Major Investment Study
Final Report

November 28, 1995

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South/North Transit Corridor Study

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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 not 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):

Figure 3-1 Map of North Corridor

(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

FIGURE 3-2: MAP OF SOUTH CORRIDOR OPTIONS

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

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:

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.

With the adoption of the *Tier I Final Report* and selection of the design concept and scope for the South/North Corridor Project, the inclusion of the design concept and scope in the applicable RTPs, the amendment of the applicable TIP and the associated determinations of air quality conformity, the MIS for the South/North Corridor was complete.

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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.

Figure 6-1

Figure 6-2

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 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.

Figure 6-3

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:

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

Figure 6-5

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

Figure 6-7

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.

Figure 6-8

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.

Figure 6-10

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.

Figure 6-12

Figure 6-13

Figure 6-14

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.

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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	$74															$2,85

Revenues	7	$ 69	$156	$156	$535	$124	$124	$123	$123	$123	$110	$115	$115	$115	$115	0

(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.