



Chapter Four

ITS PLAN CONCEPT

OF OPERATIONS

INTRODUCTION

This chapter presents the Concept of Operations for the Clackamas County ITS Plan. It includes an overview of the institutional relationships between the transportation stakeholders in the Clackamas County region and has been developed based on discussions with the Technical Advisory Committee (Clackamas County, City of Milwaukie, City of Oregon City, City of Wilsonville, and ODOT). The purpose of the concept of operations is to define the roles and responsibilities for design, maintenance and operation of Intelligent Transportation Systems (ITS) and also to define the level of information sharing, status and control between agencies.

SYSTEM COMPONENTS

The following are the specific field devices that are included in the Clackamas County ITS Plan:

- Traffic Signals
- Variable Message Signs (VMS)
- Closed Circuit Television (CCTV) Cameras
- System Detectors
- Weather Stations

Other specific components that are included in the Clackamas County ITS Plan and require integration and coordination with multiple agencies include:

- Communications Network
- Communications Hubs
- Central Signal System Software and Server
- Traffic Operations Center (TOC) Workstations

The roles and responsibilities related to the field devices and components listed above are described later in this document and in Appendix I, but first a summary of the existing institutional relationships in Clackamas County is provided.

EXISTING INSTITUTIONAL RELATIONSHIPS

Implementing ITS projects involves coordination and integration between multiple agencies and departments within agencies including transportation and development, transit services, and emergency services.

The existing institutional frameworks are described in this section.

Clackamas County Organization

Clackamas County consists of both elected and appointed positions. County citizens vote to elect the Board of Commissioners, District Attorney, Surveyor, Clerk, Assessor, Treasurer, and Sheriff. The Board of Commissioners in turn appoints a County Administrator who oversees the remaining thirteen County departments including Transportation and Development, Information Services, and C-COM (911).

The County Administrator appoints the non-elected department heads and works with them to provide direction and to ensure that ample service is being provided to citizens and customers. Additionally, the County Administrator leads the County Executive Management Team, which includes all elected and appointed department heads. The Department of Transportation and Development is responsible for this ITS plan. Final approval of this plan will come from the County Administrator and the Board of Commissioners.

Transportation and Development

In the area of transportation and development, the main agencies that own, operate, and/or maintain transportation facilities in urban Clackamas County include:

- Clackamas County (Department of Transportation and Development)
- ODOT (Region 1 Traffic Section)
- City of Gladstone
- City of Happy Valley
- City of Lake Oswego (Engineering Department)
- City of Milwaukie (Engineering Department)

- City of Oregon City (Public Works Department)
- City of West Linn (Public Works Department)
- City of Wilsonville (Engineering Department)

Clackamas County, ODOT, and the City of Lake Oswego are the only agencies that operate and maintain their own traffic signals and flashers in addition to designing and owning them. The other urban cities in Clackamas County (Gladstone, Milwaukie, Oregon City, West Linn, and Wilsonville) that own traffic signals or flashers have informal agreements with the Clackamas County Transportation and Development Department to operate and maintain traffic signals and flasher equipment. Table 4-1 lists agency responsibilities with regard to traffic signal/flasher design, ownership, maintenance, and operations.

These responsibilities may change in the future in the cities of Lake Oswego and Happy Valley. The City of Lake Oswego may eventually develop a contract with Clackamas County for maintenance and operations. Although located in urban Clackamas County, the City of Happy Valley does not currently own any traffic signal or flasher equipment, but would likely develop an agreement with the County for operations and maintenance should they build any traffic signal or flasher equipment in the future.

Transit Agencies

In urban Clackamas County, transit service is provided by Tri-County Metropolitan District of Oregon (TriMet), South Metro Area Rapid Transit (SMART), and AmTrak. TriMet currently

Table 4-1. Agency Responsibility for Urban Traffic Signal and Flasher Equipment

Role	Clackamas County	Cities of: Gladstone, Milwaukie, Oregon City, West Linn, and Wilsonville	City of Lake Oswego	ODOT
Design	Clackamas County	City/Clackamas County	Lake Oswego	ODOT
Ownership	Clackamas County	City	Lake Oswego	ODOT
Operations	Clackamas County	Clackamas County*	Lake Oswego	ODOT
Maintenance	Clackamas County	Clackamas County*	Lake Oswego	ODOT

* The cities of Gladstone, Milwaukie, Oregon City, West Linn, and Wilsonville have informal agreements in place with Clackamas County for the operations and maintenance of city-owned traffic signals and flasher equipment. The City of Happy Valley does not currently own any traffic signals or flashers.

operates bus routes throughout most of the urban area and plans to add commuter rail service to Wilsonville, light rail or bus rapid transit to the Clackamas area, and possibly streetcar service to Lake Oswego. TriMet works with transportation agencies on a project-by-project basis. SMART, a department of the City of Wilsonville, runs bus service in Wilsonville and provides a connection to TriMet services. AmTrak currently provides train service in the Portland metropolitan area and will be adding a train station in Oregon City in 2003.

Emergency Services

A combination of emergency service agencies provide 911, medical, police, and fire coverage throughout urban Clackamas County. There are four 911 centers that provide dispatch services:

- Clackamas County Communications (C-COM)
- Lake Oswego Communications (LOCOM)
- Milwaukie Police Department
- Gladstone Police Department

Table 4-2 lists the medical, police, and fire agencies that are served by these four 911 centers. Although the Milwaukie Police Department currently maintains a 911 center, they plan to turn their operations over to Lake Oswego Communications in Spring 2003.

ITS ROLES AND RESPONSIBILITIES

This section outlines the roles and responsibilities associated with the applicable ITS market packages¹ selected by the Technical Advisory Committee for deployment in Clackamas County. The purpose for identifying the roles and responsibilities is to come to an agreement on the design, ownership, operations and maintenance of integrated ITS devices and to determine which agency will have primary control of the devices.

¹ A “market package” is an ITS architecture term defined by the Federal Highway Administration as a service-oriented way to piece together transportation equipment, services, and the information flows between them to meet transportation needs.

Table 4-2. Emergency Service Providers in Urban Clackamas County

911 Center	Agencies Served by Each 911 Center		
	Medical	Police	Fire
Clackamas County Communications (C-COM)	<ul style="list-style-type: none"> American Medical Response (AMR)* 	<ul style="list-style-type: none"> Clackamas County Sheriff's Office (includes Happy Valley, Wilsonville) Oregon City Police 	<ul style="list-style-type: none"> Clackamas County Fire District #1 (includes Happy Valley, Milwaukie) Tualatin Valley Fire & Rescue (TVF&R) (includes Oregon City, Wilsonville)
Gladstone Police Department 911	<ul style="list-style-type: none"> American Medical Response (AMR)* 	<ul style="list-style-type: none"> Gladstone Police Department 	<ul style="list-style-type: none"> Gladstone Fire Department
Milwaukie Police Department 911**	<ul style="list-style-type: none"> American Medical Response (AMR)* 	<ul style="list-style-type: none"> Milwaukie Police Department 	<ul style="list-style-type: none"> Not Applicable
Lake Oswego Communications (LOCOM)	<ul style="list-style-type: none"> American Medical Response (AMR)* 	<ul style="list-style-type: none"> Lake Oswego Police Department West Linn Police Department 	<ul style="list-style-type: none"> Lake Oswego Fire Department West Linn Fire Department

* American Medical Response (AMR) is a private company that provides medical transportation services for health providers and hospitals throughout Clackamas County on a contract basis.

** The Milwaukie Police Department 911 plans to turn its operations over to Lake Oswego Communications in Spring 2003.

Roles and Responsibilities for the Clackamas County Region

Numerous market packages meet the needs of Clackamas County as identified in Chapter 3: System Architecture. Although some market packages apply specifically to a single agency, there are others that involve coordination amongst multiple agencies. The roles and responsibilities related to the design, implementation, operations and maintenance of these market packages are defined below.

Network Surveillance and Surface Street Control

These market packages provide the central control and monitoring equipment, communication links, traffic

detectors, surveillance equipment and the signal control equipment to transmit the collected data back to the transportation operations center and support local surface street control and/or arterial traffic management. Anticipated functions that will be conducted with a *Network Surveillance* and *Surface Street Control* project include:

- Configuring a traffic operations center (TOC) at Clackamas County.
- Upgrading traffic signal equipment to a base level of functionality for ITS implementation.
- Deploying communications infrastructure so that traffic signals and other field equipment are connected to the TOC.

- Deploying field devices to collect traffic conditions such as system detectors, CCTV, road weather information systems.
- Monitoring and controlling traffic conditions and equipment status.
- Implementing traffic signal timing adjustments.
- Collecting data from field devices.
- Remote control of field devices.
- Electronic data collection, warehousing and analysis.

These market packages include the majority of field devices and components that will require an agreement on roles and responsibilities. Tables describing the roles and responsibilities by field device or ITS component including a traffic operations center, central signal

system, CCTV, VMS, detection, signal timings, and road weather information systems are provided in Appendix I.

Table 4-3 shows a summary of the roles and responsibilities related to the planning, design, integration, maintenance, ownership, control, and monitoring functions for the *Network Surveillance* and *Surface Street Control* market packages. The specific roles and responsibilities for these market packages are described in more detail below.

Planning

All agencies are currently providing input and will continue to provide input regarding the planning and location of field devices.

Table 4-3. Roles and Responsibilities for Network Surveillance and Surface Street Control*

Function	Clackamas County (CC)	Milwaukie	Oregon City	Wilsonville	Lake Oswego	Gladstone, Happy Valley, West Linn	TriMet
Planning	✓	✓	✓	✓	✓	✓	✓
Design	✓	✓	✓	✓	✓	✓	✓
System Integration	✓	✓	✓	✓	✓	✓	✓
Maintenance	✓				✓		
Ownership	✓	✓	✓	✓	✓	✓	
Control**	✓				✓		
Monitor		✓	✓	✓		✓	✓
Request***	ODOT	CC/ ODOT	CC/ ODOT	CC/ ODOT	ODOT	CC/ ODOT	

* This table excludes ODOT facilities. All ODOT facilities are the complete responsibility of ODOT.

** For CCTV cameras, the agency that owns the camera will have primary control of the camera and other agencies will have monitoring and secondary control capabilities.

*** Agencies may request ODOT or Clackamas County (CC) to make signal-timing changes and may request ODOT to make freeway ramp meter timing changes.

Design

Each agency will be responsible for leading the design of future field devices within their right-of-way unless they specifically request Clackamas County to take the lead on the design.

RECOMMENDATION

Standards for construction of communications infrastructure and field devices should be agreed upon by the Clackamas County Technical Advisory Committee set up as part of this project.

System Integration

Clackamas County will be the lead agency on software integration projects, but each local agency will be responsible for integrating new devices with the existing system.

RECOMMENDATION

Clackamas County will be the primary point of contact between neighboring jurisdictions such as the City of Portland and ODOT and will be the primary agency responsible for the maintenance and operations of future field devices. Therefore, Clackamas County should be primarily responsible for software integration projects with other agencies.

Maintenance

It is assumed that all of the urban cities except for Lake Oswego will continue to contract out the services of Clackamas County for operations and maintenance of city-owned traffic signals and will develop new operations and maintenance contracts for new city-owned ITS equipment such as CCTV cameras, variable message signs, system detectors, etc...

While the line between maintenance and ownership of field devices (cameras, traffic signals, message signs, etc...) may be easily defined based on whose right-of-way the equipment is deployed within, the maintenance and ownership responsibility for telecommunications infrastructure becomes more blurred. For example, multiple agencies may be sharing the same cable of fibers and that one cable may pass through multiple jurisdictions. Fortunately for Clackamas County there is a nationally renowned model for sharing telecommunications infrastructure right here in Portland. The Cooperative Telecommunications Infrastructure Committee (CTIC) comprised of the City of Portland, ComNet, TriMet and ODOT have entered into an agreement to cooperatively design, build, maintain and fund shared communication system infrastructure throughout the Portland metropolitan area. Their model for maintaining the communications infrastructure is centered around agency boundaries and rights-of-way. In other words, the maintenance and funding responsibility is determined by whose right-of-way the maintenance is required within. For example, if a cable is broken outside of a TriMet facility but within the City of Portland street right-of-way, then the City of Portland is responsible for performing and funding the required maintenance. If however, the break occurred on the TriMet property, then TriMet would be the responsible agency.

CTIC currently contracts their fiber maintenance to one telecommunications contractor to ensure a standard level of maintenance and repair.

Control

For CCTV cameras, the agency that owns the camera will have primary control of the camera and other agencies will have monitoring and secondary control capabilities. For traffic signals, Clackamas County will have primary control of the signal timings based on the current signal operations and maintenance agreements.

Monitor

Partner agencies will be able to monitor video, traffic signal status and collect historical and real-time information from system detectors.

Request

Agencies who do not have control capabilities over a particular piece of equipment will be able to request changes such as signal timing or ramp meter adjustments from the agency with control.

Traffic Information Dissemination

The *Traffic Information Dissemination* market package allows traffic information to be disseminated to travelers using roadside equipment such as variable message signs or highway advisory radio. This package also covers the equipment and interfaces that provide traffic information from the traffic operations center to the media (including the Internet), transit management centers, emergency management centers or information service providers. Although ownership of the field devices will vary by facility, Clackamas County will be responsible for the operations and maintenance for the devices as shown in Table 4-3 except for the devices owned by Lake Oswego and ODOT. As with the network surveillance and surface street control market packages, the design and integration of field devices for traveler information will be the primary responsibility of the owning agency. Control and monitoring of these field devices will be the same as for network surveillance and surface street control.

Integration with other management centers and the media to distribute roadway condition information is planned to occur from the Clackamas County TOC. Therefore, Clackamas County will be responsible for planning and design for information sharing between other management centers and the Internet.

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| RECOMMENDATIONS |
| <ul style="list-style-type: none"> • Model the maintenance of communications infrastructure in Clackamas County after the current CTIC maintenance model. • Develop an Intergovernmental Agreement (IGA) between Clackamas County and the local jurisdictions for the maintenance and operations of telecommunications infrastructure. • Clackamas County should become a member of the CTIC and a representative for Clackamas County should attend the CTIC meetings. • A representative from Clackamas County should participate in the recently formed ITS Communications TransPort Subcommittee. |

RECOMMENDATION
The Clackamas County TOC should be the central point for collecting and disseminating County traveler information to travelers and other management centers.

Incident Management System

This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as weather service entities and event promoters.

The anticipated tasks that will be performed for the *Incident Management* market package include:

- Sharing information and providing notification throughout the duration of an incident.
- Network surveillance and surface street control.
- Coordinating incident response activities with other agencies within the County (e.g., police, fire, 911, Cities of Milwaukie, Oregon City, Lake Oswego, Wilsonville, Happy Valley, SMART, etc...).
- Coordinating incident response activities with other external transportation agencies (e.g., ODOT, TriMet, AmTrak, etc...).
- Deploying necessary resources to respond to the incident.
- Providing assistance to emergency services.

This market package, more than any other, requires significant coordination in real-time with numerous agencies and departments. The role of Clackamas County in this package will include detecting and verifying the incident and then implementing the appropriate response. The response may include

traffic control strategy modifications or resource coordination between center subsystems. The specific response will depend on the type, duration, location and time of the incident and should be planned in advance with the agencies involved.

The roles and the responsibilities relating to the design, operations and maintenance of field devices for this market package are essentially the same as those for the *Network Surveillance* and *Surface Street Control* market packages. The only difference is that Clackamas County and ODOT would need to coordinate the operation of field devices if alternate surface streets are used to divert traffic around an incident. In this case, the roles and responsibilities for operating field devices should be determined in an incident management plan.

RECOMMENDATION

Prepare a regional incident management plan. This plan could be expanded to include details for specific corridors as field devices are deployed.

Railroad Operations Coordination

The *Railroad Operations Coordination* market package consists of coordination between rail operations, traffic management centers, and emergency management centers to determine when at-grade railroad crossings will be closed. The purpose for this market package is to provide advanced train movement information to emergency management centers, fire districts, transportation management centers and travelers. This would be accomplished by deploying train detection equipment at rail crossings and a user interface to display the information.

The agencies with the primary roles and responsibilities for this market package are Clackamas County, Milwaukie, Oregon City, Wilsonville, ODOT, or Lake Oswego and the applicable 911 agency and fire district. Other cities may also play a secondary role in a project addressing this market package. At this time, the only roles and responsibilities that can be defined are for planning and design. Clackamas County will lead the planning and design effort for this project, however, the local agencies, emergency management center and the railroad operations centers (e.g., Union Pacific, Burlington Northern Santa Fe, etc...) will provide key input to the design.

Roles for the maintenance and operations of the field devices cannot be determined at this time because they will depend on whether the detection equipment is installed inside or outside railroad right-of-way or on the trains themselves. This should be determined just prior to detailed design based on conversations with the responsible parties identified above and documented in a concept of operations.

RECOMMENDATION

Coordinate the design with the railroad operations centers and the emergency management centers. Document the maintenance and operations roles and responsibilities in a project concept of operations.

Roles and Responsibilities for Portland Metropolitan Region

Five market packages apply to ongoing or upcoming projects in the Portland metropolitan region. These projects are

discussed in more detail in the Implementation Plan chapter.

The market package with the greatest impact on Clackamas County is *Regional Traffic Control*. The main roles associated with Regional Traffic Control include picking out a regional central signal system, monitoring traffic conditions on highways and arterials, controlling equipment on highways and arterials, and sharing information on traffic conditions. Table 4-4 cites roles and responsibilities involved with this market package.

The other market packages that apply to the Portland metropolitan region include the following:

- *Probe Surveillance*- Surveillance of highways and arterials with transit vehicle probes.
- *Interactive Traveler Information*- Tailored real-time information for travelers provided through a 511 telephone system and/or a regional web site.
- *Maintenance and Construction Activity Database*- Develop a database of construction and maintenance work plans/schedules and adjust plans based on user feedback.
- *ITS Data Warehouse*- Maintain a current map database of archived data that users can subscribe/request data from and generate reports.

The roles and responsibilities of Clackamas County and the local agencies will include taking part in the design and system integration of the market packages. Clackamas County will serve as the primary contact for coordinating with these regional projects while the

local agencies will be involved on a secondary level. Ownership, maintenance, and operations will be determined as each project is further developed.



- RECOMMENDATIONS**
- Continue to meet quarterly with the Clackamas County Technical Advisory Committee to coordinate projects and plans for expanding ITS.
 - Continue to participate in the TransPort committee to coordinate and integrate with the regional projects described in this section.
 - Deploy field devices (CCTV, system detectors, weather information systems, etc...) to support regional traveler information projects such as 511 and the ITS Data Warehouse.

Table 4-4. Roles and Responsibilities for Regional Traffic Control

Function	Clackamas County (CC)	Milwaukie	Oregon City	Wilsonville	Lake Oswego	Portland*	ODOT
Planning	✓				✓	✓	✓
System Integration	✓				✓	✓	✓
Maintenance	✓**				✓**	✓**	✓**
Ownership	✓**				✓**	✓**	✓**
Control	✓				✓	✓	✓
Monitor		✓	✓	✓			
Request***	ODOT	CC/ODOT	CC/ODOT	CC/ODOT	ODOT		

* The City of Portland will be the central agency for regional traffic control and other agencies throughout the region will also play similar roles to that of Clackamas County and its cities.

** Agencies in the region are in the process of trying to determine what kind of ownership and maintenance agreement will be established.

*** Agencies may request ODOT or Clackamas County (CC) to make signal-timing changes.