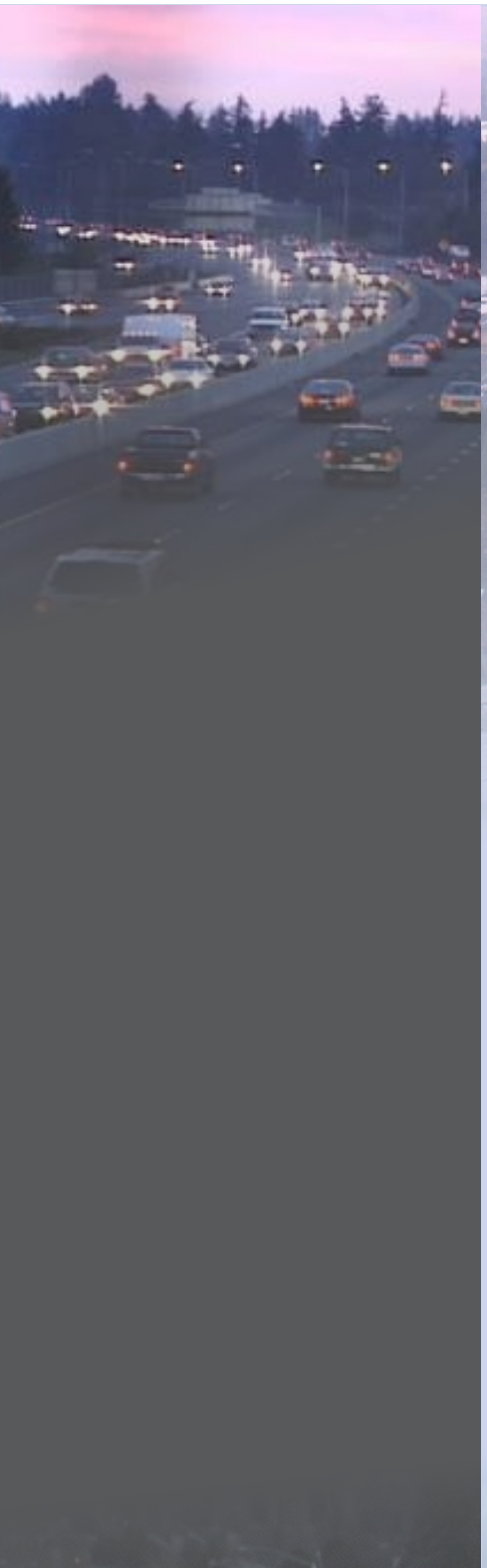
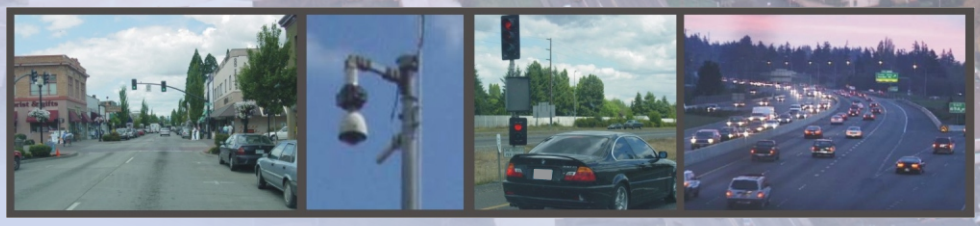


Executive Summary

Washington County ITS Plan



February 2014

Prepared by

DKS

In Cooperation with

Washington County
The City of Beaverton
The City of Hillsboro
The City of Sherwood
The City of Tigard
The City of Tualatin
Oregon Dept. of Transportation
Portland General Electric
TriMet
Tualatin Hills Parks & Rec. District
Tualatin Valley Fire & Rescue
WCCCA (911)

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INTRODUCTION

Washington County is the second largest and one of the fastest growing urban counties in Oregon. Forecasts indicate that high growth rates will continue over the next 20 years. As can be seen in Figure 1, the forecasted population and employment growth will likely result in an additional one and a half million weekday auto trips.

Significant population growth along with continued reliance on the automobile and a public transit system with limited connectivity has had a significant impact on the county's transportation infrastructure. Traffic congestion directly impacts freight movement, emissions, travel times, fuel consumption, and emergency response times. It is critical to the Washington County economy and environment that the transportation system work safely and efficiently.

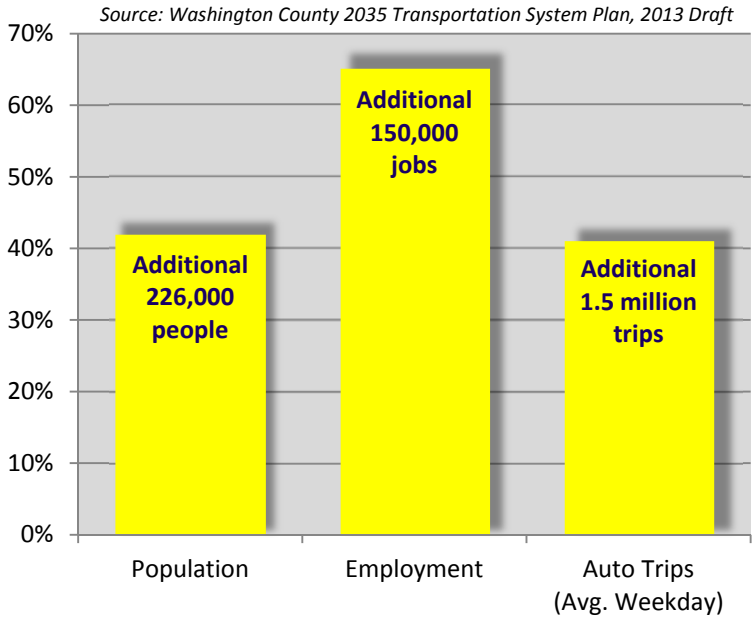


Figure 1. Forecasted 2010 to 2035 Growth

Building and managing a smarter and more efficient transportation system will require cooperation between Washington County, ODOT, and other local agencies. It will necessitate a combined strategy of capital projects, use of technology, and public transportation. For this purpose, Washington County, in partnership with numerous stakeholders, developed an Intelligent Transportation System (ITS) Plan for the county's roadways. The original plan was developed in 2005 and this 2013 update specifically focuses on Chapter 2 (existing conditions) and Chapter 5 (ITS deployment plan), which includes an extensive list of improvement projects that support many ITS strategies but with a focus on completing the communications network and improving operational and maintenance efficiencies.

The updated ITS plan will guide the deployment of advanced technologies and management techniques for the next 20 years that will improve the safety and efficiency of the transportation system. The *Washington County ITS Plan* and 2013 project update were developed in a manner consistent with similar efforts in the region and state to ensure that ITS efforts are coordinated and complementary. This document presents the Executive Summary of the Final Report with a focus on the project background, mission and goals, ITS deployment plan, and next steps.

PROJECT BACKGROUND

This section includes a description of ITS, the project purpose, recent ITS achievements, and expected benefits.

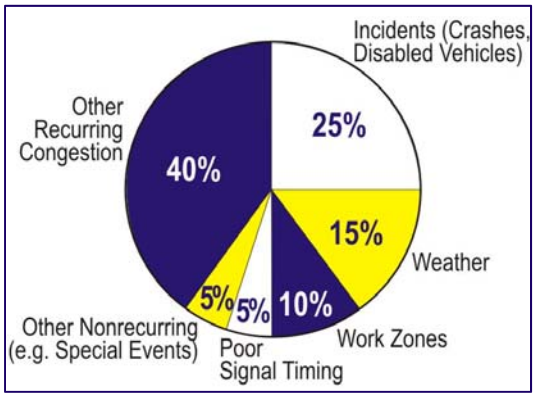


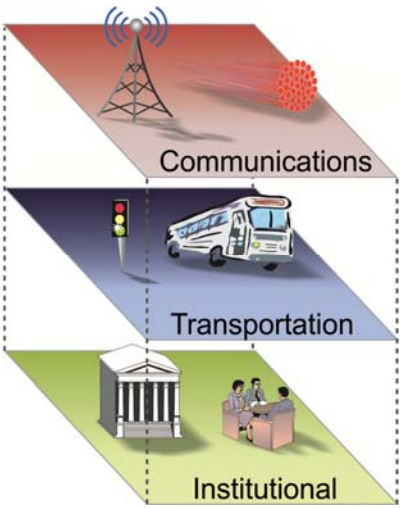
Figure 2. Causes of Congestion

What is ITS?

Intelligent Transportation Systems 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 and reducing crashes by managing congestion resulting from recurring and non-recurring events as shown in Figure 2. Examples of non-recurring events include incidents, weather, and road construction. Bottlenecks, which occur where capacity is reduced or where travel demand exceeds capacity, are the primary cause of recurring congestion. Traffic management techniques and tools can enhance the overall system performance and potentially delay the need to add capacity (e.g., travel lanes). Efficiencies are also 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 operate and manage the system seamlessly across jurisdictional boundaries.

Project Purpose

The purpose of the plan update was to develop a strategic 20-year action plan, the supporting communications infrastructure, and a project list for ITS technologies. The original *Washington County ITS Plan* was developed in 2005 and a portion of that plan has been deployed. The original ITS plan provided a framework of policies, procedures, and strategies for integration of Washington County's existing resources to effectively meet future regional transportation needs and expectations. The reasons for developing and updating the ITS plan for Washington County include:



National ITS Plan Framework

- The region cannot build itself out of congestion.
- The region endeavors to maximize the efficiencies and improve the safety of the existing infrastructure.
- The County strives to deliver better information about traffic conditions.
- 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.

Washington County ITS Achievements

Washington County Land Use and Transportation (LUT) has successfully implemented a number of ITS projects since the ITS Plan was developed in 2005. Most notable are projects related to central operations, arterial management systems, and traveler information.

Video wall and workstation at the Traffic Operations Center

Traffic Operations Center

A Traffic Operations Center (TOC) was installed at Washington County's Walnut Street Center facility in 2009. The TOC includes a video wall and two workstations that have access to LUT's adaptive traffic signal systems (InSync and SCATS), the regional central traffic signal system housed at City of Portland (TransSuite), LUT's traffic monitoring cameras, and transportation network connections to other agencies in the region. The TOC allows traffic engineers and technicians to remotely monitor and adjust signal timings for routine updates or in response to traffic incidents, citizen complaints, or alerts from the signal systems. This improves staff efficiency and reduces time spent traveling to and from traffic signals.

Arterial Management Systems

Washington County LUT deployed several arterial management projects:

- Cornell Rd (Brookwood Pkwy to Butler St): Adaptive signal timing (InSync) improved eastbound and westbound travel times by four to 25 percent.
- Tualatin-Sherwood Rd (I-5 to Teton Rd): Adaptive signal timing (SCATS) improved eastbound and westbound travel times by five to 17 percent.
- Traffic monitoring cameras on Tualatin-Sherwood Rd, Cornell Rd, and Scholls Ferry Rd support operations at the TOC and provide traveler information.
- Flashing yellow arrow deployment for left turns at many LUT-operated traffic signals has reduced delay and mostly had positive initial feedback from the public.

Adaptive signal timing improved travel times **on Tualatin-Sherwood Rd and Cornell Rd by approximately** five to 25 percent.

Traveler Information

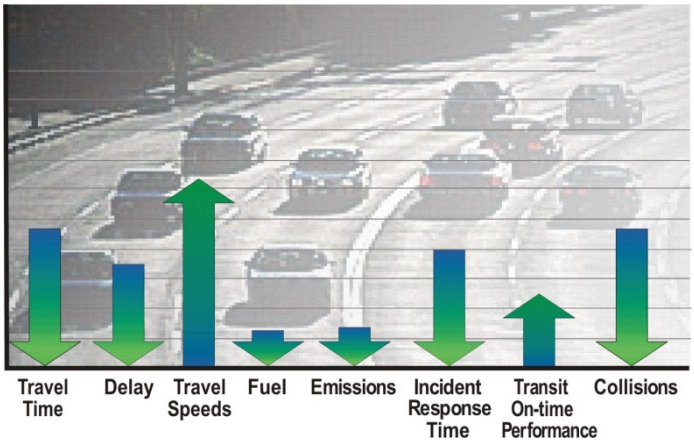
Washington County LUT now provides travelers with current information to help them make informed decisions. They developed a Washington County Roads website (www.wc-roads.com), which includes road closure and traffic advisories, construction projects, maintenance projects, bicycle and pedestrian news, and community events. Washington County LUT also posts camera images to ODOT's TripCheck website and inputs information about events with major traffic impacts to ODOT's TripCheck system using the Local Entry tool.

Other ITS Achievements in Washington County

Other agencies, particularly ODOT and the City of Beaverton, have also implemented ITS projects that have positively influenced travel within Washington County. ODOT improved traffic operations on Pacific Hwy (OR 99W) with traffic signal controller enhancements, expanded their fiber optic cable network, placed dynamic message signs on arterial roadways, and installed ramp meters at additional locations. ODOT is currently constructing an active traffic management system on OR 217 that is expected to reduce crashes through the use of variable speed limits, curve warnings, queue warnings, and traveler information with a focus on roadside messages with travel time estimates. The City of Beaverton implemented adaptive signal timing (SCATS) on Farmington Rd/Beaverton-Hillsdale Hwy (OR 10). Due to its success, the City of Beaverton is expanding the limits of the adaptive signal timing on Beaverton-Hillsdale Hwy and also adding it to Canyon Rd (OR 8) and Cedar Hills Boulevard.

Expected Benefits

Intelligent Transportation System projects are aimed at improving the safety and operational efficiency of the existing transportation infrastructure. Potential benefits for the transportation system and travelers include:



- Improved travel time reliability
- Reduced travel delay
- Reduced fuel consumption and greenhouse gas emissions
- Reduced crashes and improved safety
- Comprehensive information for travelers to make informed decisions

Potential institutional benefits for Washington County Land Use and Transportation include:

- Reduced capital costs (e.g. leveraging other planned capital improvement projects, communications sharing with other agencies)
- Improved operations and maintenance resource allocation (e.g. remote access to traffic signals at TOC, weather stations for winter maintenance activities)

- Improved system efficiency across jurisdictional boundaries (e.g. ODOT dynamic message signs on local arterial roadways)
- Increased data to support performance measurement, evaluation of operational strategies, and traditional transportation planning
- Expanded and robust communications network
- Improved traveler information

Plan Update Approach

Figure 3 illustrates the approach used to update the *Washington County ITS Plan.* One of the key outreach activities was a series of meetings with 12 key stakeholders from regional transportation and emergency response agencies. Input from these meetings was used to update the existing conditions assessment, identify needs, and develop the ITS deployment plan. Stakeholder meetings were conducted with:

- City of Beaverton
- City of Hillsboro
- City of Sherwood
- City of Tigard
- City of Tualatin
- Oregon Department of Transportation
- Portland General Electric[1]
- TriMet
- Tualatin Hills Parks & Recreation District
- Tualatin Valley Fire & Rescue
- Washington County Consolidated Communications Agency (911)
- Washington County Information Technology Services
- Washington County Land Use & Transportation

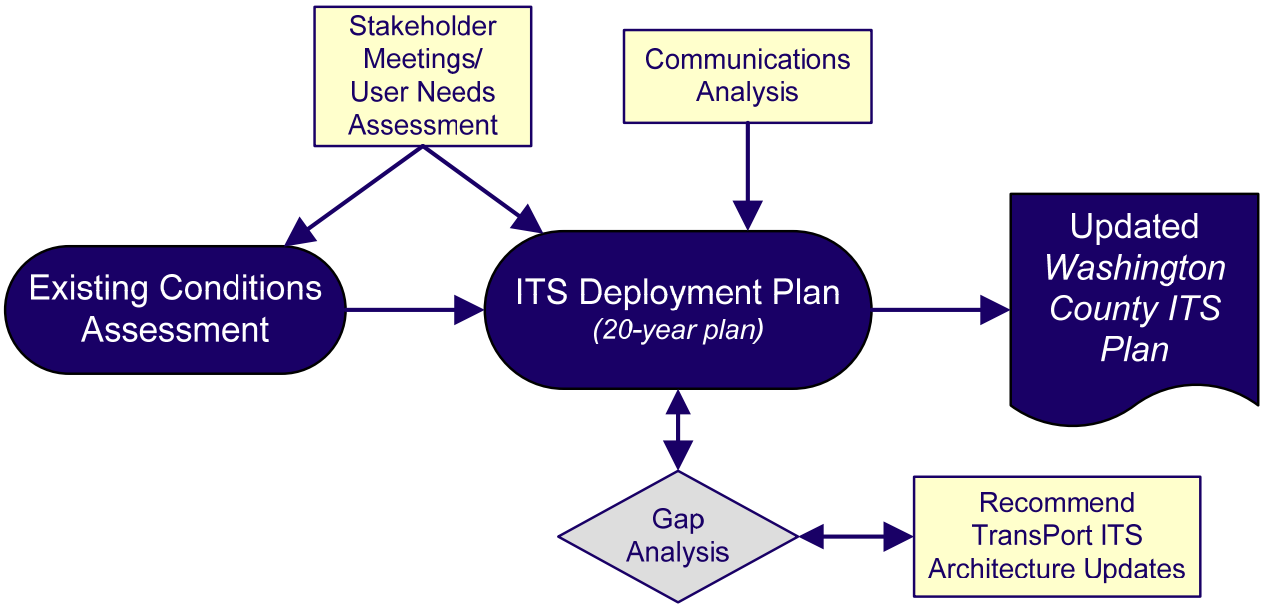


Figure 3. Plan Update Approach

[1] Portland General Electric was included in stakeholder interviews because they have a large fiber optic communications network and are open to infrastructure sharing agreements.

MISSION & GOALS

To guide the development and ultimate deployment of intelligent transportation systems in Washington County, stakeholders developed a mission statement and accompanying goals and objectives in 2005 during the initial development of the *ITS Plan*.

Washington County ITS Mission Statement

Washington County, the cities within the county, and ODOT seek to improve the safety, security and movement of goods, people and services for all modes of the transportation network by using advanced technologies, coordinated management techniques, and by providing real-time traveler information.

The mission statement is supported by five goals:

1) Improve the safety and security of our transportation system.
2) Improve the efficiency of the transportation system.
3) Provide improved traveler information.
4) Deploy functional and cost efficient ITS infrastructure.
5) Integrate regional ITS projects with local and regional partners.

Specific objectives that support each of the goals are listed in Chapter 3 of the *Washington County ITS Plan*.

ITS DEPLOYMENT PLAN

Over 60 ITS projects were identified and developed to address the current needs identified by Washington County LUT and local agencies within the county. This section includes an overview of the deployment plan projects, schedule, and costs.

ITS Deployment Plan Projects

The ITS deployment plan projects generally include installing a comprehensive communications network to support traffic signal operations and ITS devices, traffic signal improvements, expansion of CCTV traffic monitoring cameras, safety applications, and installation of rural weather stations. ITS projects can be grouped into one of two categories based on the lead agency for each project:

- **Washington County (WC)**: Projects led and primarily funded by Washington County LUT
- **Local Agency (LA)**: Projects recommended for funding and deployment by local agencies to support traffic signals maintained by Washington County LUT

Figure 4 shows the location of ITS deployment projects in Washington County and Table 1 provides details about each project. The project numbers and geographic groupings are for reference purposes only and do not indicate project priority. On Figure 4 the projects are depicted as a line for a corridor project or a circle for a project in a spot location. Some corridors show multiple project numbers such as one project number for a communications project and one project number for an adaptive traffic signal control project. These projects may be implemented at the same time pending funding allocation. Some projects include multiple spot locations, which is why some project numbers are shown in more than one location.

ITS projects support a number of operations and management strategies best-suited to meeting the transportation needs of Washington County LUT. These strategies are grouped into several categories:

- Traffic Control & Operations
- Bicycle & Pedestrian
- Rural
- Traveler Information

Table 2 shows the specific ITS strategies that are supported by each deployment plan project.

Schedule

The ITS deployment projects in this plan will likely be implemented over the next 20 years. Project priority will be determined by Washington County LUT as funding opportunities arise because project implementation is dependent on many factors such as:

- Funding sources and requirements; for example:
  - Projects that support partner agencies typically score better for regional funding programs allocated through Metro
  - Projects with CCTV cameras may be eligible for homeland security funding
- Combination of a project with a planned capital improvement project in future Washington County and local agency transportation improvement program allocations
- Communications sharing opportunities with other agencies
- Projects that support the needs of Washington County LUT operations and maintenance staff (e.g. rural weather stations)

Washington County ITS Plan

Figure 4 - ITS Deployment Plan Inset Maps and Detail Map Index

September 20, 2013

LEGEND

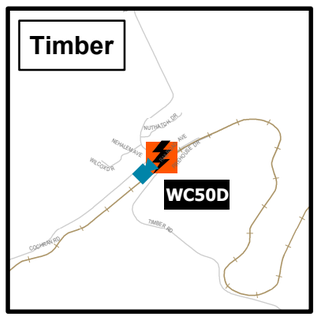
This legend is for inset maps below and Detail Maps 4a - 4f. Scale varies.

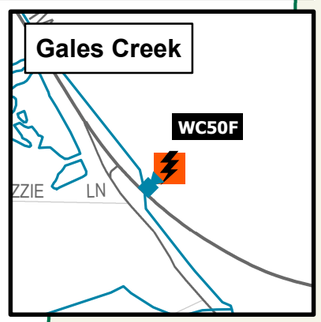
- Traffic Signal Owned or Maintained by Washington County
- Planned Traffic Signal

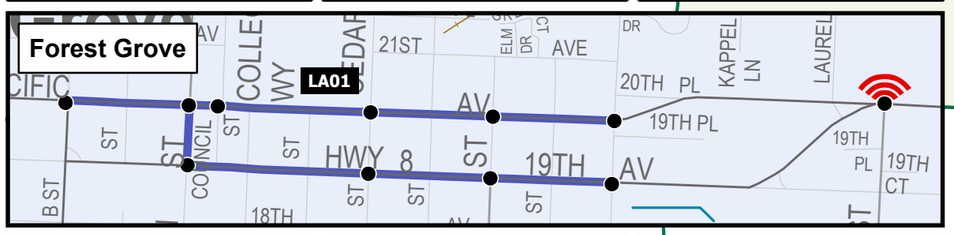
CCTV Camera

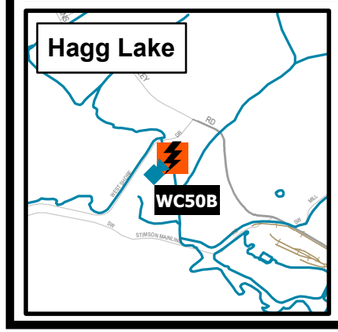
- Existing Camera
- WC44: CCTV Camera
- Proposed Camera

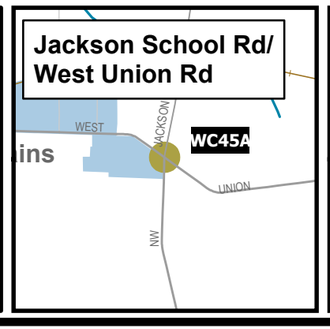
- Existing WCCCA Radio Tower
- AA## Project Number
- Event Management Project
- Warning/Feedback System Project
- Proposed Middle Switch
- Proposed Remote Cellular Connection
- Proposed Weather Station

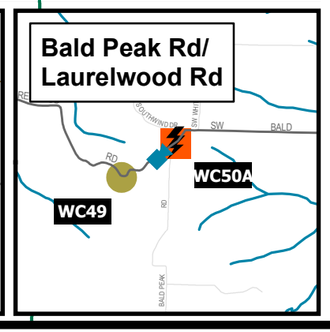


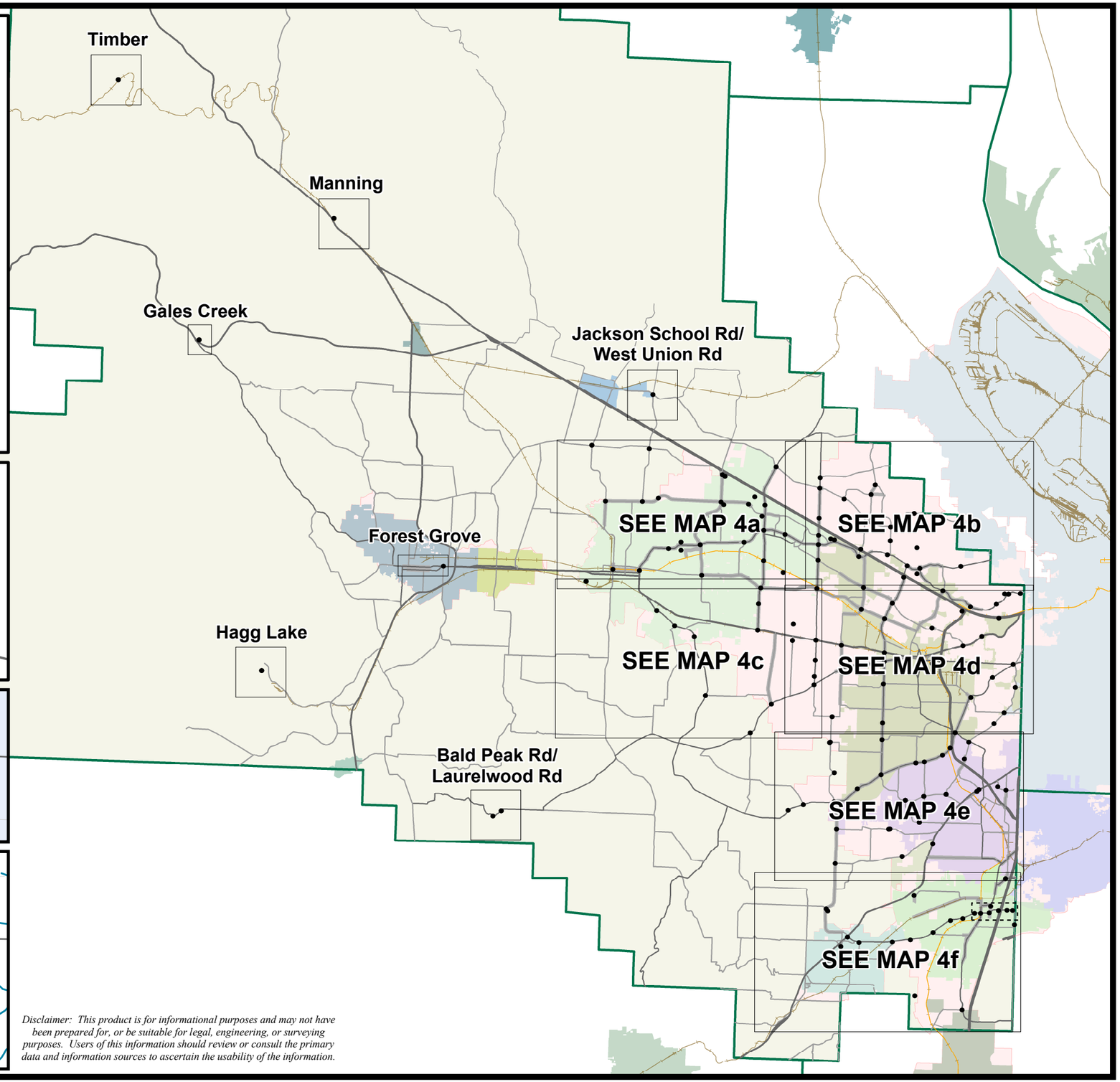












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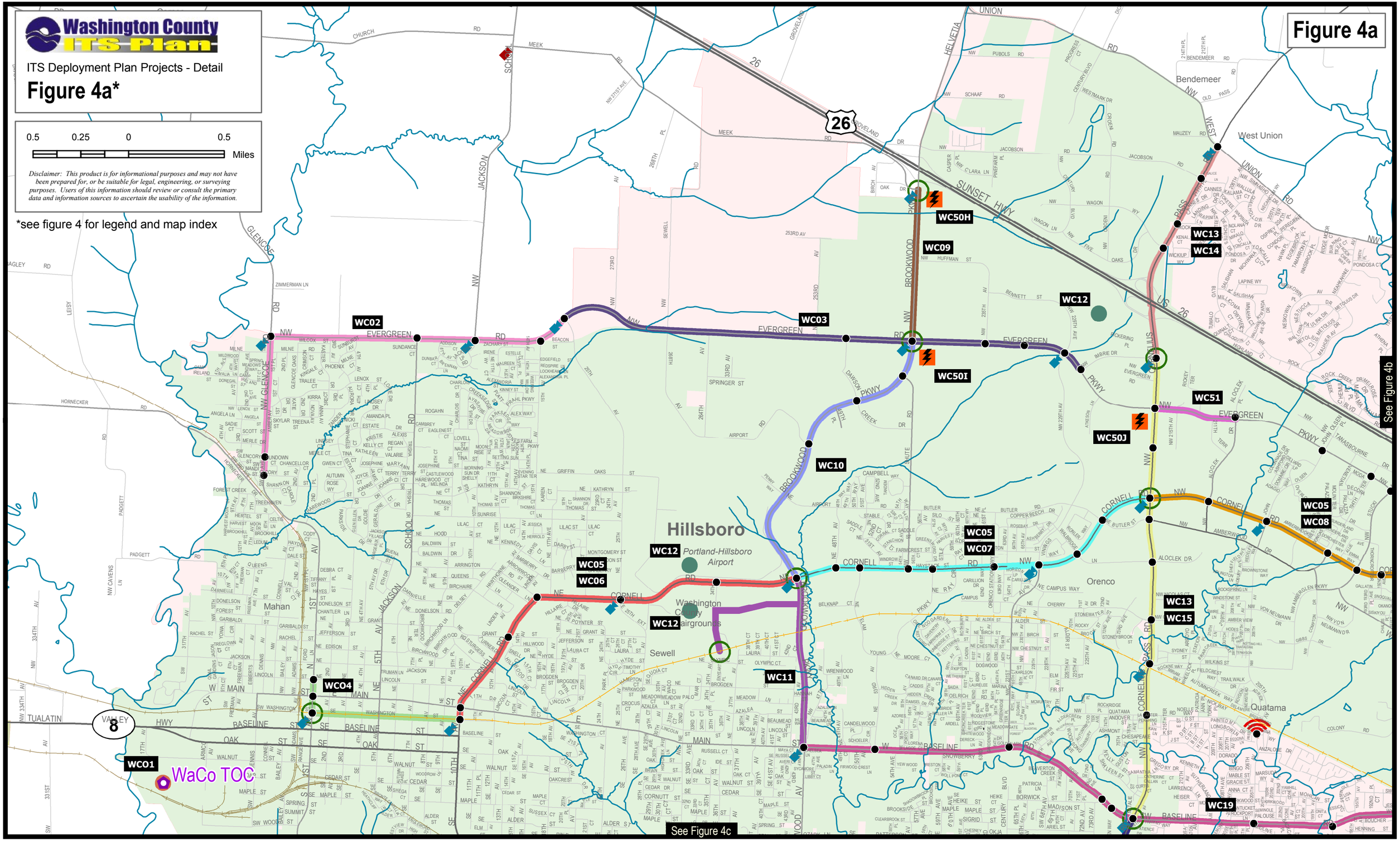
Washington County ITS Plan
ITS Deployment Plan Projects - Detail
Figure 4a*
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*see figure 4 for legend and map index
Figure 4a
See Figure 4b
See Figure 4c
WC01
WC02
WC03
WC04
WC05
WC06
WC07
WC08
WC09
WC10
WC11
WC12
WC13
WC14
WC15
WC19
WC50H
WC50I
WC50J
WC51
WaCo TOC
Hillsboro
Portland-Hillsboro Airport
Washington County Fairgrounds
Sewell
Orenco
Quatama
Mahan
Bendemeer
West Union
26
8

Figure 4b

Washington County ITS Plan

ITS Deployment Plan Projects - Detail

Figure 4b*

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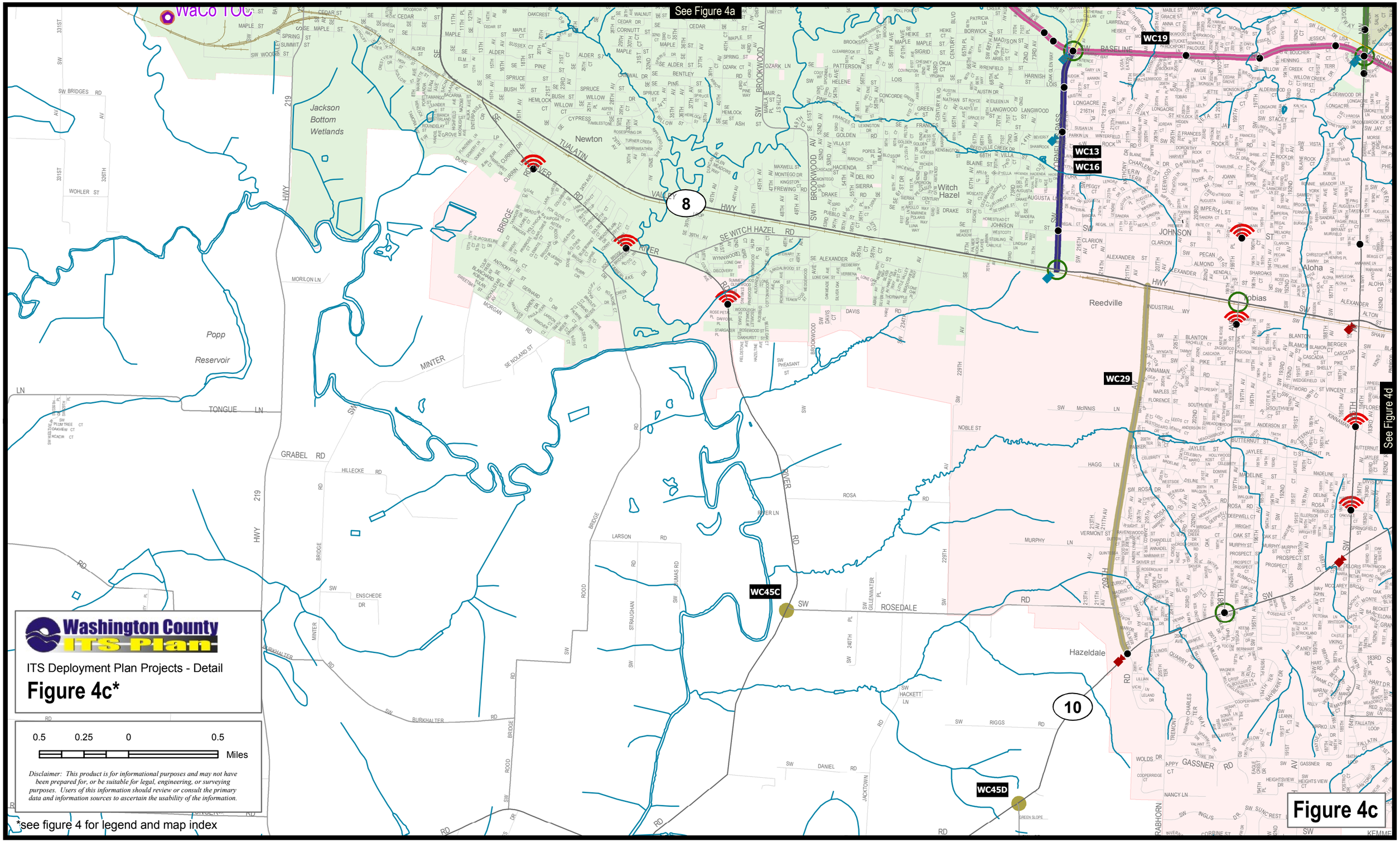
*see figure 4 for legend and map index

WC17
WC18
WC05
WC08
WCCCA
WC05
WC20
WC25
WC23
WC21
WC50K
See Figure 4a
See Figure 4d


See Figure 4a
See Figure 4d
WC19
WC13
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WC45C
WC45D
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10
Newton
Witch Hazel
Reedville
Aloha
Tobias
Hazeldale
Jackson Bottom Wetlands
Popp Reservoir
TUALATIN VALLEY HWY
SE WITCH HAZEL RD
SW ROSEDALE RD
SW BASELINE
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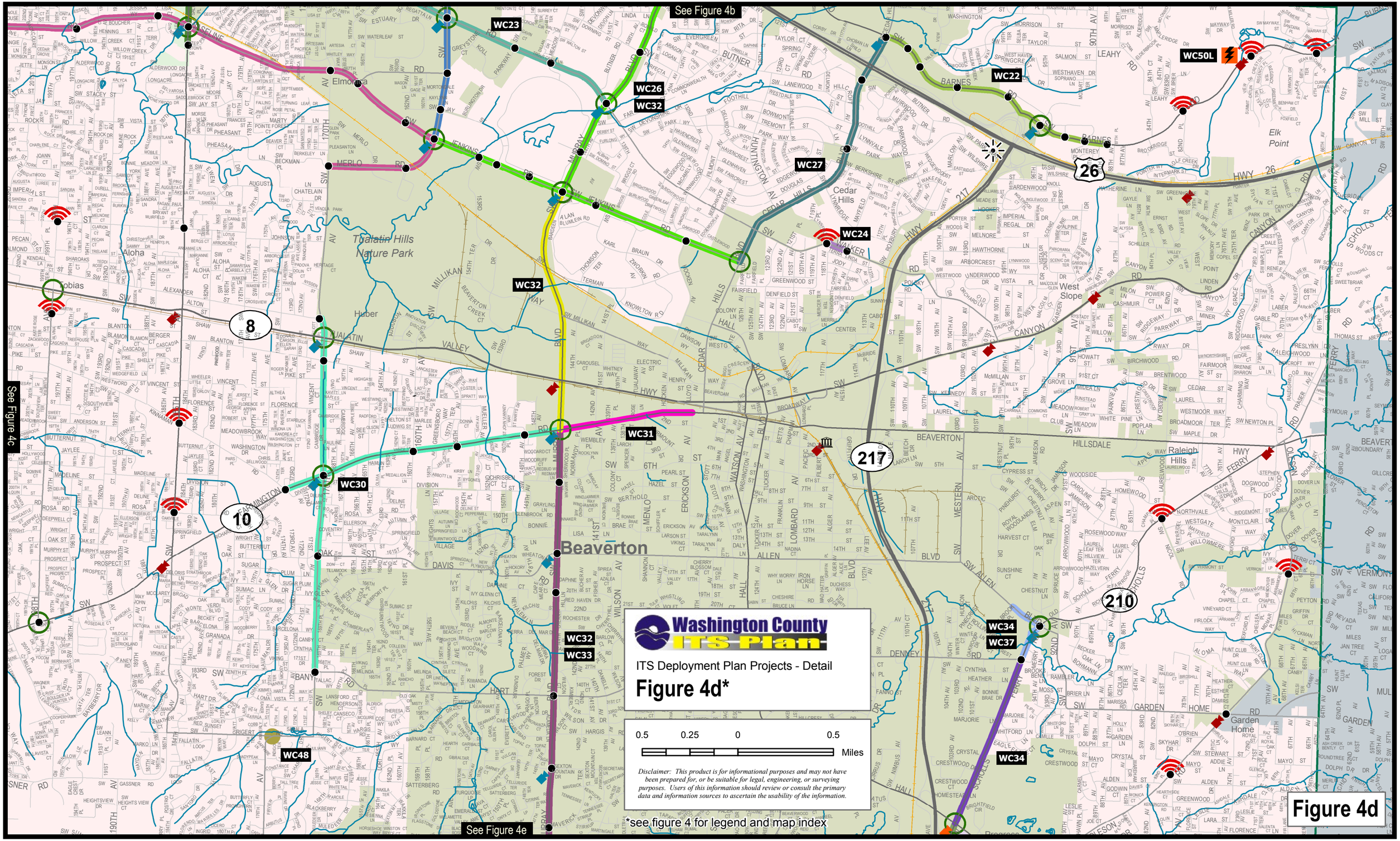
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Washington County
ITS Plan
ITS Deployment Plan Projects - Detail
Figure 4d*
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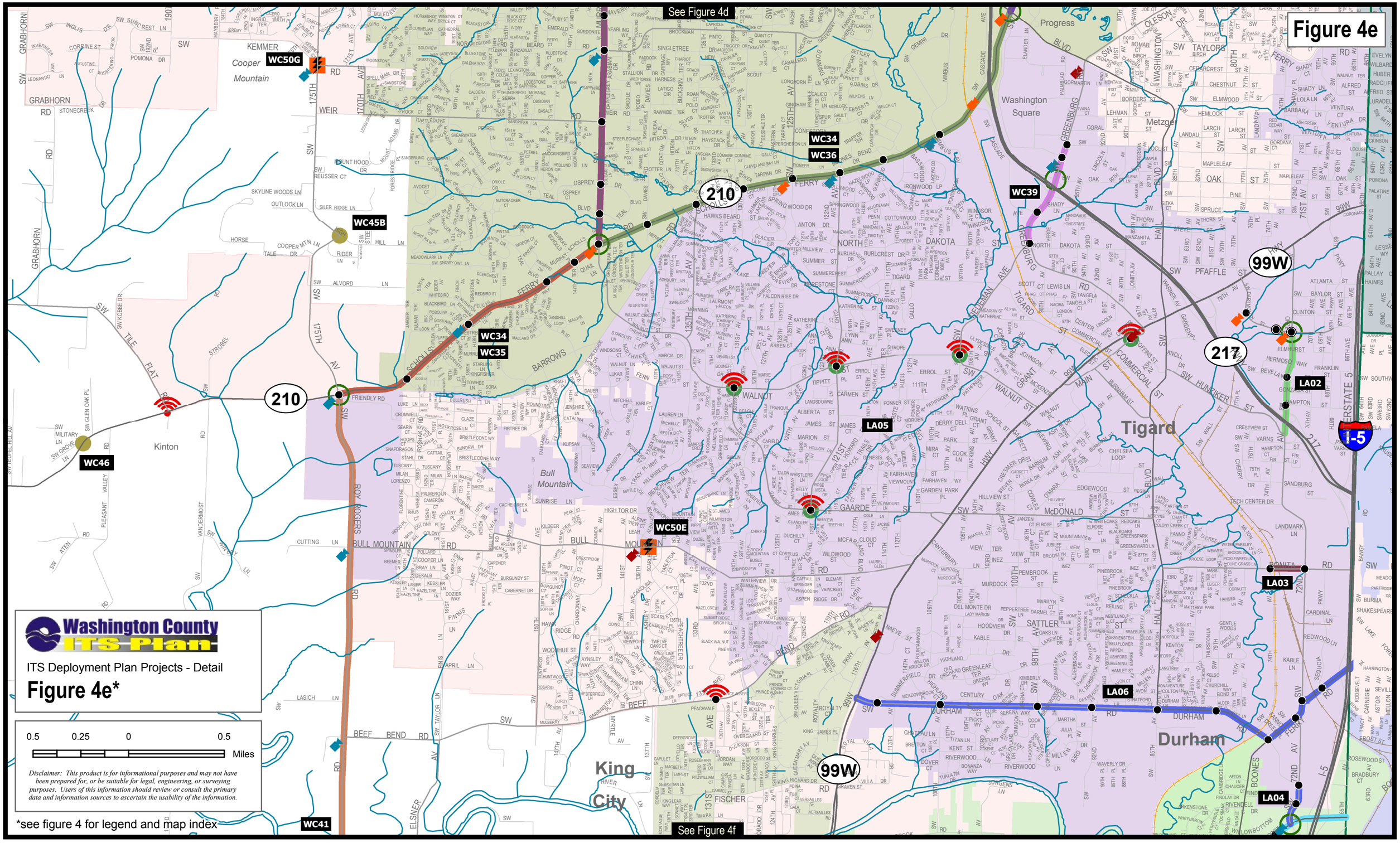
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
*see figure 4 for legend and map index
Figure 4d

Figure 4e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LA03
LA04
LA05
LA06
Kinton
Tigard
Durham
King City
Bull Mountain
Washington Square
Metzger
Progress
KEMMER
Cooper Mountain
GRABHORN
WEIR
SKYLINE WOODS LN
OUTLOOK LN
SILER RIDGE LN
HORSE
COOPER MTN LN
RIDER
ALVORD LN
SW KOBBE DR
TILE FLAT RD
STROBEL
SW GLEN OAK PL
SW MILITARY LN
SW GROVE LN
PLEASANT VALLEY RD
VANDERMOST RD
ATEN RD
FRIENDLY RD
ROY ROGERS RD
BULL MOUNTAIN RD
CUTTING LN
LASICH LN
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Washington County ITS Plan

ITS Deployment Plan Projects - Detail

Figure 4f*

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Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

*see figure 4 for legend and map index

See Figure 4e

WC41 WC50M WC40 WC42 WC47

LA04 LA10 LA07a LA07b LA09 LA08 LA11

99W I-5

Tualatin Sherwood Tonquin Middleton Nasoma Onion Flat

Figure 4f

Table 1. ITS Deployment Plan Projects

Project No.	Project Name	Project Description (see Figure 4 for project locations)	Traffic Signals Impacted	New CCTV Cameras	New Middle Switches	Capital Cost	Annual O & M Cost
Hillsboro Area ITS Projects							
WC01	Center to Center Connectivity	Install or enhance center to center connectivity for the following links: * WC01A - Install Wave Division Multiplexing (WDM) on existing fiber optic cable from Walnut Street Center (WSC) to the Washington County Law Enforcement Center (LEC) * WC01B - Install WDM on existing TriMet/Beaverton fiber optic cable from the LEC to Beaverton City Hall * WC01C - Install new wireless communications between WSC and WCCCA's Pumpkin Ridge radio tower * WC01D - Install new wireless communications between WCCCA's Pumpkin Ridge and 911 Center radio towers * WC01E - Install new wireless communications between WSC and WCCCA's Bald Peak radio tower * WC01F - Use existing Washington County, Sherwood, and PGE fiber optic cable to connect WCCCA's Bald Peak radio tower to Tualatin City Hall. Install WDM at Tualatin City Hall if added capacity is needed * WC01G - Install new router and WDM at WCCCA's 911 Center. Use existing WCCCA, ODOT, and Beaverton fiber optic cable to provide communications link from WCCCA's 911 Center to Beaverton City Hall * WC01H - Install new wireless communications between WSC and Parking Garage * WC01I - Install new wireless communications between WCCCA's 911 Center and WCCCA's Cedar Hills tower	0	0	1	$605,000	$18,150
WC02	Evergreen Rd (West)	* Ethernet over copper (EOC): Use existing twisted pair on Evergreen Rd from Glencoe Rd to 25th Ave and on Glencoe Rd from Cory St to the High School access * Wireless: Install communications link between Evergreen Rd and the High School access, and between WCCCA's Pumpkin Ridge radio tower and the new Evergreen Rd and Glencoe Rd EOC network	7	3	0	$183,000	$5,490
WC03	Evergreen Rd (Central)	* Fiber: Install new fiber optic cable from 25th Ave to Imbrie Dr	7	3	1	$948,000	$28,440
WC51	Evergreen Pkwy (East)	* Wireless: Install communications link between Cornelius Pass Rd and Aloclek Dr	2	0	0	$38,000	$1,140
WC04	1st Ave	* EOC: Use existing twisted pair on 1st Ave from Lincoln St to Washington St * Wireless: Install communications link between 1st Ave/Washington St and Cornell Rd/Washington St	4	2	1	$131,000	$3,930
WC05	Cornell Rd (Adaptive Signals)	* Adaptive: Install adaptive signal system from 10th Ave to US26	21	0	0	$1,285,000	$38,550
WC06	Cornell Rd (West)	* Install new CCTV cameras and middle switch between 10th Ave and Brookwood Pkwy * Use existing EOC and wireless communications network	0	3	1	$85,000	$2,550
WC07	Cornell Rd (Central)	* Install new CCTV cameras and middle switches between Brookwood Pkwy and Cornelius Pass Rd * Use existing EOC communications network	0	3	2	$115,000	$3,450
WC08	Cornell Rd (East)	* Wireless: Use existing communications link from Cornelius Pass Rd to 206th Ave/John Oslen Pl * EOC: Use existing twisted pair from 206th Ave/John Oslen Pl to 185th Ave * Fiber: Install new fiber optic cable from 185th Ave to Evergreen Pkwy	9	3	2	$270,000	$8,100
WC09	Brookwood Pkwy (North)	* Fiber: Install new fiber optic cable from the US26 EB on/off ramps to Evergreen Rd and provide communications link to existing ODOT fiber optic cable on US26	1	2	2	$431,000	$12,930

Table 1. ITS Deployment Plan Projects

Project No.	Project Name	Project Description (see Figure 4 for project locations)	Traffic Signals Impacted	New CCTV Cameras	New Middle Switches	Capital Cost	Annual O & M Cost
WC10	Brookwood Pkwy (Central)	* Fiber: Install new fiber optic cable from Evergreen Rd to Cornell Rd * Fiber: Fix breaks in existing conduit	5	2	2	$664,000	$19,920
WC11	Brookwood Pkwy (South)	* Fiber: Install new fiber optic cable on 34th Ave from MAX Station to Veterans Dr, on Veterans Dr from 34th Ave to Brookwood Pkwy, and on Brookwood Pkwy from Cornell Rd to Baseline Rd * WDM: Install WDM on existing fiber optic cable from MAX Station to the LEC and Beaverton City Hall	2	2	2	$637,000	$19,110
WC12	Hillsboro Stadium & Washington County Fairgrounds	*Adaptive: Install adaptive signal system or active traffic management system for event management. Corridors could include Cornell Rd, Brookwood Pkwy, Evergreen Rd, Evergreen Pkwy, and Cornelius Pass Rd	10	0	0	$612,000	$18,360
WC13	Cornelius Pass Rd (Adaptive Signals)	* Adaptive: Install adaptive signal system from West Union Rd to TV Hwy	21	0	0	$918,000	$27,540
WC14	Cornelius Pass Rd (North)	* Fiber: Install new fiber optic cable from Imbrie Dr to Wagon Way * EOC: Use existing twisted pair from Wagon Way to West Union Rd	4	2	1	$365,000	$10,950
WC15	Cornelius Pass Rd (Central)	* Fiber: Install new fiber optic cable from Imbrie Dr to Baseline Rd	10	4	3	$1,116,000	$33,480
WC16	Cornelius Pass Rd (South)	* Fiber: Install new fiber optic cable from Baseline Rd to TV Hwy	4	3	2	$523,000	$15,690
WC17	185th Ave	* Install new CCTV cameras and middle switches between West Union Rd and Baseline Rd * Use existing EOC communications network	0	6	3	$199,000	$5,970
WC18	185th Ave (Adaptive Signals)	* Adaptive: Install adaptive signal system from Rock Creek Blvd to Baseline Rd	15	0	0	$918,000	$27,540
WC19	Baseline Rd and Merlo Rd	* EOC: Use existing twisted pair on Jenkins Rd from 231st Ave to 158th Ave, and on Merlo Rd from Jenkins Rd to the TriMet Merlo Garage driveway * Fiber: Install new fiber optic cable on Baseline Rd from Brookwood Pkwy to 231st Ave * Wireless: Install communications link on Merlo Rd from 170th Ave to the TriMet Merlo Garage driveway	16	4	3	$845,000	$25,350
Beaverton Area ITS Projects							
WC20	Bethany Blvd	* Wireless: Install communications link on Bethany Blvd from Central Drive to Laidlaw Rd and on Laidlaw Rd from Bethany Blvd to Kaiser Rd * Cellular: Install communications to Bethany Blvd/Kaiser Rd and to Bethany Blvd/Laidlaw Rd	4	0	0	$47,000	$2,610
WC21	Cornell Rd and Barnes Rd	* Fiber: Install new fiber optic cable on Cornell Rd from Murray Blvd to Cedar Hills Blvd * EOC: Use existing twisted pair on Saltzman Rd from Dogwood St to Cornell Rd and on Barnes Rd from Cornell Rd to 118th Ave	9	1	2	$561,000	$16,830
WC22	Barnes Rd	* EOC: Use existing twisted pair from Cedar Hills Blvd to Catlin Gabel School Entrance * Wireless: Install communications link between WCCCA's Cedar Hills radio tower and the Baltic Ave/Barnes Rd traffic signal	9	2	1	$203,000	$6,090
WC23	Walker Rd (West)	* Fiber: Install new fiber optic cable from 173rd to Murray Blvd	0	2	2	$824,000	$24,720

Table 1. ITS Deployment Plan Projects

Project No.	Project Name	Project Description (see Figure 4 for project locations)	Traffic Signals Impacted	New CCTV Cameras	New Middle Switches	Capital Cost	Annual O & M Cost
WC24	Walker Rd (East)	* Wireless: Install communications link between Lynnfield Ln and Mayfield Ave * Cellular: Provide communications to the new Walker Rd wireless network	2	0	0	$50,000	$2,100
WC25	158th Ave	* Fiber: Install new fiber optic cable on 158th Ave from Cornell Rd to Jenkins Rd	9	2	3	$658,000	$19,740
WC26	Murray Blvd and Jenkins Rd	* Fiber: Install new fiber optic cable on Murray Blvd from Science Park Dr to Jenkins Rd and on Jenkins Rd from 158th Ave to Cedar Hills Blvd	10	4	4	$1,133,000	$33,990
WC27	Cedar Hills Blvd	* Fiber: Install new fiber optic cable from Barnes Rd to Jenkins Rd	5	1	1	$597,000	$17,910
WC29	209th Ave	* Fiber: Install new fiber optic cable from the TV Hwy to Farmington Rd	3	0	2	$695,000	$20,850
WC30	170th Ave and Farmington Rd (West)	* Fiber: Install new fiber optic on 170th Ave from Alexander St to Bany Rd * EOC: Use existing twisted pair on Farmington Rd from Kinnaman Rd to Murray Blvd	10	3	3	$745,000	$22,350
WC31	Farmington Rd (East)	* Fiber: Install new fiber optic cable from Murray Blvd to Hocken Ave	3	1	1	$340,000	$10,200
WC32	Murray Blvd (Adaptive Signals)	* Adaptive: Install adaptive signal system from US26 to Scholls Ferry Rd	20	0	0	$1,224,000	$36,720
WC33	Murray Blvd	* Fiber: Install new fiber optic cable on Murray Blvd from Jenkins Rd to Scholls Ferry Rd	12	4	2	$1,122,000	$33,660
WC34	Scholls Ferry Rd (Adaptive Signals)	* Adaptive: Install adaptive signal system from 175th Ave to Hall Blvd	20	0	0	$1,224,000	$36,720
WC35	Scholls Ferry Rd (West)	* Install new CCTV cameras and middle switch between 175th Ave and Murray Blvd * Use existing fiber optic communications network	0	2	2	$96,000	$2,880
WC36	Scholls Ferry Rd (East)	* Fiber: Install new fiber optic cable from Murray Blvd to OR217 SB ramps * EOC: Use existing EOC communications network from OR217 SB ramps to Hall Blvd	13	2	2	$713,000	$21,390
WC37	Scholls Ferry Rd and Allen Blvd	* Fiber: Install new fiber optic cable on Allen Blvd from the City of Beaverton Maintenance Building to Scholls Ferry Rd and on Scholls Ferry Rd from Allen Blvd to Denney Rd	2	1	1	$218,000	$6,540
Tigard/Tualatin/Sherwood Area ITS Projects							
WC39	Greenburg Rd	* Fiber: Install new fiber optic cable from Locust St to North Dakota St and between the Greenburg Rd network and ODOT's existing OR217 fiber optic cable	6	1	1	$383,000	$11,490
WC40	Bridgeport Rd	* Fiber: Install new fiber optic cable on Bridgeport Rd from Upper Boones Ferry Rd to 65th Ave * Wireless: Install communications link between Bridgeport Rd/Upper Boones Ferry Rd and Lower Boones Ferry Rd/Upper Boones Ferry Rd	8	1	2	$409,000	$12,270
WC41	Roy Rogers Rd	* Fiber: Install new fiber optic cable from Scholls Ferry Rd to Borchers Dr	4	4	1	$1,570,000	$47,100

Table 1. ITS Deployment Plan Projects

Project No.	Project Name	Project Description (see Figure 4 for project locations)	Traffic Signals Impacted	New CCTV Cameras	New Middle Switches	Capital Cost	Annual O & M Cost
WC42	Downtown Tualatin (Adaptive Signals)	* Adaptive: Extend existing SCATS to include: - Boones Ferry Rd/Martinazzi Ave - Boones Ferry Rd/Tualatin Rd - Boones Ferry Rd/Nyberg St - Boones Ferry Rd/Warm Springs St - Martinazzi Ave/Fred Meyer entrance - Martinazzi Ave/Warm Springs St - Nyberg St/Best Buy entrance - Nyberg St/65th Ave	8	0	0	$491,000	$15,330
Countywide/Rural ITS Projects							
WC43	Remote Traffic Signals	* Cellular: Install communications to approximately 25 remote traffic signals	25	0	0	$34,000	$16,020
WC44	CCTV Cameras	* Install approximately 23 CCTV cameras throughout Washington County to complete network coverage	0	23	0	$1,270,000	$38,100
WC45	Intersection Warning Systems	Install new roadway detectors to monitor traffic approaching rural intersections and install new electronic warning signs to warn vehicles of approaching cross traffic at: * WC45A - Jackson School Rd/West Union Rd * WC45B - 175th Ave/High Hill Ln * WC45C - River Rd/Rosedale Rd * WC45D - Farmington Rd (OR10)/Clark Hill Rd	0	0	0	$164,000	$4,920
WC46	"Military Curve" Warning System	Install a system for "Military Curve" on Scholls Ferry Rd between Clark Hill Rd and Tile Flat Rd that uses roadway detectors and speed feedback signs to warn drivers, particularly commercial vehicle operators, of high speeds in approach to the curve	0	0	0	$41,000	$1,230
WC47	"Tonquin Curve" Speed Feedback System	Install a system for "Tonquin Curve" on Tonquin Rd near the TVF&R Training Center that uses roadway detectors and speed feedback signs to warn drivers of potentially dangerous speeds in approach to the curve	0	0	0	$41,000	$1,230
WC48	175th Ave/Rigert Rd Queue Warning System	Install a system at the 175th Ave/Rigert Rd intersection that uses roadway detectors and electronic warning signs to warn drivers of an approaching queue	0	0	0	$109,000	$3,270
WC49	Laurelwood Length and Speed Warning System	Install a system on Laurelwood Rd that uses roadway detectors and electronic warning signs to alert commercial drivers of approaching length restrictions and to alert all drivers of potentially dangerous speeds in approach to geometric conditions	0	0	0	$143,000	$4,290

Table 1. ITS Deployment Plan Projects

Project No.	Project Name	Project Description (see Figure 4 for project locations)	Traffic Signals Impacted	New CCTV Cameras	New Middle Switches	Capital Cost	Annual O & M Cost
WC50	Weather Stations	Install road weather information systems (RWISs) to collect atmospheric and pavement data at key sites throughout the county to support maintenance decisions and traveler information: * WC50A - Bald Peak Rd/Laurelwood Rd * WC50B - Gaston, at Hagg Lake * WC50C - Manning at trailhead to Banks-Vernonia Trail * WC50D - Timber Road, near Timber * WC50E - Bull Mountain between Benchview Terrace and Peachtree Drive * WC50F - County Road near OR 6/Gales Creek * WC50G - 175th/Kemmer * WC50H - Brookwood south of US 26 * WC50I - Brookwood/Evergreen * WC50J - Cornelius Pass/Evergeen * WC50K - Barnes/Saltzmann * WC50L - Barnes/Miller * WC50M - Roy Rogers/Scholls-Sherwood	0	13	0	$2,492,000	$74,760
Local Agency ITS Projects							
LA01	Forest Grove: Traffic Signals	* EOC: Use existing twisted pair on Pacific Ave from B St to Hawthorne St, on 19th St from Main St to Hawthorne St, and on Main St from Pacific Ave to 19th St * Wireless: Install communications link between WSC radio tower and the new Forest Grove EOC network * Cellular: Install communications to Pacific Ave/Maple St traffic signal	11	0	0	$176,000	$5,880
LA02	Tigard: 72nd Ave (North)	* Fiber: Install new fiber optic cable from Dartmouth St to the OR217 SB Ramps/Varns St	5	0	1	$367,000	$11,010
LA03	Tigard: Bonita Rd	* Wireless: Install communications link from 72nd Ave to 74th Ave	2	0	0	$36,000	$1,080
LA04	Tigard: 72nd Ave (South)	* EOC: Use existing twisted pair from Bridgeport Rd to the Bridgeport Village access (north) * Wireless: Install communications link between the Bridgeport Village access (north) and Durham Rd	2	0	1	$78,000	$2,340
LA05	Tigard: Traffic Signals	* Cellular: Install communications to approximately five remote traffic signals	5	0	0	$58,000	$4,740
LA06	Tigard: Upper Boones Ferry Rd/Durham Rd	* Wireless: Install communications links along Durham Rd, Upper Boones Ferry Rd, and Carman Dr between OR99W and the I-5 NB Ramps * Adaptive: Install adaptive signal system from OR99W to I-5	13	0	0	$834,000	$25,020
LA07A	Tualatin: Herman Rd (Alternative A)	* Wireless: Install communications link from 124th Ave to Herman Rd/Tualatin Rd * EOC: Use existing twisted pair from Herman Rd/Tualatin Rd to Boones Ferry Rd/Martinazzi Ave	9	2	1	$242,000	$7,260
LA07B	Tualatin: Herman Rd (Alternative B)	* Fiber: Install new fiber optic cable on Herman Rd from 124th Ave to Tualatin City Hall and provide communications link between Tualatin City Hall and the Tualatin Operations Facility on 108th Ave	9	2	1	$1,056,000	$31,680

Table 1. ITS Deployment Plan Projects

Project No.	Project Name	Project Description (see Figure 4 for project locations)	Traffic Signals Impacted	New CCTV Cameras	New Middle Switches	Capital Cost	Annual O & M Cost
LA08	Tualatin: Boones Ferry Rd	*EOC: Use existing twisted pair along Boones Ferry Rd from Tualatin Rd to Avery St * Fiber: Share existing Sherwood and PGE fiber optic cable on Boones Ferry Rd from Avery St to Ibach Ct/Ibach St and on Avery St from Boones Ferry Rd to 95th Ave	8	2	3	$294,000	$8,820
LA09	Tualatin: Martinazzi Ave	* Fiber: Share existing Washington County LUT fiber optic cable from Tualatin City Hall to Tualatin-Sherwood Rd * EOC: Use existing twisted pair from Tualatin-Sherwood Rd to Warm Springs St	2	2	1	$175,000	$5,250
LA10	Tualatin: Traffic Signals	* EOC: Use existing twisted pair on 124th Ave from Tualatin Rd to Leveton Dr * Cellular: Install communications to new 124th Ave EOC network	2	0	0	$34,000	$1,620
LA11	Sherwood: Traffic Signals	* Fiber: Share existing Sherwood and Washington County LUT fiber to connect three remote traffic signals to the Tualatin City Hall	3	0	0	$122,000	$3,660

Table 2. ITS Strategies Supported by Each Deployment Plan Project

Projects **Legend for Strategy Mapping:** **C = Communications is a major project component** **P = Primary** **S = Secondary** *** = Project infrastructure supports future/concurrent project(s)**		Communications	Traffic Control & Operations						Bicycle & Pedestrian				Rural						Traveler Information		
			Traffic Operations Center	Enhanced Signal Timing Operations	Transit Signal Priority	Traffic Surveillance	Arterial Performance Monitoring	Event Management	Bicycle Detection & Real-Time Bicycle Routing	Trail Counters	Bicycle Signal Timings	Pedestrian-Based Signal Timings	Weather Stations	Intersection Warning Systems	Curve Warning Systems	Queue Warning Systems	Size & Speed Warning Systems	Speed Feedback Systems	Broadcast Traveler Information	Real-Time Traffic Flow Conditions	Roadside Traveler Information
Hillsboro Area ITS Projects																					
WC01	Center to Center Connectivity	C	P	S	*	S	S	S	*	*		*	*						S	S	
WC02	Evergreen Rd (West)	C	S	P		P	P	S	*		S	S							S	S	
WC03	Evergreen Rd (Central)	C	S	P		P	P	S	*		S	S							S	S	
WC51	Evergreen Pkwy (East)	C	S	P			P	S	*		S	S							S	S	
WC04	1st Ave	C	S	P		P			*		S	S							S	S	
WC05	Cornell Rd (Adaptive Signals)		S	P	*		P	S			S	S								S	S
WC06	Cornell Rd (West)	C	S	P	*	P	P	S	*		S	S							S	S	S
WC07	Cornell Rd (Central)	C	S	P	*	P	P	S	*		S	S							S	S	S
WC08	Cornell Rd (East)	C	S	P	*	P	P	S	*	*	S	S							S	S	S
WC09	Brookwood Pkwy (North)	C	S	P		P	P	S	*		S	S							S	S	
WC10	Brookwood Pkwy (Central)	C	S	P		P	P	S	*		S	S							S	S	
WC11	Brookwood Pkwy (South)	C	S	P		P	P	S	*		S	S							S	S	
WC12	Hillsboro Stadium & Washington County Fairgrounds		S	P				P			S	S									
WC13	Cornelius Pass Rd (Adaptive Signals)		S	P			P	S			S	S							S	S	
WC14	Cornelius Pass Rd (North)	C	S	P		P	P	S	*		S	S							S	S	
WC15	Cornelius Pass Rd (Central)	C	S	P		P	P	S	*		S	S							S	S	
WC16	Cornelius Pass Rd (South)	C	S	P		P	P	S	*		S	S							S	S	
WC17	185th Ave	C	S	P	*	P	P		*		S	S							S	S	S
WC18	185th Ave (Adaptive Signals)		S	P	*		P				S	S							S	S	S
WC19	Baseline Rd and Merlo Rd	C	S	P		P	P			*	S	S							S	S	

Projects Legend for Strategy Mapping: C = Communications is a major project component P = Primary S = Secondary * = Project infrastructure supports future/concurrent project(s)		Communications	Traffic Control & Operations						Bicycle & Pedestrian				Rural						Traveler Information		
			Traffic Operations Center	Enhanced Signal Timing Operations	Transit Signal Priority	Traffic Surveillance	Arterial Performance Monitoring	Event Management	Bicycle Detection & Real-Time Bicycle Routing	Trail Counters	Bicycle Signal Timings	Pedestrian-Based Signal Timings	Weather Stations	Intersection Warning Systems	Curve Warning Systems	Queue Warning Systems	Size & Speed Warning Systems	Speed Feedback Systems	Broadcast Traveler Information	Real-Time Traffic Flow Conditions	Roadside Traveler Information
Beaverton Area ITS Projects																					
WC20	Bethany Blvd	C	S	P					*	*	S	S							S	S	
WC21	Cornell Rd and Barnes Rd	C	S	P	*	P	P		*		S	S							S	S	S
WC22	Barnes Rd	C	S	P		P	P		*		S	S							S	S	S
WC23	Walker Rd (West)	C	S	P	*	P	P		*	*	S	S							S	S	
WC24	Walker Rd (East)	C	S	P			P		*		S	S							S	S	
WC25	158th Ave	C	S	P		P			*	*	S	S							S	S	
WC26	Murray Blvd and Jenkins Rd	C	S	P	*	P			*	*	S	S							S	S	
WC27	Cedar Hills Blvd	C	S	P		P	P		*		S	S							S	S	
WC29	209th Ave	C	S	P					*		S	S							S	S	
WC30	170th Ave and Farmington Rd (West)	C	S	P	*	P	P		*		S	S							S	S	
WC31	Farmington Rd (East)	C	S	P	*	P	P		*		S	S							S	S	
WC32	Murray Blvd (Adaptive Signals)		S	P	*		S		*		S	S							S	S	
WC33	Murray Blvd	C	S	P	*	P	P		*		S	S							S	S	
WC34	Scholls Ferry Rd (Adaptive Signals)		S	P	*		S		*		S	S							S	S	
WC35	Scholls Ferry Rd (West)	C	S	P		P	P		*	*	S	S							S	S	
WC36	Scholls Ferry Rd (East)	C	S	P	*	P	P		*		S	S							S	S	
WC37	Scholls Ferry Rd and Allen Blvd	C	S	P		P	P		*		S	S							S	S	
Tigard/Tualatin/Sherwood Area ITS Projects																					
WC39	Greenburg Rd	C	S	P		P			*		S	S							S	S	
WC40	Bridgeport Rd	C	S	P		P			*		S	S							S	S	
WC41	Roy Rogers Rd	C	S	P		P			*		S	S							S	S	
WC42	Downtown Tualatin (Adaptive Signals)		S	P			S		*		S	S							S	S	

Projects Legend for Strategy Mapping: C = Communications is a major project component P = Primary S = Secondary * = Project infrastructure supports future/concurrent project(s)		Communications	Traffic Control & Operations						Bicycle & Pedestrian				Rural						Traveler Information		
			Traffic Operations Center	Enhanced Signal Timing Operations	Transit Signal Priority	Traffic Surveillance	Arterial Performance Monitoring	Event Management	Bicycle Detection & Real-Time Bicycle Routing	Trail Counters	Bicycle Signal Timings	Pedestrian-Based Signal Timings	Weather Stations	Intersection Warning Systems	Curve Warning Systems	Queue Warning Systems	Size & Speed Warning Systems	Speed Feedback Systems	Broadcast Traveler Information	Real-Time Traffic Flow Conditions	Roadside Traveler Information
Countywide/Rural ITS Projects																					
WC43	Remote Traffic Signals	C	S	P																	
WC44	CCTV Cameras	C	S			P													S		
WC45	Intersection Warning Systems													P							
WC46	"Military Curve" Warning System														P						
WC47	"Tonquin Curve" Speed Feedback System																	P			
WC48	175th Ave/Rigert Rd Queue Warning System															P					
WC49	Laurelwood Length and Speed Warning System																P				
WC50	Weather Stations		S			P							P						S		S
Local Agency ITS Projects																					
LA01	Forest Grove: Traffic Signals	C	S	P	*		S		S		S	S							S	S	
LA02	Tigard: 72nd Ave (North)	C	S	P			S		S		S	S							S	S	
LA03	Tigard: Bonita Rd	C	S	P			S		S		S	S							S	S	
LA04	Tigard: 72nd Ave (South)	C	S	P			S		S		S	S							S	S	
LA05	Tigard: Traffic Signals	C	S	P			S		S		S	S							S	S	
LA06	Tigard: Upper Boones Ferry Rd/Durham Rd	C	S	P			S		S		S	S							S	S	
LA07A	Tualatin: Herman Rd (Alternative A)	C	S	P		P	S		S		S	S							S	S	
LA07B	Tualatin: Herman Rd (Alternative B)	C	S	P		P	S		S		S	S							S	S	
LA08	Tualatin: Boones Ferry Rd	C	S	P		P	S		S		S	S							S	S	
LA09	Tualatin: Martinazzi Ave	C	S	P		P	S		S		S	S							S	S	
LA10	Tualatin: Traffic Signals	C	S	P			S		S		S	S							S	S	
LA11	Sherwood: Traffic Signals	C	S	P			S		S		S	S							S	S	

Costs

Table 3 summarizes the estimated capital costs and annual operations and maintenance costs for implementation of all 60 projects. It includes a capital cost of approximately $32 million along with a $975,000 annual operations and maintenance cost at full build out for Washington County LUT projects. Most of the projects support traffic control and operations ITS strategies (approximately $28 million), but a small portion of the projects support rural ITS strategies (approximately $4 million). Most of the pedestrian and bicycle ITS strategies and traveler information strategies are supported secondarily by the projects. Coordinating construction of ITS strategies with the capital improvement projects from the Washington County Major Streets Transportation Improvement Program (MSTIP) is a cost effective approach to implementing many of the strategies identified in this plan. For example, installing new conduit for communications cable when the street is open for a roadway project significantly reduces the construction cost for the new conduit.

Chapter 5: ITS Deployment Plan of the *ITS Plan* includes a funding section that identifies potential funding sources and an operations, maintenance, and equipment upgrades section that describes future needs. Ultimately, installing communications to traffic signals and ITS devices will improve the operational efficiency of Washington County LUT staff, which will allow them to perform additional ITS and network support responsibilities as LUT's ITS network is expanded.

Table 3. Estimated Capital, Operations, and Maintenance Costs by Lead Agency

ITS Projects By Lead Agency and Location	Estimated Capital Costs*	Estimated Annual Operations & Maintenance Costs**
Washington County LUT Projects:		
Hillsboro Area	$10,888,000	$326,640
Beaverton Area	$10,450,000	$315,300
Tigard/Tualatin/Sherwood Area	$2,853,000	$86,190
Countywide/Rural	$4,294,000	$143,820
Subtotal	**$28,485,000**	**$871,950**
Local Agency Projects:		
City of Forest Grove	$176,000	$5,880
City of Tigard	$1,373,000	$44,190
City of Tualatin	$1,559,000	$47,330
City of Sherwood	$122,000	$3,660
Subtotal	**$3,230,000**	**$101,060**
TOTAL	**$31,715,000**	**$973,010**

* Capital costs include equipment, labor, mobilization, temporary protection and direction of traffic, project design/systems engineering, construction engineering/project management, and IT network integration.

** Annual operations and maintenance costs are per year. The full annual costs shown in this table will be reached incrementally as projects are deployed.

NEXT STEPS

The successful implementation of the *Washington County ITS Plan* and updated project list is dependent on incorporating the plan with other planning efforts, regional ITS coordination, and funding procurement.

Incorporate ITS Plan with Other Planning Efforts

The projects identified in Table 1 should be deployed concurrently with traditional maintenance and construction projects when feasible. This approach will minimize reconstruction, maximize the use of resources, and result in the modernization of the regional transportation system. The ITS Plan should be incorporated into the Washington County Transportation System Plan (TSP), which is currently being updated, and local agency TSPs. This will make it easier for projects to become components of capital improvement programs and possibly system development charges. Additionally, Figure 4 and Table 1 can be used to require the installation of conduit with public or private roadway projects to support future ITS implementation.

Regional ITS Coordination

Coordination with partners within the county limits as well as the broader Portland metropolitan area enhances transportation operations across jurisdictional boundaries and also provides opportunities for infrastructure cost sharing. Key coordination activities should include:

- Continue to actively participate on the Transportation Portland (TransPort) Committee, which is a consortium of transportation agencies in the Portland-Vancouver metropolitan area that guides the deployment and funding recommendations for ITS throughout the region.
- Join the Cooperative Telecommunications Infrastructure Committee (CTIC) to leverage over $10 million in existing ODOT, TriMet, and City of Beaverton existing communications infrastructure in the eastern urbanized portion of the county
- Develop agreements as required for communications infrastructure sharing with WCCCA, City of Sherwood, and PGE
- Coordinate with the Cities of Forest Grove, Tigard, Tualatin, and Sherwood to support the implementation of the local agency projects listed in Table 1.

Funding Procurement

Implementation of all 49 Washington County LUT projects in Table 1 will require approximately $32 million in capital costs. The two primary funding sources include Washington County's Major Streets Transportation Improvement Program (MSTIP) and Metro's Metropolitan Transportation Improvement Program (MTIP). These and other programs described in Chapter 5 of the ITS Plan should be explored for funding opportunities.

GLOSSARY OF ACRONYMS

CCTV	Closed-Circuit Television
CTIC	Cooperative Telecommunications Infrastructure Committee
EOC	Ethernet over Copper
ITS	Intelligent Transportation System(s)
LA	Local Agency (used for project numbering)
LEC	Law Enforcement Center
LUT	Land Use & Transportation
MSTIP	Major Streets Transportation Improvement Program
MTIP	Metro Transportation Improvement Program
O & M	Operations and Maintenance
ODOT	Oregon Department of Transportation
PGE	Portland General Electric
RWIS	Road Weather Information System
SCATS	Sydney Adaptive Traffic Control Systems
THPRD	Tualatin Hills Parks & Recreation District
TOC	Traffic Operations Center
TransPort	Transportation Portland
TSP	Transportation System Plan
TVF&R	Tualatin Valley Fire and Rescue
WC	Washington County (used for project numbering)
WCCCA	Washington County Consolidated Communications Agency
WDM	Wavelength-Division Multiplexing
WSC	Walnut Street Center