Intelligent Transportation Systems (ITS)

Stacy Shetler & Shaun Quayle
Washington County Traffic Engineering

October 14, 2020

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**

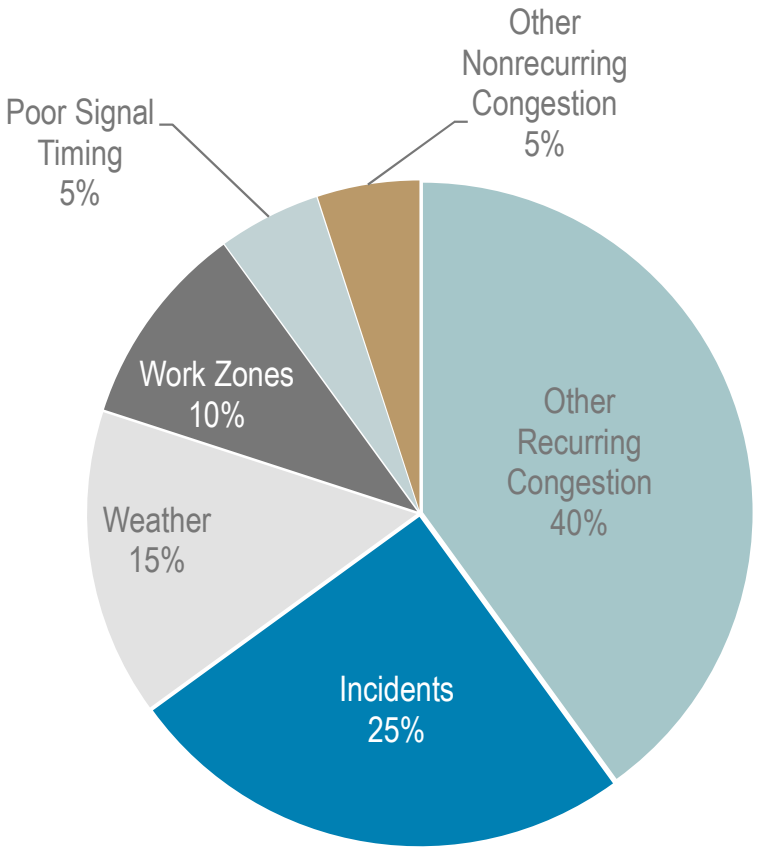
Expectations for ITS

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

2005

Original ITS Plan Adopted

2009

Catalysts for ITS: ARRA, MTIP, County Partnerships

2014

ITS Plan Updated: Project List Updated, Ongoing Implementation

2015-2017

Major ITS Projects: TIGER Grant, Gain Share, ATCMTD Grant

2019-2020

ITS Plan Update

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

Installing fiber optic communications

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

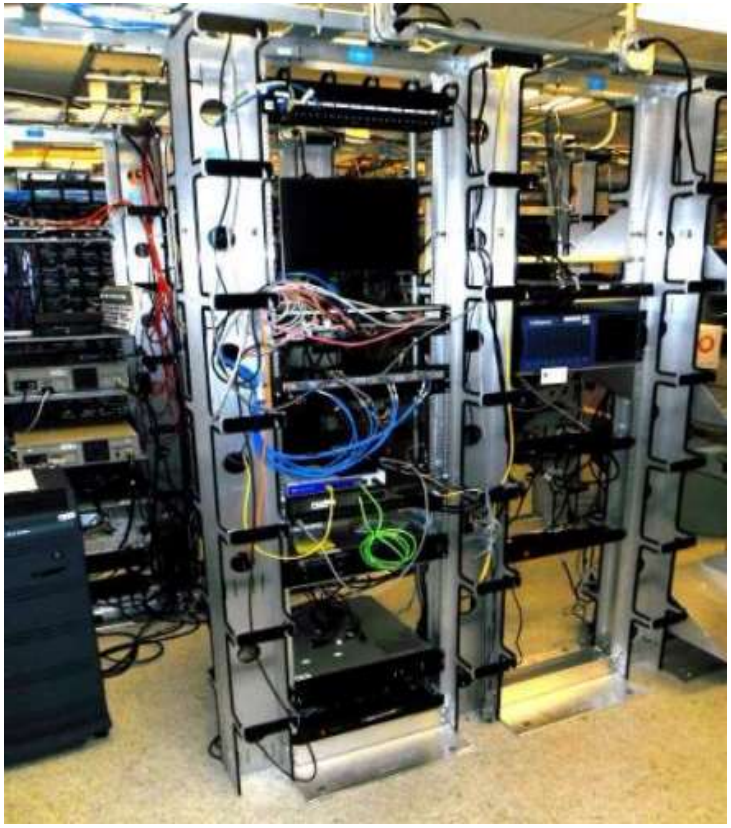
Infrastructure deployed:

- 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

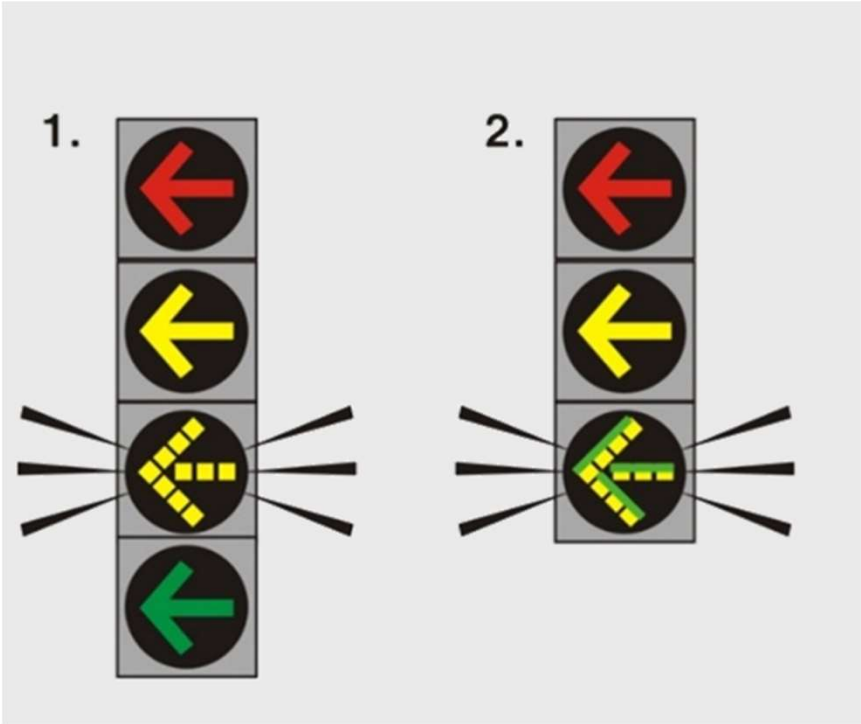
Event traffic can be managed remotely using the connected traffic signal system

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

Temporary Construction Detection

- Cornelius Pass Widening
- Nike Construction – 158th
- Cornell Rd Pavement Overlay

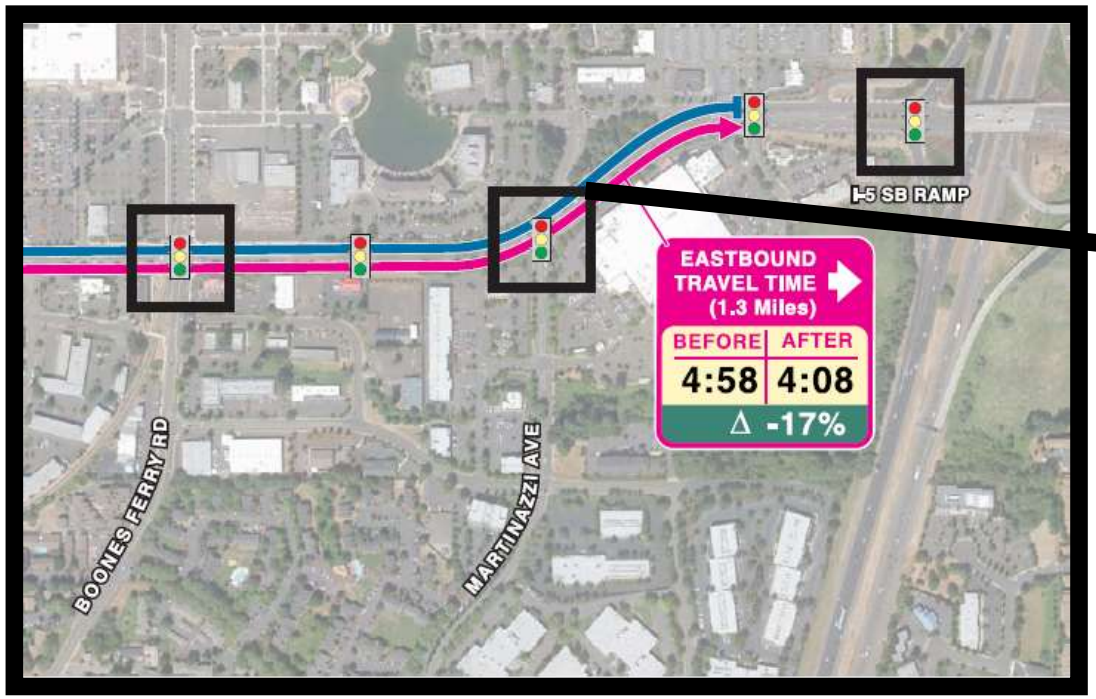
SIGNAL OPERATIONS



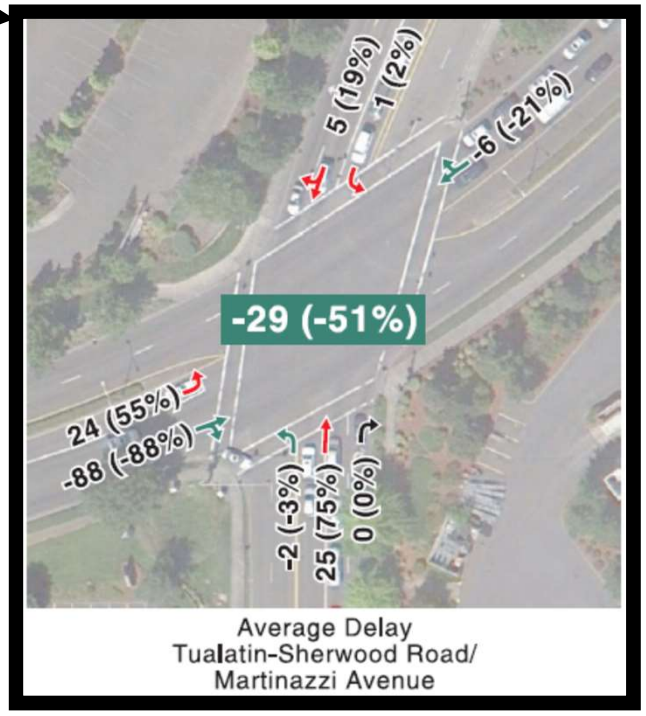
Flashing Yellow Arrow (permissive left turns)

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

REAL-TIME ADAPTIVE TIMING



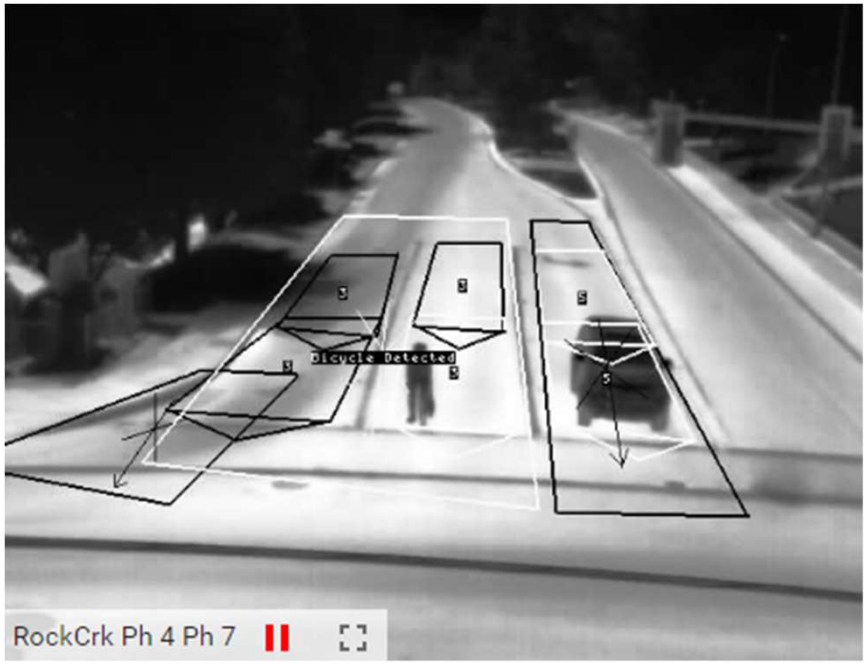
Tualatin-Sherwood Road
Teton to I-5
Traffic Adaptive System
(PM Peak Hour)



REAL-TIME ADAPTIVE TIMING

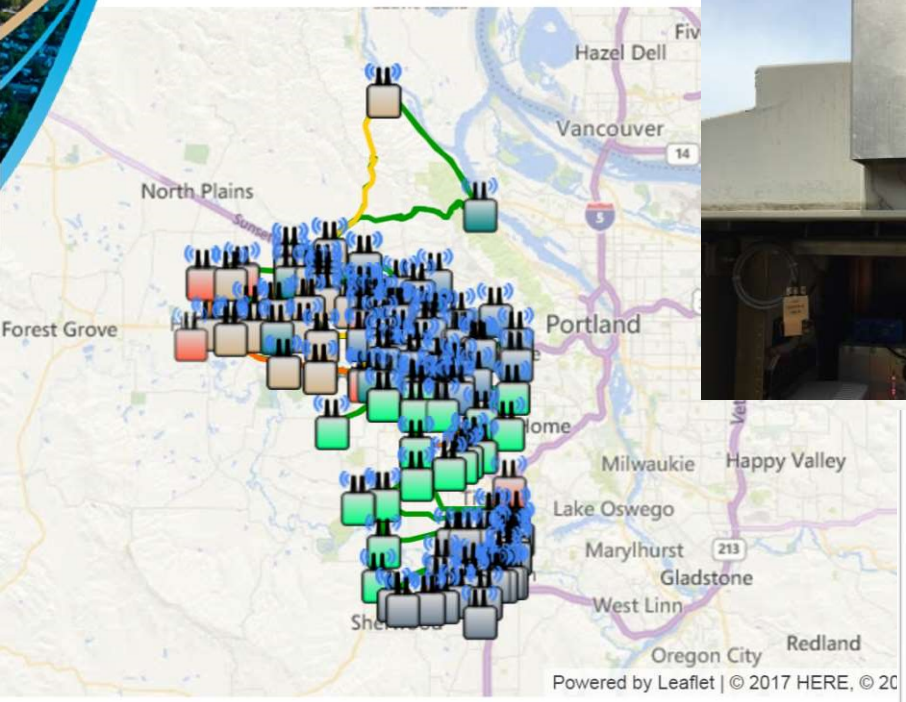
Cornell Road – Brookwood to Butler
Adaptive Traffic System
(AM Peak Hour)

BICYCLE AND PEDESTRIAN DETECTION



Optical Camera *Thermal Camera*

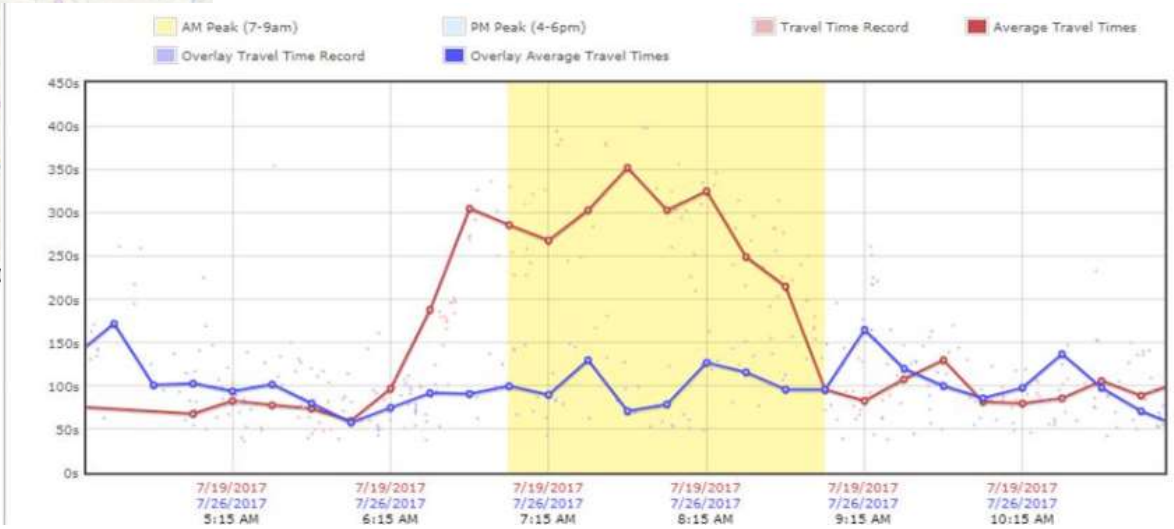
PERFORMANCE MEASURES



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)

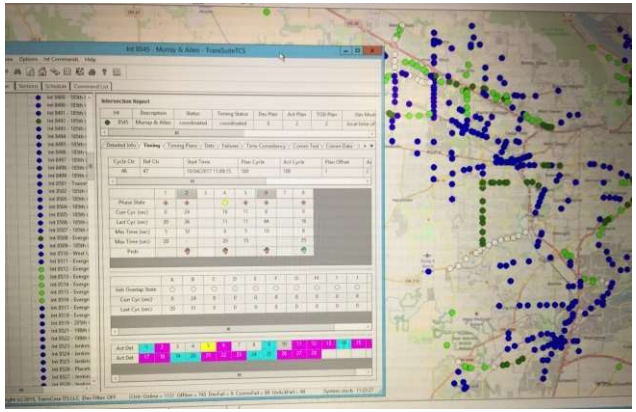
Note: You may adjust the location of the devices by clicking and dragging the markers on the map to the right. This will update the route and distance/time taken calculated.



TRAVELER INFORMATION

TRAVELER INFORMATION

CONNECTED VEHICLES



TRAFFIC TECHNOLOGY SERVICES

TTS Receives County's Real-Time Traffic Signal Information

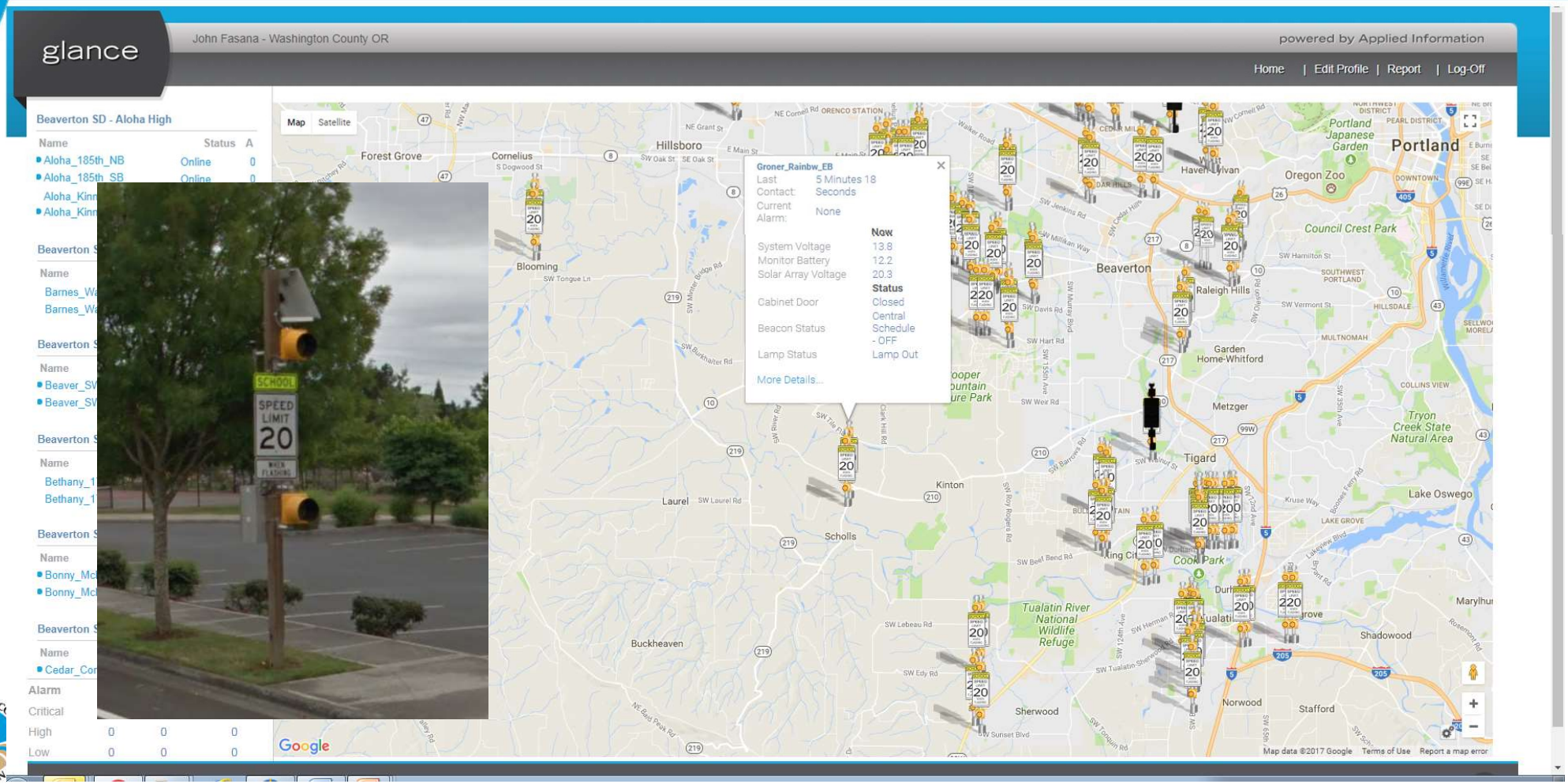
TTS Predictive Algorithm Applied

TTS Streams County Signal Data to vehicle Dash

WASHINGTON COUNTY OREGON

RURAL & SAFETY SYSTEMS

SCHOOL ZONE 20 MPH SPEED FLASHERS



RURAL FLOOD MONITORING SYSTEM

RURAL FLOOD MONITORING SYSTEM

« Prev | Next »

Taylor Way Gate

[Refresh]

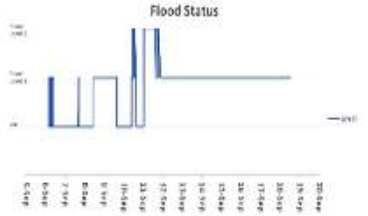
Current Status :	Online
Current Alarms :	
Power Status :	OK
Current Device Status :	OK
Timezone :	-7 Hours
Time Since Last Contact :	10 Minutes 47 Seconds 9/18/2019 1:09:52 PM

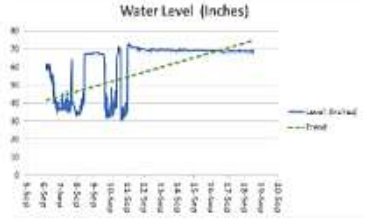
	Now	Min	Max	Avg
AC Voltage (V)	133.3	133.3	135.6	134.8
Monitor Battery (V)	13.6	13.6	13.9	13.8
Water Level (Inches)	69.806	67.822	69.806	68.911

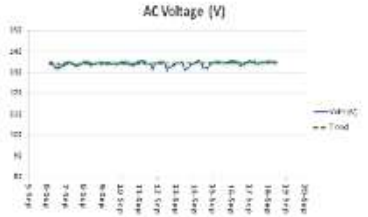
	Status
Gate Status	Open
Cabinet Door	Closed
Flood Status	Flood Level 1
Inputs	

	Status	
Gate Flasher		Off
Output		

[More Details]







SNOW ZONE SIGN AUTOMATION

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 87th 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 & Peterkort 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

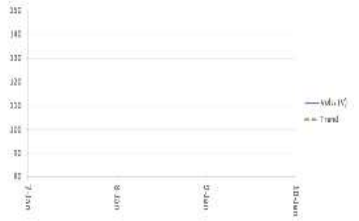
	Now	Min	Max	Avg
AC Voltage (V AC)	122.9	120.3	123.7	122.3
Cabinet Temp (F)	32	32	32	32
BBS Battery (V)	28.2	28.1	28.7	28.5
Monitor Batt (V)	14.5	14.4	15.2	14.9

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

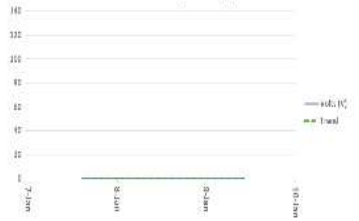
[More Details]

	Status	
Warning Flashers		Off
Output		

AC Voltage (V AC)

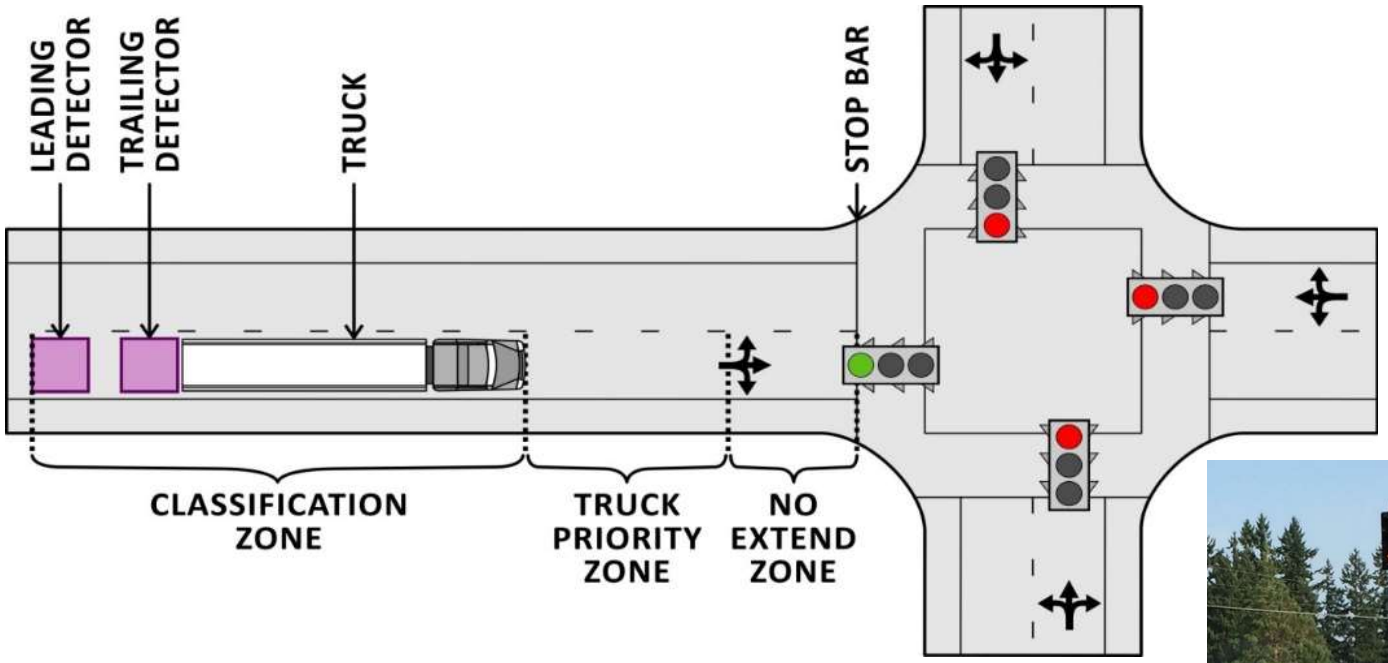


BBS Battery Volts (V)

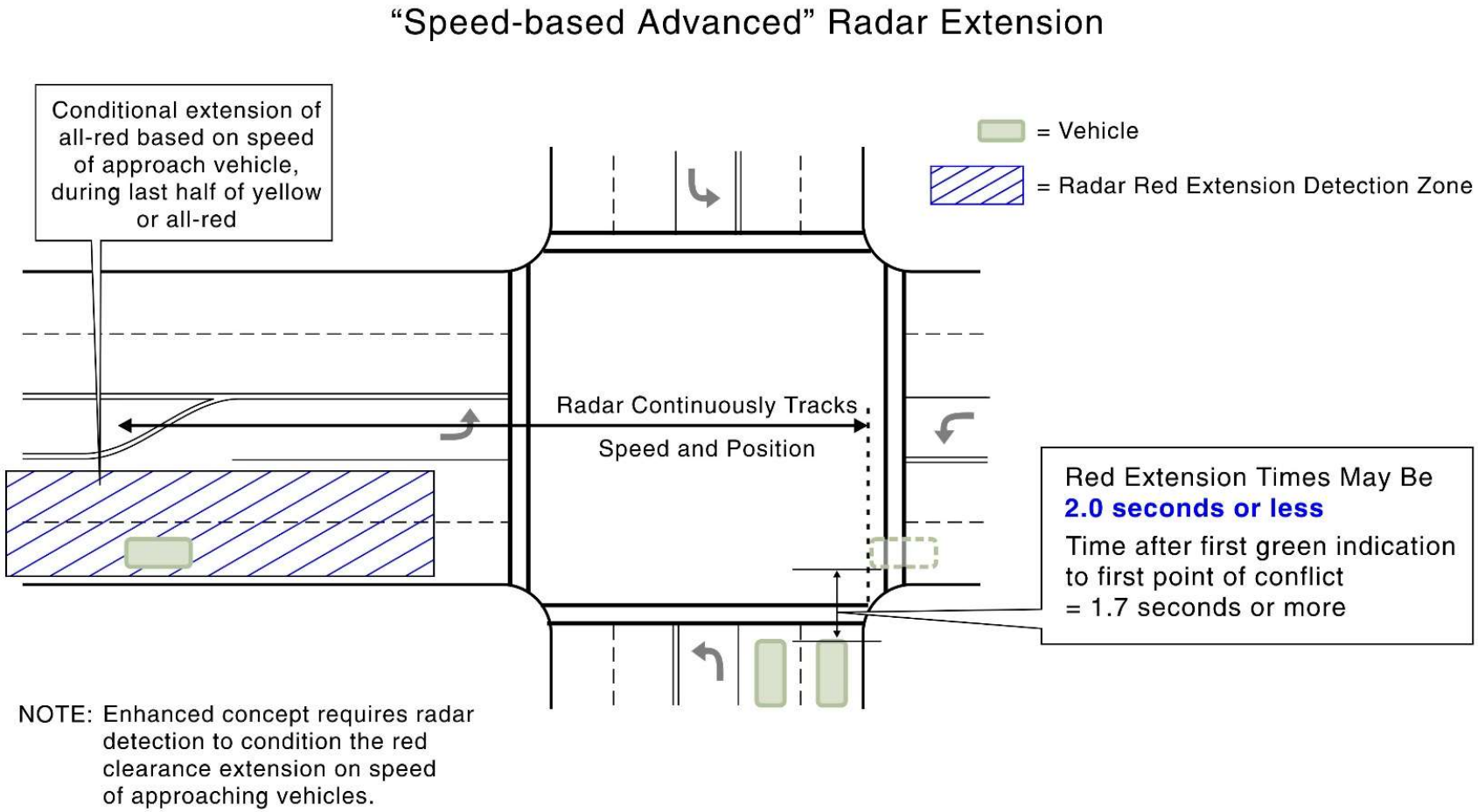


Cabinet Temp (F)

GREEN EXTENSION FOR TRUCKS AND TRANSIT



RED LIGHT RUNNING MITIGATION



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

Strategies of the ITS Plan Update

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