



# Intelligent Transportation Systems (ITS)

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Washington County Traffic Engineering

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# Agenda for this morning

- Big Picture – Define ITS
- Accomplishments
- Effectiveness – Data and Use Cases
- Next Steps – ITS Plan Update
- Q & A



# Intelligent Transportation Systems

ITS is the integration & application of technology to:

- Achieve safety and mobility goals of the transportation system.
- Enhance transportation system management and operations.

These technology's include:

- Computer hardware and software
- Communication infrastructure
- Electronics and sensors
- Safety systems



# ITS Plan Goals

- Improve the safety and security of the transportation system
- Improve the efficiency of the transportation system
- Provide improved traveler information
- Deploy functional and cost efficient ITS infrastructure
- Integrate regional ITS projects with local and regional partners

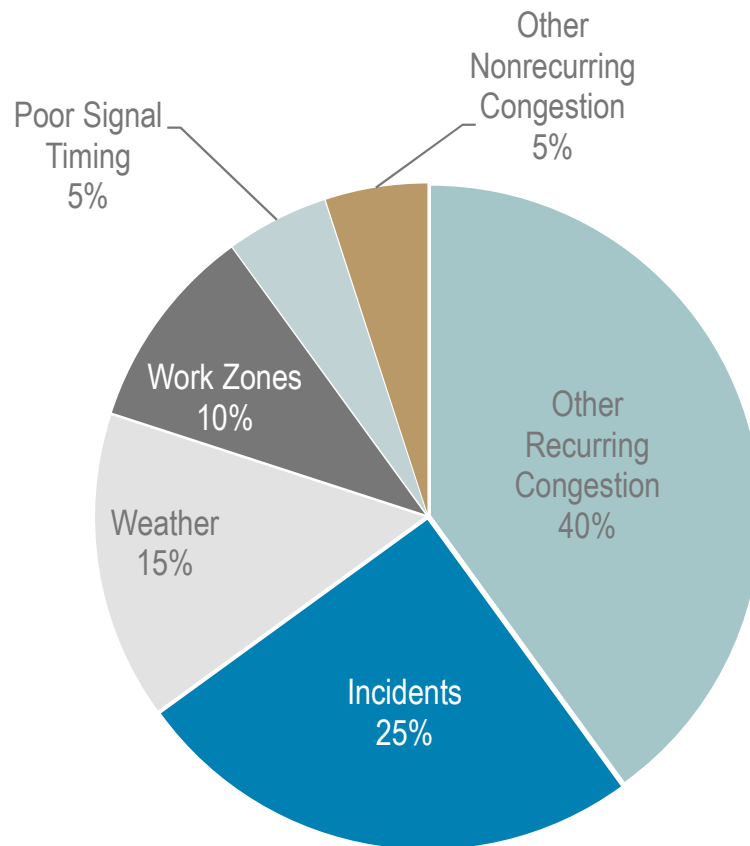
# Expectations for ITS

## ITS **can**:

- Restore lost capacity by improving operations on the facility
- Manage congestion
- Provide traveler information, smart signal technology, smart work zones, improve incident clearance times

## ITS **can not**:

- Increase roadway capacity
- Eliminate congestion



CAUSES OF CONGESTION

# Expected Benefits

## **Traveler/freight benefits:**

- Improved travel time reliability
- Reduced delay, fuel consumption, emissions, and crashes
- Comprehensive traveler info

## **Institutional benefits:**

- Improved resource allocation, system efficiency, and data





# Timeline of Implementation





# Key Initiatives

- **Modernizing** systems and hardware
- **Building** a high-speed, reliable, and shareable communications network
- **Automating** data collection and system performance measures





## Accomplishments from 2014-2019 (5 years):

- Better Management, Monitoring and Operation of the Transportation System
- 42/61 of the projects from the 2014 update were completed or partially completed
- \$17M of the proposed \$32M in projects from the 2014 update were delivered for \$5.6M



## WORKING TOGETHER

- Leveraging other capital projects for ITS enhancements
- Partnering
  - Grants with ODOT (TIGER & ATCMTD),
  - Transportation Portland (TransPort)
  - Cooperative Telecommunications Infrastructure Consortium (CTIC)

## WORKING TOGETHER



**Other Regional Partners** including Hillsboro, Beaverton, Tualatin, Sherwood, ODOT, and Tri-Met

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## Installing fiber optic communications

- High band-width capable (1, 10 & 100 Gbps)
- Redundant and reliable system architecture
- Mutually beneficial
- Adding partners





## Infrastructure deployed:

- Constructed or allowed access to >110 miles of fiber optic communication infrastructure
- Remote connection to 200 of 350 Traffic Signals owned and maintained by the County
- Installed 100 System Monitoring Cameras
- Installed 130 Travel Time Readers
- Modernized all 150 School Zone Flashers
- Automated all 9 Snow Zone Beacons

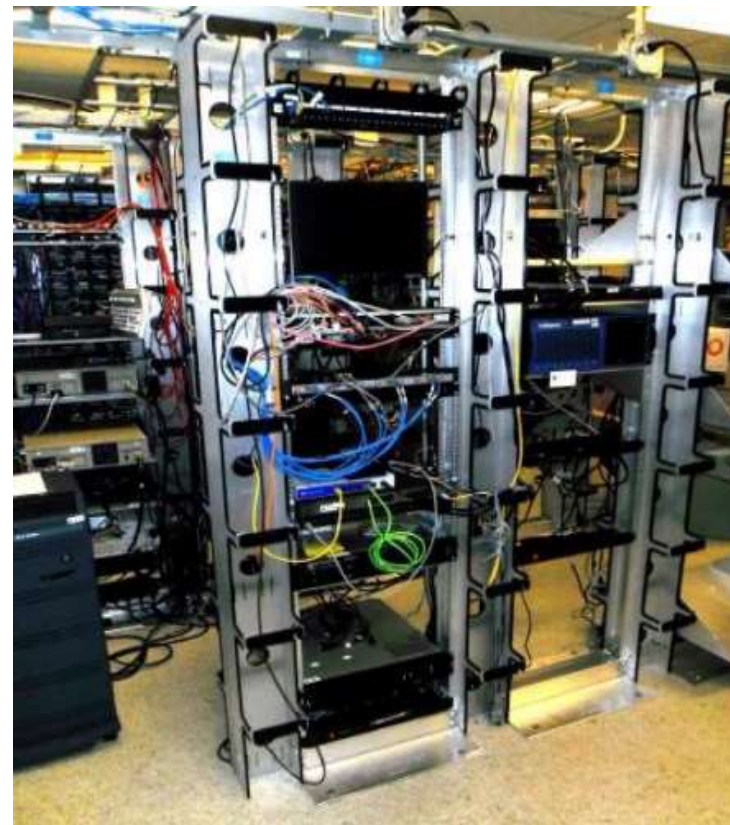
# Effectiveness





# TRAFFIC CONTROL & OPERATIONS

# TRAFFIC OPERATIONS CENTER (TOC)

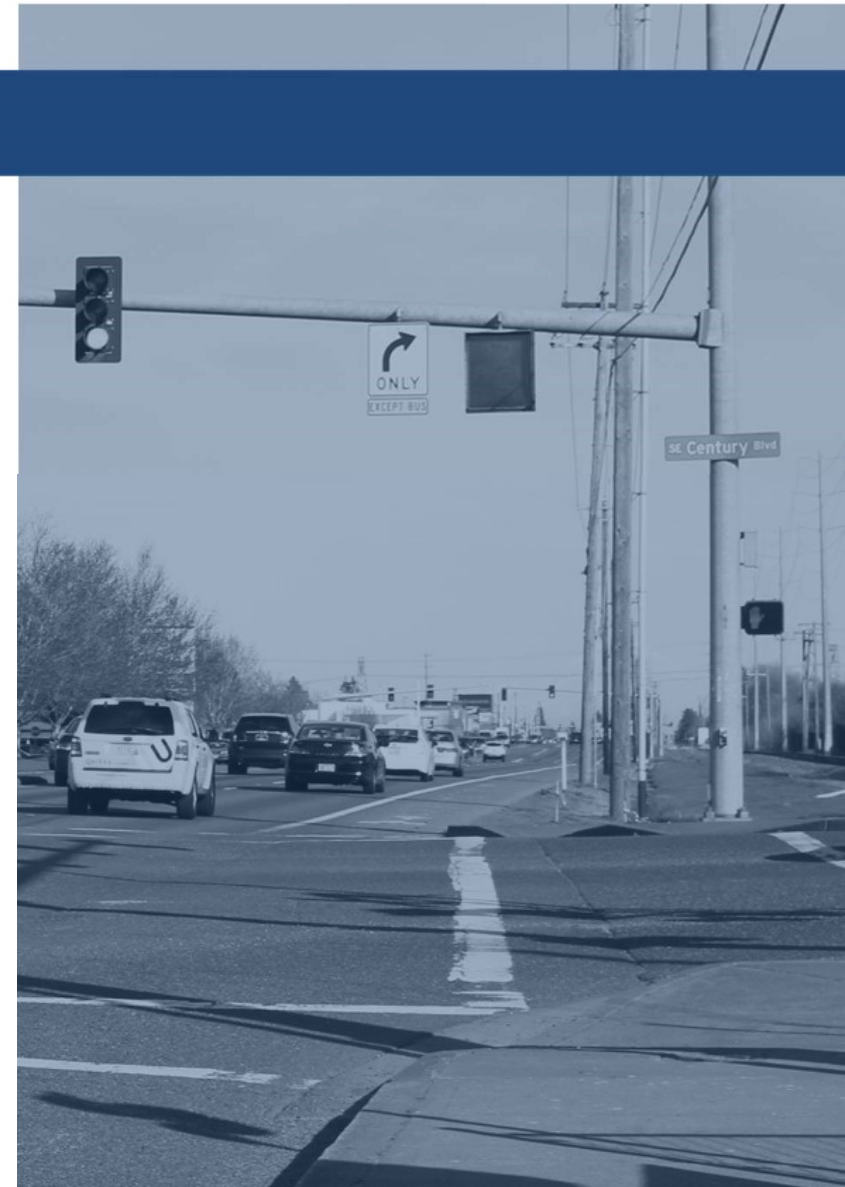




## TRAFFIC SIGNAL MAINTENANCE

### Traffic signals are monitored remotely

- Diagnose issues as they occur
- Reduces response time by making changes remotely
- Integrated into Regional Management System





# REMOTE MONITORING & CONTROL



# INCIDENT MANAGEMENT AND RESPONSE

UpperBFR at Carmen  
4:18:12.360 PM  
7/20/2018



Teton - PTZ  
8:48:32.600 AM  
9/26/2011



Nyberg Rd at Fred Meyer  
4:28:17.861 PM  
3/5/2014



Nyberg Rd @ Fred Meyer (03/05/14 16:28:09 PST)

Scholls Ferry at Murray  
9:37:32.785 PM  
2/7/2014



Scholls Ferry @ Murray (2/7/2014 21:37:30 PST)





## EVENT MANAGEMENT

### Event traffic can be managed remotely using the connected traffic signal system

- Police used to stand in the intersection and direct traffic
- Now, we monitor traffic conditions after the event make signal timing adjustments remotely



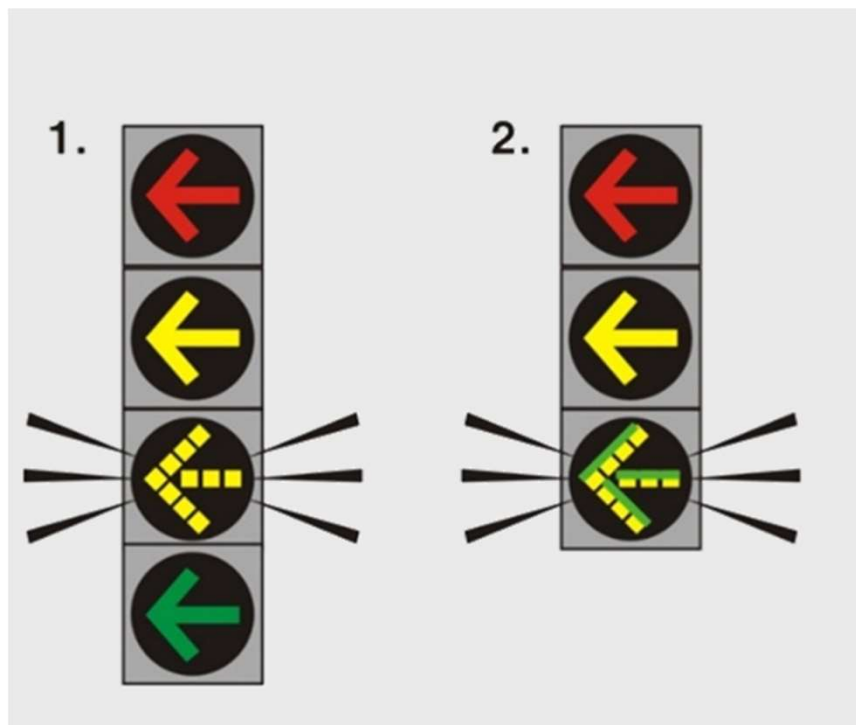
## WORK ZONE SAFETY AND EFFICIENCY

# Temporary Construction Detection

- Cornelius Pass Widening
- Nike Construction – 158<sup>th</sup>
- Cornell Rd Pavement Overlay



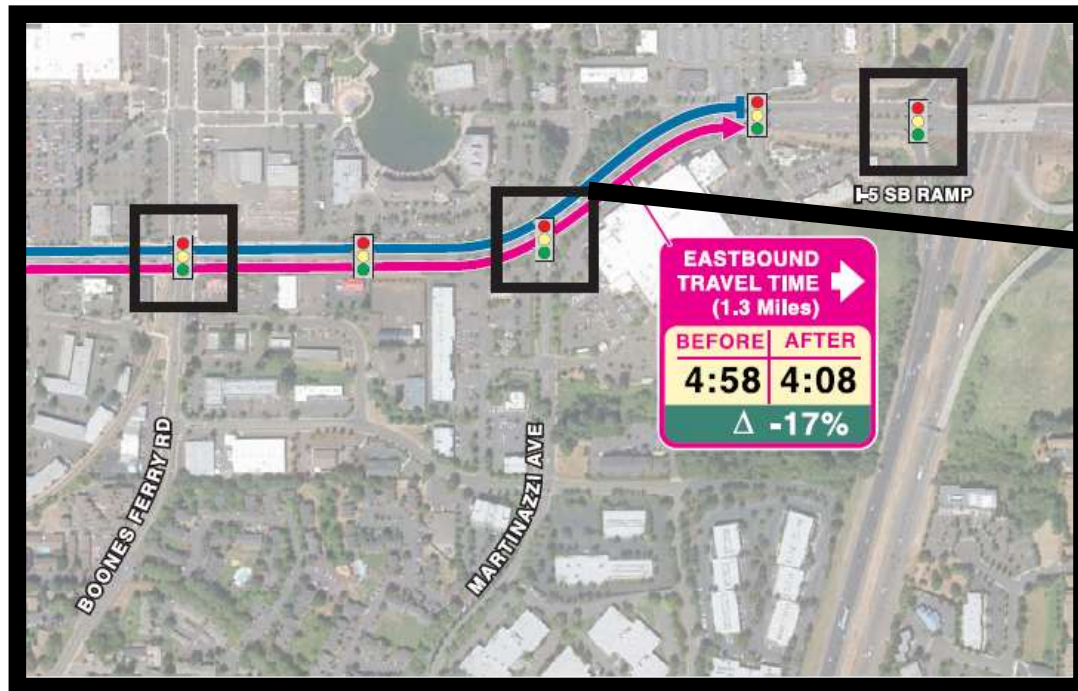
## SIGNAL OPERATIONS



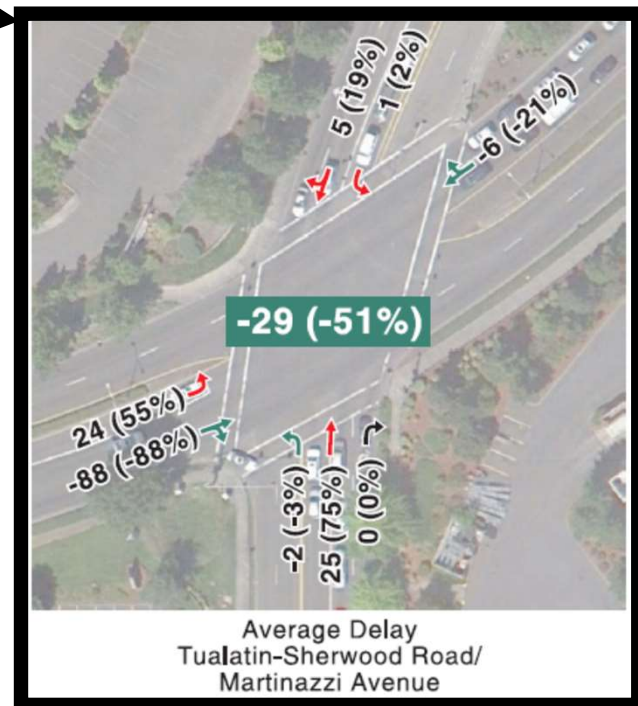
### Flashing Yellow Arrow (permissive left turns)

- Reduced stops by ~18%
- Reduced delay by ~35%
- Reduced fuel consumption by ~13%

## REAL-TIME ADAPTIVE TIMING



### Tualatin-Sherwood Road Teton to I-5 Traffic Adaptive System (PM Peak Hour)





## REAL-TIME ADAPTIVE TIMING



**Cornell Road – Brookwood to Butler  
Adaptive Traffic System  
(AM Peak Hour)**

# BICYCLE AND PEDESTRIAN DETECTION

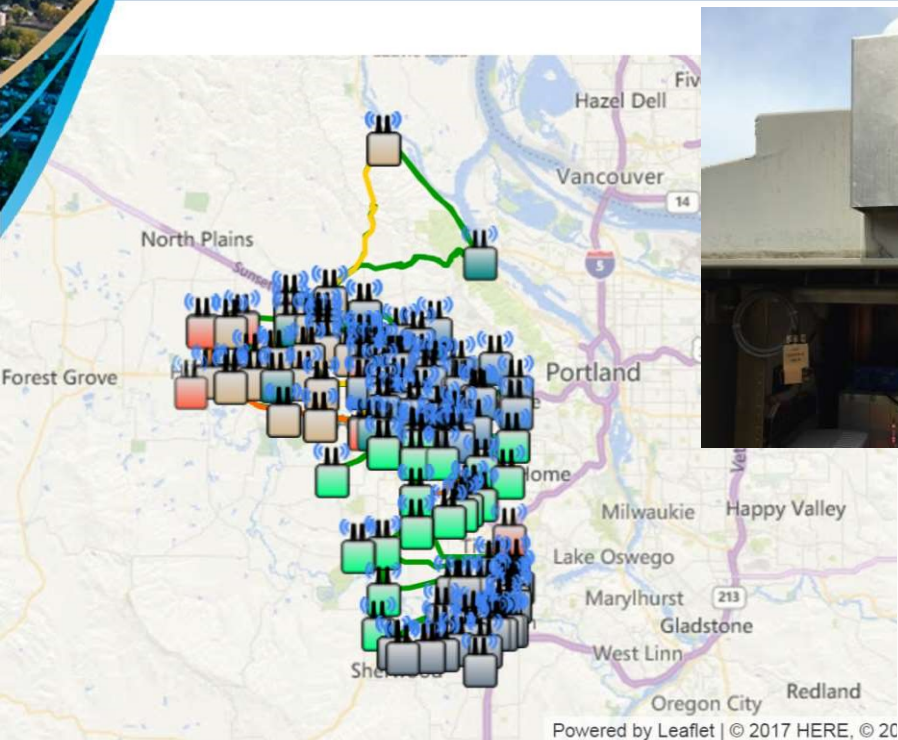


Optical Camera

Thermal Camera



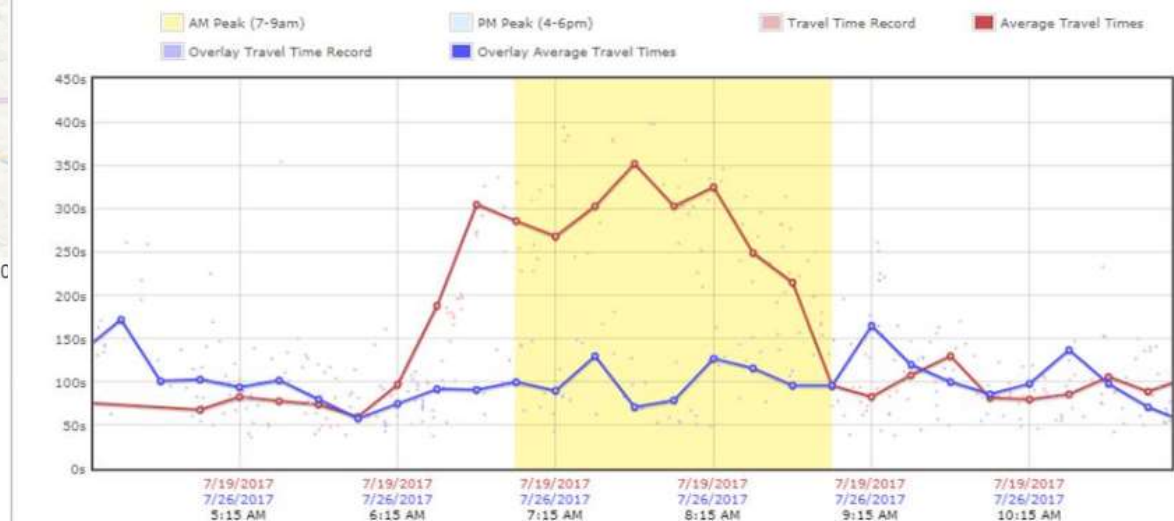
# PERFORMANCE MEASURES



## Scholls Ferry at 121st Ave to Scholls Ferry at Nimbus Ave

|                                 |                          |
|---------------------------------|--------------------------|
| Trip Distance(mi):              | 0.56                     |
| Expected Travel Time(s):        | 63 (1:03)                |
| Number of Trips:                | 104527                   |
| Mean/Median Speed(mph):         | 19.7 / 23.2              |
| Mean/Median Travel Time(s):     | 102.3 (1:42) / 87 (1:27) |
| Standard Deviation:             | 60.5                     |
| 15th Percentile Travel Time(s): | 52                       |
| 85th Percentile Travel Time(s): | 148 (2:28)               |
| 95th Percentile Travel Time(s): | 228 (3:48)               |

Note: You may adjust the location of the devices by clicking and dragging the markers on the map to the right. This will update the route and distance/time taken calculated.





# TRAVELER INFORMATION

# TRAVELER INFORMATION

Base Maps

Quick Links

Map Features

☒ Road

☒ Cameras

☒ Incidents

☒ Parking lot

☒ Travel Time

☒ Weather

☒ Restrictions

☒ Municipalities

☒ Waze Events

☒ Waze Traffic

☒ Live Traffic

Stop and Go

Slow

Moderate

Free Flow

Save This Map

Road & Weather

Travel Center

Transit & More

About TripCheck

On The Go

Contact Us

Level: 7

+

-

Hillsboro (Portland) Airport

Rockcreek

Somerset West

With Hazel

Tobias

Esri, HERE

Lat 45.5483

Lon -122.8766

Road Camera

Washington County - Cornelius Pass Rd at Baseline

Updated: Oct 02 2017 3:10 PM

Camera courtesy of Washington County



Elevation 0

TripCheck.com

Milepost

Travel Time (2)

1 of 2

26

EB

to

5

Cedar Hills Blvd

via

217

SB

10 Min

(Delay: 0)

01:28 PM

2 of 2

26

EB

to

405

Cedar Hills Blvd

9 Min

(Delay: 0)

01:28 PM

26

WB

to

NW 185th Ave

Cedar Hills Blvd

7 Min

(Delay: 1)

01:28 PM

Alerts

Closure

HWY100, 2 miles

East of Corbett MP

9 - 22

Announcements



PARKING LOT FULL?

 Road Conditions

 Travel Times

 NOAA Forecasts

 Weather Stations

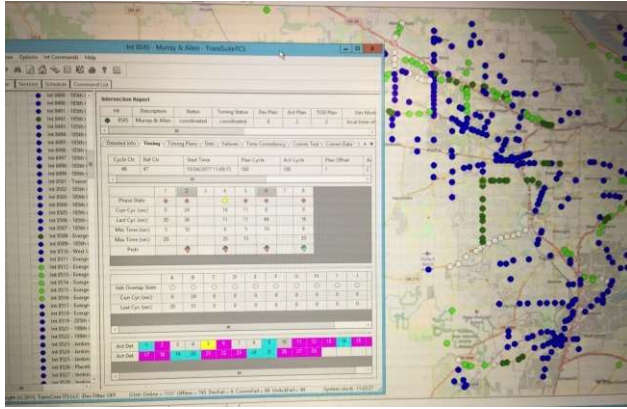
 Cameras

 Printable Condition Report





# CONNECTED VEHICLES



TRAFFIC  
TECHNOLOGY  
SERVICES



TTS Receives  
County's Real-  
Time Traffic Signal  
Information

TTS Predictive  
Algorithm Applied

TTS Streams  
County Signal Data  
to vehicle Dash





# RURAL & SAFETY SYSTEMS

# SCHOOL ZONE 20 MPH SPEED FLASHERS

glance

John Fasana - Washington County OR

powered by Applied Information

Home | Edit Profile | Report | Log-Off

## Beaverton SD - Aloha High

| Name             | Status | A |
|------------------|--------|---|
| • Aloha_185th_NB | Online | 0 |
| • Aloha_185th_SB | Online | 0 |

• Aloha\_Kinn  
• Aloha\_Kinn

## Beaverton S

Name  
• Barnes\_W  
• Barnes\_W

## Beaverton S

Name  
• Beaver\_SV  
• Beaver\_SV

## Beaverton S

Name  
• Bethany\_1  
• Bethany\_1

## Beaverton S

Name  
• Bonny\_Mo  
• Bonny\_Mo

## Beaverton S

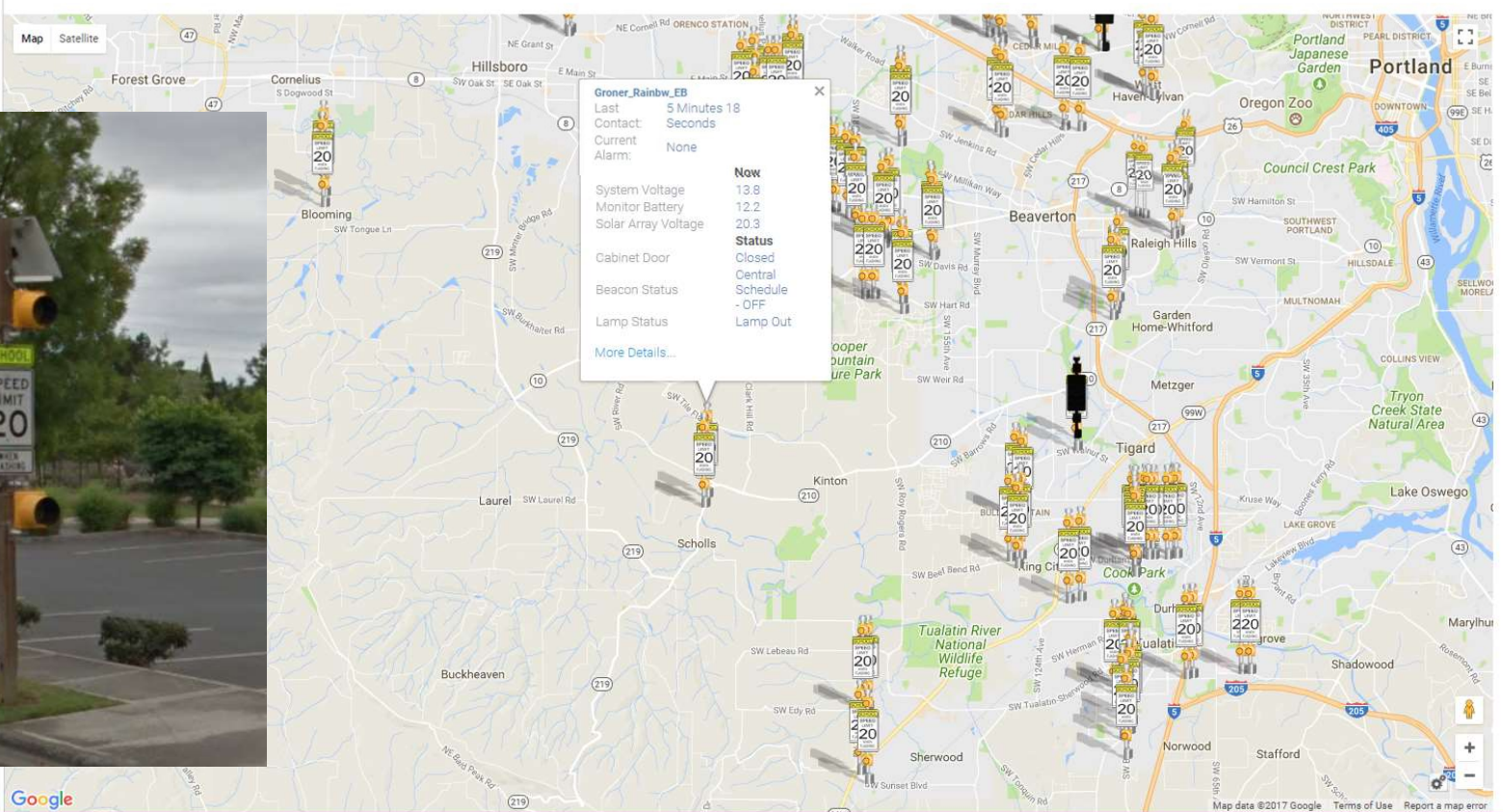
Name  
• Cedar\_Cor

## Alarm

Critical

High

Low





# RURAL FLOOD MONITORING SYSTEM



# RURAL FLOOD MONITORING SYSTEM

« Prev | Next »  
Taylor Way Gate

[ Refresh ]

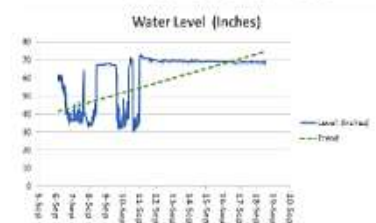
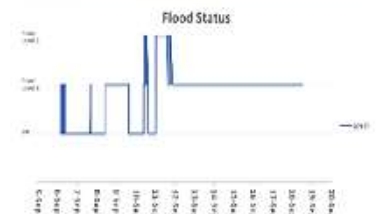
Current Status : Online  
Current Alarms :  
Power Status : OK  
Current Device Status : OK  
Timezone : -7 Hours  
Time Since Last Contact : 10 Minutes 47 Seconds  
9/18/2019 1:09:52 PM

|                      | Now    | Min    | Max    | Avg    |
|----------------------|--------|--------|--------|--------|
| AC Voltage (V)       | 133.3  | 133.3  | 135.6  | 134.8  |
| Monitor Battery (V)  | 13.6   | 13.6   | 13.9   | 13.8   |
| Water Level (Inches) | 69.806 | 67.822 | 69.806 | 68.911 |

|              | Status        |
|--------------|---------------|
| Gate Status  | Open          |
| Cabinet Door | Closed        |
| Flood Status | Flood Level 1 |
|              | Inputs        |

[ More Details ]

|              | Status |
|--------------|--------|
| Gate Flasher | Off    |
|              | Output |





# SNOW ZONE SIGN AUTOMATION

## ITS LEGEND



VICINITY MAP  
NO SCALE

(N) SNOW ZONE SIGN LOCATION  
(N=NUMBER)

| LOCATION | INTERSECTION                           | SHEET |
|----------|--|-------|
| 1        | SW 175th Ave & SW Scholls Ferry Rd     | 2     |
| 2        | SW 175th Ave & SW Rigert Rd            | 3     |
| 3        | SW 175th Ave & SW Rigert Rd            | 3     |
| 4        | NW Cornell Rd & NW 57th Ave            | 4     |
| 5        | NW Cornell Rd & NW Cedar Hills Blvd    | 5     |
| 6        | SW Barnes Rd & W Burnside Rd           | 6     |
| 7        | SW Barnes Rd & SW Baltic Ave           | 7     |
| 8        | SW Barnes Rd & Peterkofort Medical CTR | 8     |
| 9        | SW Barnes Rd & NW 118th Ave            | 9     |
| DETAILS  |  | 10-12 |



# SNOW ZONE SIGN AUTOMATION

« Prev | Next »  
SZ\_Crnl\_87\_WB

[ Refresh ]

Current Status : Online  
Current Alarms :  
Power Status : OK  
Current Device Status : OK  
Timezone : -8 Hours  
Time Since Last Contact : 7 Minutes 13 Seconds  
2/19/2020 2:00:20 PM

|                   | Now   | Min   | Max   | Avg   |
|-------------------|-------|-------|-------|-------|
| AC Voltage (V AC) | 122.9 | 120.3 | 123.7 | 122.3 |
| Cabinet Temp (F)  | 32    | 32    | 32    | 32    |
| BBS Battery (V)   | 28.2  | 28.1  | 28.7  | 28.5  |
| Monitor Batt (V)  | 14.5  | 14.4  | 15.2  | 14.9  |

|                 | Status |
|-----------------|--------|
| BBS On Battery  | On AC  |
| BBS Low Battery | OK     |
| Cabinet Door    | Closed |
| Inputs          |        |

[ More Details ]

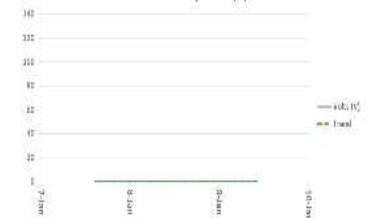
|                  | Status |
|------------------|--------|
| Warning Flashers | Off    |
| Output           |        |



AC Voltage (V AC)



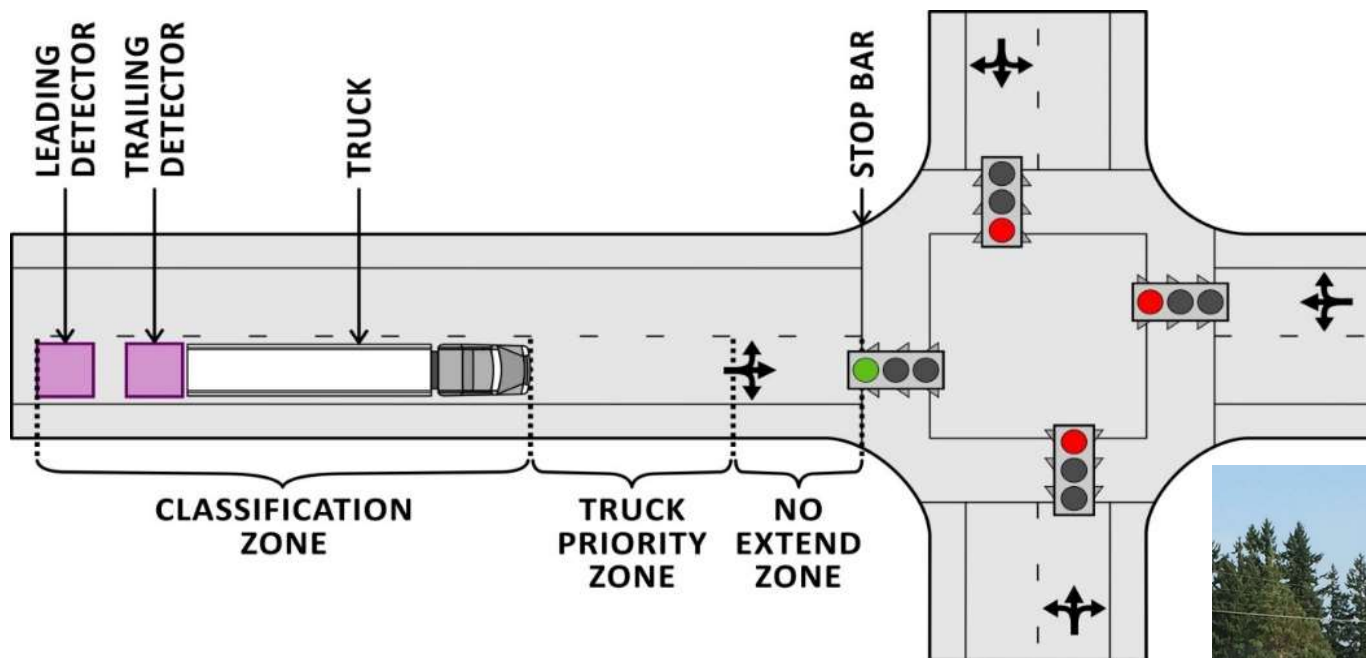
BBS Battery Volts (V)



Cabinet Temp (F)

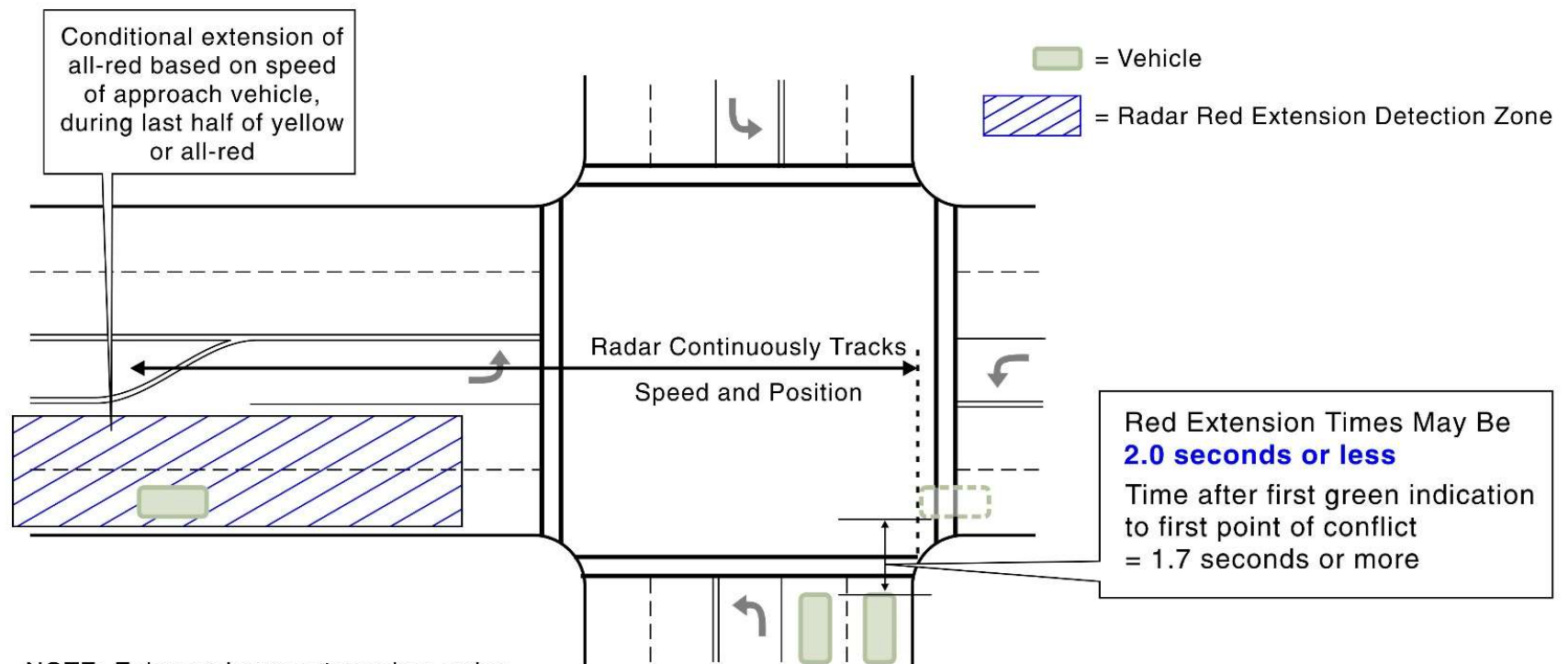


# GREEN EXTENSION FOR TRUCKS AND TRANSIT



# RED LIGHT RUNNING MITIGATION

## “Speed-based Advanced” Radar Extension



NOTE: Enhanced concept requires radar detection to condition the red clearance extension on speed of approaching vehicles.



# DYNAMIC CURVE WARNING SYSTEM





# Use Case Summary

- **Utilizing technology to improve** mobility, safety, and efficient work flow/maintenance
- **Integrating technology** into projects  
(MSTIP, development & other ITS funding sources)
- **Building strong partnerships** to share information & resources
- **Laying the foundation** for next wave of transportation technology



# ITS Plan Update 2020

This effort updates *only* the chapters of the plan that require changes:

✓ Executive Summary

Chapter 1: Introduction and Summary

✓ Chapter 2: Updated Current and Programmed Transportation Conditions

Chapter 3: User Needs Assessment Regional ITS Architecture

Chapter 4: Regional ITS Architecture

✓ Chapter 5: ITS Deployment Plan

We've also added

✓ Accomplishments Story between 2014 and 2019

- Partnering, Incident Management and Response, Event Management, Traveler Information, Traffic Signal Maintenance

# Goals of the ITS Plan Update

WASHINGTON COUNTY'S ITS PROGRAM SEEKS  
TO ACHIEVE AS OUTCOMES:



ENHANCED SAFETY FOR ALL  
TRAVEL MODES



EFFECTIVE MOBILITY FOR  
PEOPLE, GOODS, AND SERVICES



EQUITABLE ACCESS TO THE  
WASHINGTON COUNTY  
TRANSPORTATION SYSTEM



REDUCTION IN VEHICLE  
EMISSIONS, CONGESTION,  
AND USER FRUSTRATION



ENHANCED TRAVELER INFORMATION



# Strategies of the ITS Plan Update



**TRAFFIC  
CONTROL AND  
OPERATIONS**



**BICYCLE AND  
PEDESTRIAN**



**RURAL**



**TRAVELER  
INFORMATION**



**EMERGING  
TECHNOLOGY**



# Continue Building

## Connectivity

- Fiber backbone & high capacity linkages to the Traffic Operations Center for traffic signals and ITS devices

Partnerships with local agencies



# Expand on Initiatives

## Bicycle & Pedestrian

- detection, differentiation & adaptive response

## Resiliency

- back up power
- Redundant communications

## Automation

- data to information



# ITS Plan Update – Next Steps

- Update project list
  - 43 new updated projects, 10 Local Agency projects
  - \$63M total cost estimate
- Finish draft documents
- Schedule Public outreach (online open house)
- Move towards Board adoption
  - Spring/Summer of 2021

# Q & A

