

# Regional ITS Operations & Implementation Plan for The Eugene-Springfield Metropolitan Area

Draft Executive Summary

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Prepared by

**DKS Associates**

TRANSPORTATION SOLUTIONS &



In association with

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**Lane County**

**City of Eugene**

**City of Springfield**

**Lane Council of Governments**

**Lane Transit District**

**Federal Highway Administration**





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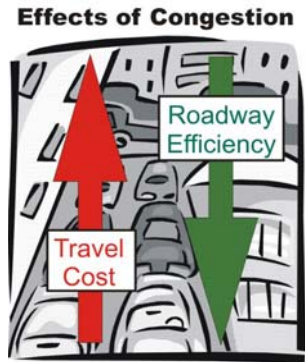


# Project Background

A collective effort by the Oregon Department of Transportation (ODOT), Lane County, the City of Eugene, the City of Springfield, the Lane Council of Governments (LCOG), and the Lane Transit District (LTD) has led to the *Regional Intelligent Transportation System (ITS) Operations & Implementation Plan for the Eugene-Springfield Metropolitan Area*. This plan strives to deploy ITS projects, which include advanced technologies and management techniques, to improve the safety and efficiency of the transportation system over the long term. It is also consistent with similar efforts in other regions and statewide to ensure the ITS strategies utilized are integrated and complementary. This document provides the Executive Summary of the Final Report.

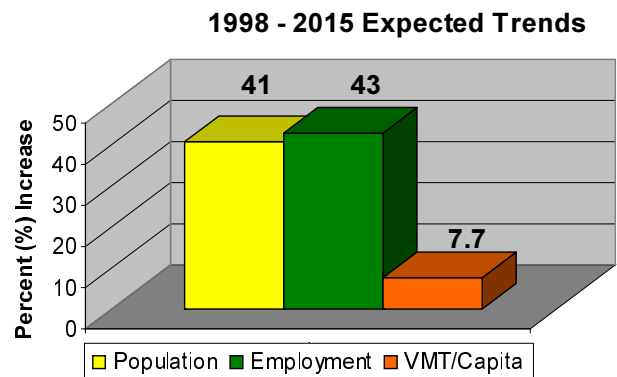
## The Problem

According to the *Register-Guard*, “Eugene-Springfield is getting congested faster than any metropolitan area of its size, nationwide. From 1996 to 2001, the amount of traffic that local motorists endured climbed 14 percent, according to an annual report released by the Texas Transportation Institute at Texas A&M University.”<sup>1</sup> Congestion results in travel delay, reduced productivity, and a frustrated driving public.



The population in Lane County grew 14 percent from 1990 to 2000 according to the *2000 Census*, and LCOG’s forecasts in the *TransPlan* indicate that from 1998 to 2015 the population in the Eugene-Springfield metropolitan area will grow 41 percent and employment will grow 43 percent. Other trends predicted by LCOG include a 7.7 percent increase in vehicle miles traveled per capita and a 293 percent increase in congested miles traveled as a percent of total miles traveled (a jump from 2.7 percent of total miles traveled to 10.6 percent). The expected growth in population, employment, and vehicle miles of travel will place an enormous burden on the existing transportation infrastructure.

At the same time, public agencies have come to realize that building new transportation infrastructure as the single means of relieving congestion is not feasible, particularly due to high land and construction costs and environmental constraints. Therefore, a systematic approach is necessary to effectively manage the region’s transportation system and capitalize on the existing infrastructure as the region grows. This includes applying Intelligent Transportation Systems (ITS) in conjunction with new roadway construction.



## The Opportunity

ITS applications provide a viable opportunity for improving the safety and efficiency of the surface transportation system in the Eugene-Springfield metropolitan area. These applications help improve transportation system operations by performing a function more quickly or reliably or by providing a service that was not previously available. In effect, ITS improves the mobility of people and goods on the existing roadways and also provides the potential for substantial savings on future construction, particularly of highways. It is often easy to overlook the importance of investing in operations, but it is necessary to ensure that the traveling public makes safe and efficient use of existing roadways.

<sup>1</sup> Molloy, Tim. Traffic congestion surges in Eugene. *The Register-Guard*, Oct. 1, 2003.

# Project Background



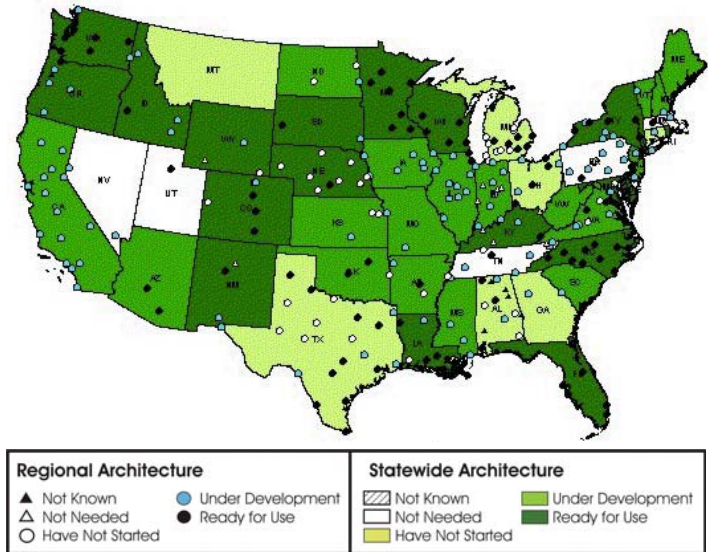
## What is ITS?

Intelligent Transportation Systems (ITS) involve the application of advanced technologies and proven management techniques to solve transportation problems, enhance safety, provide services to travelers, and assist transportation system operators in implementing suitable traffic management strategies. ITS focuses on increasing the efficiency of existing transportation infrastructure, which enhances the overall system performance and reduces the need to add capacity (e.g., travel lanes). Efficiency is achieved by providing services and information to travelers so they can (and will) make better travel decisions and to transportation system operators so they can better manage the system.

## Why Develop an ITS Plan?

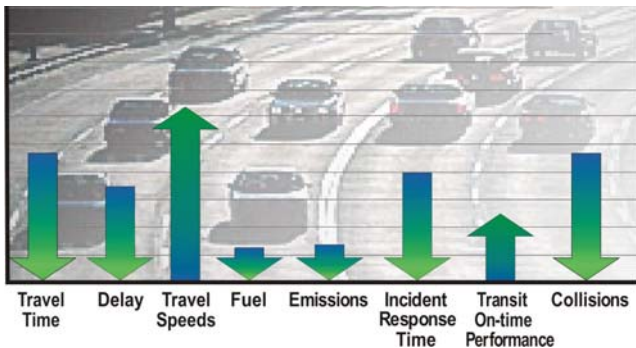
An ITS plan provides a framework of policies, procedures, and strategies for integration of a region's existing resources to effectively meet future regional transportation needs and expectations. The following reasons provide the basis for developing an ITS plan for the Eugene-Springfield metropolitan area:

- The region cannot build itself out of congestion.
- The region endeavors to maximize the efficiencies and improve the safety of the existing infrastructure.
- The public demands better information about traffic congestion.
- The plan fosters multi-agency coordination for system operations.
- The Federal Highway Administration requires that all ITS projects funded through the Highway Trust Fund shall be in conformance with the National ITS Architecture and applicable standards.



## What are the Expected Benefits?

Intelligent Transportation System projects are aimed at improving the safety and operational efficiency of our existing transportation infrastructure by reducing vehicle delays related to recurrent and non-recurrent congestion, reducing accidents and incident response times, and providing travelers with real-time information to make informed route and mode choice decisions. Quantifiable benefits resulting from Intelligent Transportation Systems include:



- Reduced vehicle delays
- Reduced accidents
- Improved air quality
- Reduced fuel consumption
- Improved travel times

Other accrued benefits, which are more difficult to quantify, include reduced driver frustration and reduced driver anxiety from having real-time travel information.

Additionally, improved efficiency due to coordinated and cooperative agency actions can produce long term savings, particularly in relation to coordinating regional projects and a coordinated regional response to incidents.



# Project Background

To estimate the potential benefits resulting from the proposed projects within this plan, the ITS Deployment Analysis System (IDAS), developed by the Federal Highway Administration, was used. This software uses the regional travel demand model for the base conditions and proposed ITS projects can be deployed onto the existing Eugene-Springfield travel demand model. The software identifies the resulting potential reduction in delays, fuel consumption, emissions and accidents deployed within the network. Based on this analysis, and using the proposed 10-Year ITS Plan projects, the potential benefit-to-cost ratio ranges from 3 to 1 up to 20 to 1 depending on the project. Overall, the expected benefit-to-cost ratio for the implementation of the full 10-year plan is approximately 10 to 1.

Example benefits from other projects around the State and Country include:

## Coordinated Signal Timings

State-of-the-art traffic signal systems, with communication to a central computer and coordinated signal timing plans have proven to produce substantial benefits to the public. Examples from local coordinated signal timing projects in Oregon have produced the following benefits:

- 10- to 40-percent reduction in stops
- 5- to 25-percent reduction in travel time
- 15- to 45-percent reduction in delay
- Up to 15-percent reduction in fuel consumption



## Ramp Meters

Ramp meters are used to regulate the flow of traffic onto a freeway. The purpose of a ramp meter is to smooth the flow of traffic on the freeway and to reduce accidents resulting from merging conflicts. In 2000, Minneapolis, Minnesota shut down all of its ramp meters and performed a benefits assessment. The results of this assessment showed ramp meters were responsible for:



- 21-percent reduction in crashes
- 10-percent increase in the volume of traffic accommodated by area freeways
- 22-percent decrease in travel times

## Incident Management

The Oregon Department of Transportation in association with the Oregon State Police currently operates an incident management program in Region 2 to assist disabled vehicles. The incident management program includes incident response vehicles that patrol the Region 2 roadways to assist motorists and reduce the duration of incidents and reduce the resulting traffic congestion. Based on a recent evaluation of the program<sup>2</sup>, the following benefits have been produced:

- 15-percent reduction in average incident duration.
- 35-percent reduction in vehicle-hours incident delay



<sup>2</sup> *Evaluation of Region 2 Incident Response Program Using Archived Data*, Portland State University, June 30, 2001.

# Project Background



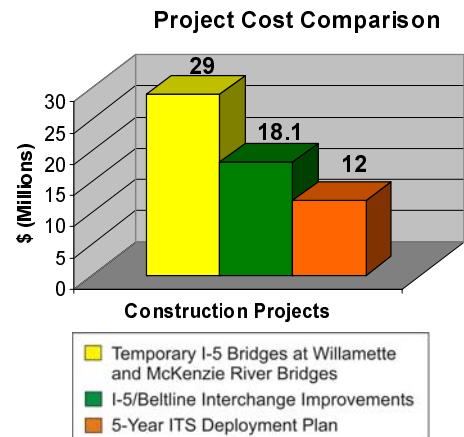
## Traveler Information

The dissemination of real-time traveler information provides travelers the ability to make informed travel choices, which could include changing a route, or selecting an alternate mode of travel. The resulting benefits include:

- 7- to 12- percent reduction in travel time
- Up to 33- percent reduction in emissions

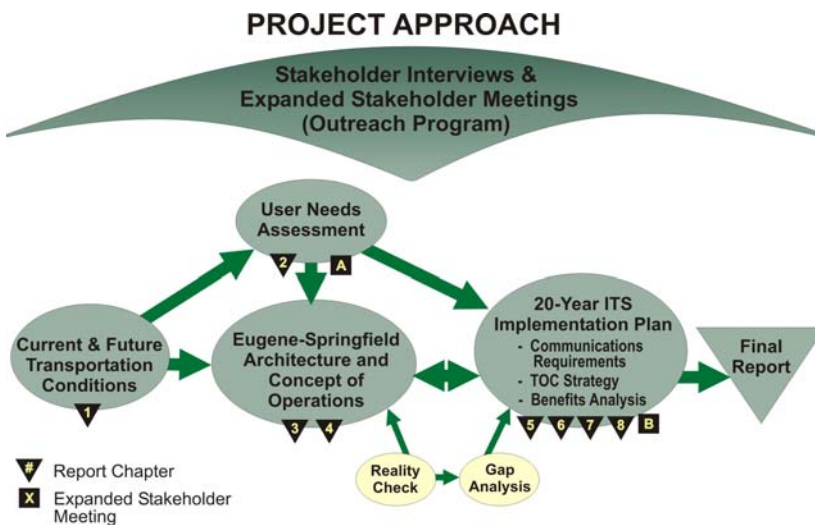
## Cost Comparison

ITS components can be deployed throughout the Eugene-Springfield Metropolitan area for a fraction of the cost of large construction projects.



## Project Approach

The figure below illustrates the project approach for the development of an ITS plan for the Eugene-Springfield metropolitan area. The stakeholder outreach program has been an integral part of developing a cooperative plan that meets regional needs regardless of jurisdiction.



A Steering Committee composed of key stakeholders from regional transportation agencies guided the project with additional input from expanded stakeholders that represented local emergency management agencies, the City of Coburg, and the University of Oregon. Key stakeholder outreach activities included the following:

- Monthly Steering Committee meetings
- Interviews with key stakeholders to collect transportation user needs information
- Two expanded stakeholder meetings (User Needs and Deployment Plan)

The following sections describe the results of the plan process for the 20-year Eugene-Springfield ITS Plan, with particular focus on these six interest areas:

- Travel & Traffic Management
- Communications
- Public Transportation Management
- Emergency Management
- Information Management
- Maintenance & Construction Management



# Mission, Goals & Objectives

Our Mission Statement is:

*The Eugene-Springfield area strives to enhance the safety and efficiency of multi-modal travel through the use of advanced technologies, transportation management techniques, agency coordination, and partnerships.*

The following project goals and objectives were developed to obtain our mission:

**Goal #1: Build consensus and improve coordination among project stakeholders.**

- Building consensus among the Steering Committee members.
- Building a coalition among all ITS stakeholders in the Eugene-Springfield metropolitan area.
- Sharing resources between local and regional agencies.
- Coordinating and integrating projects with other agencies.
- Promoting public and private partnerships for ITS deployment, operations, and maintenance.
- Developing a concept of operations with a seamless interface between agencies.

**Goal #2: Improve and maintain a safe transportation system.**

- Reducing frequency, duration, and effects of incidents.
- Reducing emergency response times.
- Reducing recurrent congestion.
- Coordinating incident response with other local and regional agencies.

**Goal #3: Improve the efficiency of the transportation system.**

- Improving travel time for vehicles, including transit vehicles.
- Reducing travel time variability.
- Reducing fuel consumption and environmental impacts.
- Improving transit service reliability.
- Improving maintenance and operations efficiencies.

**Goal #4: Deploy functional and cost efficient ITS infrastructure.**

- Deploying systems that fit in with future improvements.
- Deploying systems with a high benefit-to-cost ratio.
- Deploying systems that maximize the use of existing infrastructure.
- Deploying systems with minimal use of maintenance and operational support.
- Integrating deployments with other local and regional projects.

**Goal #5: Develop a commitment to ITS deployment in the Eugene-Springfield area.**

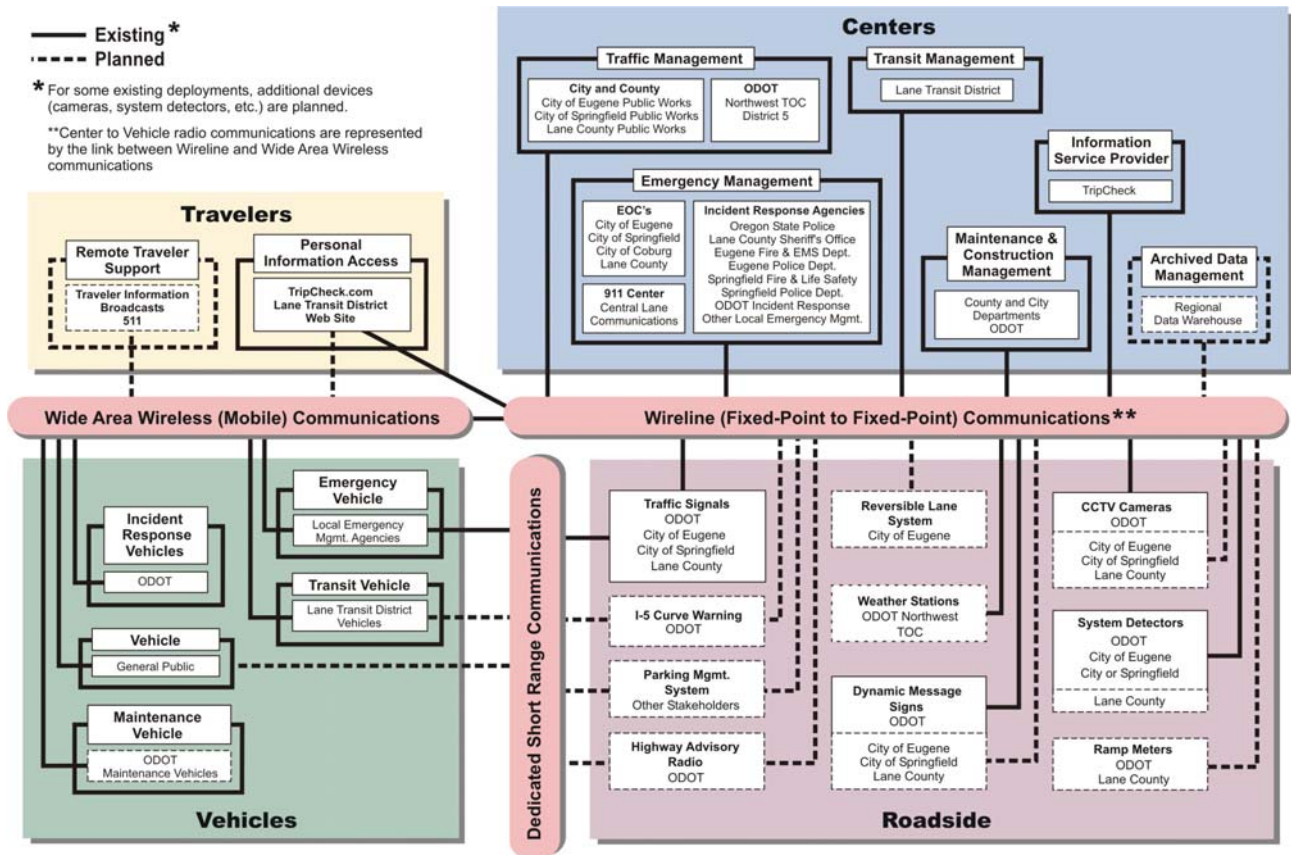
- Creating a regional architecture that complements the statewide architecture.
- Developing a phased implementation process based on a prioritized project list.
- Identifying unique funding in addition to utilizing traditional funding sources.
- Developing a process that ensures program continuation.
- Integrating the ITS Plan with the Central Lane TMA regional transportation plan and other transportation plans in the region.

# Eugene-Springfield ITS Architecture



The National ITS Architecture and the Oregon Statewide ITS Architecture provide the basis for the Eugene-Springfield ITS Architecture. The figure below depicts the physical architecture for the Eugene-Springfield metropolitan area and includes key stakeholders, existing and desired services (or ITS elements), and the necessary interconnections and information flows required to ensure system compatibility and interoperability.

Providing compatibility amongst jurisdictions will enable the region to fully maximize the use of ITS technologies. For example, an LTD bus traveling along ORE 126 must be able to communicate with the traffic signals in both the cities of Eugene and Springfield to allow for transit signal priority. The physical architecture ensures this happens by identifying the connection to the appropriate agencies (ie. LTD, City of Eugene, and City of Springfield) and their equipment (ie. traffic signals and transit vehicles) and the information required to provide the desired service (ie. transit signal priority).



Eugene-Springfield Physical ITS Architecture

## Concept of Operations

The concept of operations, which supplements the ITS physical architecture, defines the roles and responsibilities of the participating transportation and public safety agencies and identifies information flows between the agencies in the Eugene-Springfield metropolitan area. The concept of operations defines the responsibilities of the various agencies providing ITS services in the region for activities such as design, construction, integration, planning, operations and maintenance. In addition, the concept of operations defines the level and types of information shared between agencies such as data, video, status, request and control.



# ITS Deployment Plan

The Eugene-Springfield Deployment Plan is organized into three time frames: 0-5 years, 6-10 years, and 11-20 years. Based on stakeholder input and key findings from system evaluations, the projects recommended for implementation in the Eugene-Springfield metropolitan area have been organized and described by the following program areas:

- Travel and Traffic Management (TM)
- Communications (CO)
- Public Transportation Management (PTM)
- Emergency Management (EM)
- Information Management (IM)
- Maintenance and Construction Management (MC)

Each program area is described on the following pages, with additional details in Tables 1 - 4 about projects included in the 5-Year Plan. A key component of the 5-Year Plan is the implementation of traveler information collection devices on the primary corridors.

Table 5 summarizes the complete list of projects along with pertinent details. The project numbers used in this table are for reference purposes only and do not indicate any type of priority. A priority of high (H), medium (M), or low (L) is assigned to each project in the table and correlates to the 5-Year Plan, 10-Year Plan, and 20-Year Plan, respectively. Priorities are based on existing and future corridor operation, focusing on recurrent congestion, traffic data, bottlenecks and accident data. Figure 1 provides a graphic summary of the full 20-Year ITS Plan.

## Travel And Traffic Management

Projects within this Program Area are focused on improving the efficiency and safety of our existing roadway system by providing tools to better manage the existing infrastructure, to coordinate with regional partners and to provide traveler information to the public. The following projects are part of the 5-Year Plan.

### Regional Freeway Congestion Management

The purpose for these projects is to improve travel time, to reduce incident response time, and to reduce crashes and the effects of crashes. To accomplish this purpose the following items will be deployed in the 5-Year Plan.

*Northwest Transportation Operations Center (NWTOC)*



*Permanent Dynamic Message Sign*

*CCTV Camera*

# ITS Deployment Plan



## Regional Arterial Congestion Management

These projects are intended to improve travel time and reduce crashes and the effects of crashes. To accomplish this purpose the following 5-Year Plan items will be deployed.



*Fiber Optic Cable Terminations*

## Communications

The Communications system plays an integral part in the deployment of the projects in the other five program areas by providing a network for information flows to and from field devices and stakeholder agencies. There are two projects slated for deployment during the 5-Year Plan: (1) the documentation of communications standards to ensure standardization and compatibility throughout the region and (2) the integration of radio infrastructure amongst regional agencies. For the most part, the communications network needed to support the ITS Plan will be deployed on a project-by-project basis throughout the next 20 years.

## Public Transportation Management

Public Transportation Management technologies address two major aspects of transit operations: (1) transit traveler information systems and (2) transit agency operations and management. The projects in this category build off of the current LTD effort to deploy vehicle location technologies and a new computer aided dispatch system. Some of the benefits of these projects include more reliable bus travel times and improved transit traveler information. These 5-Year Plan projects include:



#30 to Eugene TC	3 Min
#11 to Springfield TC	5 Min



# ITS Deployment Plan

## Emergency Management

The purpose of the Emergency Management projects is to reduce emergency response times and to integrate emergency management with transportation and transit management. The emergency response projects included in the ITS Plan are highly dependent on the deployment of key travel and traffic management and communications projects, therefore none of these projects are included in the 5-Year Plan.

Central Lane 911



ODOT Region 2 Incident Response



## Information Management

A critical part of this ITS Plan includes collecting, archiving, and managing all sorts of transportation-related data. Since much of the data collection is closely tied to projects that deploy field devices and systems to collect data, the main information management project has been included in the 10-Year Plan.

## Maintenance and Construction Management

These projects are aimed at improving the safety of motorists and workers in construction zones. In addition, these projects are aimed at improving the efficiency of work zone management and control.





## Figure 1 (11x17)- Front Side



Figure 1 (11x17)- Back Side



## Table 5- Page 1 of 9



## Table 5- Page 2 of 9



## Table 5- Page 3 of 9



## Table 5- Page 4 of 9



## Table 5- Page 5 of 9



## Table 5- Page 6 of 9



## Table 5- Page 7 of 9



## Table 5- Page 8 of 9



## Table 5- Page 9 of 9



# ITS Deployment Plan

## DEPLOYMENT PLAN SCHEDULE (Page 1 of 2)

Ref. #	Project Title	5-Year Plan					10-Year Plan					20-Year Plan									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Travel &amp; Traffic Management</b>																					
ES-TM-01	Regional Virtual Transportation Operations Center																				
ES-TM-02	Regional Freeway Surveillance and Management																				
ES-TM-03	Regional Arterial Surveillance and Management																				
ES-TM-04	Reversible Lane Management on MLK/Centennial																				
ES-TM-05	Gateway Area Traffic Responsive Signal Timing																				
ES-TM-06	30 <sup>th</sup> Avenue Signal Timing Coordination Near I-5																				
ES-TM-07	Incident Management Operational Plans																				
ES-TM-08	Incident Notification System																				
ES-TM-09	Transit Signal Priority																				
ES-TM-10	Traffic Signal Interconnect																				
ES-TM-11	Integrate Regional Virtual TOC with JO SOS Room																				
ES-TM-12	Beltline Highway Queue Warning System																				
ES-TM-13	I-5 Bridge Security																				
ES-TM-14	I-5 Bridge Weather Detection and Deicing System																				
ES-TM-15	Highway Advisory Radio (HAR)																				
ES-TM-16	Integrate Traveler Information with TripCheck, 511, & Highway Advisory Radio																				
ES-TM-17	Congestion/ Incident Information Mapping																				
ES-TM-18	Traveler Information at Rest Areas																				
ES-TM-19	Rest Area Surveillance System																				
ES-TM-20	Advanced Parking Management & Information System																				
ES-TM-21	Road Weather Information Systems (RWIS)																				
ES-TM-22	Advanced Railroad At-Grade Crossings																				
ES-TM-23	Integrate Freeway Management Systems & Central Signal Systems																				
ES-TM-24	Integrate Central Signal Systems with Transit & Emergency Management Systems																				
ES-TM-25	Special Event Management Systems																				
ES-TM-26	Integrate Eugene Airport Traveler Information with Northwest Transportation Operations Center																				
ES-TM-27	Develop Evacuation Route Plan																				
<b>Communications</b>																					
ES-CO-01	Document Communications Design Standards																				
ES-CO-02	Communications Network																				
ES-CO-03	Radio Infrastructure Integration																				

 Proposed Implementation  
 Currently Funded Projects

# ITS Deployment Plan



## DEPLOYMENT PLAN SCHEDULE (Page 2 of 2)

Ref. #	Project Title	5-Year Plan					10-Year Plan					20-Year Plan									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Public Transportation Management</b>																					
ES-PTM-01	Real-Time Customer Information Displays																				
ES-PTM-02	Portable Real-Time Customer Information Displays																				
ES-PTM-03	Integrate Transit Traveler Information with ODOT Transit Trip Planning Project																				
ES-PTM-04	Transit Buses as Traffic Probes																				
ES-PTM-05	Electronic Fare Collection																				
ES-PTM-06	Automated Vehicle Location System																				
ES-PTM-07	Automated Passenger Information Systems																				
ES-PTM-08	Automated Passenger Counting																				
ES-PTM-09	Transit Fleet Maintenance and Security System																				
ES-PTM-10	Automatic Vehicle Location System and Computer Aided Dispatch System for Paratransit																				
ES-PTM-11	Integration of Bus Video Data with LTD Dispatch																				
ES-PTM-12	Bus Rapid Transit																				
<b>Emergency Management</b>																					
ES-EM-01	Provide Interface Between Traffic/Transit Management Systems and Emergency Dispatch Centers																				
ES-EM-02	Provide Interface Between Traffic Management Systems and Emergency Operations Centers																				
ES-EM-03	Traffic Adaptive Emergency Response																				
ES-EM-04	Integration of Traffic Management Information with Mobile Data Terminals																				
ES-EM-05	Incident Response Fleet Management System																				
<b>Information Management</b>																					
ES-IM-01	Regional Data Management System																				
ES-IM-02	Integrate Transportation Information with GIS Centerline Project																				
<b>Maintenance &amp; Construction Management</b>																					
ES-MC-01	Maintenance Fleet Management System																				
ES-MC-02	Construction Zone Safety Enhancements During I-5 Bridge Reconstruction																				
ES-MC-03	Maintenance, Construction, and Special Event Coordination System																				
ES-MC-04	Develop Work Zone Management Standards																				

 Proposed Implementation  
 Currently Funded Projects



# Implementation Summary

To successfully implement the proposed ITS plan, the following steps are necessary:

## ITS Program Continuation



The continuation of the ITS steering committee is possibly the most important item for the successful implementation of the ITS plan. This group should include the key stakeholders from the planning process and should be organized as a new subcommittee to the Transportation Planning Committee (TPC). This group will initiate the steps outlined in this plan, plan projects that fit agencies' needs, pursue Federal funding opportunities, and monitor/report progress and effectiveness. In addition, a representative from this ITS subcommittee should report current status of the plan implementation at least annually at the Metropolitan Policy Committee (MPC).

## Deploy "Early Winner" Projects

Another key to the success of ITS in Eugene-Springfield will depend on the deployment of "early winner" projects. A potential "early winner" project includes the deployment of field devices (closed circuit television cameras, count stations, variable message signs, and ramp meters) on Beltline Highway to support regional freeway management and traveler information. This project would also support the current Statewide implementation of the 511 traveler information telephone number by providing real-time information from these field devices.



## Incorporate the ITS Plan in the RTP Update Process

The ITS steering committee plans to incorporate this ITS Plan in the upcoming Regional Transportation Plan (RTP) Update process. The ITS devices and communications infrastructure identified in this plan should be installed on corridors concurrently with traditional transportation construction and maintenance projects. This approach will minimize reconstruction, save time and money, and result in the modernization of the regional transportation system. Where applicable, the relationship to currently planned regional projects have been identified in Table 5. In addition, the data collection, analysis, operational techniques and information sharing developed through the projects in this plan can become key elements of other regional efforts.

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December 2001

## Do Not Overlook Future Needs if They Fit With Current Opportunities

The region should pursue a flexible approach to implementing the plan. Opportunities may become present in early years to implement elements of the plan identified for later deployment. These opportunities may be possible due to other funding sources, coordination with roadway construction, coordination with local agency/private initiatives and/or transit priorities. These opportunities should be seized when appropriate.

## Define a Revenue Stream

The Eugene-Springfield Metropolitan Area will need to define a revenue stream for construction, operations and maintenance. This plan provides the basis for the funding and identifies opportunities for regional coordination and cost-sharing. The region must dedicate funding sources to implement each increment of the 20-year plan. In addition to the traditional funding sources, other non-traditional sources for funding such as grants from non-profit agencies should be considered.



# Implementation Summary



The total capital, engineering and annual operations/maintenance costs for the ITS program are provided below. The Eugene-Springfield Metropolitan Area will need an on-going commitment to operations and maintenance of the equipment and software to maximize the benefits of the ITS program. The ITS elements proposed within this program require consistent staffing for effective system operation, as well as requiring trained staff to do routine maintenance.

<i><b>Implementation Stage</b></i>	<i><b>Estimated Implementation Capital Costs</b></i>	<i><b>Estimated Annual Operations &amp; Maintenance Costs</b></i>
5-Year Plan: 0 - 5 Years	\$14,500,000	\$775,000
10-Year Plan: 6 - 10 Years	\$13,000,000	\$700,000
20-Year Plan: 11 - 20 Years	\$20,000,000	\$1,000,000
<b>TOTAL</b>	<b>\$47,500,000</b>	<b>\$2,475,000</b>

Costs above are per year for the associated phase



# Glossary of Terms

AVL	Automated Vehicle Location
BOEC	Bureau of Emergency Communications
CAD	Computer Aided Dispatch
CCTV	Closed Circuit Television
CO	Communications
DMS	Dynamic Message Sign
EM	Emergency Management
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
GIS	Geographical Information System
H	High Priority
HAR	Highway Advisory Radio
IM	Information Management
ITS	Intelligent Transportation System
L	Low Priority
LCOG	Lane Council of Governments
LTD	Lane Transit District
M	Medium Priority
MC	Maintenance and Construction Management
MDT	Mobile Data Terminal
MP	Milepost
NWTOC	Northwest Transportation Operations Center
O&M	Operations and Maintenance
ODOT	Oregon Department of Transportation
PAN	Public Agency Network
PTM	Public Transportation Management
SOS	Stadium Operations and Security
STIP	Statewide Transportation Improvement Plan
TOC	Transportation Operations Center
TM	Traffic Management
TMA	Transportation Management Area
UO	University of Oregon
VMT	Vehicle Miles Traveled
WSDOT	Washington Department of Transportation