Bus Rapid Transit (BRT) Concept

Major Investment Study (MIS)

Final Report

1999

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BRT Concept MIS Report Contents

Preface

The Bus Rapid Transit (BRT) concept is the preferred transit strategy for the Eugene-Springfield metropolitan area. BRT emerged as the preferred strategy through a Major Investment Study (MIS) undertaken as part of the *Eugene-Springfield Regional Transportation Plan (TransPlan)* update. *TransPlan* guides the comprehensive metropolitan transportation system planning process and the MIS is a subset of this process. The *TransPlan* update process was the decision making process for the BRT concept. The MIS informs decisions by the Metropolitan Planning Organization (MPO), in cooperation with participating agencies, on the design concept and scope of major investments. The MIS scope of work, level of detail, schedule, and technical methods were based on local conditions through a collaborative, cooperative process involving partnership between local, state, and federal agencies. The key participating agencies were Lane Council of Governments (Metropolitan Planning Organization), Oregon Department of Transportation (ODOT), Lane Transit District, City of Eugene, City of Springfield, Lane County and the Federal Highway Administration (FHWA).

TransPlan Update/BRT Concept MIS Overview

The *Eugene-Springfield Regional Transportation Plan (TransPlan)* establishes the framework upon which participating public agencies can make consistent and coordinated planning decisions regarding inter- and intrajurisdictional transportation. Since 1992, *TransPlan* has been undergoing a comprehensive update process encompassing extensive public involvement, a broad range of technical analyses and studies, and the expertise of staff, consultants, public officials, and stakeholders. The updated plan is scheduled for adoption in 1999.

Purpose and Need

The necessity for the BRT MIS was established at the beginning of the *TransPlan* update process as needs, trends and issues were identified. Some of the key trends and issues are listed below and are discussed in detail on page 4:

- Rapid population and employment growth
- Vehicle miles traveled outpacing population growth
- Traffic congestion increasing and forecasted to increase further
- Forecasted air quality degradation
- Reduced transit travel times as buses are caught in growing congestion

The purpose of the *TransPlan* update/BRT Concept MIS is set forth through the goals and objectives that were established and are presented on page 6. An alternatives evaluation process was developed that conformed to the goals and objectives and additional needs. The evaluation process is described beginning on page 12. Draft *TransPlan* policies that address the community's needs are presented on page 13.

Alternatives Development and Analysis

The *TransPlan* update/BRT Concept MIS process included consideration of a range of alternatives, including urban rail. This report describes the public process and technical analysis by which the alternatives were developed and evaluated. The rationale for narrowing the

alternatives was based on the *TransPlan* update goals and objectives and evaluation criteria. Public and agency input was obtained to refine the alternatives and selected a preferred alternative. The alternative plan concepts are described on page 11. The Bus Rapid Transit alternatives are described on page 38.

Public and Agency Involvement

Throughout the *TransPlan* update/BRT MIS process, citizens and agencies have had numerous opportunities to comment on the process and products. Through public involvement techniques such as the stakeholder process, open houses, surveys and focus groups, citizens participated in the development and review of needs and issues, goals and objectives, strategies and alternative plan concepts. Descriptions of citizen and agency involvement are included in Chapter 1: Overview of *TransPlan* Update/BRT MIS Process, Chapter 2: Urban Rail Study, and Chapter 4: Transit Market Analysis and Transit System Analysis .

TransPlan Update/BRT Concept MIS Guidance

The *TransPlan* update/BRT MIS process was guided by several bodies of elected and appointed officials and staff, including:

1. **The Lane Council of Governments Board of Directors** established policy except in specific cases where that responsibility was delegated to the Metropolitan Policy Committee. As the Metropolitan Planning Organization (MPO), LCOG has responsibility for conducting the continuing, comprehensive and cooperative transportation planning process in the Eugene-Springfield metropolitan area. The LCOG Board retains responsibility for endorsement of the transportation plan and amendments and for adoption of the work program.

2. **The Metropolitan Policy Committee (MPC)** is comprised of two elected officials each from Lane County, Eugene and Springfield, two appointed board members from Lane Transit District and as ex-officio members, the chief administrative officers of Lane County, Eugene, Springfield and Lane Transit District and the Region 2 Manager for the Oregon Department of Transportation. MPC provides policy guidance related to the conduct of the transportation planning process, for adoption of the annual Transportation Improvement Program, and for advising the LCOG Board on its action related to the transportation plan and the annual review process and other transportation issues.

3. **The Transportation Planning Committee (TPC)** conducts the technical portions of the process and public participation. It is composed of staff planners and engineers from all participating jurisdictions.

4. **The Joint Planning Commission Committee (JPCC)** is composed of two members from the planning commissions of Lane County, Eugene and Springfield. It provides general guidance and input into the region's transportation public involvement process.

Major Investment Study Definition and Requirements

A Major Investment Study (MIS) is a planning tool to provide the regional multimodal transportation planning effort with in-depth technical analyses of various subarea or corridor options, allowing for better decisions about improving transportation in metropolitan areas. An MIS for a corridor or subarea is undertaken when the need for a major metropolitan transportation investment has been identified in the metropolitan planning process and where federal funds are potentially involved. A *major investment* is officially defined as a "high-type highway or transit improvement of substantial cost that is expected to have a significant effect on capacity, traffic flow, level of service, or mode share at the transportation corridor or subarea

scale." Where major investments are contemplated, it is necessary 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 subarea level transportation problems **-- Major Investment Studies (MISs)** meet this need.

MIS requirements include the following:

- Provide a focused analysis and evaluation of the mobility needs and related problems of a corridor or subarea within the region
- Identify a multimodal set of mobility investment and policy options to address those needs and problems
- Develop measures of benefits, costs, and impacts
- Conduct comprehensive analysis and evaluation of the options
- Inform decisions on the design concept and scope for corridor/subarea major investments and policies to be incorporated into the regional transportation plan

If the Eugene-Springfield metropolitan area decides to advance the Bus Rapid Transit concept that emerged from the *TransPlan* update/BRT MIS process, the next steps involve project development – including preliminary engineering – which defines major design features in greater detail, and completion of the National Environmental Policy ACT (NEPA) process. The BRT Concept MIS follows the principles of the NEPA process, including public involvement and the consideration of alternatives and their environmental effects. The MIS process and documentation will serve as input to subsequent NEPA documentation. Following completion of the NEPA environmental review process, transportation improvements could be advanced to final design and implementation.

Organization of This Report

This MIS report is organized around the key components of the BRT Concept MIS process.

- The first chapter provides a general overview of the *TransPlan* update process. The *TransPlan* update process provided the decision making framework for the BRT MIS. A thorough understanding of the *TransPlan* update process facilitates understanding the BRT MIS decision-making process.
- The second chapter describes in detail the Urban Rail Study conducted in 1995 during Phase II of the *TransPlan* update process. This study provided important conclusions regarding rail and resulted in recommendations that informed the BRT MIS process.
- The third chapter describes in detail the alternative plan concepts that were developed and evaluated as part of the *TransPlan* update process. This chapter documents results of the technical evaluation of the various combinations of transportation demand management and land use strategies and transit and roadway networks.
- The fourth chapter describes transit market analysis, and transit system analysis.
- The fifth chapter provides a summary and conclusions to the study and a description of the proposed BRT system.

Chapter 1: Overview of *TransPlan* Update/BRT MIS Process

The *TransPlan* update/BRT MIS process consisted of four phases:

- Phase I: Needs/Issues and Goals/Objectives (June 1992 – June 1993)
- Phase II: Alternatives Development (July 1993 – October 1995)
- Phase III: Alternatives Evaluation and Draft Plan Direction (November 1995 – April 1997)
- Phase IV: Draft Plan Development, Review, and Adoption (May 1997 – 1999)

Phase I: Needs/Issues and Goals/Objectives (June 1992 – June 1993)

The first phase focused on developing a comprehensive understanding of transportation-related existing and projected needs and issues and on defining the mobility deficiencies that the *TransPlan* update/MIS process would address. Phase I public involvement efforts, including two open houses, presentations, a survey and newsletters, focused on publicizing the kickoff of the *TransPlan* update and identifying the issues, needs, and concerns of community residents about transportation and land use planning.

Key Trends and Issues

Phase I included trends analysis and forecasts of future need based on population, employment and land use assumptions. Trends that affect the regional transportation planning environment include the following:

Trend #1: The regional population is growing.

Over the last 20 years, the region's population increased by 30 percent. By 2015, the population is expected to grow an additional 44 percent to approximately 296,000 people.

	1995	2015	Percentage Increase
Population	224,100	301,400	34%
Employment	106,900	153,000	43%

Trend #2: The number of automobiles is growing even faster.

Between 1970 and 1990, the number of vehicles in Lane County increased by 83 percent, while the number of households only increased by 62 percent.

Trend #3: The number of miles traveled by automobile is growing still faster.

Residents are taking increased numbers of vehicle trips more frequently and over greater distances. Between 1980 and 1990, vehicle miles traveled (VMT) grew at a rate seven times that of the population growth. The U.S. Department of Transportation forecasted that the VMT rate would double by the year 2020.

Insert TransPlan Trek Timeline

Trend #4: Reliance on the automobile is increasing while the use of alternatives is decreasing.

More people drive alone to work and use their cars for almost all business, social, and recreational activities. Between 1983 and 1990, the percentage of single-occupant vehicle commuters rose from 64 percent to 73 percent. The percentage who used bikes, buses, or who walked as a primary means of transportation continued to decline: bus commuters dropped from 4.5% to 3%, bike commuters from 5% to 4%, and walking commuters from 6% to 5%.

Trend #5: Existing land use patterns encourage automobile use.

Most residents live in single-family residential neighborhoods, some distance from jobs and shopping. These land use patterns make it easier to get to these places by car rather than by bus, bike, or walking. New office and retail developments are dispersed throughout the cities in areas away from downtowns and along arterial streets lined with commercial developments.

Trend #6: Transportation costs are rising while revenues are shrinking.

Investments in transportation facilities have not kept pace with the growing demands on the system. This trend is expected to continue. The State of Oregon estimates total road and bridge needs in the next 20 years of about $49 billion, but projects revenues of only about $23.7 billion. All regions of the state can expect less help to resolve transportation problems.

Transportation-related **issues** that affect the region's quality of life include the following:

Issue #1: Some Eugene-Springfield roads are already congested and this will increase as the region grows.

Increased VMT and growth in daily traffic on major streets is creating congestion that will worsen as more vehicles use the system. Average daily traffic on many major streets is growing by 3-6 percent or more per year. Congestion in Eugene-Springfield is no longer limited to rush hours. At least half of the local residents find roads are congested at various times of the day. The vast majority finds roads are congested during morning and evening rush hours. Lane Transit District has also felt the effects of increased traffic congestion. To maintain its current level of service, LTD added buses to several routes.

Issue #2: Traffic growth affects air and water quality and the livability of neighborhoods.

New automobile technology has markedly reduced automobile emissions, but air quality is still being degraded. Motor vehicles emitted 60,000 tons of carbon monoxide into the region's air annually in the early 1990s, causing 50 percent of all air pollution. Water quality is also affected as automobile emissions, oil, grease, and metals are washed into local rivers and wetlands by urban stormwater.

Issue #3: Auto-dependent land use patterns limit mobility.

Policies that encourage the separation of land uses limit residents' mobility and transportation choices. These conditions also diminish mobility for those who rely exclusively on the automobile because the conditions lead to increased congestion, travel distances, and travel times.

Those who do not drive have limited choices as well. The 1990 U.S. Census reported that approximately 10 percent of all households in the Eugene-Springfield metro area did not own a vehicle.

Issue #4: Growing demands on the transportation system raise questions about the ability to pay for needed improvements.

At both the state and local levels, the ability to finance new transportation projects and to maintain and operate existing facilities is not keeping pace with growing demand. Transportation and land use systems designed predominantly for the automobile are expensive to build and maintain.

Preservation of the transportation system is important. Maintaining streets and meeting legal requirements is expensive and may divert funding from other transportation system improvements. Preservation is generally given higher priority than building new facilities because failure to perform timely maintenance results in even greater expense.

Issue #5: State and federal environmental standards are stricter and stronger.

While new environmental standards for water and air quality will help to reduce the environmental impacts of transportation projects, the standards also are likely to increase project costs. Current revenue sources, such as gas tax and timber receipts, cannot keep pace. New revenue sources will be needed to address increased demand and new regulations, as well as to meet new policy direction.

Issue #6: For the first time, federal and state policies emphasize reducing reliance on the automobile and federal funds support investment in alternatives.

A major shift in policy has occurred at both the federal and state levels. New policies that require coordinated land use and transportation planning also provide increased and more flexible funding for alternatives, require removal of barriers to transportation access, and require plans that will increase opportunities to use other transportation methods and to improve transportation choices.

Goals and Objectives

The Draft *TransPlan* goals and objectives development process included the following steps:

- The **federal and state regulatory frameworks** for transportation planning were evaluated for their implications in the Eugene-Springfield area. Legislation such as the *Intermodal Surface Transportation Efficiency Act (ISTEA), 1991 and the Transportation Planning Rule (TPR), 1991*, was reviewed. *(Trends, Issues and Opportunities, November 1993)*

- **Existing local transportation and land use planning policies** (*Metro Area General Plan, 1987 Update; TransPlan 1986*) were reviewed in the context of federal and state regulations. The existing local policies were found to be generally consistent with federal and state direction, yet it was clear that the policy framework needed to be updated to close gaps due to new federal and state mandates to integrate transportation and land use planning, to reduce congestion and vehicle miles of travel per person, and to reduce reliance on the auto.

- **Interim goals and objectives** were proposed to guide the plan update process and serve as the first step toward development of plan policies. When developing the interim goals and objectives, staff took into account the existing local policy framework and the federal and state regulatory framework for transportation planning in the Eugene-Springfield metro area. Some goal language was derived from goal language set forth in the *Oregon Transportation Plan (1992)*.

- A **Goals and Objectives Committee** was formed in 1995. The committee consisted of ten stakeholders, including planning commissioners and the chairpersons and co-chairpersons from the three strategy task forces. During the first series of meetings (between January 1995 and March 1995), the committee reviewed and refined the *TransPlan* interim goals and objectives, taking into account the comments and suggestions from stakeholders at the first symposium. The Interim Goals and Objectives were reviewed by planning commissioners and elected officials from each of the three metropolitan jurisdictions. In December 1995, the **Metropolitan Policy Committee** approved the interim goals and objectives as the guiding framework for the *TransPlan* update. *(MPC Meeting Minutes, December 14, 1995)*

The Draft *TransPlan* goals and objectives follow:

Goal #1: Integrated Transportation and Land Use System

Provide an integrated transportation and land use system that supports choices in modes of travel and development patterns that will reduce reliance on the auto and enhance livability, economic opportunity, and the quality of life.

Goal #2: Transportation System Characteristics

Enhance the Eugene-Springfield metropolitan area's quality of life and economic opportunity by providing a transportation system that is:

a) Balanced,
b) Accessible,
c) Efficient,
d) Safe,
e) Interconnected,
f) Environmentally responsible,
g) Supportive of responsible and sustainable development,
h) Responsive to community needs and neighborhood impacts, and
i) Economically viable and financially stable.

Objective #1: Accessibility and Mobility

Provide adequate levels of accessibility and mobility for the efficient movement of people, goods, and services within the region.

Objective #2: Safety

Improve transportation system safety through design, operations and maintenance, system improvements, support facilities, public information, and law enforcement efforts.

Objective #3: Environment

Provide transportation systems that are environmentally responsible.

Objective #4: Economic Vitality

Support transportation strategies that improve the economic vitality of the region and enhance economic opportunity.

Objective #5: Public Involvement

Provide citizens with information to increase their awareness of transportation issues, encourage their involvement in resolving the issues, and assist them in making informed transportation choices.

Objective #6: Coordination/Efficiency

Coordinate among agencies to facilitate efficient planning, design, operation, and maintenance of transportation facilities and programs.

Objective #7: Policy Implementation

Implement a range of actions as determined by local governments, including land use, demand management, and system improvement strategies, to carry out transportation policies.

Phase II: Alternatives Development (July 1993 – October 1995)

The second phase focused on identifying a range of strategies to address existing and projected needs and issues and to meet goals and objectives. As opportunities for addressing the transportation-related issues were identified and categorized, three sets of strategies were developed:

1. Land Use Measures (LUM),
2. Transportation Demand Management (TDM) strategies, and
3. Transportation System Improvements (TSI).

Land use measures
focus on the relationship between land use and transportation by encouraging development patterns that reduce the need for autos, reduce trip lengths, and support the use of alternative modes. Balanced land use patterns allow future growth to occur without the congestion and deteriorating road conditions experienced in many metropolitan regions.

Demand management strategies
focus on reducing the demand placed upon the transportation system by redistributing or eliminating vehicle trips and encouraging use of alternative modes. Demand management strategies provide opportunities to lower capital costs while recognizing that there will be a need for expanding capacity for all users of the system: bus riders, pedestrians, bicyclists, and drivers.

System improvements
focus on increasing efficiency and adding capacity or new facilities to the existing highway, transit, bicycle, and pedestrian systems. System improvements address that streets and highways are of vital importance to supporting all modes of transportation, the region's development, and quality of life.

Public involvement work in Phase II was centered on the stakeholder process. The stakeholder process constituted the core of the public involvement program and was the primary method of achieving sustained public involvement. Symposiums and task forces were key components of the stakeholder process. A main objective of the stakeholder process was to involve groups representing a comprehensive cross section of the community, who have a vital interest in the outcome of the transportation planning process. Stakeholders committed to participating in all the symposiums and a majority of stakeholders served on one of the three task forces. In addition, many stakeholders served on focus committees.

The concept of integrated transportation planning requiring three types of strategies – land use, transportation demand management, and transportation system improvements -- was presented to stakeholders at the first *TransPlan* update symposium in November 1993. Stakeholders reviewed a preliminary "tool box" containing the three types of strategies. Three stakeholder task forces were established to study the categories of strategies for achieving the transportation goals and objectives. The objective of the task forces was to obtain stakeholder input on identifying and evaluating strategies and opportunities for achieving *TransPlan* update goals and objectives. While each task force had a different approach, the conceptual framework was the same:

- Which strategies work?
- Where would be the best application of those strategies?
- How do the strategies fit together?
- What is the best time frame in which strategies should be implemented?

Land Use Measures

The LUM task force looked at strategies which create urban development patterns that reduce the need to rely on the automobile for most trips. Land use measures have the greatest potential to influence the *causes*, rather than the *symptoms* of congestion. Land use changes are long-term solutions that can take from 10 to 20 years, or more, to effectively employ. Examples of land use measures include mixed use development, higher density transit corridors, infill development, residential design guidelines, and transit oriented development (TOD) standards. Twenty-four stakeholders and six jurisdictional staff members served on the LUM task force. The TSI Task Force final report included ten strategies and nine categories of implementation techniques. Highlights of the multi-modal corridor strategy description follow:

- The multi-modal corridor strategy involves identification of a network of multi-modal corridors within which a high level of transit service is provided, transit supportive land uses can be developed, and bicycle and pedestrian circulation systems, amenities and safety features can be provided.
- Multi-modal corridors are typically oriented along major arterials within the urban area.
- Although it is expected that the multi-modal corridor will be served by rubber-tired buses operating on the street with cars and bicycles, the major corridors could be served equally well with an on-street light rail system.
- Multi-modal corridors would be expected to provide a relatively high level of transit amenities and safety features such as passenger shelters, lighting and bus pullouts.
- The effectiveness of multi-modal corridors may be increased if bus priority systems are implemented along the corridor and the frequency of transit service is high.
- The multi-modal corridor strategy has the potential to work well in our community. LTD has already established a goal of peak-hour 10 minute service on many major arterials.

Transportation Demand Management

The Transportation Demand Management (TDM) task force focused on ways to eliminate or redistribute vehicle trips to reduce demand on the transportation system. Examples of TDM strategies include ridesharing, preferential parking for carpool and vanpool vehicles, telecommuting and flexible work hours. Twenty-one stakeholders and six jurisdictional staff members served on the TDM task force. The TDM Task Force final report presented 22 different TDM strategies that the task force considered.

Transportation System Improvements

The TSI task force examined ways to increase efficiency and capacity of existing facilities, and evaluated needs for construction of new facilities. Examples of TSI strategies include changing street patterns and design standards, building new roads, bridges and bikeways, and improving connections between different travel modes. Twenty-four stakeholders and six jurisdictional staff members served on the TSI task force. The TSI Task Force final report presented at least 17 different categories of TSI strategies. The TSI Task Force final report included the following policies specific to transit:

1. Implement priority treatment for carpools and transit where appropriate. Implementation strategies include:
    - Providing carpool/transit-only lanes on streets during the peak hour;
    - Giving preferential turning movements at appropriate intersections for carpools or buses;
    - Providing traffic priority at key traffic signals for buses through the use of electronic signal pre-emption devices; and
    - Giving priority to transit/carpools during the peak hour at appropriate ramps to limited access facilities.

2. Study the feasibility of an urban rail/street car system for the metro area. Implement a system if it is found to be appropriate.
3. Provide for bus turnouts, passenger shelters and passenger loading improvements in construction or reconstruction of all collector or arterial streets, unless they are determined unnecessary.
4. Provide frequent transit service in corridors which connect major nodes, such as Valley River Center, downtown Eugene, downtown Springfield, the University of Oregon, and other corridors between nodes where appropriate.

The TSI Task Force final report included discussion of the following strategies specific to transit:

1. HOV Lanes and Exclusive Busways
   a) Freeway lanes reserved for buses/other HOVs
   b) Arterial street lanes reserved for express bus/other HOVs
2. Transit Improvements
   a) Bus transfer stations
   b) Park and ride lots along transit routes
3. Transit Service Management
   a) Radial design
   b) Grid design
   c) Expanded regular route bus service
   d) Limited and skip stop bus routes
   e) Shuttle buses

Urban Rail Feasibility Study

An Urban Rail Feasibility Committee consisting of stakeholders was formed to guide the Urban Rail Feasibility Study. This study defined the type of rail system that could be constructed at a conceptual level, identified when a rail system for the Eugene-Springfield area would be feasible based on cost and ridership estimates, and identified actions that could be taken now to make rail a success in the future. The study concluded that projected 2015 ridership for an urban rail system was too low to be competitive with other cities seeking federal rail transit funding. The study recommended that the region act now to implement parking, land use, and transit policies that would help increase future ridership potential and improve the effectiveness of public transit on the region's major corridors. *(Urban Rail Feasibility Study Eugene-Springfield Area Final Report, July 1995)*

The Urban Rail Study is described in detail in Chapter 2: Urban Rail Study on page 18.

Preliminary Plan Concepts

The *TransPlan* update/MIS process provided a framework through which roadway, transit, and integrated multimodal alternatives could be developed. An effort was made to consider all reasonable alternatives and develop alternatives that respond directly to the transportation problems.

Approximately two dozen **preliminary plan concepts**, combining one of six different land use alternatives, three different transit system alternatives, three roadway network alternatives, and numerous TDM options were developed and evaluated using the computer model. The preliminary plan concepts underwent an iterative evaluation, review, and refinement process, which was shaped by input from citizens, stakeholders, public officials, staff, and results of technical studies and the travel forecasting model. Through consideration of the stakeholder task

forces' recommendations and input from citizens and public officials, plan concepts were developed based on the three sets of alternative strategies. In fall 1994, a strategies survey was mailed to over 90,000 households to collect citizen input on the types of strategies that were considered by the stakeholder task forces. The preliminary plan concepts were reviewed with stakeholders at the second symposium in April 1995. The Transportation Planning Committee decided to refine six of these alternative plan concepts for public review through open houses and the third stakeholder symposium. *(TransPlan Update Third Symposium Materials, August 1996).*

Phase III: Alternatives Evaluation and Draft Plan Direction (November 1995 – April 1997)

Phase III focused on developing and evaluating alternative plan concepts and obtaining direction on the policy framework for the draft plan.

Alternative Plan Concepts

The alternative plan concepts resulting from the preliminary plan concept refinement process represented staff's efforts to develop a range of plan concepts containing all three types of strategies that respond to the stated preferences of citizens, stakeholders, and public officials; address legislative requirements; and make progress towards achieving the *TransPlan Update Interim Goals and Objective*s. The six alternative plan concepts are summarized below.

Plan Concept #1: The ***Base Case*** contained strategies that were essentially an extension of current transportation and land use conditions and trends. The concept served as a point of reference from which to gauge the effectiveness of the other plan concepts.

Plan Concept #2: The ***Demand Management Emphasis*** plan concept contained higher levels of demand management strategies and lower levels of land use and system improvement strategies.

Plan Concept #3: The ***Land Use Emphasis*** plan concept contained higher levels of land use strategies and lower levels of demand management and system improvement strategies.

Plan Concept #4: The ***System Changes Emphasis*** plan concept contained higher levels of system improvement strategies and lower levels of land use and demand management strategies.

Plan Concept #5: The ***Equal Emphasis*** plan concept attempted to strike a balance between the three strategy categories.

Plan Concept #6: The ***Transportation Planning Rule Vehicle Miles Traveled Goal Compliance*** plan concept emphasized demand management and system improvement strategies to meet the Transportation Planning Rule goal of

reducing vehicle miles traveled by 10 percent over current conditions by the year 2015.

Alternative Plan Concept Technical Analysis

Phase III technical analysis efforts provided timely and complete information on the options for addressing identified transportation problems before investment decisions were made and included in *TransPlan.* The purpose of the technical analysis was three-fold:

1. First, it provided a process for determining the relative significance of the alternatives and the desirability of one alternative over another.
2. Second, it provided decision-makers with an evaluation of the impacts of each proposed alternative, tradeoffs and areas of uncertainty.
3. Finally, the evaluation served to identify areas for further refinement. The evaluation process provided the basis for the development of a draft plan.

The alternative plan concept evaluation was structured around a framework which included:

1. A set of **key questions** designed to address major policy areas; and
2. A set of specific **performance measures**, designed to provide useful information on differences among the alternatives and respond to the key questions

The technical evaluation process, findings and conclusions are described in detail in Chapter 3: Alternative Plan Concepts.

Selection of Preferred Plan Concept

The public process for selection of the preferred plan concept is described below:

- A series of focus groups were conducted with community members and business representatives in December 1995 and May 1996 to obtain feedback on the alternative plan concepts. (TransPlan Focus Groups with Area Residents, February 1996; Exploratory Research on TransPlan with Area Business Owners/Managers, June 1996)
- In May 1996, public opinion on system improvements for all modes was obtained through a statistically valid survey of 429 residents. (TransPlan Community Survey Report, June 1996)
- In May 1996, two community workshops provided citizens with additional opportunities to review and comment on the alternative plan concepts.
- Stakeholders reviewed the alternative plan concept strategies and provided their recommendations on preferred strategies to include in a plan concept at the third symposium in August 1996. In summary, stakeholders recommended the following strategies:
  - ⇒ Encourage nodal development in all potential areas,
  - ⇒ Expand voluntary demand management measures,
  - ⇒ Increase the statewide gas tax to both raise revenues and influence demand,
  - ⇒ Increase parking fees and apply them region-wide,
  - ⇒ Reduce transit fares (contingent upon replacement revenue),
  - ⇒ Build the existing and committed projects network, and
  - ⇒ Build a Bus Rapid Transit system (without wholly exclusive right-of-way).
- Staff developed conclusions regarding the relative merits of each alternative and findings were presented to the public and appointed and elected officials. Based on public input, technical analysis, and expert knowledge, staff developed a set of 14 strategies describing a preferred alternative. These strategies were outlined in the Policy-Makers' Decision Package (November 1996).

- In April 1997, elected officials directed staff to use the Decision Package strategies, with some modification, as the guiding policy framework for development of the Draft TransPlan. (TransPlan Update Improving Our Transportation Choices Newsletter, Summer 1997)

Phase IV: Draft Plan Development, Review, and Adoption (May 1997 – 1999)

Phase IV focused on developing and reviewing the draft plan and producing and adopting the final plan. The policy development process is described below:

- Once policy direction was received from elected officials in April 1997, the Transportation Planning Committee designated a **policy development subcommittee**. The committee developed a work program for policy development. The committee determined that existing *Metro Plan* definitions for goals, objectives, policies, and implementation actions should be adhered to.
- The first committee task was to **inventory existing *Metro Plan* Transportation Element and *TransPlan* policies** and identify policies that were consistent with and supportive of *Decision Package* strategies. Next, staff reviewed plan elements within *Metro Plan* for inconsistencies or conflicts with the *Decision Package* strategies.
- The committee reviewed the **federal and state regulatory framework** to identify what types of policy direction were necessary to ensure compliance. This was an important step since the Transportation Planning Rule had been amended (1995) since the last regulatory framework review was conducted in 1993.
- Based on the policy inventories for *Decision Package* strategies, **gaps/conflicts** were identified where additional policy direction was needed.
- The **policy development subcommittee** developed policies that were consistent with *Decision Package* strategies and Interim Goals and Objectives and that filled gaps in the existing policy framework. A key objective that the committee strove for was to eliminate redundancy and overlapping policies, thereby reducing the overall number of policies. The committee determined that many policies comprising the existing policy framework (*Metro Plan, TransPlan*) were actually implementation actions.
- The **policy development subcommittee** proposed policies and implementation actions in the following categories: Land Use, Transportation Demand Management, Transportation System Improvements, and Finance. The Transportation System Improvements category was further subdivided into System-Wide, Roadway, Transit, Bicycle, Pedestrian, Goods Movement, and Other Modes Policies. **Preliminary policies** were published in the *Local Jurisdiction Review Edition, Draft TransPlan, November 1997*.
- The **preliminary policies** underwent an iterative review process involving planners, engineers and attorneys from each of the local jurisdictions.
- The committee reviewed the **Interim Goals and Objectives** and made revisions to maintain consistency with the proposed policies.
- Based on the strategies approved by elected officials, staff developed a set of 21 **transportation system improvement policies** and developed **planning and program actions** for inclusion in the Draft *TransPlan*. The system improvements policy categories are: system-wide (4), roadways (3), transit (4), bicycles (3), pedestrians (3), goods movement (1), and other modes (3). *(Draft TransPlan, February 1998)*

Draft TransPlan Policies

The Draft *TransPlan* transit policies follow:

TSI Transit Policy #1: Transit Improvements
Improve transit service and facilities to increase the system's accessibility, attractiveness, and convenience for users.

TSI Transit Policy #2: Bus Rapid Transit
Establish a Bus Rapid Transit (BRT) system that provides frequent, fast transit service along major corridors and neighborhood services that connects with the corridor service and with activity centers, if the

system is shown to materially reduce existing or projected traffic congestion, if local governments demonstrate support, and if financing for the system is feasible.

TSI Transit Policy #3: Transit/High-Occupancy Vehicle (HOV) Priority
Implement traffic management strategies and other actions, where appropriate and practical, that give priority to transit and other HOVs.

TSI Transit Policy #4: Park-and-Ride Facilities
Expand the Park-and-Ride system within the metropolitan area and nearby communities.

Other Draft *TransPlan* policies that support transit include the following:

Land Use Policy #1: Nodal Development
Apply the nodal development strategy, which consists of neighborhood centers, commercial centers, and employment centers, in areas selected by each jurisdiction that have identified potential for this type of transportation-efficient land use pattern.

Land Use Policy #3: Transit-Supportive Land Use Patterns
Provide for transit-supportive land use patterns and development, including higher intensity, transit-oriented development along major transit corridors and near transit stations; medium- and high-density residential development within ¼ mile of transit stations, major transit corridors, employment centers, and downtown areas; and development and redevelopment in designated areas that are or could be well served by existing or planned transit.

Land Use Policy #4: Multi-Modal Improvements in New Development
Require improvements that accommodate transit, bicycles, and pedestrians in new commercial, public, mixed-use, and multi-unit residential development.

TSI System-Wide Policy #2: Intermodal Connectivity
Develop or promote intermodal linkages for connectivity and ease of transfer among all transportation modes.

Draft TransPlan Transit Capital Investment Actions

Capital Investment Actions are transportation system improvement projects for motor vehicles, transit, bicycles, pedestrians, goods movement, and other modes that require significant capital investment. The projects selected for inclusion as Capital Investment Actions establish a network of facilities that meet overall transportation needs for the 20-year planning period. *The draft TransPlan Capital Investment Actions are fiscally unconstrained, meaning that more projects are proposed for construction within the 20-year planning period than revenue has been identified.* During draft *TransPlan* review, decisions must be made to delete projects or identify new revenue sources to meet the fiscal constraint requirement under ISTEA. The Capital Investment Action project lists will be adopted, making them legislatively binding.

The following types of projects are included in the Capital Investment Action Transit Projects list:

1. **Park-and-Ride lots:** These projects are the construction or establishment of a formal Park-and-Ride lot.
2. **Passenger boarding improvements:** These types of projects consist of improvements that accommodate the transit passenger, such as benches and shelters.

The Capital Investment Action Transit Projects are integrated with the Planning and Program Actions for transit that implement the proposed Bus Rapid Transit system.

Summary of Capital Investment Actions

Transit Projects

Implementation Phase	*Total Estimated Cost*
Short Range	$43,355,000
Medium Range	$17,900,000
Long Range	$22,400,000
Total Transit Projects	**$83,655,000**

Draft TransPlan Transit Planning and Program Actions

The **Planning and Program Actions** represent a range of regionally significant planning, administrative, and support actions that might be used to implement *TransPlan* policies. Local jurisdictions will use their discretion to evaluate and prioritize Planning and Program Action implementation. The Planning and Program Actions are not adopted, meaning they are not binding or limiting to any implementing jurisdiction. Some Planning and Program Actions will lead to additional capital expenditures, others are examples of capital expenditures that might be implemented after further study. For example, a corridor study could lead to system improvements along the corridor. Planning and Program Actions are not subject to the same fiscal constraint requirements as the Capital Investment Actions. However, ongoing funding will be necessary to continue to implement actions such as the region's transportation demand management program. The Draft *TransPlan* planning and program actions specific to transit follow:

1. Transit Service Improvements

1.1. Provide service every ten minutes along major corridors. (*TransPlan* 1986, Policy AM1.)
1.2. Implement a shuttle that connects the downtown Eugene area with the University of Oregon, Sacred Heart Hospital, and other nearby activity centers.
1.3. Conduct feasibility studies on expanding transit service operations to nearby communities.
1.4. Implement operating procedures and monitor design guidelines to minimize security and safety concerns at transit stops/stations and on vehicles.
1.5. Acquire low-floor buses to improve and speed access by riders.
1.6. Acquire smaller buses to serve neighborhoods on local streets and connect the neighborhood service with the corridor service at nearby land use nodes.
1.7. Establish a prepaid fare system along the BRT corridors to speed rider boarding

2. Transit Facility Improvements

2.1. Construct transit stations in newly developed areas in the Eugene-Springfield area and in nearby communities. (Based on *Metro Plan* 1987 Transportation Policy 3.)
2.2. Implement a transit signal priority system along major transit corridors. (Based on *TransPlan* 1986 Policy TSM3, AM2.)
2.3. Support transit use through provision of bus stops, pullouts and shelters, optimum road geometrics, on-road parking restrictions and similar facilities, as appropriate. (TPR 660-12-045(4)(a))

2.4. Implement transit priority techniques, such as exclusive bus lanes, restricted turn movements at appropriate intersections for all vehicles except buses, queue-jumpers, and separate access ramps, along major transit corridors. (Based on *TransPlan* 1986 Policy TSM3, AM2.) Give priority to transit/carpools during the peak hour at appropriate ramps to limited access facilities. (*TransPlan* 1986 Policy TSM3, AM2.)

2.5. Provide transit facility improvements, such as shelters, benches, lighting, and transit schedule information, at major bus stops.

2.6. Provide transit schedule information at all transit shelters.

3. Park-and-Ride Facilities

3.1. Provide multiple Park-and-Ride facilities along major corridors.

3.2. Establish Park-and-Ride facilities in nearby communities for commuters into the metro area. (*TransPlan* 1986, Policy IC2.)

3.3. Develop Park-and-Ride facilities that make use of existing public and private parking lots, where use by Park-and-Ride commuters does not conflict with existing parking use (e.g., churches or retail establishments with evening or weekend peak demand) (*TransPlan* 1986 Policy AM5.)

3.4. Consider establishment of a Park-and-Ride facility at Autzen Stadium with a direct link to the University/Sacred Heart/Riverfront Research Park area.

Draft TransPlan Transit System Finance

Transit system finances are largely independent of other transportation systems, and are therefore analyzed separately. Revenues and expenses are consistent with LTD's long-range financial plan. The capital costs and revenues are consistent with the long-range capital plan. Assumptions about grant revenue amounts are significantly different than they are in the Capital Plan as they have been reduced to cover only the first phase of the BRT project.

Transit System Costs

Transit capital cost estimates are based on the assumptions that the BRT project will proceed with primary focus on the development of an east-west pilot corridor, that Park-and-Ride facilities will be added on major corridors as the need is identified and suitable sites are selected, and that fleet expansion and vehicle replacement will continue at a rate determined by service level needs. BRT project implementation could begin as early as FY 2001.

Transit costs include the first phase of the BRT project, which is currently estimated to cost between $20 and $30 million. BRT includes many potential elements that will need to be carefully reviewed and evaluated. Until this engineering work is completed and decisions are made on the extent and timing of the long-term development of the BRT corridors, it is very difficult to provide a more accurate cost estimate for the BRT system.

Transit System Revenues

Transit revenue estimates are based on assumptions that overall federal grant funds in support of capital projects will decline, that fare revenue will continue to increase as it has over the last two years, and that payroll tax receipts will increase due to growth in employment and wages.

It is anticipated that discretionary federal grant funds will pay for up to 80 percent of the capital cost of the BRT system. This expectation is consistent with the District's previous success in obtaining federal funds. During the past ten years, the District has been awarded discretionary federal funds for a new operating facility ($7 million), a new central station, ($10 million), buses

($3 million), and supporting equipment ($2 million). In addition, there is considerable enthusiasm at the federal level for LTD's BRT project, as it is seen as a low-cost and effective alternative to light-rail. This enthusiasm should translate into funding support. Therefore this revenue source meets the legal requirement that it is reasonably expected to exist.

Table 1: Transit Funding Summary 1998-2017 (1997 $millions)

Costs		Revenues	
O&M	$374.2	Local Revenue	$484.3
Preservation	$40.9	Misc. Grant Revenue	$14.2
System Improvements	$53.7	TEA 21 Grant	$8.8
Misc. Capital Expenses	$7.6	BRT Planning Grant	$1.0
BRT	$30.0		
TDM	$2.0		
Total Transit Costs	***$508.4***	***Total Transit Revenues***	***$5083***

Chapter 2: Urban Rail Study

The Urban Rail Feasibility Study, conducted by Lane council of Governments (LCOG), in cooperation with the Oregon Department of Transportation (ODOT), defined the type of rail system that could be constructed at a conceptual level, identified when a rail system for Eugene/Springfield would be feasible based on cost and ridership estimates, and identified actions that could be taken now to make rail a success in the future.

A citizen advisory committee, formed as a subcommittee of the *TransPlan* update public involvement effort, directed this study by selecting the rail technology, evaluation criteria, and potential corridors for urban rail. The committee has also reviewed the analysis and recommendations for this study. This summary reviews the key assumptions that have been made in this feasibility study and presents the recommendations.

Rail Technology

Based on a review of the capacity, right-of-way requirements and costs of alternative rail technologies the Committee selected light rail transit (LRT) as the technology for consideration this study. Some of the advantages of LRT over alternative technologies, such heavy rail or automated Group Transit (AGT), for the Eugene/Springfield area are its flexibility to operate in lanes shared with traffic in different right-of-way configurations and its potential lower costs. It can also operate as a streetcar, serving local trips, or as a line-haul mode serving work and other regional trips. The Committee was also interested in considering diesel-electric vehicles, instead of electric vehicles, as another means to reduce capital costs.

Evaluation Criteria

To develop evaluation criteria, the Committee discussed financial feasibility, economic redevelopment, reducing congestion and other factors that were important to them in measuring the success of an urban rail system. One of the key differences discussed was between the role of urban rail in addressing a regional transportation problem verses its role as a supplemental circulator for tourist and other non-work trip uses. Based on this discussion and considering the scope of the study, the committee selected eight criteria for use in evaluating urban rail. The consultant developed measures for use in applying the criteria in selecting the three corridors with the greatest potential for urban rail and in evaluating these corridors. The evaluation criteria used in the screening process and the corridor evaluation are:

- Increases transit ridership
- Reduces vehicle miles traveled
- Re-enforces desires urban form, linking land use, transportation, economic development and community livability
- Contributes to overall air quality improvement
- Minimizes traffic disruption
- Provides and improves access to major activities
- Creates intermodel transportation opportunities
- Minimizes private property takings

Corridor Screening

The Committee identified 17 urban rail corridors and asked the consultant to identify the three corridors that meet most of the selection criteria and that represented a range of potential rail applications to the Eugene/Springfield metro area. Based on the results of the screening process, the committee identified the following three representative corridors for further evaluation:

1. Between Eugene and Springfield along Main/Franklin, with the understanding that further evaluation of the corridor could include analysis of Centennial Boulevard as an alternative alignment

2. Some combination of the central Eugene corridor options with service to the edge of the U of O, Sacred Heart, downtown Eugene and an extension to serve nodes proposed by the *TransPlan* Land Use Measures (LUM) task force in the central area along either the Blair Line or Willamette.

3. Coburg Road, with the further development of services to increase the travel shed for this corridor.

Based on this, the Committee further defined the corridors for use in estimating cost and ridership as follows:

- *Downtown Loop*, serving the downtown employment and cultural areas, Sacred Heart Medical center, the U of O campus and established commercial and residential areas along 18th and Willamette. Beginning at the Amtrak station at 5th and Willamette, the route follows Willamette, East Broadway and Hilyard Streets to the U of O campus. Through the campus, the route follows on East 13th Street, University and East 15th right-of-way to Agate Street. The route continues on Agate Street, 18th Avenue and Willamette Street.

- *Coburg Road*, serving the growing commercial and residential areas along Coburg Road as well as the downtown Eugene employment and cultural center along Willamette Street. Beginning at Beltline Road, the corridor follows Coburg Road to the Amtrak station at 5th and Willamette and follows Willamette to East 11th Avenue past the LTD transit center. This corridor assumes use of a new bridge across the river in the vicinity of the existing Ferry Street Bridge.

- *Main/Franklin*, connecting downtown Eugene with downtown Springfield with extensions to River Road to the west and to S. 58th Street at Main Street in Springfield to the east. Beginning at River Road near the intersection of the Northwest Expressway and the footbridge to Valley River Mall, the corridor follows 2nd Avenue and Blair Blvd., 5th Ave., Willamette Street, Broadway and Franklin Blvd in Eugene. In Springfield, the route follows Main Street and South A Street. It would serve the Amtrak station, the LTD transit center in downtown Eugene and be within a few blocks of the downtown Springfield transit center. A sub-corridor was also evaluated that ended at S. 14th Street in Springfield.

For all three corridors, the analysis assumes that stations would be located approximately every two blocks within downtown Eugene. Outside of downtown, stations would be located approximately every ½ mile. Park and ride lots, already being developed by LTD, would serve the ends of the corridors at River Road, Beltline Road and South 58th Street.

The routings for each corridor are for evaluation purposes only as the basis for developing order of magnitude cost and ridership estimates. Any further consideration of LRT would need to include evaluation of alternative streets, right of way and terminus locations as well as operational configurations.

Corridor Evaluation

For these three corridors, the consultants developed conceptual capital, operations and maintenance cost estimates and potential ridership. For capital costs, the consultant developed two different types of estimates:

1. *A Low-End Cost* that assumes single track and passing track, asphalt paving, limited traffic signal modifications, utility protection instead of relocation, used vehicles and a limited communications system.

2. *A Mid-Range Cost* that assumes double track with pavers between tracks, traffic signal modifications for critical train movements and train pre-emption, utility relocation, new vehicles and a train-to-wayside communication system.

Though both systems were designed to operate at 10 minute peak headways, the use of a single track and passing track configuration would result in less reliability than a double-track system. In addition, because the low-end cost estimate does not include utility relocation, the system would be subject to closure for utility access. As a result, the mid-range system would be more suitable for revenue-operation as part of the regional transportation system while the low-end system would be more suitable for a local or tourist-oriented system. Based on these factors, the mid-range system is more likely to perform as a regional transportation solution than the low-end estimate. Both systems require modifications to existing traffic circulation patterns and on-street parking.

Using these assumptions, capital costs would range from $4.7 to $7.6 million per mile for the low end cost and $16.1 to $18.6 million per mile for the mid range cost, depending on the corridor. Table 1 summarizes these estimates.

Table 2: Low-End and Mid –Range Capital Cost Estimates

Corridor	Miles	No of Stations	Low End		Mid-Range	
			Cost	Cost/Mile	Cost	Cost/Mile
Downtown Loop	4.34	17	$29.5	$6.8	$74.2	$17.1
Coburg Road	3.34	13	$25.4	$7.6	$62.1	$18.6
Main/Franklin (S. 14th St.)	10.67	32	$49.5	$4.7	$171.8	$16.1
Main/Franklin (S. 14th St.)	6.56	24	$34.8	$5.3	$112.0	$17.1

Note: Includes construction, vehicles, contingency and project administration (In Millions of 1995 dollars)

Operations and maintenance costs, based on the experience with diesel-electric vehicles in Galveston, Texas, would range from $1.7 million for the Coburg Road line to $2.2 million for the downtown loop to $5.3 million for the Main/Franklin line annually. These costs assume that the urban rail would operate at roughly the same speeds as Lane Transit district buses today. Though operating costs would be lower if electric vehicles were used instead of diesel electric vehicles, capital costs, necessary for the catenary and substations, would be higher.

Ridership estimates were based on the number of trips with origins and destinations in the corridor and the potential for these trips to use transit, plus the additional ridership that could be

expected from feeder bus and park and ride. A special factor, reflecting the attractiveness of rail transit was used in the ridership estimates to estimate a high end range. As a result, daily ridership in the range of 3,000 to 6,600 for the low end and 4,000 to 10,000 at the high end could be expected, as shown in Table 2. These estimates indicate that urban rail would not carry a significant share of traffic and would be much lower than the capacity that urban rail offers. The number of new riders, though not calculated specifically at this level of analysis, is likely to be low based on the limited reductions in travel time that are possible with LRT in shared traffic lanes.

Table 3: 2015 Low and High Estimated Daily Ridership

Corridor	Length (miles)	Daily Ridership Low/High	Ridership/mile Low/High
Downtown Loop	4.34	3,300/4,900	760/1,130
Coburg Road	3.34	3,000/4,000	900/1,200
Main/Franklin (S. 58th St.)	10.67	6,600/10,100	620/950
Main/Franklin (S. 14th St.)	6.56	4,400/6,500	670/1,010

Conclusions and Recommendations

Frequent existing transit services in major corridors and planned nodal development are factors that support urban rail in the Eugene-Springfield area. If public right-of-way can be used, another favorable factor would be that rail could be constructed for less than $20 million per mile which is low compared to rail cost in other cities. However, projected 2015 ridership levels for the three corridors analyzed, assuming continuation of current trends and development patterns, appear too low to be competitive with other cities seeking federal transit funding. A review of ridership in other cities that have successfully competed for federal funding indicates that ridership levels are roughly twice that projected for the Eugene/Springfield area.

As a tourist-oriented system, not intended to provide the frequent, reliable services that commuters require, lower cost urban rail could be developed but would still require major financial investments and modifications to the transportation system which may conflict with other transportation policies.

Based on these conclusions, this study recommends that the region act now to implement parking, land use and transit policies that will help increase future ridership potential and help ensure feasibility of urban rail in the future. These policies include:

- *Make long-term parking less available* by not increasing the supply and/or increasing the cost in downtown Eugene, Springfield, U of O campus, medical centers, Riverfront Research Park and other major employment areas. Parking alternatives, including peripheral or satellite parking and additional park and ride capacity, should be pursued. Higher parking costs and longer walking distances to parking are key factors that increase transit use.

- *Encourage trip-making activity along the major corridors and within the downtown region* by increasing densities in designated nodes, encouraging mixed-use commercial and residential development and encouraging in-fill development. Policies that help increase the number of trips made within a corridor and reduce the travel distances between these trip ends can lead to greater use of transit for trips to and within the corridor.

- *Adopt development design standards that support transit use*, including full street grids in residential neighborhoods that allow convenient and direct transit and pedestrians access and building orientation that makes access more convenient for transit and pedestrians than for auto. This will help make transit more attractive by reducing the total trip times for transit compared to auto.

- *Improve bus services to rapid transit standards in major corridors* by increasing service frequencies, improving bus speeds and offering convenient transfer connections between secondary level bus routes and the major bus corridor service. These improvements, which begin to replicate rail services, will help develop the corridor ridership that will eventually help justify the larger capital investment in rail.

- *Within central Eugene, where the ridership is not as easy to forecast as for the major commuter-oriented corridors, LTD should consider implementing a circulator service* that would replicate a potential streetcar route. The bus could be specially designated, such as a specially painted natural-gas operated bus. This would help indicate future ridership levels and help determine the most successful future rail route.

- *LTD should work with the Cities of Springfield and Eugene and the U of O to identify possible changes in traffic circulation and/or elimination of parking* to give transit priority, convenient access, and faster running times for service to the greatest concentration of employees. Much as the rail might utilize contra-flow lanes, the pedestrian mall, or travel through campus, these routings should be considered for bus. This will help give transit the priority over the auto that is necessary to attract new riders and qualify for federal funding.

- *A variety of other techniques that would increase the cost of using autos relative to the cost of using transit should be evaluated*. In addition to parking cost and availability, these could include increasing the gas tax, vehicle registration fees or even congestion pricing.

Chapter 3: Alternative Plan Concepts

This section first describes the alternative plan concepts then defines the strategies comprising the alternative plan concepts. The findings and conclusions from the evaluation process are presented. The accompanying table presents the alternative plan concepts in matrix format.

Six Alternative Plan Concepts

As summarized in Chapter 1: Overview of *TransPlan* Update/BRT MIS Process, the following six alternative plan concepts were considered:

Base Case Concept

The Base Case contains strategies that are essentially an extension of current transportation and land use conditions and trends into the year 2015. The Base Case serves as a point of reference from which to gauge the effectiveness of the five alternative plan concepts. The Base Case strategies include:

- Voluntary TDM;
- Existing land use patterns;
- Base transit system; and
- Existing and committed projects roadway network.

Demand Management Emphasis Concept

This alternative plan concept contains higher levels of TDM strategies and lower levels of land use and system improvement strategies. The following strategies are included:

- Voluntary TDM programs;
- TDM pricing measures, including:
  - ⇒ Increased parking fees in central Eugene;
  - ⇒ Reduced transit fare;
  - ⇒ $1.00 per gallon gas tax;
- Nodal development only in new growth areas;
- Enhanced transit system; and
- Existing and committed projects roadway network.

Land Use Emphasis Concept

This alternative plan concept contains higher levels of land use strategies and lower levels of demand management and system improvement strategies. The following strategies are included:

- Nodal development in all potential areas;
- Voluntary TDM programs;
- TDM pricing measure: increased parking fees in central Eugene;
- Enhanced transit system; and
- Committed and Planned projects roadway network.

System Changes Emphasis Concept

This alternative plan concept contains higher levels of transportation system improvement strategies and lower levels of land use and demand management strategies. The following strategies are included:

- Voluntary TDM programs;
- TDM pricing measure: increased parking fees in central Eugene;
- Nodal development only in new growth areas;
- Bus rapid transit system; and
- Committed and Planned projects roadway network.

Equal Emphasis Concept

This alternative plan concept draws equally from the three strategy categories. The following strategies are included:

- Voluntary TDM programs;
- TDM pricing measures, including:
  - ⇒ Increased parking fees in central Eugene;
  - ⇒ Reduced transit fare;
- Nodal development only in central areas;
- Bus rapid transit system; and
- Committed and Planned projects roadway network.

TPR VMT Goal Compliance Concept

This alternative plan concept emphasizes TDM strategies and TSI strategies to meet the Transportation Planning Rule (TPR) goal of reducing vehicle miles traveled (VMT) by 10% per capita over current conditions by the year 2015. The following strategies are included:

- Voluntary TDM programs;
- TDM pricing measures, including:
  - ⇒ Increased parking fees in central Eugene;
  - ⇒ Reduced transit fare;
  - ⇒ Bridge tolls;
  - ⇒ $1.00 per gallon gas tax;
- Nodal development only on major bus routes;
- Bus rapid transit system with exclusive right-of-way on BRT routes; and
- Existing and committed projects roadway network.

Component Strategies used in TransPlan Alternative Plan Concepts

	Base Case	TDM	LUM	TSI	Equal	VMT
Transportation Demand Management Strategies						
Voluntary Programs	X	X	X	X	X	X
Pricing Measures:						
Increased Parking Fees in Central Eugene		X	X	X	X	X
Reduced Transit Fare		X			X	X
Bridge Tolls						X
Gas Tax		X				X
Land Use Measures						
Existing Land Use Patterns	X					
Nodal Development Land Use Patterns:						
In All Potential Areas			X			
Only in New Growth Areas		X		X		
Only in Central Areas					X	
Only on Major Bus Routes						X
Transportation System Improvements						
Transit Systems						
Base Transit System	X					
Enhanced Transit System		X	X			
Bus Rapid Transit (BRT) System				X	X	X[E]
Roadway Networks						
Existing and Committed Projects Network	X	X				X
Committed and Planned Projects Network			X	X	X	

E=This BRT system includes exclusive right-of-way (dedicated lanes) on BRT corridor routes.

Strategies Comprising the Alternative Plan Concepts

Descriptions of the strategies making up the alternative plan concepts follow.

Land Use Measures

Two types of land use patterns are found in the Base Case and alternative plan concepts: existing land use patterns and nodal development land use patterns.

A. Existing Land Use Patterns

Existing land use patterns assume implementation of the existing Metropolitan Plan without significant changes in the patterns of land use and development. Growth is evenly allocated to developable land according to its land use designation. This land use pattern is included only in the Base Case.

B. Nodal Development Land Use Patterns

The nodal development land use pattern, the primary strategy under land use measures, is an expansion and refinement of concepts already included in *Metro Plan*. It consists of centers containing a mix of compatible land uses, a variety of housing types, and a total population somewhat higher than in areas outside the centers. More frequent transit would serve the centers and design and development would enhance pedestrian, bicycle, and transit travel options, as well as accommodate automobiles. All areas within a center would be within an average ¼-mile walking distance of the commercial core and transit stops.

Four different nodal development land use patterns are proposed as alternative strategies. All options involve changes in plan designations to achieve density and mixed-use targets for nodal development.

1. **Nodal Development in All Potential Areas:** This strategy assumes achievement of the nodal development pattern in all areas in Eugene-Springfield that have potential for mixed uses and housing types and that are or can be served by transit. Projected increases in population are allocated to these areas at average densities per plan designation as specified in the Metro Plan. Projected increases in employment are allocated to these areas based on existing densities (employees per acre) for commercial and industrial land. Forty-six (46) areas are assumed to be fully developed consistent with the proposed nodal development design principles by 2015.
2. **Nodal Development Only in New Growth Areas:** This strategy assumes achievement of the nodal development pattern only in potential areas which typically have a substantial amount of vacant land and little existing development and are generally located on the edge of the urban area. Twenty-three (23) areas are assumed to be fully developed consistent with the proposed nodal development design principles by 2015.
3. **Nodal Development Only in Central Areas:** This strategy assumes achievement of the nodal development pattern only in potential areas located in the central urban parts of the Eugene-Springfield region and along major bus routes where a more frequent level of bus service already exists or could be provided. In this strategy, the average density levels in the nodal developments are assumed to be higher than the average levels in land use strategies 1 and 2. Also, it is assumed that some land within the urban growth boundary will not develop by 2015 because of a lack of necessary urban services. Thirty-six (36) areas are assumed to be fully developed consistent with the higher average density levels and other proposed nodal development design principles by 2015.
4. **Nodal Development Only on Major Bus Routes:** This strategy assumes achievement of the nodal development pattern only in potential areas located along major bus routes. In this strategy, the average density levels in the nodal developments are assumed to be higher than the average levels in land use strategies 1 and 2. It also is assumed that some land in the UGB will not be developed by 2015. Twenty-six areas are assumed to

be fully developed consistent with the higher average density levels and other proposed nodal development design principles by 2015.

Transportation Demand Management Strategies

Transportation demand management (TDM) strategies include both voluntary programs and pricing measures.

A. Voluntary Programs

The majority of the voluntary TDM programs are employer-based, and since they are voluntary, there is no legal or regulatory pressure on employers to offer them. Most of these programs are currently offered by at least some employers in the region. This strategy assumes that use of these programs will increase over the next 20 years. The programs include:

1. Preferential parking for carpools/vanpools;
2. Flexible work schedules and telecommuting;
3. Guaranteed ride home program;
4. Employer bus pass program;
5. LTD carpool program; and
6. Transportation allowances.

B. Pricing Measures

Varying levels of TDM pricing measures are incorporated into the alternative plan concepts. Descriptions of the different types of TDM pricing measures included in the plan concepts follow.

1. **Increased Parking Fees:** This strategy assumes that the downtown Eugene parking management area will be expanded to include all area within the Central Area Transportation Study and that average parking costs n central Eugene will increase three-fold.
2. **Reduced Transit Fare:** This strategy assumes an average fare of $.25 per trip. Note: A downtown Eugene fareless square is assumed in all the alternative plan concepts. This is an area in which all transit rides would be free to passengers.
3. **Bridge Tolls:** This strategy assumes a toll of $.50 per crossing of the Willamette River on the Washington/Jefferson Bridge, Ferry Street Bridge, Springfield Bridge and a proposed Valley River Bridge.
4. **Gas Tax:** This strategy assumes an additional $1.00 per gallon gas tax in the year 2015. Assuming the average vehicle gets 20 miles to a gallon of gas, a $1.00 per gallon gas tax is equivalent to increasing general vehicle operating costs by $0.05 per mile.

Transportation System Improvements

Two categories of transportation system improvements are incorporated into the alternative plan concepts: transit systems and roadway networks.

A. Transit Systems

Three alternative transit system options were developed. Evaluation of these alternative transit systems using the travel forecasting model focused on providing a reasonable estimate of service levels to determine transit mode shares and their effects on roadway congestion levels. All three transit systems assume addition of a new downtown Eugene transit station and new Park & Ride

facilities at 11th/Bertelsen and 58th/Main, and operation of an electric shuttle-circulator in the Eugene downtown area, with a "fareless square" service area.

1. **Base Transit System:** The base system is essentially an extension of the 1995 transit system. Provisions are made for modest investments in transit to keep it comparable with highway improvements. All bus routes and headways are assumed to remain constant (although it is clear that service hours will have to be increased to maintain existing service levels). Service is extended to newly developed areas as demand warrants.
2. **Enhanced Transit System:** The enhanced system builds upon the base system by providing 10-minute service frequency on major corridors. The enhanced system also supports nodal development by providing at least 20 minute service to all nodal development areas.
3. **Bus Rapid Transit (BRT) System:** BRT contains all the capital improvements planned for the base and enhanced systems and, on top of that, provides more frequent and faster transit service. BRT consists of 4 routes through downtown Eugene and a circular route. Feeder bus routes, which serve neighborhoods not on a BRT line, connect with the BRT bus routes. Exclusive right-of-way (lanes dedicated to BRT) on BRT bus routes is an option included in the TPR VMT Goal Compliance alternative plan concept.

B. Roadway Networks

One of two roadway networks are found in each of the 2015 alternative plan concepts: Existing and Committed Projects Network and the Committed and Planned Projects Network. It should be noted that a series of proposed bicycle system improvements are included in all of the alternative plan concepts. In many cases, the roadway networks described below reflect on-street bicycle system improvements as well.

1. **Existing and Committed Projects Network:** This network includes projects which are under construction or which will be constructed in the next 20 years. In other words, this network assumes construction of all projects currently in the "pipeline," but no additional projects. Most of the existing and committed projects are in the Statewide Transportation Improvement Program (STIP) for 1996-1998. Additional projects are included that are not currently in the STIP. These are medium-term (construction beginning with 5 - 10 years) projects that staff expected to be built to address existing capacity and safety problems.
2. **Committed and Planned Projects Network:** This network includes all projects contained in the Existing and Committed Projects Network, plus additional projects. Most of the additional projects are included in the current *TransPlan* project list. Staff updated this list by removing projects already constructed and projects that are no longer thought to be necessary in the 20 year planning horizon. Projects that address capacity problems and that are likely to be included in the updated *TransPlan* were added to the list.

Alternative Plan Concepts Technical Evaluation

This section describes the technical evaluation process methodology and presents findings and conclusions.

Evaluation Process Methodology

In order to be effective, the evaluation is structured around a framework which includes:

1. A set of **key questions** designed to address major policy areas; and
2. A set of specific **performance measures**, designed to provide useful information on differences among the alternatives and respond to the key questions

Key Questions

In the context of an urban region such as Eugene-Springfield, decisions on public investments and policy inevitably involve multiple objectives and complex, inter-related systems. This

presents a challenge when evaluating regional transportation-land use alternatives. In order to maintain an effective and useful structure throughout this complex process, a set of key questions are being addressed. This framework also represents key areas of policy focus. The key questions are:

1. IS THE CONCEPT TECHNICALLY SOUND?
    - Is it efficient?
      ⇒ *Does it minimize trip length, frequency and time for users, optimize the cost effectiveness and convenience of all transportation options and does it meet or exceed appropriate minimum service standards and user needs?*
    - Is it effective?
      ⇒ *Does it provide for efficiency in a useful and serviceable way? What are the joint land use-transportation impacts and the transportation system impacts? What is the potential for ease of reaching a range of destinations?*
2. IS IT ENVIRONMENTALLY SENSITIVE?
    - *How does the alternative impact air and water quality? What are the impacts upon natural areas and open space?*
3. IS IT FINANCIALLY FEASIBLE?
    - *Is the alternative affordable? What are the capital, operating, maintenance, and preservation costs?*
4. IS IT EQUITABLE?
    - *How does it impact different community members and groups?*

Performance Measures/Evaluation Criteria

A diverse list of specific performance measures are used to provide detailed information on how each alternative performs. These measures answer the key questions and were developed from a preliminary listing of several dozen potential measures. They underwent both inter-jurisdictional staff and elected official review and refinement.

The evaluation results are presented in terms of the following performance measures:

- *Daily Fuel Use* - an efficiency measure. An objective for each alternative is to minimize fuel use. In general, a combination of pricing and land use measures have the most affect on fuel use.

- *Congested Miles of Travel* - an efficiency measure. An objective for each alternative is to minimize congested mile of travel. Figure 1 illustrates the relative levels of congestion for each alternative. In every future alternative, congestion is higher than existing conditions, ranging from 2 to 4 times current levels. In general, additional system improvements (both roadway and transit) can have a significant impact on minimizing congestion.

- *Daily Vehicle Miles of Travel per Capita* - a measure of effectiveness. An objective for each alternative is to reduce VMT per capita. The Transportation Planning Rule requires no increase in VMT per capita over 10 years and a 10 percent reduction over 20 years. Locally, the 10 year goal is 15.62 VMT per capita; the 20 year goal is 14.06 VMT per capita.

- *Percent of Person Trips Under 1 Mile* - a measure of effectiveness. An objective for each alternative is to increase the percent of person trips under 1 mile as this provides more opportunity for use of alternative modes.

- *Mode Choice* - an effectiveness measure. This measure looks at the level of choice for 5 modes - walk, bike, bus, drive alone auto, and shared ride auto. An objective for each alternative is to reduce drive alone auto trips while increasing the number of trips taken by other modes. Given the relatively small share of trips achieved by non-auto modes, it is useful to look at the change from the base case. It should also be noted that, given limitations of the model, the actual split between the non-motorized modes (walk and bike) could vary.

- *Vehicle Emissions* - a measure of environmental feasibility. An objective of each alternative is to reduce vehicle emissions. Specifically, the draft plan will be subject to a more formal process to determine conformity with federal and state air quality standards.

- *Costs and Revenues Associated with Each Alternative* - a measure of financial feasibility. An objective of each alternative would be to reduce costs, maximize revenues and minimize (ultimately eliminate) and shortfall.

The technical evaluation is accomplished, in part, by using the travel forecasting model with a set of performance measures. The travel forecasting model is a complex computer-run program comprised of a diverse collection of land use, population, employment, travel behavior and transportation system information. In short, the model attempts to mirror as close as possible the real world of land use development patterns and travel behavior and their interactions on the Eugene-Springfield's transportation system. It can show existing conditions, potential trouble spots and can help to illustrate the impacts of a future scenario, based upon the latest information on how our region is growing.

LCOG's travel forecasts begin with regional population and employment forecasts. The resulting dwelling units and jobs are allocated to available lands of the appropriate comprehensive plan designation. Occupied dwelling units by structure type and geographic location are used to estimate households by household size and vehicle ownership, which are then used to estimate person trip "productions" for each of 7 trip purposes. Employment, stratified by industrial sector, is used to estimate person trip "attractions". The trip distribution model matches productions to attractions using a "gravity" analog, with relative attractiveness proportional to the "mass", or relative number of attractions, and inversely proportional to a function of the "distance", or travel time and cost that separates the production and attraction. The mode choice model is a nested-logit type, as described above. It evaluates the relative "utility", or user costs of each of 9 travel modes for each of four user classes, and determines the probability of selecting each mode.

Technical Analysis Results

The following findings and conclusions were drawn for each alternative plan concept as part of the technical evaluation of TransPlan Alternative Plan Concepts described above. The performance measures described in the previous section are the foundation of the evaluation framework. A range of technical data was generated from the travel forecasting model and information from other sources was used, including:

- Geographic Information System;
- Air Quality forecasting model;
- Estimates of transportation costs and revenues;
- Fuel consumption model; and
- Qualitative assessments of impacts on community members & groups

The accompanying table presents the results of the technical evaluation in matrix format.

Base Case Concept Findings

Implementation of the Base Case results in the following: lower levels of alternative modes use than currently exists; the highest level of VMT per capita; the highest levels of congestion; the highest vehicle emissions and fuel use; and the fewest short trips

Demand Management Emphasis Concept Findings

This alternative achieves the lowest VMT per capita after of the TPR compliance alternative. This is due primarily to the pricing strategies included. Because this alternative is limited to the existing and committed roadway network (as opposed to the more extensive set of planned projects) it also has the highest percentage of congested miles after the Base Case. Additional revenue is available in this alternative as a result of the gas tax and increased parking fees.

Land Use Emphasis Concept Findings

This alternative is one of the highest in terms of short trips (person trips less than 1 mile). This is one reason for its higher levels of walk and bike trips. Because nodes are dispersed, VMT per capita still increases over the 20 year planning horizon. It also has relatively low levels of congestion.

System Changes Emphasis Concept Findings

This alternative represents an improvement over the Base Case in terms of lower drive-alone auto trips. VMT per capita increases over existing conditions but is significantly lower than the Base Case. Congestion is improved over the Base Case primarily as a result of additional roadway projects and Bus Rapid Transit.

Equal Emphasis Concept Findings

This alternative achieves a slight decrease in VMT per capita without fuel taxes or road pricing. This is primarily due to Bus Rapid Transit and nodal development concentrated in central areas. Other than the TPR Compliance alternative, this alternative has the highest percentage of overall alternative mode use, the lowest levels of congestion, and the lowest levels of vehicle emissions.

TPR VMT Goal Compliance Concept Findings

This alternative was developed explicitly to achieve the VMT targets set forth in the state's Transportation Planning Rule. It achieves the 20 year target (10 percent reduction) with an estimated VMT per capita of 13.78. This represents a 11.8 percent reduction from current VMT per capita. As a result of the extensive use of pricing mechanisms, concentrated levels of development, and exclusive right of way for the Bus Rapid Transit system; this alternative performs better than all the other alternatives.

Summary of Technical Analysis of TransPlan Alternative Plan Concepts

			Alternative Plan Concepts					
	Objective	Existing Conditions	Base Case	Demand Management Emphasis	Land Use Emphasis	System Changes Emphasis	Equal Emphasis	TPR VMT Goal Compliance
Key Performance Measures								
Daily Fuel Use (in 1,000s of Gallons)	Minimize	**193**	**271**	**253**	**259**	**262**	**251**	**233**
Congested Miles of Travel	Minimize	**2.6%**	**11.9%**	**9.0%**	**6.3%**	**6.6%**	**5.8%**	**5.0%**
Daily Vehicle Miles of Travel per Capita	Reduce to 14.06	**15.62**	**16.54**	**15.21**	**15.82**	**15.93**	**15.38**	**13.78**
Percent of Person Trips Under 1 Mile	Increase	**13.8%**	**12.7%**	**14.5%**	**14.5%**	**13.6%**	**14.2%**	**16.8%**
Mode Choice								
Percent Walk Trips	Increase	**8.0%**	**7.0%**	**8.6%**	**8.5%**	**8.1%**	**8.5%**	**9.4%**
Percent Bike Trips	Increase	**3.5%**	**3.0%**	**3.4%**	**3.4%**	**3.3%**	**3.4%**	**3.8%**
Percent Bus Trips	Increase	**2.1%**	**2.2%**	**3.6%**	**3.1%**	**3.4%**	**4.0%**	**4.7%**
Percent Drive Alone Auto Trips	Reduce	**42.5%**	**43.5%**	**37.1%**	**39.5%**	**39.5%**	**39.1%**	**34.1%**
Percent Shared Ride Auto Trips	Increase	**27.0%**	**27.3%**	**27.9%**	**27.4%**	**27.4%**	**27.0%**	**27.9%**
Vehicle Emissions (Annual Tons of Carbon Monoxide)	Reduce	**14,142**	**13,723**	**12,995**	**13,131**	**13,182**	**11,065**	**10,070**

Conclusions from Technical Analysis

The evaluation shows that, compared to the Base Case, implementing a more integrated set of strategies can result in:

- Fewer vehicle miles traveled (VMT) system-wide;
- Fewer miles of the transportation system experiencing congestion;
- With Travel Demand Management in place, decreased drive alone auto trips and increased shared auto trips; and,
- An increase in shorter trip lengths, providing the opportunity for use of alternative modes.

Even with the strategies in place, our region will experience increased congestion, and VMT reduction is difficult to achieve without implementing pricing measures. While we may have more congestion, our region's air quality will continue to meet state and federal standards.

The following conclusions can be made on each strategy type:

Nodal Development Conclusions

The nodal development land use strategy, which builds on concepts already included in *Metro Plan,* helps achieve objectives to increase the percentage of walk, bike and bus trips and the percentage of trips under one mile. The strategy also helps to reduce congestion and vehicle miles traveled per capita. The nodal development strategy has the greatest impact when the nodal development areas are limited to those located in the central urban areas and along major bus routes and they are developed at higher average densities. This is consistent with the view that compact urban growth supports use of alternative modes and shorter trips.

TDM Pricing Measures Conclusions

Pricing measures are effective in changing travel behavior and achieving transportation planning objectives particularly when they are combined with land use strategies and improvements in the transportation system. When used alone, pricing measures are not sufficient to avoid decreased mobility and higher levels of congestion. Pricing the use of roads (bridge tolls) has the greatest impact and appears to be necessary to achieve the state's target to reduce vehicle miles traveled per capita by 10 percent. Pricing vehicle use (parking) also has a significant impact even when limited to the central Eugene area. In general, reductions in VMT are only achieved where pricing mechanisms have been introduced. Although the level of public understanding and acceptance of pricing measures is low, they are included in the alternative plan concepts for purposes of comparison and evaluation.

Transportation System Improvements Conclusions

Strategies to improve the transit, roadway, and bicycle/pedestrian elements of the region's transportation system also help achieve the planning objectives. Both an enhanced bus system and a Bus Rapid Transit (BRT) System will significantly increase transit ridership particularly when combined with demand management measures and nodal development patterns. The greatest impacts in terms of increasing the percent of bus trips come from establishment of a BRT System. The travel model shows the highest increase in bus ridership with a BRT system that includes exclusive right of way. Improvements to the road system have a positive impact on congestion and support increased use of transit. A combination of TDM (primarily pricing), land use and system improvements has the greatest impact on congestion. Most planned projects identified in the current *TransPlan,* as well as other major new projects, are necessary to support transit improvements and reduce congestion at key points in the road system.

Chapter 4: Transit Market Analysis and Transit System Analysis

In recent years, the Eugene-Springfield metropolitan area has seen rapid economic growth and development and an increasing demand for faster, more convenient transit service. This has challenged Lane Transit District to find innovative ways to design and maintain new transit services that can more effectively compete with the automobile.

The potential for public transportation in the Eugene-Springfield area was studied through transit market analysis and transit system analysis. This effort focused on matching key elements of transit service and factors affecting transit ridership to identify effective transit strategies. The Bus Rapid Transit concept emerged as the preferred transit strategy.

Transit Market Analysis Findings and Conclusions

Eugene-Springfield transit market analysis included segmentation of 1994 LTD On-Board Survey data by geographic area, trip purpose and household auto ownership for use in the regional travel forecasting model. Transit market analysis also included an attitude and opinion survey conducted in March 1995 and a focus group effort conducted in June 1996. These surveys provided for a better understanding of public perceptions about existing transit service, as well as to anticipate community reaction to and support of the Bus Rapid Transit concept.

Because attitudes toward public transportation so clearly differentiate transit riders from nonriders, these attitudes serve to identify key market segments more likely to be receptive to service and marketing strategies. The majority of LTD riders are "firm" riders, whose attitudes towards personal travel and public transportation suggest they are likely to continue using public transportation. The market survey showed that about 27% of LTD riders are considered "vulnerable" riders, meaning they are current transit users, but attitudes towards personal travel and public transportation indicate they have the potential to stop riding should circumstances change. A third market segment is comprised of "potential riders," who are currently non-users of transit. However, their attitudes are similar to those held by transit users, suggesting the greatest potential for new riders.

Results obtained from both market studies indicate that service quality and rider attitude are key factors in increasing overall ridership and mode share. Both research tools suggest that LTD needs to increase community education efforts as to the benefits of the public transportation system, as well as the extent of services provided. Specific service improvements identified as important to increasing ridership include increased service frequency, and elimination of transfers. The majority of nonriders also identified length of trip as a barrier to transit use. Rider and nonrider attitudes suggest that transit improvements should focus on travel time reduction strategies, increased frequencies, and more direct point to point service with fewer transfers.

Market Segmentation Analysis

The 1994 LTD On-Board Survey was used in the development of the transit modeling effort of the *TransPlan* update. The transit model was employed to assist in the development and evaluation of transit alternatives. Information on origins and destinations and the travel behavior of key market segments of LTD's existing ridership was derived from the On-Board Survey and used to calibrate the transit model.

The mode choice model used by LCOG in its travel forecasting model set is critical in the evaluation of mode share impacts of alternative plan concepts. It was developed using a combination of borrowed elasticities and local data derived largely from a Household Activity Survey (HHS) conducted in 1994. Transit trips were significantly under-represented in the cross-sectional portion of the 94 HHS, due to an under-representation of major transit users such as college students and certain types of lower income households. The expanded transit trips derived from the On-Board Survey data allowed the development of much more reliable and consistent transit trip targets. The survey effort resulted in 34,000 responses of which 20,500 represented weekday transit trips. Essentially, the process for incorporating this data into the regional forecasting model involved the following steps:

1. Survey responses are geocoded to LCOG's 30 districts (aggregation of 295 zones)
2. Responses are allocated to 8 trip purposes
3. Transfer trips are estimated from survey data
4. Data is expanded to represent total regional transit trips

Market Area Survey

Lane Transit District commissioned the Market Area Study in 1995 to gather information regarding community awareness of existing transit service, and attitudes towards using transit. Specific objectives of the study included:

- Identify attitudes and opinions concerning the transit system, its routes and schedules, its perceived performance levels of service to the public and its value to the community.
- Assess attitudes toward transit that affect transportation choices.
- Profile riders and nonriders, including; demographic characteristics, retention of riders, and ridership stimulation opportunities.
- Profile commuters, in the following categories; preferred travel mode, travel patterns, barriers to use of public transportation, and importance of specific service factors.
- Identify attitudes and opinions about transportation option such as buses, carpooling and vanpooling.

A total of 605 computer-assisted telephone interviews were conducted by Northwest Research Group with Lane County residents in late January and early February 1995. The survey averaged 23 minutes in length, and included 67 questions. Key findings are summarized below.

- The community perceives that transportation needs have not always been met, with LTD, ODOT, the cities and the County sharing the blame. The community wants LTD to take a leadership role in setting up solutions to many of these problems.
- Most respondents focus on transportation objectives geared toward increased use of public transportation and high occupancy vehicles, rather than solutions to facilitate single occupant vehicle use.
- Maintaining quality of life is deemed important. Quality of life issues include reducing congestion, improving air quality, and creating an environment in which use of alternative transportation modes is an easier option.

- There will be some resistance to using tax dollars to improve public transportation.
- There is a high awareness level of LTD and its services.
- One third of non-riders have used LTD regularly in the past. Reasons for no longer riding the bus include change of circumstance, access to car, and slower travel time by bus.
- Two-thirds of former riders indicated they are somewhat or very likely to ride LTD in the future.
- Nothing could convince one-third of the nonriders to ride the bus.
- Most important factors in respondents decision to ride the bus are on-time performance, personal safety on the bus and while waiting at the stop, and reliability of the service.
- LTD is rated less favorably on frequency of service, safety at transit stations and stops, speed of travel on the bus, and number of transfer connections needed to reach a destination.
- Riders and nonriders agree that priority for service improvements should be concentrated on frequency of service, travel time, and personal safety at transit stations and bus stops.
- To attract nonriders, LTD should pay attention to comfort and cleanliness of stations and directness of service.

Transit Focus Groups

Four focus groups were conducted between June 10 and 12, 1996, with community members who regularly use transit and business owners who would be impacted by Bus Rapid Transit improvements. Two full size focus groups were conducted with community members who live, work or attend school on a likely pilot corridor. In addition, two mini-focus groups were conducted with owners of locally owned or franchised businesses along the corridor. Specific objectives of this research included gauging public awareness of and support for existing transit service, exploring community reactions to the BRT concept, investigating the extent of likely community support for BRT, and identifying what might be barriers to support. Key findings are summarized below.

- For both residents and businesses alike, the primary transportation issue along the corridor appears to be traffic "congestion," particularly in Eugene.
- Some area residents feel the transit system contributes to corridor congestion.
- The speed of traffic along the corridor, particularly the Glenwood section, is commonly viewed as a problem.
- Predominant transportation issues for corridor transit users concern ways to improve the system. Key improvements appear to include more direct connections, less transferring, and expanded service.
- Reactions to the BRT concept were generally favorable. Most participants thought it was a positive step for the future of Eugene-Springfield.
- BRT was viewed as a faster, more convenient, and easier way to move more people along the corridor.
- BRT was perceived to represent at least a partial solution to reducing corridor congestion.
- A slight majority of participants felt that BRT would be likely to increase ridership, especially among those who work downtown.
- A small minority of area residents, particularly those who own businesses in Springfield and Glenwood, didn't see a need for BRT, now or in the future.

Transit System Analysis Findings and Conclusions

The following three alternative transit systems are described in detail on page 27:

1. Base Transit System
2. Enhanced Transit System
3. Bus Rapid Transit (BRT) System

Evaluation of these transit systems using the travel forecasting model focused on providing a reasonable estimate of service levels to determine transit mode shares and their effects on roadway congestion levels. The travel forecasting model indicated that establishment of a BRT system would bring about substantial increases in transit ridership. As proposed, the service would be much more effective than existing service in attracting transit ridership from outlying areas. Of all trip purposes, largest increases are in Home-Based School and College trips.

A primary finding from the modeling effort has to do with ridership in and around the downtown Eugene area. The lower ridership forecast within Central Eugene reflects the limited opportunities to use the BRT buses for short hops. It points up the need for a well-integrated circulator bus system, which will not only improve intra-district transit accessibility, but would further enhance BRT transit accessibility for all trips to Central Eugene.

Model Limitations

Bus Rapid Transit represents a service concept that is new to the Eugene-Springfield region. It involves not only a new route structure, but new vehicle types, fare collection systems, and timed transfers. The model can evaluate the effects of changes in travel times and costs on ridership, but the modal bias constant, which represents the "unexplained" part of the mode choice utility expression, was calibrated using the 1994 Household Survey data. At the time of the survey, this region was served by a few limited-stop express routes, some of which used portions of the freeway system, but the express bus service still differed markedly from the proposed BRT concept. Moreover, we did not obtain a sufficient number of express bus trips in the survey to enable the calibration of separate bias constants. Thus, the bias constants do not reflect any affinity that various segments of the travel market may have for aspects of the BRT service that were not present at the time of the 1994 survey.

For example, we have captured the travel time effects of transit priority operations by developing transit in-vehicle time functions that reflect the findings of a traffic engineering study for the BRT pilot corridors. Priority operations, however, may also result in user-perceived improvements in the reliability of transit in comparison with the private auto. Since the mode choice utility functions do not explicitly include a term for reliability, the user's perception is captured in the modal bias constant.

The end result is that the BRT ridership estimates may be conservative, especially with respect to the ridership potential among discretionary riders, or those who have an automobile available for their use.

Findings on the Integration of Public Transportation Strategies with Nodal Development

Convenience, passenger amenities, and personal safety have been identified through market research as critical components of transit which are necessary to attract new, "choice" riders. The integration of transit improvements and nodal development areas provide opportunities for increased convenience and access to residential, employment, and commercial activity centers. Combined with other transit improvement strategies such as increased frequencies and express service, the integration of transit with nodal development areas can increase the potential for transit use.

Research to date indicates that BRT and nodal development can be extremely compatible and mutually-supportive strategies, if nodal development occurs along the proposed BRT corridors. In fact, nodal development is the ideal land use pattern for a BRT system, and a BRT system can make nodal development a more attractive and viable land use option.

Nodes include a central, easily-accessed transit stop, with a high level of amenities for riders, such as shelters, benches, lighting, and passenger information. This type of stop/station is the type envisioned for the BRT system. The high level of activity in each node would concentrate activity adjacent to the BRT stops, providing better access between the BRT line and residential, commercial, and employment destinations and increasing use of the transit system. Since BRT stops are planned to be spaced much farther apart than current system bus stops, the concentration of activity around those stops, rather than in a strip along the BRT corridor, will provide the most effective access to the BRT system.

The BRT system would make nodal development more attractive by providing frequent, high speed transit service to those living in or traveling to nodal development centers, thereby reducing automobile traffic within the nodes. In addition, the BRT system includes a network of feeder buses that would provide access from outlying neighborhoods to nearby activity centers and the BRT corridor routes. It is envisioned that these feeder routes would connect with the BRT lines at nodes, thereby providing additional access from nearby neighborhoods to the employment and commercial services offered within each node.

Conclusions on BRT and Nodal Development

The integration of public transportation strategies, such as BRT, with nodal development will enhance the potential for public transportation in Eugene-Springfield for the following reasons:

- Nodes include a central, easily accessed transit stop
- The high level of activity in each node concentrates activity and potential transit users adjacent to transit stops
- Direct transit service from residential areas to commercial nodes allows for more convenient transit access to shopping
- Increased frequencies of BRT service at major nodes will reduce passenger wait time and increase perception of personal safety while waiting

Comparison of Alternative BRT Service Concepts

The BRT concept consists of high-frequency, fast transit service along major transportation corridors, with small bus service in neighborhoods that connects with the BRT corridor service and with nearby activity centers. The following are potential elements of a BRT system:

1. Exclusive bus lanes,
2. A bus guideway system,
3. Traffic signal priority for transit,
4. Low-floor buses for faster boarding,
5. Pre-paid fares for faster boarding,
6. Greater spacing between bus stops,
7. Improved stops and stations (shelters, lighting, information, etc.), and
8. Park-and-Ride lots along BRT corridors.

The BRT system represents a significant change from the current "radial" bus system, with most transfers occurring at the "hubs" in downtown Eugene and downtown Springfield, to a "trunk and feeder" system with frequent transfers throughout the system. LCOG tested four BRT transit networks which represent differing neighborhood service concepts at the ends of BRT routes. This modeling effort evaluated trade-offs between feeder bus frequencies and the elimination of transfers.

A transfer involves out-of-vehicle waiting time, which is generally perceived as two to three times more onerous than time spent on the bus. Furthermore, LCOG's mode choice model coefficients, which are borrowed from long-established urban area models elsewhere, place an additional penalty, equivalent to 4 to 6 minutes of in-vehicle time, on each transfer. This penalty reflects user perceptions of "unpleasantness" associated with transfers, such as exposure to the weather, concerns about bus scheduling and reliability, concerns about personal safety, and so forth.

Each of the scenarios tested included the Base Case land use and highway network. BRT trunk routes were identical, and were assumed to operate at 10-minute headways during both base and peak periods.

- BRT/F assumed feeder buses serving all neighborhoods, and operating at 20-minute headways during base periods, and 10-minute headways during peak periods.

- BRT/1 replaced the highest-ridership feeder loop near each end of each BRT route with a direct extension of the BRT route. It eliminated all transfers on that feeder loop, and even reduced off-peak headways from 20 minutes to 10 minutes. It showed increases, relative to BRT/F, for all trip purposes, with highest proportional increases going to those trip purposes having substantial off-peak travel. However, this is at the cost of additional service hours.

- BRT/2 extended direct neighborhood service on the the 2 highest priority loops. It essentially increased headways in the peak period, since every 2nd bus served a given loop, from 10 minutes to 20 minutes. This resulted in a slight reduction in peak period trips such as home-based work, school and shopping. The off-peak headways remained the same as BRT/F, and with the elimination of transfers from 2 loops at each end of each BRT, off peak transit trips increased above BRT/F levels. However, overall ridership is forecast to be slightly lower.

- BRT/3 extended direct neighborhood service on the highest 3 loops. Preliminary results indicate that the increased base and peak headways on those loops may be offset by the elimination of transfers from 3 loops at each end of each BRT. Ridership remains about the same as the BRT/F, but with significantly fewer service hours.

Chapter 5: Study Summary and Conclusions

Study Summary and Conclusions

This Study has presented an overview of the extensive analysis of transit options leading to the Bus Rapid Transit concept completed as part of the TransPlan Update process. Transit alternatives for the Eugene-Springfield area were developed beginning with the identification of several transit strategies in Phase II: Alternatives Development. The Urban Rail Study provided an analysis of the feasibility of urban rail alternatives for the region. Conclusions of the Urban Rail Study led LTD to identify potential improvements to its existing system which resulted in the development of the BRT concept.

BRT was analyzed as a component of the Alternative Plan Concepts. Results of that analysis indicated that, of the three transit strategies considered, BRT provided the greatest increase in transit ridership. BRT with exclusive right-of-way was shown to provide the highest increase in transit ridership.

The BRT concept was further analyzed in a Transit Market Analysis and Transit System Analysis. The Market Analysis indicated that transit improvements should focus on travel time reduction strategies, increased frequencies, and more direct point to point service with fewer transfers. While transfers are expected to increase slightly under the proposed neighborhood feeder service, the proposed BRT system makes significant strides in increasing service frequencies and reducing travel times. The BRT system travel times are expected to be competitive with single-occupant vehicle (SOV) travel times. The neighborhood feeder service also provides opportunities for more point to point service.

The Transit System Analysis assessed the relationship between BRT and Nodal development and analyzed alternative BRT scenarios to help refine the BRT concept for inclusion in the Draft TransPlan. The integration of BRT with nodal development will enhance the potential for public transportation in Eugene-Springfield for the following reasons:

- Nodes include a central, easily accessed transit stop
- The high level of activity in each node concentrates activity and potential transit users adjacent to transit stops
- Direct transit service from residential areas to commercial nodes allows for more convenient transit access to shopping
- Increased frequencies of BRT service at major nodes will reduce passenger wait time and increase perception of personal safety while waiting

The system analysis showed that the greatest increases in forecasted ridership are in outlying areas, in which BRT represents significant improvements in transit service levels. The Danebo, River Rd, Santa Clara, and Ferry Street Bridge areas of Eugene, and the north and central areas of Springfield achieve significant benefits. Gains are not as great in the east Springfield and Thurston areas, due to the current availability of express bus service.

The BRT system proposed in the Draft TransPlan (described in detail below) is forecast to increase transit's share of the region's person trips by 34%. The percent of households with access to ten minute service frequency goes from 23% currently to 88% in 2015 – a 282% increase. The percent of employment with access to ten minute service frequency goes from 52% currently to 91% in 2015 – a 75% increase.

Bus Rapid Transit, in essence, uses a bus system to emulate the positive characteristics of a light rail system. BRT can be implemented at a fraction of the cost of rail, and can be implemented incrementally. In addition, BRT can lay the foundation for a future rail system.

Description of Proposed BRT System

Following the completion of the BRT alternatives comparison and results of the BRT scenario model runs, the BRT concept was included in the Draft *TransPlan* Decision Document as a proposed transit strategy. A proposed BRT system concept was developed in response to input received during the Draft review process, and as a result of Stakeholder input at the final Symposium. The combination of system components that were packaged together as the BRT concept reflect those technologies that have demonstrated reduced transit travel time and decreased passenger boarding times in other transit systems.

The components that make up a transit system in general include:

1. Route Structure
2. Service Frequency
3. Buses
4. Corridor Features
5. Facilities
6. Park and Ride Lots

The proposed Bus Rapid Transit System is described below in terms of these transit system components.

1. Route Structure

The BRT system involves high-frequency, fast service along major corridors and feeder bus service in neighborhoods.

- Five BRT corridor lines:
  - West 11th/18th - Main Street
  - Willamette - Coburg/Harlow
  - Highway 99 - Centennial
  - River Road - LCC (via Patterson/Hilyard)
  - Circumferential route
- Neighborhood connector routes in outlying areas would connect neighborhoods to nearby employment and shopping areas and to the corridor bus service.
- Closer-in neighborhood routes would continue to provide direct access to downtown.
- Direct service to major activity centers, such as the UO and LCC, would be continued.

2. Service Frequency

- BRT corridor lines
  - 10-minute headways, weekday daytime
  - 20-minute headways, evenings and weekends
- Neighborhood Connector routes
  - 10 minute service, weekday peak
  - 20 minute service, off-peak, evenings and weekends
- Other routes
  - Various headways (some operate peak trips only)

3. Buses

New bus designs and technology will be used as appropriate. It is likely that the District will switch to low-floor buses, which are buses that do not require steps up to the seated area and, therefore, facilitate boarding, especially for persons with mobility impairments. It is also possible that the District eventually will switch to alternatively-fueled vehicles to replace the current diesel buses. BRT corridor lines will use larger (40-foot or longer) buses, while the neighborhood connector routes will use smaller (30-foot or shorter) buses.

4. Corridor Features

The BRT corridor service will include a number of features designed to decrease travel time and reduce operating costs. These features include:

- Exclusive bus lanes
- Transit signal priority and other transit priority treatment (e.g., q-jumpers)
- Stops an average of every .5 mile
- Improved shelters and boarding areas
- A barrier-free fare system

5. Facilities

Lane Transit District's facilities include bus stops, benches, shelters, stations, and support facilities. New facilities will be added as needed to improve the convenience of the service. Stops along the BRT corridor lines will be designed as a station, with covered shelter, seating, lighting, and passenger information. All facilities will be designed to be an attractive addition to the community and will be maintained at a high level.

6. Park & Ride Lots

Lane Transit District will continue the expansion of the Park & Ride network as outlined in LTD's Park & Ride Plan. New lots will be added at strategic locations, primarily along the BRT corridors.

Cost Estimates

LTD developed capital cost estimates for the implementation of a BRT system in the Eugene-Springfield area. A complete system, including exclusive right-of-way is estimated to cost

approximately $102 million (1997 $$). Without exclusive right-of-way, the system is estimated to cost approximately $52 million. A comparable fixed route system is estimated to cost approximately $28 million.

The original cost estimate for the complete system assumed implementation of 10% exclusive right-of-way. For the pilot corridor, the preliminary cost estimate was $9.8 million, which also assumed 10% exclusive right-of-way. Preliminary corridor engineering and planning work indicate that the per mile cost to implement the pilot corridor is $2.5 million per mile. This assumes greater than 10% exclusive right-of-way, and does not include the cost of purchasing BRT vehicles.

BRT Implementation Process

Specific determination of which of the BRT elements are used and where they are used will require a significant amount of research and analysis. The research will include consideration of impacts on transit ridership, traffic flow, cost, the environment, and adjacent residences and businesses. Also to be investigated are funding sources to pay for the improvements.

The BRT system would be implemented on a corridor-by-corridor basis. The first corridor is expected to be an east/west line between Springfield and Eugene along Main Street, Franklin Boulevard, and West $11^{th}/13^{th}/18^{th}$. This corridor was selected based on an analysis of several factors, including existing and projected transit ridership, car and bus travel times, population, employment, and coordination with planned nodal development.

The research and analysis process will include community involvement, with an emphasis on encouraging participation by those who work, live, or travel along the pilot corridor. There will also be extensive participation by technical staff from appropriate jurisdictions. The BRT improvements will not be implemented without the approval of both the LTD Board of Directors and the policy board with jurisdiction over the road in question.

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