South North
Transit Corridor Study

Tier I Evaluation Methodology Report

December 17, 1993

METRO

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South/North Corridor
Alternatives Analysis

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

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1. INTRODUCTION

1.0 Background

METRO is initiating Alternatives Analysis/Draft Environmental Impact Statement [AA/DEIS] work on the **South/North Corridor**. The South/North Corridor [Figure 1] encompasses a south/north oriented travel shed between Clark County, Portland's eastside, the Portland CBD, and Clackamas County. The Corridor has been divided into seven *"segments"* to facilitate the evaluation of alternatives. These segments are the largest unit of disaggregation which will be used and will be further subdivided, as necessary, to accommodate the analytical needs of the AA/DEIS. Figure 2 illustrates the segments and the general alignments within each segment that will be examined in Tier I.

The proposed AA/DEIS process includes a [i] Tier I AA in which the preferred mode and study termini will be selected and alignment alternatives will be narrowed for inclusion in a DEIS and [ii] a Tier II in which a DEIS will be prepared on the selected mode(s) and narrowed set of alignment alternatives. Tier II would conclude with the selection of the locally preferred alternative.

1.1 Purpose of the Report

The purpose of this report is to define the process and criteria by which the modal alternatives, alignment alternatives and options and study termini alternatives will be evaluated in Tier I of the AA/DEIS. While the final conclusions of Tier I will ultimately depend on the analyses and public input developed during Tier I, the preliminary objectives of Tier I are to:

[a] Narrow the modal alternatives to be included in the DEIS to a No-Build Alternative, a TSM Alternative and one HCT modal alternative;

[b] Narrow the number of HCT alignment alternatives [major route choices such as McLoughlin Boulevard versus the Macadam Avenue] and design options [secondary routing choices such as, for example, alignments variations along Macadam Avenue] to be included in the DEIS to two-or-three per segment, if possible; and

[c] Select the study termini to be addressed in the DEIS.

1.2 Organization of the Report

This report is divided into four chapters:

Chapter 1: Introduction defines the background, purpose and organization of the report.

Chapter 2: Purpose and Need to Evaluate Fixed Guideway Alternatives in the South/North Corridor defines the transportation, land use and air quality problems and policies which necessitate the Corridor study. The chapter concludes with the identification of Tier I goals and objectives which serve as the backbone for the evaluation methodology.

Chapter 3: Study Process elaborates on the four main selections for further study that are to be made during Tier I and explains the study organization, including the public involvement process, for making those selections.

Chapter 4: Evaluation Measures defines the criteria and measures for evaluating each of the Tier I objectives. The chapter concludes with a description of how the criteria will be applied to the various study selections in Tier I.

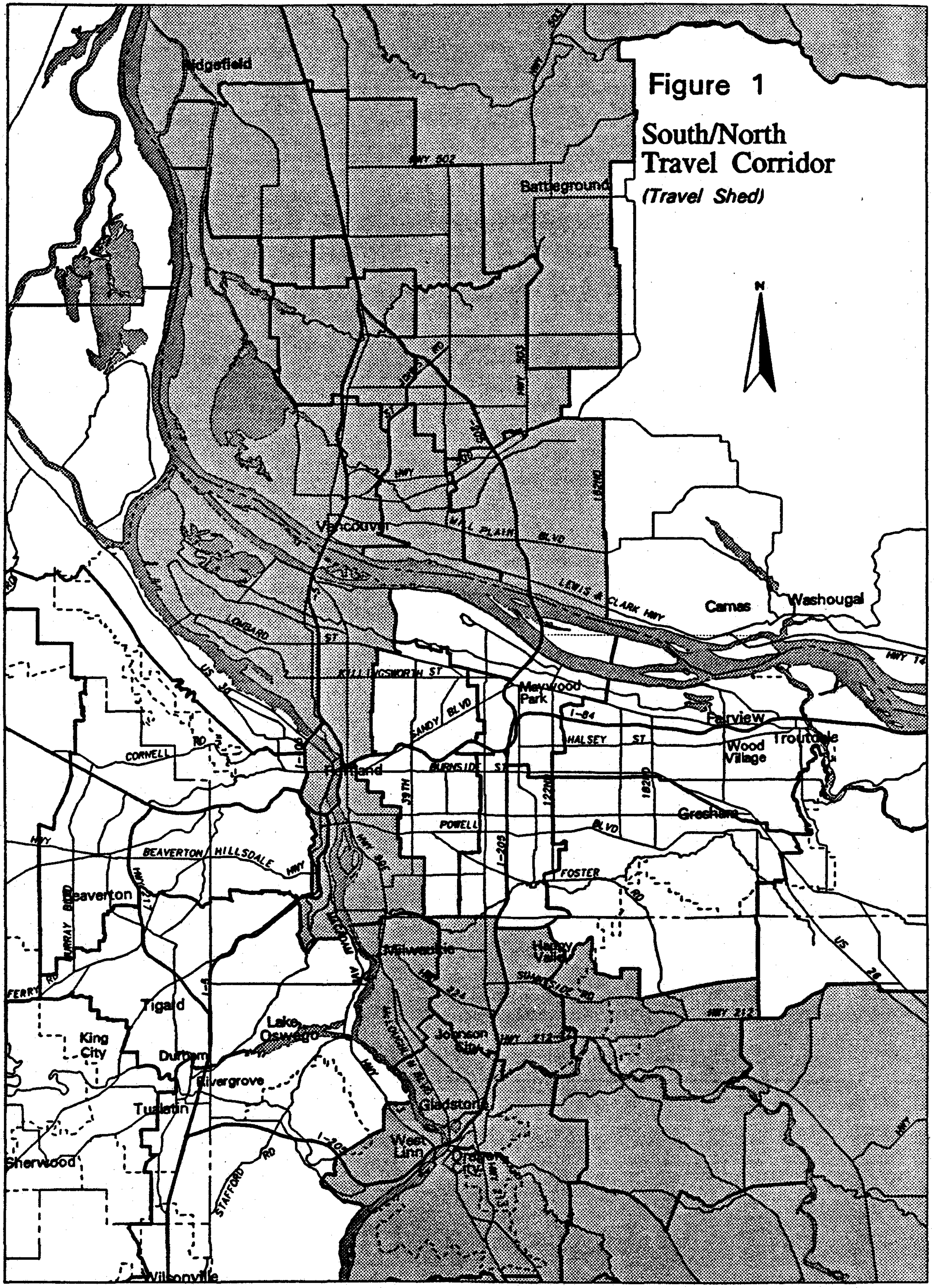


Figure 1

South/North Travel Corridor

(Travel Shed)

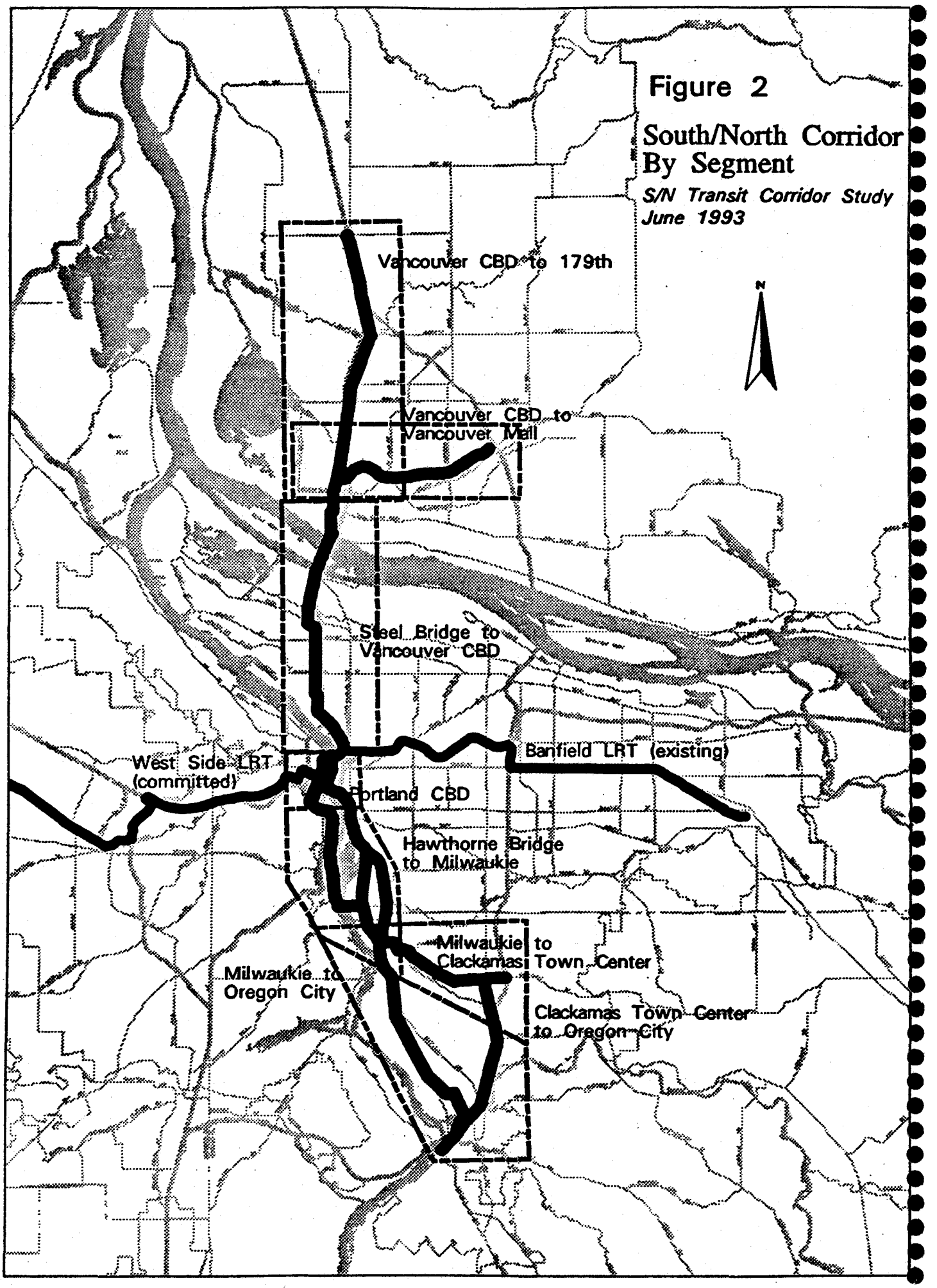


Figure 2
South/North Corridor
By Segment
S/N Transit Corridor Study
June 1993
N
Vancouver CBD to 179th
Vancouver CBD to
Vancouver Mall
Steel Bridge to
Vancouver CBD
Banfield LRT (existing)
West Side LRT
(committed)
Portland CBD
Hawthorne Bridge
to Milwaukie
Milwaukie to
Clackamas Town Center
Milwaukie to
Oregon City
Clackamas Town Center
to Oregon City

2. PURPOSE AND NEED TO EVALUATE FIXED GUIDEWAY ALTERNATIVES IN THE SOUTH/NORTH CORRIDOR

2.0 Overview

The reason for considering fixed guideway options for the South/North Corridor is best understood by examining 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 fixed guideway system. These interrelationships are described Sections 2.1 and 2.3. Section 2.4 extracts the critical findings of the previous two sections and concludes with a summary of the purpose and need for the study.

2.1 Transportation Plans and Issues

2.1.1 Transportation Plans and Policies

A major shift in regional transportation planning priorities occurred 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 one can see this policy fundamentally affected almost every major planning and development decision in the region over the past seventeen years.

2.1.2 Transportation Problems

Highway

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 South Study Area 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 are 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 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.

The capacity limitations of the I-5 Bridge became increasingly apparent in the 1970's. To add capacity, the I-205 Glen Jackson Bridge was built between 1979 - 1982 and opened to traffic in 1983. At about the same time as the Jackson Bridge was opened, portions of I-5 were widened and interchanges were altered to increase the capacity of 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 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. Table 2-5 shows those sections of I-5 currently experiencing problems. Even with the committed improvements to I-5, significant problems are projected for the future [see Table 2-6].

Table 2-1
1980 Service Levels on McLoughlin Boulevard

Segment of McLoughlin Boulevard	PM 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

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

McLoughlin Boulevard at:	1971 ADT	1981 ADT	71-81Growth	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%

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

Location	1990 V/C Ratio[1]	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
Hwy 224 at Lake Rd.	0.47	0.99
Sunnyside at 82nd	0.60	0.48

[1] P.M. Peak Hour, Peak Direction
[2] Includes committed highway improvements.

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%

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

Location	North-bound	South-bound
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
Freemont Bridge-Broadway	Over-Capacity	At-Capacity
Broadway-I-84	Over-Capacity	Over-Capacity

[a] OK means volumes are below capacity and Level of Service is D or better.
[b] 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	North-bound	South-bound
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

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

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.

Transit

Tri-Met operates four trunk routes on McLoughlin Boulevard between Milwaukie and the Portland CBD. One trunk route operates on McLoughlin Boulevard between Milwaukie and Oregon City. 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 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 for 1988 - 1992* 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.

2.2 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.

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[1]	29.5	1
76	Vancouver Mall Express[1]	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

[1] These buses use I-205 but serve trips that might employ an I-5 North alignment if it is extends to a Vancouver Mall terminus.

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

County	1970	1980	1990	2010
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

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

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

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.

2.2.1 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 have until May 1994 to amend their subdivision and code regulations and until May 1996 to amend their 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] By May 1994, 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 travelled 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/North Corridor to ensure that the updated land use plans, which are required by the rule, maximize the benefit of an investment in transit.

2.2.2 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 by July 1, 1994. 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] Level of service standards for roads and transit. 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 travelled 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 travelled 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 initial plan, or any subsequent review, 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 Council [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". A draft Framework Plan was completed in October 1992. When formally adopted, it will serve as the guide for preparing the detailed comprehensive plans of the county and its cities.

The draft plan would concentrate growth in urban centers in the county, each center being separate and distinct from the others. While these centers may be 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 12 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. As proposed, the Community Framework Plan is dependent on high capacity transit to provide connections between urban centers within Clark County and between Clark County and Portland.

Concurrent with the preparation of the Community 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 the preparation of a transportation demand management strategy, including the development and approval of employer programs.

These activities in Clark County are reminiscent, although perhaps more aggressive, 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 will be established on the basis of high capacity transit corridors between residential centers and major regional activity centers; and

[b] water, sewer, transportation and other infrastructure plans in these jurisdictions will be prepared to support such development.

If the resulting transportation 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.

2.3 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 - 25,000 per ton of emission range. With an approved AQMP, new business and industries would be allowed to use "Best Available Technology (BACT)" to meet federal requirements. Since BACT methods tend to cost in the $5000 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 is projected to save new industry about $2 million per year (1990 dollars) in air quality clean-up costs.

2.4 Purpose and Need Summary

The following major findings are reached regarding the purpose and need for evaluating high capacity transit in the South/North Corridor:

[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 comprehensive plans -- thus, tightening the linkage between land use and transit development.

[e] Historically, South/North Corridor population and employment are 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/arterial 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 the ability to attract industrial and commercial development to the corridor 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. It is noteworthy that 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 proposed 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] 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.

2.5 Tier I Project Goals and Objectives

Based on the above-mentioned purpose and need analysis, the following goals and objectives for the South/North Transit Corridor were authorized by the Project Management Group for the Tier I evaluation:

Goal

To implement a major transit expansion program in the South/North Corridor which supports bi-state land use goals, optimizes the transportation system, is environmentally sensitive, reflects community values and is fiscally responsive.

Objectives

[a] Provide high quality transit service in the South/North Corridor.

[b] Ensure effective transit system operations in the South/North Corridor.

[c] Maximize the ability of the transit system to accommodate future growth in travel demand in the South/North Corridor.

[d] Minimize traffic congestion and traffic infiltration through neighborhoods in the South/North Corridor.

[e] Promote desired land use patterns and development in the South/North Corridor.

[f] Provide for a fiscally stable and financially efficient transit system.

[g] Maximize the efficiency and environmental sensitivity of the engineering design of the proposed project.

2.6 Tier I Study Objectives

See Section 3.4.

3. STUDY PROCESS

3.0 Introduction

There are four basic study selections which are 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 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; and

[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.

These study selections establish the framework for the evaluation methodology described in Chapter 4. Sections 3.1 - 3.3 provides an outline of the major alternatives and options to be examined in Tier I. A more detailed description of these alternatives and options may be found in the *Draft Description of Wide Range of Alternatives Report, METRO, July 1993*. The summary of the description of alternatives and options included in Sections 3.1 - 3.3 are included for reference purposes.

3.1 Modal Alternatives

Six modal alternatives for the South/North Corridor were identified in the Pre-AA study. Each of these modal alternatives will be investigated in Tier I of the AA. It is the objective of Tier I to narrow the modal alternatives for the Tier II DEIS to the No-Build Alternative [required by EPA], the TSM Alternative [required by FTA] and one HCT alternative.

There are two points during Tier I at which modal alternatives may be narrowed. It is possible that modal alternatives will be eliminated during the Scoping Process at the beginning of Tier I. Modal alternatives remaining at the conclusion of the Scoping Process will be carried throughout Tier I. The Tier I Final Report would evaluate the remaining modal alternatives and recommend the alternative[s] to be forwarded to Tier II.

The initial set of modal alternatives are described in the following subsections.

3.1.1 No-Build Alternative

The No-Build alternative would include current transit service levels plus those minor service increases which can be funded with existing revenue sources through the year 2010. The basic components of the No-Build alternative includes committed [i.e., projects which have programmed funds] highway and transit projects plus "customary" increases in transit service in response to peak-hour capacity problems and reduced peak-hour travel speeds caused by increased traffic. Buses in the corridor would continue to operate in mixed traffic, there would be no major increase in the transit fleet.

3.1.2 Transportation System Management [TSM] Alternative with Highway Improvements

The TSM alternative would include major expansion of bus service with a network configuration consisting of trunk lines served by feeder lines. Transit service coverage would be increased in both the Milwaukie and I-5 segments of the corridor, headways on trunk lines would be shortened, park-and-ride lots would be added, and some associated street and highway improvements would be made to allow for improved operations along McLoughlin Boulevard, Highway 224, S.E. Harmony Road, Interstate Avenue and I-5.

3.1.3 Busway Alternative

The feasibility and effectiveness of a busway serving the South/North corridor will be analyzed. This alternative includes the construction of an exclusive busway facility primarily along McLoughlin Boulevard and the I-5 freeway with branch lines along Highway 224 to the Clackamas Town Center and along SR-500 to Vancouver Mall. The busway alternative would improve the point-to-point travel times by including access ramps at key locations to improve the overall 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.

3.1.4 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 in downtown Portland and in the vicinity of the Coliseum Station in Northeast Portland.

The South/North LRT line would be double tracked. Over most of the line, train operation would be controlled and protected by Automatic Block Signals [ABS] similar to those on portions of the existing MAX line. At-grade crossings would be protected by either railroad gates or traffic signals actuated by a preemption system similar to that used in downtown Portland.

3.1.5 Commuter Rail Alternative

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. 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.

3.1.6 River Transit Alternative

The Columbia and the Willamette Rivers are navigable rivers which traverse the South/North Corridor and, thus, provide the opportunity for a river transit alternative. River transit would be regularly scheduled, passenger-only boats which would operate over a defined route connecting 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 to be evaluated would be a system running between Oregon City, Oregon and Vancouver, Washington and would include eight stops: St. Johns, Swan Island, Old Town, Riverplace, John's Landing, Sellwood, Milwaukie, and Lake Oswego.

3.2 Study Termini Alternatives

Study Termini define the limits of the Corridor. They should not be mistaken for Minimum Operable Segments [MOS] which generally must be addressed in the DEIS. Study termini alternatives were investigated in the Pre-AA study, as well as in public workshops held in various locations throughout the South/North Corridor. Currently there are three options in the southern portion of the Corridor:

[a] South of Milwaukie CBD

[b] Clackamas Town Center

[c] Oregon City

and three options in the northern portion of the Corridor:

[a] North of Vancouver CBD [N.E. 88th Street]

[b] Vancouver Mall

[c] N.E. 179th Street

Study termini alternatives represent major issues to be investigated in Tier I. Study termini alternatives will not be addressed in the Scoping Process. Study termini alternatives will be sufficiently different to require separate network forecasts of travel times, ridership, and network statistics. Accordingly, it is anticipated that the Tier I Final Report would evaluate the study termini alternatives and recommend the alternative[s] to be forwarded to Tier II.

3.3 Alignment Alternatives and Design Options

Alignment alternatives represent the major route choices to be investigated in Tier I. Alignment alternatives will normally be sufficiently different from each other to generally require separate network forecasts of travel times, ridership, and network statistics. Accordingly, it is anticipated that the Tier I Final Report would evaluate the alignment alternatives and recommend the alternative[s] to be forwarded to Tier II.

Design options represent secondary routing choices which are generally not sufficiently different from each other as to necessitate separate network analyses. It is anticipated that design options will be narrowed during the Scoping Process, on an on-going basis throughout Tier I and, if more detailed analysis or public involvement is necessary, included in the Tier I Final Report.

Alignment alternatives and options were investigated in the Pre-AA study, a series of workshops with professional staff from the participating jurisdictions and a series of public workshops held in

various locations throughout the South/North Corridor. To date, only one alignment has been identified for the Commuter Rail and River Transit alternatives. However a series of alignment alternatives and options have been identified for the LRT alternative which also may be applicable to a Busway alternative. The following subsections describe the currently existing Alignment alternatives and options for the LRT Alternative on a segment-by-segment basis.

3.3.1 Oregon City to Milwaukie/Clackamas Town Center Segment

There are four Alignment alternatives in this, the southern most, segment of the Corridor:

[a] McLoughlin Boulevard from Oregon City to Milwaukie

[b] Portland Traction ROW from Oregon City to Milwaukie

[c] I-205 from Oregon City to Clackamas Town Center area

[d] Oregon City [I-205] through Gladstone to Milwaukie

Each of these alignment alternatives has several design options in this segment.

3.3.2 Clackamas Town Center to Milwaukie

There is one Alignment alternative [Harmony Road to Highway 224] in this segment, which has several design options.

3.3.3 Milwaukie to Portland CBD

There are three Alignment alternatives in this segment:

[a] East Side: McLoughlin Boulevard

[b] East Side: Portland Traction ROW

[c] West Side: Adjacent to Macadam Avenue

Each of these alternatives has several design options.

3.3.4 Portland CBD

There are two major alignment alternatives in this segment:

[a] Mall Alignment: Surface

[b] Mall Alignment: Tunnel

In addition, there are several design options depending on the alignment alternative to Milwaukie.

3.3.5 Portland CBD to Downtown Vancouver

There are two Alignment alternatives in this segment:

[a] I-5

[b] Interstate Avenue

In addition there are several design options in this segment. One critical choice will be how the Columbia River would be crossed. Currently there are three main options:

[a] Tunnel

[b] High Bridge

[c] Lift Bridge

3.3.6 Downtown Vancouver to Vancouver Mall

There is one alignment alternative [McLoughlin Boulevard] in this segment with several design options.

3.3.7 Downtown Vancouver to N.E. 179th

There are two alignment alternatives in this segment with several design options:

[a] I-5

[b] Highway 99

3.4 Tier I Study Organization

The objectives of the study organization are to:

(a) Ensure that the Tier I study process is reflective of community values, and

(b) Ensure that the Tier I study is a cooperative process and results in a regional consensus regarding the alternatives to be addressed in the DEIS.

Metro will be the lead agency for the South/North Alternatives Analysis. Participating agencies and jurisdictions include: C-TRAN, Tri-Met, Oregon Department of Transportation [ODOT], Washington State Department of Transportation [WSDOT], Clackamas County, Clark County, Multnomah County, Portland, Milwaukie, Oregon City, Vancouver, Gladstone, and the Southwest Washington Regional Transportation Council [RTC].

Figure 3 illustrates the organizational structure for the AA. Table 3-1 shows the roles of the oversight bodies in the Tier I evaluation process.

The following subsections explain the oversight bodies.

Figure 3
South/North AA Organizational Structure

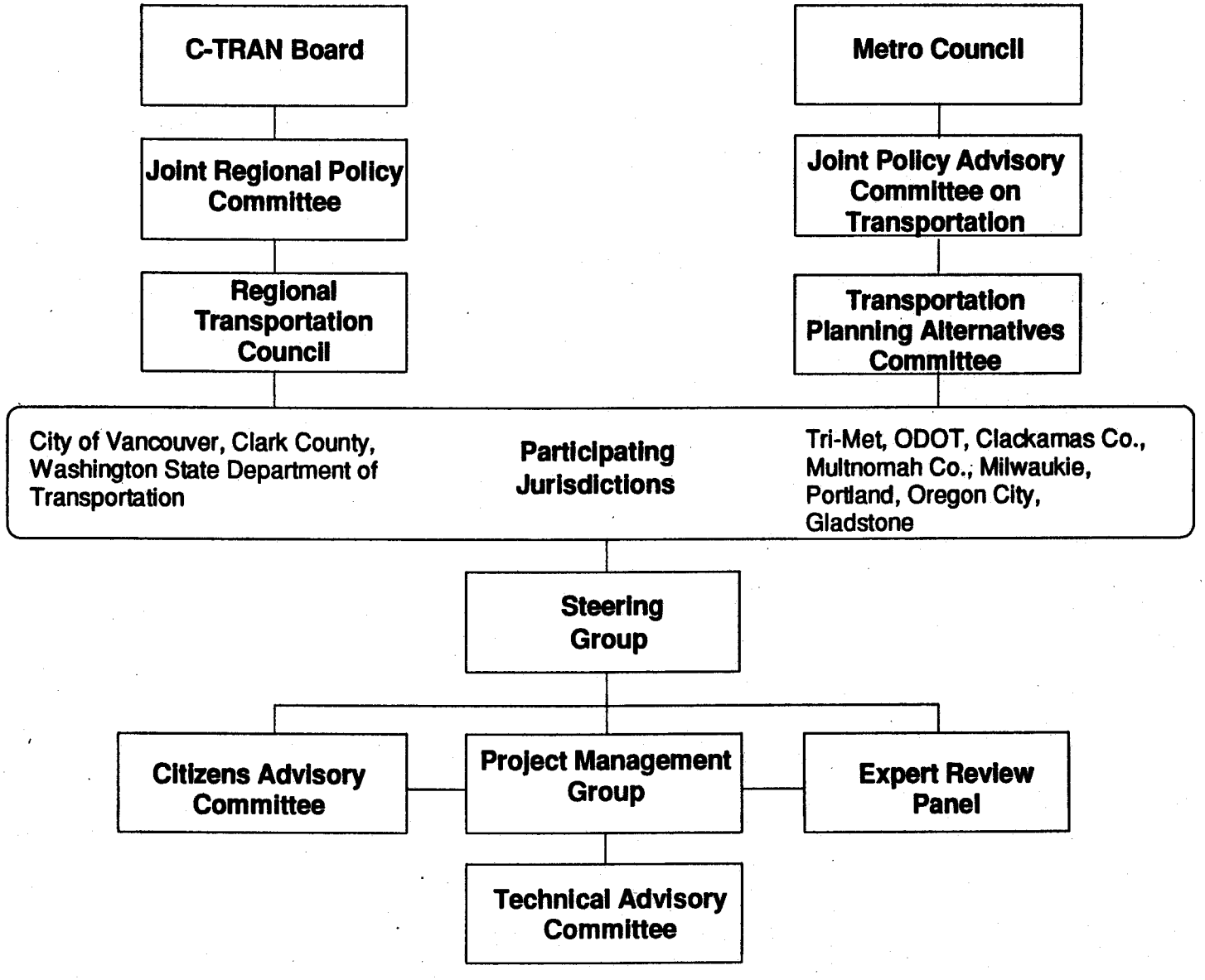


Table 3-1
Tier I Study Organization

Study Organization\ Product	Tier I Evaluation Methodology	Preliminary Alternatives Report for Scoping Meeting	Definition of Tier I Alternatives Report	Narrow Design Options	Tier I Final Report
Technical Advisory Committee	Review	Review	Review	Review	Review
Project Management Group	Recommend to Steering Group	Approve	Recommend to Steering Group	Approve or Recommend to Steering Group	Recommend to Steering Group
Expert Review Panel	Technical Validity Review	NA	Technical Validity Review	NA	Technical Validity Review
Citizens Advisory Committee	Review	Review	Recommend to Steering Group	Review	Recommend to Steering Group
Steering Group	Approve	NA	Approve	NA or Approve per PMG Action	Recommend to Participating Jurisdictions
Participating Jurisdictions	NA	NA	NA	NA	Recommend to RTC, JRPC, C-TRAN, JPACT, METRO
RTC/JRPC/C-TRAN	NA	NA	NA	NA	Approve
TPAC/JPACT/ METRO	NA	NA	NA	NA	Approve

3.4.1 Metro/JPACT/TPAC

The Tier I Final Report will be approved by the Metro Council, the MPO for the Oregon portion of the corridor. Recommendations to the Metro Council will come through the Joint Policy Advisory Committee on Transportation [JPACT] which is composed of elected officials and agency directors from throughout the region. The Transportation Policy Alternatives Committee [TPAC] is a senior staff level committee from jurisdictions and agencies in the region which makes recommendations to JPACT. The Metro Council, TPAC and JPACT will receive regular updates throughout the study process. Metro will be joint local lead agency with C-TRAN for the Draft Environmental Impact Statement within Tier II

3.4.2 RTC/JRPC/C-TRAN

The Tier I Final Report will 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 High Capacity Transit Act of 1990 [HB 1825] as amended in 1991 [HB 1677 and HB 2125] requires that a policy forum, or Joint Regional Policy Committee [JRPC] be formed by C-TRAN in order to qualify projects for State of Washington HCT funds. In 1991, C-TRAN established a JRPC, consisting of itself and a WSDOT representative, to ensure that HCT planning in Clark County adheres to state and federal requirements. The JRPC makes recommendations to C-TRAN. C-TRAN will be joint local lead agency with Metro for the Draft Environmental Impact Statement within Tier II and will be lead agency in meeting State of Washington Environmental Policy Act (SEPA) requirements.

3.4.3 Steering Group

The South/North Steering Group will be made up of policy-level representatives from the participating jurisdictions and Metro. In particular, representatives from the Steering Group will be provided by Metro (the Chair), C-TRAN, RTC, Tri-Met, the City of Portland, Clark, Multnomah and Clackamas Counties, Washington and Oregon State Departments of Transportation and a representative from the cities of Clark and Clackamas Counties. The Steering Group provides policy direction to the study and forwards recommendations to the participating jurisdictions, JPACT, Metro, RTC, JRPC and C-TRAN.

3.4.4 Project Management Group [PMG]

The PMG consists of senior management staff from the participating jurisdictions. The PMG oversees the general management of the study, focusing on schedule, scope and policy. Staff recommendations to the Steering Group are made through the PMG.

3.4.5 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.

3.4.6 Expert Review Panel [ERP]

The ERP for the AA/DEIS will consist of about ten outside experts, some local and some from throughout the country. A representation from several disciplines will be sought including transit industry officials, academicians and other specialized professional backgrounds. The ERP is required by Washington law to maintain eligibility for State of Washington funds. 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.

3.4.7 Technical Advisory Committee [TAC]

The South/North TAC is composed of technical staff from all of the participating agencies and jurisdictions. The TAC monitors the technical aspects of the study such as technical methodologies, technical assumptions and review of technical reports. The TAC reports to the PMG.

3.5 Public Involvement

The South/North Corridor Project will conduct an extensive public involvement program in conjunction with the AA/DEIS process. The two primary focuses of the public involvement program will be: (a) providing the public with information regarding the project and study, and (b) providing the public with opportunities to express their concerns regarding the project and their ideas to improve the project or mitigate its impacts. To this end, the following public involvement program has been developed for Tier I.

- **Citizens Advisory Committee**: The purpose of the Citizens Advisory Committee (CAC) is to [i] receive reports and information on the alternatives, [ii] serve as a forum for citizens to present their concerns and [iii] make recommendations regarding study selections to the Project Steering Group. The CAC will be involved in major study selections throughout the AA/DEIS phase.

- **Scoping Meeting:** At least one Scoping Meeting, in conformance with FTA guidelines, is held at the beginning of Tier I to determine the alternatives which will enter the Tier I evaluation process.

- **Information Meetings, Open Houses, Workshops**: These are open-to-the-general-public meetings which are used to provide project information and obtain public input. Several of these meetings will be held at the beginning of the project to inform the public of the alternatives being considered and of the process for public involvement. Meetings will also be held at key study selection points in the process.

- **Neighborhood Meetings**: Project staff will meet with neighborhood groups throughout the project area to obtain input about specific neighborhood concerns and develop possible design alternatives to mitigate those concerns.

- **Meetings with Community Leaders**: These meetings will keep both public officials and business leaders informed of project progress to ensure coordination of public and private sector decisions that might affect the South/North Corridor Project.

- **Meetings with Civic Groups**: Project and technical staff will make informational presentations to such civic groups as the Chambers of Commerce, fraternal organizations and service clubs on request.

- **Meetings with Individual Property Owners**: Project staff will meet with individual property owners to explain project design and impacts as requested.

- **Newsletters and Additional Information Materials**: Several issues of the project newsletter, *South/North News*, will be published to keep the public informed on project progress. This newsletter will be distributed throughout the South/North Corridor area. In addition, Fact Sheets, exhibits, and other audio-visual aids will be produced to keep the public informed and involved.

4. EVALUATION MEASURES

4.0 Introduction

In Section 2.5, a Tier I goal and seven Tier I objectives were derived for the Corridor Study from the purpose and needs analysis. These objectives, or sub-sets thereof, serve as the basis for making the study selections set forth in Chapter 3. The Tier I evaluation methodology described in this chapter prescribes two or more *criteria* for each of the objectives, and one or more *measures* for each criterion. The following subsections define, for each objective, the criteria and measures to be used in Tier I evaluation.

The list of measures identified in this report represents an initial determination of such factors based on analyses to date. The final list of criteria and measures to be included in the evaluation process may be modified due to further technical analyses and public involvement.

4.1 Objective 1: Provide High Quality Transit Service

The automobile provides the quality of service by which most people judge other transportation options. If transit is to be effective in reducing the region's reliance on the automobile, it must offer a competitive quality of service.

Transit network statistics used to calculate the quality of service measures; including capacities, travel times, transit ridership, and auto volumes will be derived from the EMME2 model described in the *Travel Demand Forecasting Methodology Report, January 1993*. These models will be applied to the road and Tier I transit network configurations. The assumptions used in the ridership forecasts are documented in that Methodology Report.

4.1.1 Ease of Access To/From Network

[a] *Number of residential units/population within station areas*

This measure indicates the amount of people living within a one-half mile walk of a transit station or stop.

[b] *Number of jobs within station areas*

This measure indicates the amount of people working within a one-half mile walk of a transit station or stop.

[c] *Elderly and Disabled [E&D] Accessibility*

This measure will primarily be used in the evaluation of modal alternatives. It assesses whether or not there are any special requirements, advantages or limitations relating to E&D accessibility inherent in the mode.

4.1.2 Transferability

[a] *Ease of transfers*

Qualitative analysis of the physical, reliability and wait time aspects of transferring.

[b] *Ability to site park-and-ride lots*

Assessment of any difficulties or limitations in siting and building park-and-ride lots.

4.1.3 Travel Times

[a] Representative weighted transit travel times between major origins and destinations in the Corridor

Total weighted travel time includes time spent walking to transit, initial and transfer (if any) wait time, in-vehicle time, and the time walking from transit to the destination. The time associated with each component of a trip is weighted to reflect how that time is perceived by the traveler. Time spent in a vehicle is given a factor of one. Peak-hour wait time and walking time are given a factor of about 2:1. The total weighted travel time is not directly related to the actual time a trip will take, but instead reflects the perceived cost in time for the traveler.

4.1.4 Reliability

[a] *Miles of exclusive right-of-way*

Alternatives which include no or limited amounts of reserved right of way require transit service to operate in mixed traffic. Tri-Met has found that the existing Eastside LRT, which uses reserved or separated ROW, has historically exhibited a higher percentage of on-time arrivals than buses in mixed traffic. Thus, the relative amount of reserved right of way in the Corridor between alternatives is used one measure of the relative reliability of the alternatives.

[b] *Percent of trunkline intersections which are protected*

In addition to reserved right of way, transit reliability can be enhanced through the

use of transit priority measures such as queue bypasses, gated intersections, and signal pre-emption equipment. This measure of reliability compares alternatives on the basis of the percent of intersections along the major trunkline in the Corridor which have some sort of transit priority [the type of treatment is not differentiated].

[c] *Per cent of corridor passenger miles on exclusive right-of-way*

Another measure of reliability to be used in Tier I is the total amount of corridor passenger miles occurring in reserved ROW (this includes LRT passenger-miles, which are in reserved ROW, and bus passenger-miles, which are not in reserved ROW). The alternative with the most corridor passenger miles occurring in separated ROW would provide reliable transit operations to the greatest amount of transit travel among the alternatives.

4.1.5 Ridership

[a] *Corridor Transit Ridership*

Corridor transit ridership refers to the daily number of linked trips (transfers not counted) on the transit network within the corridor travel shed in the forecast year on all transit modes.

[b] *HCT Transit Ridership*

The daily number of transit trips using the HCT component of the South/North transit system [e.g., busway, LRT, Commute Rail or River Transit]. HCT ridership will be estimated on a segment-by-segment basis.

[c] *Transit Ridership to/from Major Centers*

The daily corridor number of transit trips produced in and/or attracted to downtown Portland, Vancouver, east Portland and Clackamas County in the forecast year.

4.2 Objective 2: Ensure Effective Transit System Operations

4.2.1 Downtown Portland Operations

Because of additional downtown Portland transit service associated with all of the modal alternatives, it is critical to ensure that downtown portion of the system continues to operate in an efficient and reliable manner. The following measures will be used in Tier I to assess downtown Portland operations:

[a] *Number of Peak Hour Transit Vehicles in Downtown*

P.M peak-hour bus and light rail volumes in downtown Portland by street/alignment.

[b] *Transit Mall operations*

Are bus or light rail volumes on the mall approaching or exceeding the capacity of the mall? Are there any special requirements or limitations to operating the mall that are necessitated by the alternative?

[c] *Potential for intersection blockages/traffic circulation impacts*

Will the likelihood of trains and/or buses backing-across intersections significantly increase? Are significant revisions/additions to the downtown Portland traffic signalization system needed? Are there significant reductions in the capacity of the downtown road/parking network?

4.2.2 Modal Compatibility

As discussed in Chapter 3, the initial set of Tier I modal alternatives include: bus, light rail, commuter rail and river transit. Whereas, bus and rail networks are operating modes within the existing system, commuter rail and river transit would be new modal options to the region. As with any new option, the compatibility of the new option with the existing operations must be assessed -- special requirements, limitations and advantages must be identified and analyzed. The following measures will be used in this assessment. The questions that follow each measure are examples of the type of information to be researched, and will be used to the extent they prove to be important differentiations between the modes:

[a] *Safety considerations and risk management requirements*

Are there any unique safety considerations associated with operating the mode? In comparison to the existing Tri-Met risk management program, are there any special vehicle, driver or liability insurance requirements [and costs] or savings inherent in the mode? Are there any additional liabilities associated with the mode? If so, are these acceptable?

[b] *Availability of vehicles and parts*

Are vehicles and parts readily available from more than one source? Are there any unusual [good or bad] time allowances that are required to obtain vehicles and parts? Are there any unusual [good or bad] vehicle and parts costs trends? Are there any existing or upcoming federal regulations which may significantly change the availability or costs of vehicles and parts?

[c] *Maintenance requirements*

Has the maintenance record of the modal option in other regions been acceptable? Are there any unusual maintenance requirements such as special facilities, unusually long down-times, special employee skill or contract service requirements, new types of maintenance requirements? Or are there any special advantages?

[d] *Operating requirements*

Are there significant limitations or advantages to operating the mode at certain grades, under adverse weather conditions, at certain river levels [for river transit]. Are unusually long dwell times needed at stops? Are there any unusual time-of-day restrictions or requirements on operations? Are any special fuels required? If so, are they readily available?

[e] *Driver requirements*

Is any special driver training or licensing required? Are trained drivers readily available? Are different unions and union rules involved? Can existing drivers be easily employed?

[f] *Environmental considerations*

Is the mode unusually noisy? Does the mode operate in a particularly sensitive environment? Are there any significant special environmental requirements associated with the mode?

[g] *Regulatory requirements*

Are there any federal, state, or local regulatory requirements associated with the mode that effect its operational effectiveness such as federal railroad statutes or rules, waterway and greenway protection statutes or rules, PUC rules, Coast Guard or Corps of Engineers requirements, Section 4(f) requirements, etc?

4.3 Objective 3: Maximize the Ability of Transit Network to Accommodate Growth in Travel Demand

Federal guidelines require that the transit networks shown in an AA/DEIS be adequate for a design year approximately 20 years in the future. An important local consideration is the effectiveness of the alternatives to respond to growth beyond the 20 year time frame. The capacity of the various alternatives are restricted by different factors. The measures which follow identify these factors and qualitatively assesses the capacity of the alternatives and the ease of expanding the South/North Corridor transit system to meet travel demands in the forecast year and beyond.

4.3.1 Design Capacity

[a] *Capacity of HCT vehicle*

This measure compares the seated, standing and total [seated plus standing] capacity of the primary modal alternatives [bus, LRV, Commuter Rail, and River Transit].

[b] *Place miles within the corridor*

"Place Miles" is an indicator of how much travel the transit system can potentially accommodate. A "Place Mile" is defined as one seated or standing space traveling one mile. While "Place Miles" do not necessarily indicate if the capacity is in the precise location needed to accommodate demand; the higher the number of "Place Miles", the greater the corridor-wide potential of an alternative to accommodate demand.

4.3.2 Future Expansion Capability

[a] *Corridor network expansion capability*

Assessment of how and the extent to which the alternative/option impacts the costs, constraints and opportunities for future expansion of the system.

4.4 Objective 4: Minimize Traffic Congestion and Traffic Infiltration through Neighborhoods

The quality of traffic operations on roadway facilities is described in terms of level of service, a measure of operational conditions and their perception by motorists. Level-of-service (LOS) ratings range from "A" to "F"; LOS A represents the best operation and LOS F the poorest operation. Within the Portland metropolitan region, the peak-hour level-of-service goal is LOS D. Deficiencies are deemed to exist at LOS E (exceeding the D-E boundary). Attainment of the regional level-of-service goal would result in a "balanced" highway system characterized by moderate peak-hour congestion levels without significant breakdowns in flow on any roadway facilities.

In a "balanced" road system, through traffic would be carried on facilities classified as "arterials" or "highways." However, as traffic grows and peak-hour traffic on these facilities begins to exceed their capacity, the deteriorating traffic conditions and resulting delays will motivate motorists to seek alternate routes. Oftentimes these alternate routes are on collectors or local traffic streets passing through established neighborhoods. Such traffic results in a broad array of negative impacts on the neighborhood.

4.4.1 Highway System Use

[a] *P.M. peak-hour, peak direction traffic volumes at cutlines*

Detailed traffic analyses will be performed in Tier II, not in Tier I. To estimate this impact in Tier I, traffic volumes will be estimated on a cutline basis. The relative effectiveness of the alternatives in achieving highway and arterial service level objectives and traffic infiltration through neighborhood objectives will be measured by the difference between their projected traffic counts at these cutlines.

4.4.2 Traffic and Neighborhood Infiltration Relief

[a] *P.M. peak-hour transit ridership at key traffic congestion cutlines in Corridor*

This measure indicates the potential of the transit alternatives to resolve the traffic congestion problems identified above. By removing cars from the peak hour road system, the transit alternatives increase the level of service on highways and arterials reduce the likelihood or amount of traffic infiltration in neighborhoods. Specifically, peak direction transit ridership will be calculated at each of the cutlines tested on the highway system. The higher the ridership at key cutlines on the highway system, the higher the potential of the transit system to assist in relieving traffic congestion and neighborhood infiltration.

4.5 Objective 5: Promote Desired Land Use Patterns and Development

FTA requires the assumption underlying an AA/DEIS be that the alternatives will not affect the amount of population and employment growth but could affect the distribution of land development in the corridor. Accordingly, the AA/DEIS will not project quantitative differences between the alternatives in the amount of population and employment within the region or corridor. Instead, the relative ability of the alternatives to promote efficient land use and land development patterns will be evaluated on a qualitative basis.

4.5.1 Support of Activity Centers

[a] *Proximity of stations to downtown Portland, Lloyd District, Central Eastside Industrial District, downtown Milwaukie, downtown Vancouver, Clackamas Town Center, Van Mall, downtown Oregon City*

The ability of the alternatives to provide visibility, accessibility and foot-traffic to the major activity centers in the Corridor will be qualitatively assessed.

[b] *Other significant considerations*

Qualitative assessment of the ability of the alternative to be physically and functionally integrated into the activity centers in the Corridor.

4.5.2 Support of Bi-State Policies

[a] *Propensity to control sprawl*

Qualitative assessment of the ability of the alternatives to maintain the Clark County and METRO urban growth boundaries.

[b] *Propensity to help manage the pattern of growth*

Qualitative assessment of where growth is expected to occur, the density of growth and the relationship of the pattern and density of growth to the goals, objectives and policies of local and regional land use and development plans.

[c] *Commitments to Transit Supportive Land Use*

Pursuant to the policies set forth in ISTEA, assess current and possible future land use policies and regulations in terms of their ability to create transit supportive land uses in station areas.

4.6 Objective 6: Provide for a Fiscally Stable and Financially Efficient Transit System

4.6.1 Cost

[a] *Capital Cost*

Tier 1 Capital Costs will be developed in 1993 dollars from conceptual designs for each of the alignment alternatives and options. These designs will be developed in sufficient detail to identify the type of right-of-way, principal quantities, and description of the main facilities so that the estimating methodology described in the Capital Cost Estimating Methodology Report can be applied. The resulting estimates provide an indication of how the capital costs of the alignment alternatives and options compare, but may well change during Tier II as more detailed designs are developed.

[b] *Operating Cost*

Total operating cost within the corridor will be estimated [for the forecast year in 1993 dollars] for each alternative by factoring the transit operations characteristics of the corridor [for example: vehicle miles and hours of operations, etc.] by the applicable 1993 unit costs [for example: cost per mile and cost per hour, etc.] experienced by Tri-Met.

[c] *Net Operating Subsidy*

The net operating subsidy within the corridor is the difference between corridor operating costs and the farebox revenue generated in the corridor. Farebox revenues within the corridor will be computed by multiplying the number of riders in the corridor by an average fare per boarding rider [note that boarding rides include originating trips and transfers].

4.6.2 Cost-Effectiveness

Cost-effectiveness analysis provides a means of comparing the benefits of each alternative with its costs. FTA has established a Cost-Effectiveness Index as a standardized measure for evaluating the relative merits of fixed guideway alternatives within a corridor. The Index measures the cost-per-added-rider of an LRT alternative compared to a TSM Alternative. This measure will be used in Tier II, when the networks are refined and the costs are more reliable.

The Tier I cost-effectiveness measures include:

[a] *Net Operating Subsidy per rider*

[b] *Net Operating Subsidy per place mile*

[c] *Boarding Riders per Revenue Hour*

This measure is the ratio of the number of riders on the HCT line divided by the amount of time the HCT line operates. The measure will be generated on a segment-by-segment basis.

[d] *Annualized total public cost per rider*

The annualized capital cost of the alternative and forecast year net operating subsidy [for the corridor] will be totaled and divided by the average number of annual transit riders in the corridor -- producing an average public cost per rider.

4.6.3 Financial Feasibility

A detailed capital cost and system operating cost feasibility analysis will be prepared in Tier II when costs and funding prospects are better known. The Tier I "financial feasibility" criterion focuses on the comparative prospects of the various alternatives to secure sufficient funding.

[a] *Applicability of capital funding options to mode/alignment*

The Pre-AA Funding Inventory was prepared to identify the funding options available to plan and construct fixed guideway projects in the South/North Corridor. The existing funding authorities of FTA, C-TRAN, Tri-Met, METRO, Clark County, cities and counties, and the states of Oregon and Washington which could reasonably relate to fixed guideway projects in the South/North Corridor were identified and researched. Preliminary data regarding the amount of revenue which could be generated by each funding option were compiled through literature search, conversations with staff and extrapolation of other secondary sources.

These funding options will be reviewed in Tier I and supplemented with additional research to determine if there are any attributes of the options which make them more or less available to each of the alternatives.

[b] *Capital Cost Threshold*

Based on the additional research above, a study assumption will be proposed to establish a threshold on the maximum amount of capital funds which will ultimately be available to the alternatives. The capital cost of each alternative will then be compared to the capital cost threshold for that alternative to assess the likely feasibility of that alternative.

4.7 Objective 7: Maximize the Efficiency and Environmental Sensitivity of the Engineering Design

4.7.1 Significant Environmental Impacts

[a] *Identify significant environmental issues*

The DEIS will assess the broad array of environmental impacts as required by the National Environmental Protection Act (NEPA). The evaluation of the modal, alignment and study termini alternatives in Tier I will identify those environmental factors that are considered to be significant to the selection of the Tier II alternatives [e.g. significant displacements, etc.].

4.7.2 Significant Design Considerations

[a] *Identify major operating considerations*

The study team will identify operating issues regarding alignment alternatives and options which they determine may be significant in narrowing the alternatives and options. This may include the impacts of the alignment alternatives and options on such factors as maneuverability, scheduling, travel speeds, reliability, etc.

[b] *Identify major engineering considerations*

The study team will identify engineering issues regarding alignment alternatives and options which they determine may be significant in narrowing the alternatives and options. This may include the impacts of the alignment alternatives and options on such factors as capacity, traffic conflicts, design safety, etc.

4.8 Application of Evaluation Methodology to Tier I Study Process

The aforementioned criteria and measures will be used in various combinations to evaluate the choices outlined in Chapter 3. Table 4-1 shows the criteria which are applicable to Scoping Process. Table 4-2 shows the criteria which are applicable to the selection of design options for further study throughout [on an on-going basis] Tier I. Table 4-3 shows the criteria which are to be used in the Tier I Final Report.

Table 4-1
Evaluation Criteria for Scoping Process

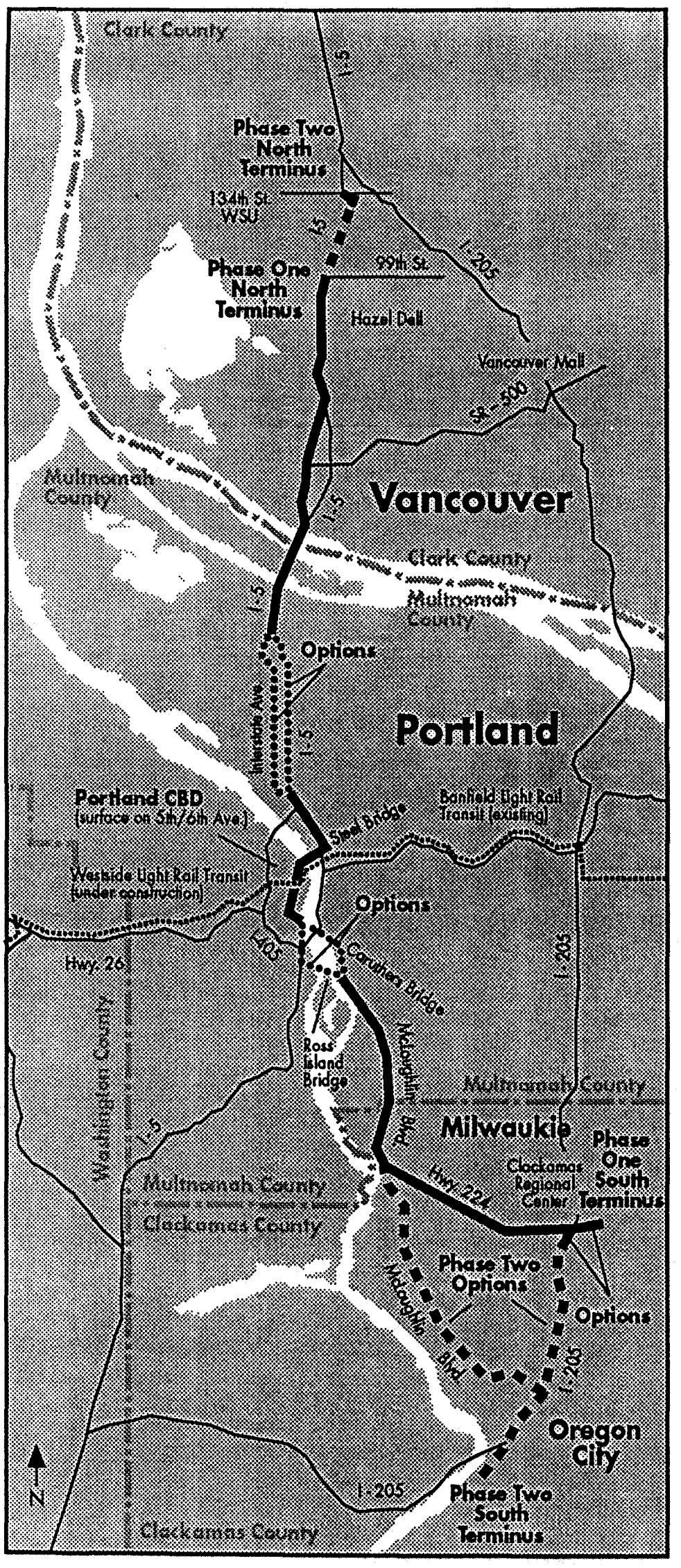
NARROW MODAL ALTERNATIVES	NARROW ALIGNMENT ALTERNATIVES	NARROW DESIGN OPTIONS	NARROW STUDY TERMINI ALTERNATIVES
Transit Service – ***Ease of Access*** – ***Transferability*** – ***Travel Times*** – ***Reliability*** – ***Ridership*** **Transit Operations** – ***Modal Compatibility*** **Ability to Accommodate Growth** – ***Design Capacity*** – ***Future Expansion Capability*** **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***	**Alignment Alternatives will not be narrowed during the Scoping Process**	**Transit Service** – ***Ease of Access*** – ***Transferability*** **Transit Operations** – NA – **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 will not be narrowed during the Scoping Process**

Table 4-2
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**

Table 4-3
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 –


Clark County
I-5
Phase Two North Terminus
134th St. WSU
Phase One North Terminus
99th St.
I-205
Hazel Dell
Vancouver Mall
Vancouver
Multnomah County
Clark County
Multnomah County
Options
Interstate Ave.
Portland
Portland CBD
(surface on 5th/6th Ave.)
Steel Bridge
Banfield Light Rail Transit (existing)
Westside Light Rail Transit (under construction)
Options
Hwy. 26
Washington County
Ross Island Bridge
Multnomah County
Milwaukie
Phase One South Terminus
Clackamas Regional Center
Hwy. 224
Clackamas County
Phase Two Options
Options
McLoughlin Blvd.
Oregon City
N
I-205
Phase Two South Terminus
Clackamas County