
Land Use Policies	Local Jurisdiction's Policies County/State/Regional Policies		Greater opportunity for future transit oriented development
Transit Ridership			
Ridership	Walk Market LRT Ridership Potential (Hwy. 212/224/ Sunnyside/ 93rd / 84th)	1,340 / 1,970 / 1,180 / 940	1,210 / 1,980 / 1,060 / N/A
	LRT Travel Time (minutes:seconds) (Hwy. 212/224 / Sunnyside / 93rd / 84th)	7:53 / 6:22 / 4:55 / 3:10	8:55 / 8:00 / 5:57 /N/A
	LRT Ridership Impacts from Run Time Differences (Hwy. 212/224 / Sunnyside / 93rd / 84th)	0 / 0 / 0 / 0	-70 / -110 / -70 / N/A
	Net LRT Segment Boardings (Hwy. 212/224 / Sunnyside / 93rd / 84th)	1,340 / 1,970 / 1,180 / 940	1,140 / 1,870 / 990 /N/A
Reliability	Percentage of Segment within Exclusive ROW At-grade Crossings	97-99%	96-99%
Transferability	Quality of Bus Service/LRT Transfer	Less auto/bus conflicts	Existing Transit Center location

Criteria	Measure	South of Mall	North of Mall
Fiscal Stability and Efficiency			
Costs (in millions of $)	YOE Capital Costs		
	Hwy. 212/224 Terminus	$271	$307
	Sunnyside Terminus	$181	$202
	93rd Ave Town Center Area Terminus	$147	$183
(From lowest cost design option with the same terminus))	YOE Difference in Capital Costs [1]		
	Hwy. 212/224 Terminus	$0	$36
	Sunnyside Terminus	$0	$21
	93rd Ave Town Center Area Terminus	$0	$36
	84th Ave CTC Mall Terminus	N/A	N/A
	Difference in Annual O&M (1994$)[1]		
	Hwy. 212/224 Terminus	$0	$0.25
	Sunnyside Terminus	$0	$0.45
	93rd Ave Town Center Area Terminus	$0	$0.25
	84th Ave CTC Mall Terminus	N/A	N/A
Comparative Ratio [2]	Ratio of Annual Cost and Ridership		
	Hwy. 212/224 Terminus	21.3	24.4
	Sunnyside Terminus	14.1	16.7
	93rd Ave Town Center Area Terminus	11.9	14.9
	84th Ave CTC Mall Terminus	7.3	N/A
Engineering Efficiency			
Design Considerations	Level of Engineering Risk or Construction Issues	More Construction impacts to businesses; bridge/berm on north side of Sunnyside from 82nd up to 97th	82nd Avenue bridge, I-5 Bridge, Sunnyside Bridge
Environmental Sensitivity			
Displacements	Residential/Commercial Bldgs./Commercial Units		
	Sunnyside Terminus	31 / 6 / 6	74 / 3 / 3
	93rd Ave Town Center Area Terminus	17 / 6 / 6	72 / 9 / 15
	84th Ave CTC Mall Terminus	27 / 4 / 4	N/A
Neighborhoods	Integration of LRT Service in the Community	Affects south of Southgate Village area	Affects north/east portion of Southgate Village area
Visual	Potential Impacts on Aesthetics of an Area	Structure at Mall/Sunnyside Road	
Noise and Vibration	Potentially Sensitive Receptors		Some residential
Traffic	Traffic Impact Assessment		2 gate crossings of mall traffic

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

[2] Comparative ratio includes *LRT Segment Boardings* plus the following bus transfers to LRT: 1) 930 bus transfer access trips for the Highway 212/224 termini - South of Mall design option; 2) 1,100 bus transfer access trips for Highway 212/224 termini - North of Mall design option; 3) 1,070 for 93rd Avenue, Town Center Area terminus - South of Mall design option; 4) 1,240 for 93rd Avenue Town Center Area terminus - North of Mall design option; 5) 380 bus transfer access trips for the Sunnyside terminus - South and North of Mall design option; and 6) 1,310 bus transfer access trips for 84th Avenue/CTC terminus.

Summary of Measurement Criteria
Southern Terminus Options

Criteria	Measure	Hwy. 212/224 Terminus	Sunnyside Terminus	93rd Avenue Town Center Area Terminus	84th Avenue CTC Terminus
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	Terminus located in commercial industrial area	Terminus located near residential/ commercial/medical uses	Terminus located near office/ commercial uses	Does not serve all of Regional Center
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):				
	Within 5 minute walk of LRT stations	0-4 / 27-40 / 2	0-11 / 16-30 / 0	0-5 / 19-33 / 0	N/A
	Between 5 & 10 min. walk of LRT stations	5-34 / 97-109 / 65-78	20-45 / 52-191 / 40-77	2-32 / 87-73 / 0-1	
	Households/Employment:				
	Within 5 minute walk of LRT stations				
	South of Mall	400 / 4,340	1,120 / 5,820	390 / 3,820	390 / 2,930
	North of Mall	860 / 3,400	1,930 / 4,980	840 / 2,870	
	Between 5 & 10 min. walk of LRT stations				
	South of Mall	1,000 / 7,350	1,450 / 7,680	840 / 6,040	N/A
	North of Mal	2,130 / 9,510	2,340 / 6,990	1,980 / 8,270	
Land Use Policies	Local Jurisdiction's Policies County/State/Regional Policies				
Transit Ridership					
Ridership	Walk Market LRT Ridership Potential				
	South of Mall	1,340	1,970	1,180	940
	North of Mall	1,210	1,980	1,060	N/A
	LRT Travel Time (minutes:seconds)				
	South of Mall	7:53	6:22	4:55	3:10
	North of Mall	8:55	8:00	5:57	N/A
	LRT Ridership Impacts from Run Time Differences (from North of Mall LRT Ridership)	-70	-110	-70	N/A
	Net LRT Segment Boardings				
	South of Mall	1,340	1,970	1,180	940
	North of Mall	1,140	1,870	990	N/A
Reliability	Percentage of Segment within Exclusive ROW	98%	96%	97%	98%
	At-grade Crossings	5-11	7-13	4-10	2
Transferability	Quality of Bus Service/LRT Transfer	No differences between options	No differences between options	No differences between options	No differences between options

Criteria	Measure	Hwy. 212/224 Terminus	Sunnyside Terminus	93rd Avenue Town Center Area Terminus	84th Avenue CTC Terminus
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs				
	South of Mall	$271	$181	$147	$89
	North of Mall	$307	$207	$183	N/A
(From lowest cost design option with the same terminus)	YOE Difference in Capital Cost [1]	$182 - $219	$92 -$113	$58 - 94	0
	Difference in Annual O&M (1994$)[1]	$1.20 / $1.46	$0.83 / $1.28	$0.45 - $0.71	$0.00
Comparative Ratio [2]	Ratio of Annual Cost and Ridership				
	South of Mall	21.3	14.1	11.9	7.3
	North of Mall	24.4	16.7	14.9	N/A
Engineering Efficiency					
Design Considerations					
	Level of Engineering Risk or Construction Issues	New underpass of I-205, wetlands, construction impacts on traffic	Bridge of I-205, construction impacts on traffic	Construction impacts on traffic	
Environmental Sensitivity					
Displacements	Residential/Commercial Units	23-72 / 11-15	31-74 / 3-6	17-72 / 6-15	4 / 27
Neighborhoods	Integration of LRT Service in the Community		Direct service to Sunnyside Area		
Noise and Vibration	Potentially Sensitive Receptors	Precision Castparts	Kaiser/Sunnyside		
Ecosystems	Potential Impacts on the Natural Environment	Mt. Scott and Dean Creek			Phillips Creek and CTC detention pond

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] Difference from the lowest cost design option with same central Milwaukie alignment. A zero indicates that option as the low cost option.

[2] Comparative ratio includes *LRT Segment Boardings* plus the following bus transfers to LRT: 1) 930 bus transfer access trips for the Highway 212/224 termini - South of Mall design option; 2) 1,100 bus transfer access trips for Highway 212/224 termini - North of Mall design option; 3) 1,070 for 93rd Avenue Town Center Area Terminus - South of Mall design option; 4) 1,240 for 93rd Avenue Town Center Area Terminus - North of Mall design option; 5) 380 bus transfer access trips for the Sunnyside terminus - South and North of Mall design options, and 6) 1,310 bus transfer access trips for 84th Avenue CTC Terminus.

Summary of Measurement Criteria
Highway 224 Segment

Criteria	Measure	Railroad Ave.	North of Hwy. 224	South of Hwy. 224
Promote Desired Land Use and Development				
Service to Activity Centers	Current and Planned Land Use Context	Near to residential and industrial	Adjacent to industrial/ commercial	Adjacent to residential
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):			
	Within 5 minute walk of LRT stations	6 / 2 / 15	6 / 2 / 17	8 / 1 / 12
	Between 5 & 10 min. walk of LRT stations	41 / 9 / 22	52 / 9 / 27	50 / 11 / 28
	Households/Employment (2015):			
	Within 5 minute walk of LRT stations	500 / 500	460 / 320	500/ 370
	Between 5 & 10 min. walk of LRT stations	1,490 / 2,710	1,520 / 3,150	1,490 / 3,090
Land Use Policies	Local Jurisdiction's Policies	No significant differences		
	County/State/Regional Policies	No significant differences		
Transit Ridership		3 stations	3 stations	3 stations
Ridership	Walk Market LRT Ridership Potential	400	340	370
	LRT Travel Time (minutes:seconds)	3:33	3:41	3:52
	LRT Ridership Impacts from Run Time Differences	0	0	0
	Net LRT Segment Boardings	400	340	370
Reliability	Percentage of Segment within Exclusive ROW	99%	99%	98%
	At-grade Crossings	2	4	5
Transferability	Quality of Bus Service/LRT Transfer	No significant differences	No significant differences	No significant differences

Criteria	Measure	Railroad Ave.	North of Hwy. 224	South of Hwy. 224
Fiscal Stability and Efficiency				
Costs (in millions of $)	YOE Capital Costs	$189	$212	$197
	YOE Difference in Capital Costs [1]	$0	$23	$8
	Difference in Annual O&M (1994$)[1]	$0	$0	$0
Comparative Ratio	Ratio of Annual Cost and Ridership	80.9	106.5	91.3
Engineering Efficiency				
Design Considerations	Level of Engineering Risk or Construction Issues	Construction adjacent to SP Main Line	Wetlands, impacts to Hwy. 224	Retaining walls, impacts to Hwy. 224
Environmental Sensitivity				
Displacements	Residential Units/Commercial Buildings/Commercial Units	71 / 5 / 5	46 / 11 / 11	85 / 3 / 6
Neighborhoods	Integration of LRT Service in the Community			
Visual	Potential Impacts on Aesthetics of an Area	Structure near residential area	None identified	None identified
Noise and Vibration	Potentially Sensitive Receptors	No potential receptors	Some potential receptors	Some potential receptors
Ecosystems	Potential Impacts on the Natural Environment	Minimal	Wetlands	Minimal
Hazardous Materials	Potential Hazardous Materials Risk	Confirmed release at Catellus Site	None identified	None identified
Historic	Number of Potential Impacts on Historic and Cultural Resources	2	0	0
Parks	Potential Impacts to Parklands	Campbell School Playground		
Traffic	Traffic Impact Assessment		No significant differences	No significant differences

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.
[1] Difference from the lowest cost design option connecting to the same Central Milwaukie alignment. A zero indicates that option as the low cost option.

Summary of Measurement Criteria
Milwaukie Segment

Criteria	Measure	Washington to 21st/McLoughlin	Washington to East of SP Branch Line	Monroe St. to 21st/McLoughlin	Monroe St. to East of SP Branch Line
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	Residential/Commercial	Residential/Commercial	Residential/Commercial	Residential/Commercial
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):				
	Within 5 minute walk of LRT stations	1-2 / 8-9 / 0	3 / 6 / 0	1 / 9 / 0	3 / 3 / 0
	Between 5 & 10 min. walk of LRT stations	7-11 / 17-21 / 0	8 / 26 / 0	7 / 19 / 0	6 / 25 / 0
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	170-200 / 550	190 /580	170 / 550	200 / 610
	Between 5 & 10 min. walk of LRT stations	1,025-1,160 / 1,230-1,250	970 / 1,170	1,030 / 1,250	960 / 1,140
Land Use Policies	Local Jurisdiction's Policies County/State/Regional Policies	Direct CBD service; Central to Regional Center	Edge of CBD service; Central to Regional Center	Direct CBD service; Central to Regional Center	Edge of CBD service; Central to Regional Center
Transit Ridership					
Ridership	Walk Market LRT Ridership Potential	760	790	760	810
	LRT Travel Time (minutes:seconds)	6:04	5:12	4:36	4:02
	LRT Ridership Impacts from Run Time Differences	-470	-360	-280	-210
	Net LRT Segment Boardings	290	430	480	600
Reliability	Percentage of Segment within Exclusive ROW	58%	49%	91%	88%
	At-grade Crossings (gated/signalized)	5	6	8	6
Transferability	Quality of Bus Service/LRT Transfer				
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs[1]	$227 - 236	$202 - 209	$206 - 216	$185 - 192
	YOE Difference in Capital Costs [2]	$106	$79	$79	$57
	Difference in Annual O&M (1994$) [2]	$0.36	$0.15	$0	$0.19
Comparative Ratio [3]	Ratio of Annual Cost and Ridership	12.2 - 12.6	10.3 - 10.7	10.2 - 10.7	9.1 - 9.4

Criteria	Measure	Harrison to Main St./McLoughlin	Harrison to East of SP Branch Line	Milwaukie Expressway	SP Main Line
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	Residential/Commercial	Residential/Commercial	Residential/Commercial	Industrial/Commercial
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):				
	Within 5 minute walk of LRT stations	1 / 7 / 0	1 / 3 / 0	1 / 5 / 0	0
	Between 5 & 10 min. walk of LRT stations	1 / 16 / 2	6 / 17 / 4	11 / 22 / 0	0
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	250 / 420	540 / 200	240 / 370	0
	Within 5 & 10 min. walk of LRT stations	430 / 1,420	510 / 1,630	390 / 1,470	0
Land Use Policies	Local Jurisdiction's Policies County/State/Regional Policies	Far edge of CBD service	Far from CBD	Far from CBD	Does not serve CBD; edge of regional center
Transit Ridership					
Ridership	Walk Market LRT Ridership Potential	750	870	720	350
	LRT Travel Time (minutes:seconds)	4:55	4:30	4:09	2:32
	LRT Ridership Impacts from Run Time Differences	-325	-265	-225	0
	Net LRT Segment Boardings	425	605	495	350
Reliability	Percentage of Segment within Exclusive ROW	93%	93%	99%	99%
	At-grade Crossings	3	3	1	1
Transferability	Quality of Bus Service/LRT Transfer				
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs [1]	$210 - 214	$171 - 178	$183 -192	$128 - 139
	YOE Difference in Capital Costs [2]	$82	$43	$56	$0
	Difference in Annual O&M from (1994$) [2]	$0.71	$0.84	$0.62	$0.98
Comparative Ratio [3]	Ratio of Annual Cost and Ridership	11.2 - 11.4	9.1 - 9.4	9.7 - 10.1	8.4 - 9.0

Milwaukie Segment (cont.)

Criteria	Measure	Washington to 21st/McLoughlin	Washington to East of SP Branch Line	Monroe St. to 21st/McLoughlin	Monroe St. to East of SP Branch Line
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	Steep grades, CBD construction impacts; blind tunnel under SP	CBD construction impacts	Steep grades, CBD construction impacts; tunnel under SP	CBD Construction impacts
Environmental Sensitivity					
Displacements	Residential Units/Commercial Units	3-9 / 37-49	5-9 / 37-48	11-18 / 21-22	64-70 / 18-19
Neighborhoods	Integration of LRT Service in the Community				
Visual	Potential Impacts on Aesthetics of an Area	SP branch line undercrossing		SP branch line undercrossing	
Noise and Vibration	Potentially Sensitive Receptors	Several potential sensitive receptors with all downtown options.			
Historic	Number of Potential Impacts on Historic and Cultural Resources	5	1	7	4
Parks	Potential Impacts to Parklands	Scott Park		Scott Park	
Traffic	Traffic Impact Assessment	Mixed traffic	Mixed traffic		

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] The range of capital costs represents the difference in the cost of connecting the design option to the three different design options in the Railroad Avenue/Highway 224 segment.

[2] Difference from the lowest cost design option connecting to the Railroad Avenue design option. A zero indicates that option as the low cost option.

[3] The daily LRT ridership used to develop the *comparative ratio* includes an additional 390 bus transfer trips with the SP Main Line design option. Also, the weekday LRT ridership for the downtown Milwaukie design options includes an additional 3,000 bus transfer from buses south of Milwaukie, while the SP Main Line option includes an additional 2,790 bus transfers from buses south of Milwaukie.

Criteria	Measure	Harrison to Main St./McLoughlin	Harrison to East of SP Branch Line	Milwaukie Expressway	SP Main Line
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	CBD Construction impacts, long bridge		Long bridge	Negotiating with railroad
Environmental Sensitivity					
Displacements	Residential Units/Commercial Units	21-26 / 23-25	20-23 / 18-21	1-7 / 19-27	0-4 / 18
Neighborhoods	Integration of LRT Service in the Community				
Visual	Potential Impacts on Aesthetics of an Area	Bridge structure in downtown			
Noise and Vibration	Potentially Sensitive Receptors	Several potential receptors in downtown area		Few potential receptors	Few potential receptors
Historic	Number of Potential Impacts on Historic and Cultural Resources	2	1	1	0
Parks	Potential Impacts to Parklands	Scott Park			
Traffic	Traffic Impact Assessment	Regional collector	Regional collector		

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] The range of capital costs represents the difference in the cost of connecting the design option to the three different design options in the Railroad Avenue/Highway 224 segment.

[2] Difference from the lowest cost design option connecting to the Railroad Avenue design option. A zero indicates that option as the low cost option.

[3] The daily LRT ridership used to develop the *comparative ratio* includes an additional 390 bus transfer trips with the SP Main Line design option. Also, the weekday LRT ridership for the downtown Milwaukie design options includes an additional 3,000 bus transfer from buses south of Milwaukie, while the SP Main Line option includes an additional 2,790 bus transfers from buses south of Milwaukie.

Summary of Measurement Criteria
Eastside Connection Design Options

Criteria	Measure	PTC/McLoughlin	East Brooklyn Yards	West Brooklyn Yards
Promote Desired Land Use and Development				
Service to Activity Centers	Current and Planned Land Use Context	Serves Brooklyn neighborhood and industrial area	Serves Brooklyn and HAND neighborhood & industrial area	Serves Brooklyn and HAND neighborhood & industrial area
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):			
	Within 5 minute walk of LRT stations	4 / 10 / 25	4 / 5 / 44	4 / 6 / 40
	Between 5 & 10 min. walk of LRT stations			
	Households/Employment (2015):			
	Within 5 minute walk of LRT stations	900 / 2,430	680 / 7,030	695 / 6,540
	Between 5 & 10 min. walk of LRT stations	1,780/ 7,390	6,330/ 11,460	3,760/ 10,370
Land Use Policies	Local Jurisdiction's Policies			
	County/State/Regional Policies			
Transit Ridership		3 stations	3 stations	3 stations
Ridership	Walk Market LRT Ridership Potential	1,990	3,570	3,400
	LRT Travel Time (minutes:seconds)	6:30	6:17	6:25
	LRT Ridership Impacts from Run Time Differences	0	0	0
	Net LRT Segment Boardings	1,990	3,570	3,400
Reliability	Percentage of Segment within Exclusive ROW	99%	100%	99%
	At-grade Crossings	1	0	3
Transferability	Quality of Bus Service/LRT Transfer			

Criteria	Measure	PTC/McLoughlin	East Brooklyn Yards	West Brooklyn Yards
Fiscal Stability and Efficiency				
Costs (in millions of $)	YOE Capital Costs	$211	$279	$237
	YOE Difference in Capital Costs [1]	$0	$68	$26
	Difference in Annual O&M (1994$)[1]	N/A	N/A	N/A
Comparative Ratio	Ratio of Annual Cost and Ridership	19.2	13.5	12.3
Engineering Efficiency				
Design Considerations	Level of Engineering Risk or Construction Issues	Questionable fill near OMSI	Questionable fill near OMSI, negotiations with railroads	Questionable fill near OMSI, negotiations with railroads
Environmental Sensitivity				
Displacements	Residential Units/Commercial Buildings/ Commercial Units	28 / 11 / 11 13 / 10 / 10 sub-option	16 / 47 / 49	1 / 38 / 53
Neighborhoods	Integration of LRT Service in the Community	Opposition to Center St. Station		Neighborhood support
Noise and Vibration	Potentially Sensitive Receptors	Residences on east side of McLoughlin		
Ecosystems	Potential Impacts on the Natural Environment	Willamette River edge		
Hazardous Materials	Potential Hazardous Materials Risk	Industrial area	Industrial area	Industrial area
Historic	Number of Potential Impacts on Historic and Cultural Resources	7	3	5
Parks	Potential Impacts to Parklands	Greenway, Riverside Park, PTC Trail		
Traffic	Traffic Impact Assessment	Minor	Minor	Minor

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.
[1] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

Summary of Measurement Criteria
Caruthers River Crossings

Criteria	Measure	Caruthers/Marquam	Caruthers Modified	Caruthers	Caruthers "S"
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	Serves Riverplace and OMSI	Serves Riverplace and OMSI	Serves Riverplace and OMSI	Serves Riverplace, OMSI and North Macadam
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):				
	Within 5 minute walk of LRT stations	N/A	N/A	N/A	
	Between 5 & 10 min. walk of LRT stations	N/A	N/A	N/A	
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	N/A	N/A	N/A	690 / 5,050
	Between 5 & 10 min. walk of LRT stations				
Land Use Policies	Local Jurisdiction's Policies County/State/Regional Policies				
Transit Ridership					1 station
Ridership [3]	Walk Market LRT Ridership Potential	N/A	N/A	N/A	2,000
	LRT Travel Time (minutes:seconds)	1:57	1:43	2:00	3:09
	LRT Ridership Impacts from Run Time Differences	N/A	N/A	N/A	-400
	Net LRT Segment Boardings	N/A	N/A	N/A	1,600 [4]
Reliability	Percentage of Segment within Exclusive ROW	99%	100%	98%	98%
	At-grade Crossings	1	1	3	3
Transferability	Quality of Bus Service/LRT Transfer	same	same	same	same
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs [1]	$132	$141	$133	$159
	YOE Difference in Capital Costs [2]	$0	$9	$1	$27
	Difference in Annual O&M (1994$)[2]	$0	$0	$0	$0.37
Comparative Ratio	Ratio of Annual Cost and Ridership	N/A	N/A	N/A	N/A

Criteria	Measure	Caruthers/Marquam	Caruthers Modified	Caruthers	Caruthers "S"
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	Geologic/Seismic	Geologic/Seismic	Geologic	Geologic
Environmental Sensitivity					
Displacements	Residential Units/Commercial Buildings/ Commercial Units	0	1	0	0
Visual	Potential Impacts on Aesthetics of an Area	New bridge	New bridge	New bridge	Impacts view from both banks
Ecosystems	Potential Impacts on the Natural Environment	Piers in River	Piers in River	Piers in River	More piers in River
Hazardous Materials	Potential Hazardous Materials sites			Known site	Known site
Historic	Number of Potential Impacts on Historic and Cultural Resources	2	2	2	3
Parks	Potential Impacts to Parklands	Willamette Greenway	Willamette Greenway	Willamette Greenway	Willamette Greenway
Traffic	Traffic Impact Assessment	Grade-crossing at Moody	Grade-crossing at Moody	Grade crossing at Moody and Sheridan	Grade crossing at Moody and Sheridan

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] The capital costs for these bridge options assume a concrete segmental bridge type. Other bridge types may cost more; for example, a through truss bridge would cost $18M more for Caruthers "S" and about $15M more for the other options.

[2] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

[3] *LRT segment boardings* for the Caruthers "S" option reflects the increase in South/North LRT riders over the other two options which would require riders to board buses at this location and transfer to South/North LRT at a downtown station. Without accounting for bus transfers to LRT for the other two options, the Caruthers "S" would have approximately 2,600 *LRT segment boardings.*

[4] *LRT segment boardings* may be over estimated because the Caruthers "S" option may limit the development potential of the property between the Ross Island and Marquam Bridges which could lead to fewer residents and employees being located within walking distance of the LRT station.

Summary of Measurement Criteria
Ross Island River Crossings

Criteria	Measure	South and Parallel to Ross Island Bridge	North Ross Island	Mid Ross Island
Promote Desired Land Use and Development				
Service to Activity Centers	Current and Planned Land Use Context	Serves some of North Macadam redevelopment area	Serves all North Macadam redevelopment area	Serves all North Macadam redevelopment area
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):			
	Within 5 minute walk of LRT stations	5 / 63 / 13	4 / 86 / 14	1 / 88 / 9
	Between 5 & 10 min. walk of LRT stations	not available	not available	not available
	Households/Employment (2015):			
	Within 5 minute walk of LRT stations	1,550 / 6,440	2,250 / 9,230	1,660 / 10,280
	Between 5 & 10 min. walk of LRT stations	not available	not available	not available
Land Use Policies	Local Jurisdiction's Policies	Less supporting	Supports comp plan densities	Supports comp plan densities
	County/State/Regional Policies	Less supporting	Supports 2040	Supports 2040
Transit Ridership		4 stations	5 stations	4 stations
Ridership	Walk Market LRT Ridership Potential	4,490	6,460	6,440
	LRT Travel Time (minutes:seconds)	7:20	8:00	7:27
	LRT Ridership Impacts from Run Time Differences	0	-200	0
	Net LRT Segment Boardings	4,490	6,260[3]	6,440
Reliability	Percentage of Segment within Exclusive ROW	98%	98%	98%
	At-grade Crossings	3	3	3
Transferability	Quality of Bus Service/LRT Transfer	2 transfer stations	2 transfer stations	3 transfer stations
Fiscal Stability and Efficiency				
Costs (in millions of $)	YOE Capital Costs [1]	$331	$351[4]	$405
	YOE Difference in Capital Costs [2]	$0	$20	$74
	Difference in Annual O&M (1994$) [2]	$0	$0.16	$0
Comparative Ratio	Ratio of Annual Cost and Ridership	12.7	9.7	10.7

Criteria	Measure	South and Parallel to Ross Island Bridge	North Ross Island	Mid Ross Island
Engineering Efficiency				
Design Considerations	Level of Engineering Risk or Construction Issues	Geological, in-water construction limits	Geological, in-water construction limits	Geological, in-water construction limits, conflict with gravel extraction
Environmental Sensitivity				
Displacements	Residential Units/Commercial Buildings/ Commercial Units	58 / 12 / 14 15 / 13 / 15 sub-option	30 / 13 / 15 15 / 14 / 16 sub-option	13 / 17 / 17
Neighborhoods	Integration of LRT Service in the Community			
Visual	Potential Impacts on Aesthetics of an Area	New bridge	New bridge	New bridge
Noise and Vibration	Potentially Sensitive Receptors	Most: East side of McLoughlin	More: East side of McLoughlin	Few
Ecosystems	Potential Impacts on the Natural Environment	River, but more piers	River, Island	River, Island, Great Blue Heron
Hazardous Materials	Potential Hazardous Materials Risk	Known unremediated sites	Potential along Moody Ave.	Potential along Moody Ave.
Historic	Number of Potential Impacts on Historic and Cultural Resources	3	3	4
Parks	Potential Impacts to Parklands	Willamette Greenway and Riverside Park	Willamette Greenway	Willamette Greenway
Traffic	Traffic Impact Assessment	Moody Ave., Franklin St.	Moody Ave., Center St.	Potential impact on Bancroft

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] Capital cost assumes a concrete segmental bridge. Other bridge types may cost more, for example, a cable stayed (North and Mid Ross Island) or through truss (South Parallel) bridge type would cost between $18 to $20 million more.

[2] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

[3] The West of McLoughlin sub-option would eliminate the Center Street station resulting in a decrease in segment LRT boardings to 6,030.

[4] The West of McLoughlin sub-option would cost $354M (YOE).

Summary of Measurement Criteria
Steel Bridge to Kaiser

Criteria	Measure	Wheeler/Flint Station	Wheeler/Russell Station	East I-5/Kerby Station	West I-5/Graham Station
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	Flint Station serves high density residential	Russell Station serves high density residential	Kerby Station serves center of Emanuel Campus	Graham Station serves industrial sanctuary
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial):				
	Within 5 minute walk of LRT stations	2 / 13 / 7	1 / 13 / 10	2 / 16 / 12	2 / 13 / 27
	Between 5 & 10 min. walk of LRT stations	43 / 37 / 50	54 / 43 / 44	45 / 33 / 35	45 / 36 / 23
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	340 / 7,400	290 / 7,850	320 / 9,240	210 / 7,920
	Between 5 & 10 min. walk of LRT stations	940 / 3,150	950 / 2,400	1,380 / 8,260	860 / 8,080
Land Use Policies	Local Jurisdiction's Policies	Identified in Albina Community Plan	Identified in Albina Community Plan	Not included in Albina Community Plan	Not included in Albina Community Plan
Transit Ridership		3 stations	3 stations	3 stations	3 stations
Ridership	Walk Market LRT Ridership Potential	2,580	2,680	3,140	2,640
	LRT Travel Time (minutes:seconds)	6:25	6:33	5:16	4:28
	LRT Ridership Impacts from Run Time Differences	-780	-780	-270	0
	Net LRT Segment Boardings	1,800	1,900	2,870	2,640
Reliability	Percentage of Segment within Exclusive ROW	51%	58%	86%	95%
	At-grade Crossings	12	8	5	6
Transferability	Quality of Bus Service/LRT Transfer	Transfers at Rose Quarter Transit Ctr.	Transfers at Rose Quarter Transit Ctr.	Transfers at Rose Quarter Transit Ctr.	Transfers at Rose Quarter Transit Ctr.
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs	$169	$168	$146	$145
	YOE Difference in Capital Costs [1]	$24	$23	$1	$0
	Difference in Annual O&M (1994$)[1]	$0.49	$0.52	$0.20	$0
Comparative Ratio	Ratio of Annual Cost and Ridership	18.1	17.0	9.4	9.9

Criteria	Measure	Wheeler/Flint Station	Wheeler/Russell Station	East I-5/Kerby Station	West I-5/Graham Station
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	Coordination with I-5 improvements, narrow ROW on Wheeler, difficult access to I-5 alignment	Coordination with I-5 improvements, narrow ROW on Wheeler	Coordination with I-5 improvements	Coordination with I-5 improvements, difficult access to I-5 alignment
Environmental Sensitivity					
Displacements	Residential Units/Commercial Buildings/ Commercial Units	8 / 14 / 15	15 / 12 / 18	7 / 9 / 10	3 / 12 / 74
Noise and Vibration	Potentially Sensitive Receptors	Tubman Middle School, Emanuel, Kaiser	Tubman Middle School, Emanuel, Kaiser	Emanuel, Kaiser	Kaiser
Historic	Number of Potential Impacts on Historic and Cultural Resources	4	4	5	6
Parks	Potential Impacts to Parklands	Lillis Albina Park	Lillis Albina Park	Lillis Albina Park	none
Traffic	Traffic Impact Assessment	Arena parking access, at-grade crossing of Broadway/Weidler	Arena parking access, at-grade crossing of Broadway/Weidler	none	none

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.
[1] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

Summary of Measurement Criteria
Kaiser to Expo Center

Criteria	Measure	All I-5 Alternative	N. Killingsworth Crossover	N. Portland Blvd. Crossover	Kenton Area Crossover
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	No direct service to Kenton Business District	Direct access to Kenton Business District	Direct access to Kenton Business District	Direct access to Kenton Business District
Walk Market Area Data	Vacant and Redevelopable Acres (Residential/Commercial/Industrial)				
	Within 5 minute walk of LRT stations	16 / 16 / 4	24 / 23 / 5	30 / 23 / 4	26 / 19 / 26
	Between 5 & 10 min. walk of LRT stations	45 / 13 / 5	48 / 7 / 5	44 / 7 / 6	44 / 11 / 6
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	1,600 / 2,760	2,260 / 3,320	2,210 / 3,520	1,780 / 3,370
	Between 5 & 10 min. walk of LRT stations	3,330 / 2,950	3,350 / 2,340	3,240 / 2,450	3,460 / 2,470
Land Use Policies	Local Jurisdiction's Policies	Identified in Albina Community Plan	Consistent with Albina Community Plan	Consistent with Albina Community Plan	Consistent with Albina Community Plan
Transit Ridership		6 stations	6 stations	6 stations	6 stations
Ridership	Walk Market LRT Ridership Potential	2,110	2,790	2,820	2,430
	LRT Travel Time (minutes:seconds)	11:20	12:32	12:24	12:28
	LRT Ridership Impacts from Run Time Differences	0	-550	-550	-550
	Net LRT Segment Boardings	2,110	2,240	2,270	1,880
Reliability	Percentage of Segment within Exclusive ROW	100%	66%	76%	95%
	At-grade Crossings	10	19	18	16
Transferability	Quality of Bus Service/LRT Transfer	No Kenton transfer	Kenton transfer opportunity	Kenton transfer opportunity	Kenton transfer opportunity
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs	$374	$434	$410	$402
	YOE Difference in Capital Costs [1]	$0	$60	$36	$28
	Difference in Annual O&M (1994$)[1]	$0	$0.29	$0.29	$0.29
Comparative Ratio	Ratio of Annual Cost and Ridership	31.8	34.4	32.4	38.4

Criteria	Measure	All I-5 Alternative	N. Killingsworth Crossover	N. Portland Blvd. Crossover	Kenton Area Crossover
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	Neighborhood construction impacts	Tight turns on crossovers	Tight turns on crossovers	Tight turns on crossovers
Environmental Sensitivity					
Displacements	Residential Units/Commercial Units	81 / 5	69 / 16	81 / 16	93 / 17
Noise and Vibration	Potentially Sensitive Receptors	Noise walls are possible	Noise walls are possible in I-5 sections	Noise walls are possible in I-5 sections	Noise walls are possible in I-5 sections
Historic	Number of Potential Impacts on Historic and Cultural Resources		2	0	4
Parks	Potential Impacts to Parklands	Low impact risk	Low impact risk	Low impact risk	Low impact risk
Traffic	Traffic Impact Assessment	Few traffic concerns	Traffic concerns at Crossover and in Kenton	Traffic concerns at Crossover and in Kenton	Traffic concerns at Kenton

Notes: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.
[1] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

Summary of Measurement Criteria
Hayden Island

Criteria	Measure	West of I-5 (over ramp)	West of I-5 (under ramp)	Center Avenue	Adjacent to Jantzen Beach Center
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context	Retail Commercial	Retail Commercial	Retail Commercial	Retail Commercial
Walk Market Area Data	Vacant and Redevelopable Acres:				
	Within 5 minute walk of LRT stations	N/A	N/A	N/A	N/A
	Between 5 & 10 min. walk of LRT stations	N/A	N/A	N/A	N/A
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	N/A	N/A	N/A	N/A
	Between 5 & 10 min. walk of LRT stations	N/A	N/A	N/A	N/A
Land Use Policies	Local Jurisdiction's Policies				
	County/State/Regional Policies				
Transit Ridership					
Ridership	Walk Market LRT Ridership Potential	N/A	N/A	N/A	N/A
	LRT Travel Time (minutes:seconds)	4:04	4:31	4:11	4:19
	LRT Ridership Impacts from Run Time Differences	N/A	N/A	N/A	N/A
	Net LRT Segment Boardings	N/A	N/A	N/A	N/A
Reliability	Percentage of Segment within Exclusive ROW	100%	100%	82%	85%
	Number of At-grade Crossings	0	0	2	2
Transferability	Quality of Bus Service/LRT Transfer	good	good	good	good
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs	$95	$89	$81	$83-$89
	YOE Difference in Capital Costs [1]	$14	$8	$0	$2-$8
	Difference in Annual O&M (1994$)[1]	$0	$0	$0	$0
Comparative Ratio	Ratio of Annual Cost and Ridership	N/A	N/A	N/A	N/A

Criteria	Measure	West of I-5 (over ramp)	West of I-5 (under ramp)	Center Avenue	Adjacent to Jantzen Beach Center
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	Harbor bridge and bridges over roadways; bridge over operating ramps	Harbor bridge and bridges over roadways; tunnel under operating ramps	Harbor bridge and bridges over roadways; bridge over major intersection	Harbor bridge and bridges over roadways; bridge over major intersection
Environmental Sensitivity					
Displacements	Residential Units/Commercial Buildings/ Commercial Units	12 / 7 / 14	12 / 7 / 14	17 / 3 / 3	17 / 3 / 3
Neighborhoods	Integration of LRT Service in the Community	Elevated station has difficult access		Divides floating home community	Divides floating home community
Visual	Potential Impacts on Aesthetics of an Area	Highest impact	Low impact	Moderate impact	Moderate impact
Noise and Vibration	Potentially Sensitive Receptors	Hugs I-5 - away from receptors	Hugs I-5 - away from receptors	Closest to receptors	Closest to receptors
Ecosystems	Potential Impacts on the Natural Environment	Harbor Bridge	Harbor Bridge	Harbor Bridge	Harbor Bridge
Hazardous Materials	Potential Hazardous Materials Risk				
Historic	Number of Potential Impacts on Historic and Cultural Resources	0	0	0	1
Parks	Potential Impacts to Parklands				
Traffic	Traffic Impact Assessment	No impacts	No impacts	Impact to intersection of Center Ave. & ramps	Impacts to mall access and circulation

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.
[1] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

Summary of Measurement Criteria
Columbia River Crossing

Criteria	Measure	Low Level Lift Span	Bored Tunnel
Promote Desired Land Use and Development			
Service to Activity Centers	Current and Planned Land Use Context	Would serve Hayden Island and Vancourver CBD	Would serve Hayden Island
Walk Market Area Data	Vacant and Redevelopable Acres:	Would serve Lucky Brewery Redevelopment site	Would miss Lucky Brewery Redevelopment site
Land Use Policies	Local Jurisdiction's Policies	Encourages CDB's development	Misses most of downtown
Transit Ridership			
Ridership	Walk Market LRT Ridership Potential	N/A	N/A
Reliability	Percentage of Segment within Exclusive ROW	100%	100%
	Number of At-grade Crossings	N/A	N/A
Transferability	Quality of Bus Service/LRT Transfer	Serves the transit center	4 blocks from transit center
Fiscal Stability and Efficiency			
Costs (in millions of $)	YOE Capital Costs [1]	$167	$268
	YOE Difference in Capital Costs [2]	$0	$101
	Difference in Annual O&M (1994$) [2]	$0 - 0.16	$0
Comparative Ratio	Ratio of Annual Cost and Ridership	N/A	N/A

Criteria	Measure	Low Level Lift Span	Bored Tunnel
Engineering Efficiency			
Design Considerations	Level of Engineering Risk or Construction Issues	Piers in River; in-water construction	Biological, tunneling, dewatering
Environmental Sensitivity			
Displacements	Residential Units/Commercial Buildings	0 / 1	0 / 4
Neighborhoods	Integration of LRT Service in the Community		
Visual	Potential Impacts on Aesthetics of an Area	New bridge	500' and 470' long portals
Ecosystems	Potential Impacts on the Natural Environment	Piers in River	
Historic	Number of Potential Impacts on Historic and Cultural Resources	4	21

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] Capital cost is for a concrete segmental bridge. Other bridge types could cost more. For example, a bow string design over the full length of the bridge could add up to $60 million (YOE) to the capital costs.

[2] Difference from the lowest cost design option. A zero indicates that option as the low cost option.

Summary of Measurement Criteria
Vancouver CBD to VA Hospital/Clark College

Criteria	Measure	Washington Street from River	Columbia Street from River	Double-track on Washington	Washington/Main St. Couplet
Promote Desired Land Use and Development					
Service to Activity Centers	Current and Planned Land Use Context		Could limit development of brewery	Better serves residential areas and office development	
Walk Market Area Data	Vacant and Redevelopable Acres:				
	Within 5 minute walk of LRT stations	N/A	N/A	N/A	N/A
	Between 5 & 10 min. walk of LRT stations	N/A	N/A	N/A	N/A
	Households/Employment (2015):				
	Within 5 minute walk of LRT stations	N/A	N/A	N/A	N/A
	Between 5 & 10 min. walk of LRT stations	N/A	N/A	N/A	N/A
Land Use Policies	Local Jurisdiction's Policies				
	County/State/Regional Policies				
Transit Ridership					
Ridership	Walk Market LRT Ridership Potential				
	LRT Travel Time (minutes:seconds)	N/A	N/A	2:11	3:00
	LRT Ridership Impacts from Run Time Differences	N/A	N/A	0	-250
	Net LRT Segment Boardings				
Reliability	Percentage of Segment within Exclusive ROW				
	At-grade Crossings				
Transferability	Quality of Bus Service/LRT Transfer				
Fiscal Stability and Efficiency					
Costs (in millions of $)	YOE Capital Costs	$34	$31	$56	$87
	YOE Difference in Capital Costs [2]	$3	$0	$0	$31
	Difference in Annual O&M (1994$)[1]	N/A	N/A	$0	$0.22
Comparative Ratio	Ratio of Annual Cost and Ridership	N/A	N/A	N/A	N/A

Criteria	Measure	Washington Street from River	Columbia Street from River	Double-track on Washington	Washington/Main St. Couplet
Engineering Efficiency					
Design Considerations	Level of Engineering Risk or Construction Issues	New opening under railroad	May require widening of existing structure		Higher risk because of impacts to 2 streets; Main St. may be more sensitive to construction impacts
Environmental Sensitivity					
Displacements	Residential Units/Commercial Units			0 / 0	0 / 0
Noise and Vibration	Potentially Sensitive Receptors				Tight turns could result in additional noise
Ecosystems	Potential Impacts on the Natural Environment				
Historic	Number of Potential Impacts on Historic and Cultural Resources			55	59
Parks	Potential Impacts to Parklands		May limit access to waterfront		
Traffic	Traffic Impact Assessment	Potential traffic impacts at 5th & Washington		Supports City proposals to enhance traffic circulation in CBD	Conflicts with future CBD circulation improvements

Note: All costs are in millions. Capital costs are for year of expenditure (YOE). Operating and Maintenance (O&M) costs are in 1994 dollars.

[1] The data in this table represent the portion of this segment between 7th Street and 17th Street. The costs and run times for the portion from 17th Street to VA Hospital/Clark College would be constant for both options.

[2] Difference from the lowest cost design option. A zero indicates that option as the low cost option.