

# ROAD SAFETY AUDIT:

## Stafford Road between Wilsonville and Lake Oswego City Limits

Report to Stafford Hamlet and CPO

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*Joseph Marek, Transportation Safety Program Manager*

February 12, 2018

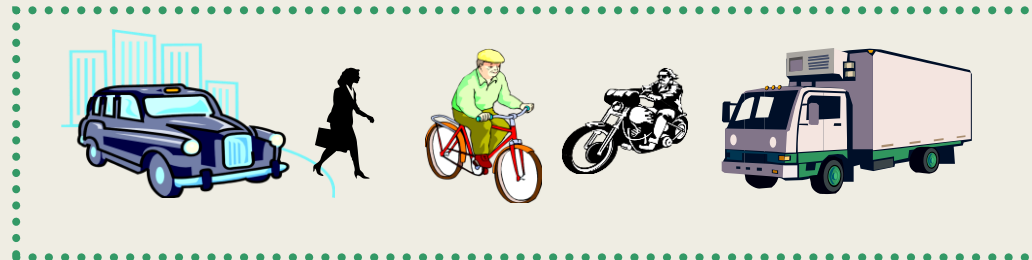


**CLACKAMAS**  
COUNTY



# Road Safety Audit (RSA)

- Purpose: **Identify opportunities to improve safety**
- A **formal safety performance examination** of an existing or future road or intersection by an independent audit team
- Process and participants determined by an **approved federal process**
- **Designed to:**
  - *Consider the safety of **all** road users*
  - *Examine the interaction of project elements*
  - *Consider interactions at the borders or limits of the project*
  - *Proactively consider mitigation measures*

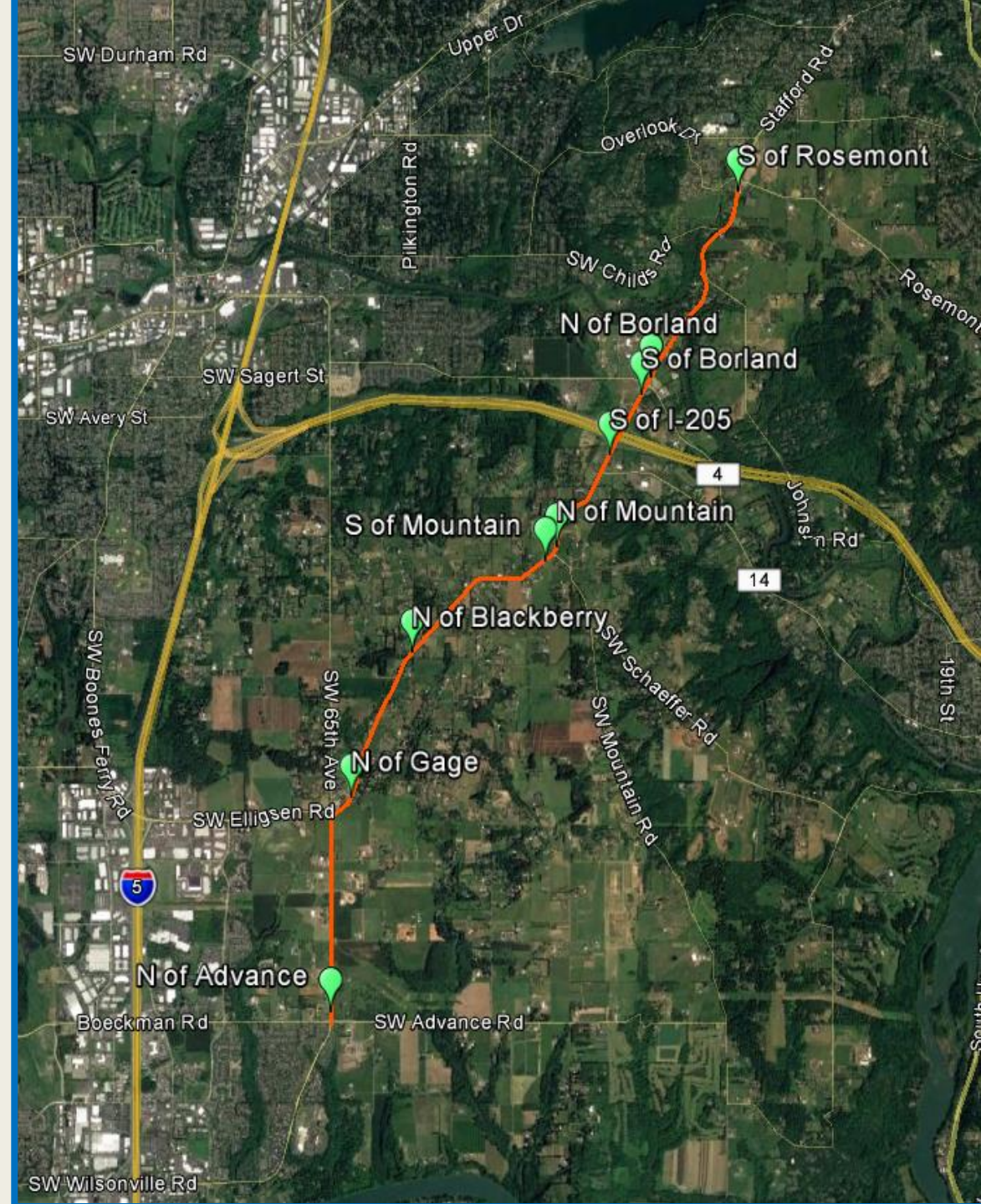


# Federal Highway Administration (FHWA) RSA Process



# Stafford RSA Study Team

- 4 Traffic Engineers
  - *Clackamas County*
  - *Lake Oswego*
  - *Eugene*
  - *Lane County*
- 1 Development Engineering Manager, Wilsonville
- 1 Senior Principal Engineer, Kittelson & Associates
- 1 Transportation Analyst, Kittelson & Associates
- Additional county support from:
  - *Traffic Engineering*
  - *Transportation Maintenance*



# Study team observations

- **Review data** – drawings, aerial photos, background reports, design criteria, crash history, traffic volumes, crash data analysis
- **Observe the corridor and intersections**
  - *Road user characteristics*
  - *Surrounding land uses, including link points to adjacent transportation networks*
  - *Driveway issues, roadside hazards, sight distance obstructions*
  - *Peak and off-peak times, day and night, wet and dry*
- **Drive the roadway**, including **all** intersections, **all** turns and **all** approaches
- **Walk and bicycle** the roadway
- **Consider all users** and driver behavior
- **Take notes and photos**

# Study team risk analysis

## ■ For each issue

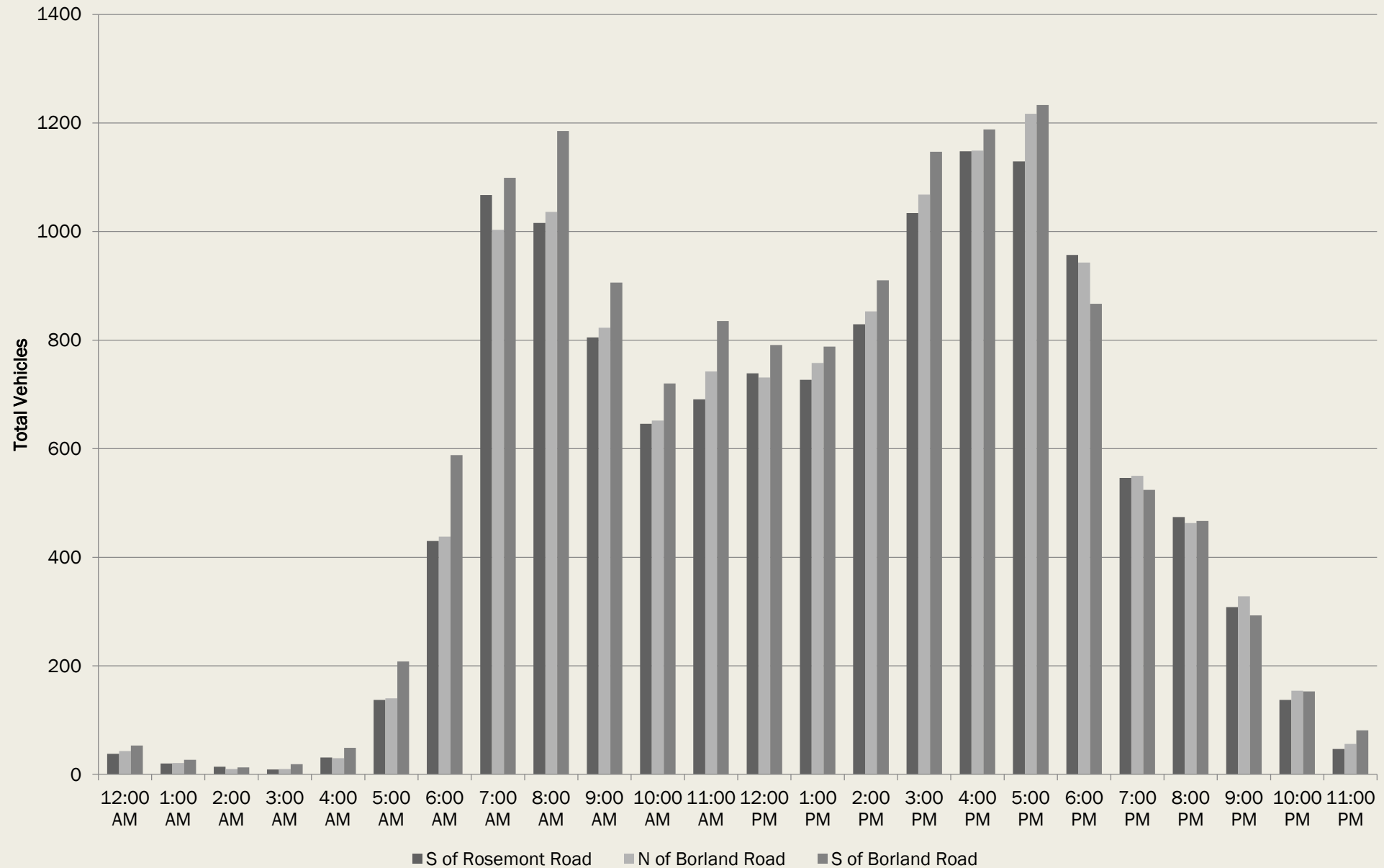
- *What potential is there for crashes (what exposure exists)*
- *What is the likelihood of crashes (what probability exists)*
- *How severe are the crashes likely to be (what are the likely consequences)*



# Current characteristics

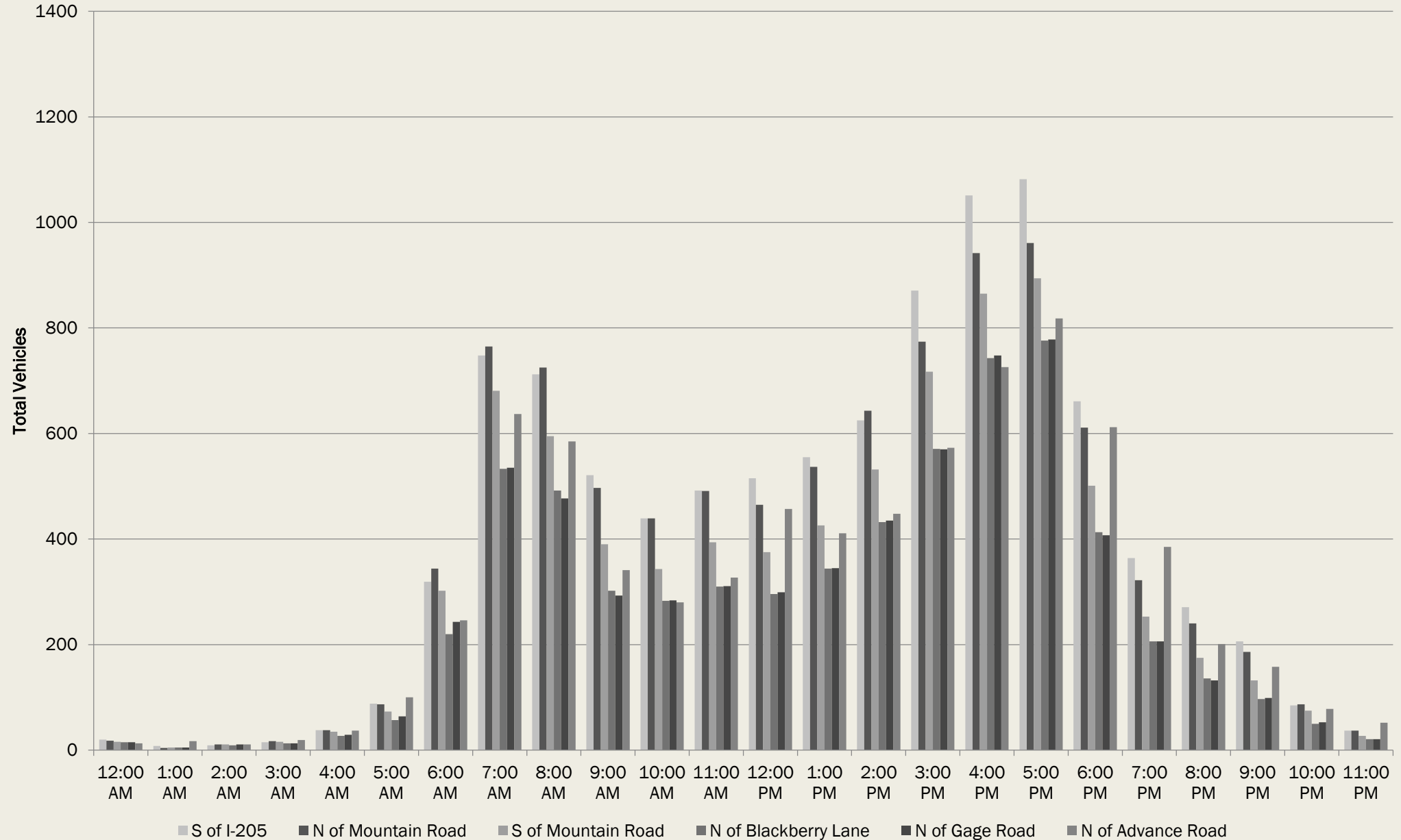
- Two-lane arterial, 6.5 miles between Wilsonville and Lake Oswego
- 24 intersections plus private access points
  - *18 stop-controlled intersections*
  - *4 intersections with traffic signals*
  - *2 roundabouts*
- No transit
- Infrequent bicycle traffic
- Regular school bus traffic

# Traffic count north of I-205






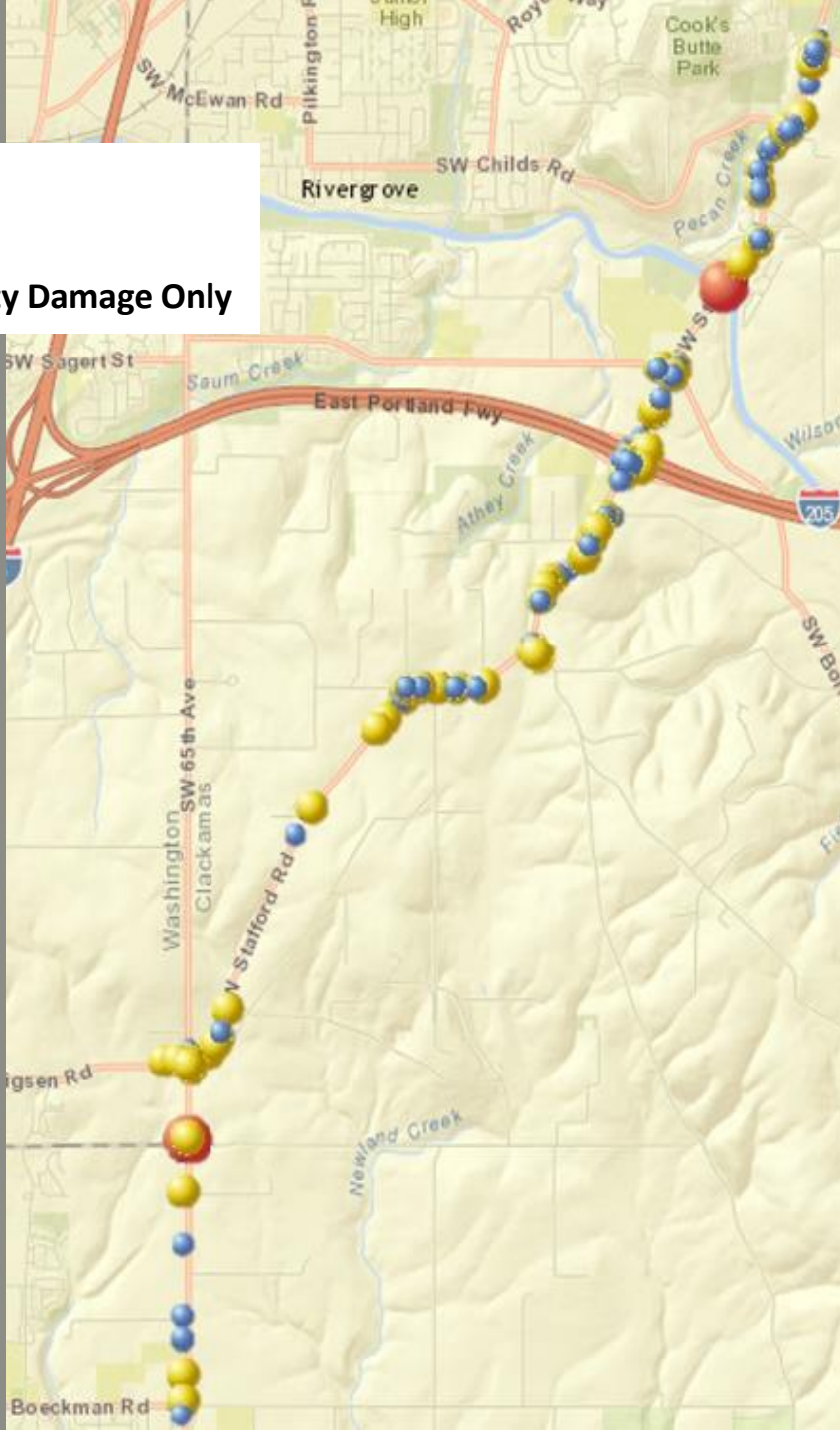


# Traffic count south of I-205



# 165 crashes from 2011-15

-  Fatal
-  Injury
-  Property Damage Only



- **Location**

- 87 at intersections
- 41 on straight roadway segments
- 31 on horizontal curves
- 6 other (driveways, vertical grade or on bridge)

- **Type**

- 48 rear-end crashes
- 44 turning movement crashes
- 43 fixed object or other crashes
- 30 other (sideswipe, head-on, etc.)

- **Results**

- 2 crashes with fatalities
- 79 crashes with injuries
- 86 crashes with property damage only

- **Causes include:**

- 39 – failure to yield right of way
- 23 – following too closely
- 19 – driving too fast for conditions
- 19 – failing to avoid vehicle ahead
- 14 – other driver error
- 11 – driving on the wrong side of the street
- 7 – speeding
- 6 – inattention

# Stafford Road corridor-wide

- **Issue: Not all striping visible in rainy, nighttime conditions**

- Proposals:

- *Use striping with better reflectivity*
- *Install raised pavement markers*
- *Update to recessed pavement markers not impacted by snow plows*

- **Issue: Fast right-turns at intersections**

- Proposals:

- *Restripe intersections*
- *Add or relocate chevrons*
- *Add flexible delineators*
- *Reconfigure intersections to create more perpendicular angles*
- *Create smaller-radius curves and remove extra pavement*

# Stafford Road corridor-wide (p. 2)

## ■ Issue: Winding road (currently 18 signed curves)

### ■ Proposals:

- *Sign fewer curves;*
- *Use chevrons;*
- *Delineators/reflectors to guardrails;*
- *Consider installing rumble strips on certain segments*

## ■ Issues: Low intersection visibility and awareness; vegetation overgrowth

### ■ Proposals:

- *Add street name on advance intersection warning signs*
- *Add “stop” legends on side streets behind stop bars*
- *Put stop signs near stop bars*
- *Consistent street name signs*
- *Consider installing delineators along intersection edges*
- *Clear shrubbery blocking sight lines*
- *Keep trees and vegetation trimmed*



R6-4



R6-4a



R6-4b

# Stafford Road corridor-wide (p. 3)

- **Issues: High speeds; lane-departure crashes**

- Proposals:

- *Consistent messaging on advisory speeds*
- *Speed feedback signs at key locations*
- *Consider centerline and shoulder rumble strips*
- *Delineators along pavement edge*

- **Issue: Passing zones**

- Proposal: Convert centerline to double yellow on segment south of Homesteader

- **Issue: Multiple stops along signalized segments of roadway**

- Proposals:

- *Coordinated signal timing plan*
- *Add northbound advance signal warning sign for Ek Road*

# Rosemont Road

- Note: in Lake Oswego jurisdiction
- Proposals
  - Updated yield signs with improved reflectivity
  - Updated signs to roundabout directional arrows
  - Updated pavement markings
  - Add capacity by improving north, south and east legs



# Childs Road

- Improved signage and delineation
- Evaluate

- *Need for through route activated warning system*
- *Installation of left-turn lane*
- *Reconfiguring the intersection to create more perpendicular angles*
- *Installation of separate eastbound right-turn and left-turn lanes*
- *Installation of a signal or construction of a roundabout*





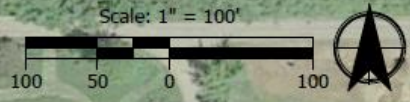
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Stafford Road/Childs Road - Signalized Intersection Concept  
Clackamas County, Oregon





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Stafford Road/Childs Road - Roundabout Concept  
Clackamas County, Oregon

Exhibit  
15



# Johnson Road

- Signage and delineation enhancements
- Consider evaluating:
  - *New intersection configuration to better tee off the side street*
  - *Removal of excess pavement*
  - *Through route activated warning system*
  - *Installation of a left-turn lane*
  - *Long-term solution of restricting access to right-in, right-out and left-in*

# Shadow Wood Drive; Advance Road/Boeckman Road

No proposals



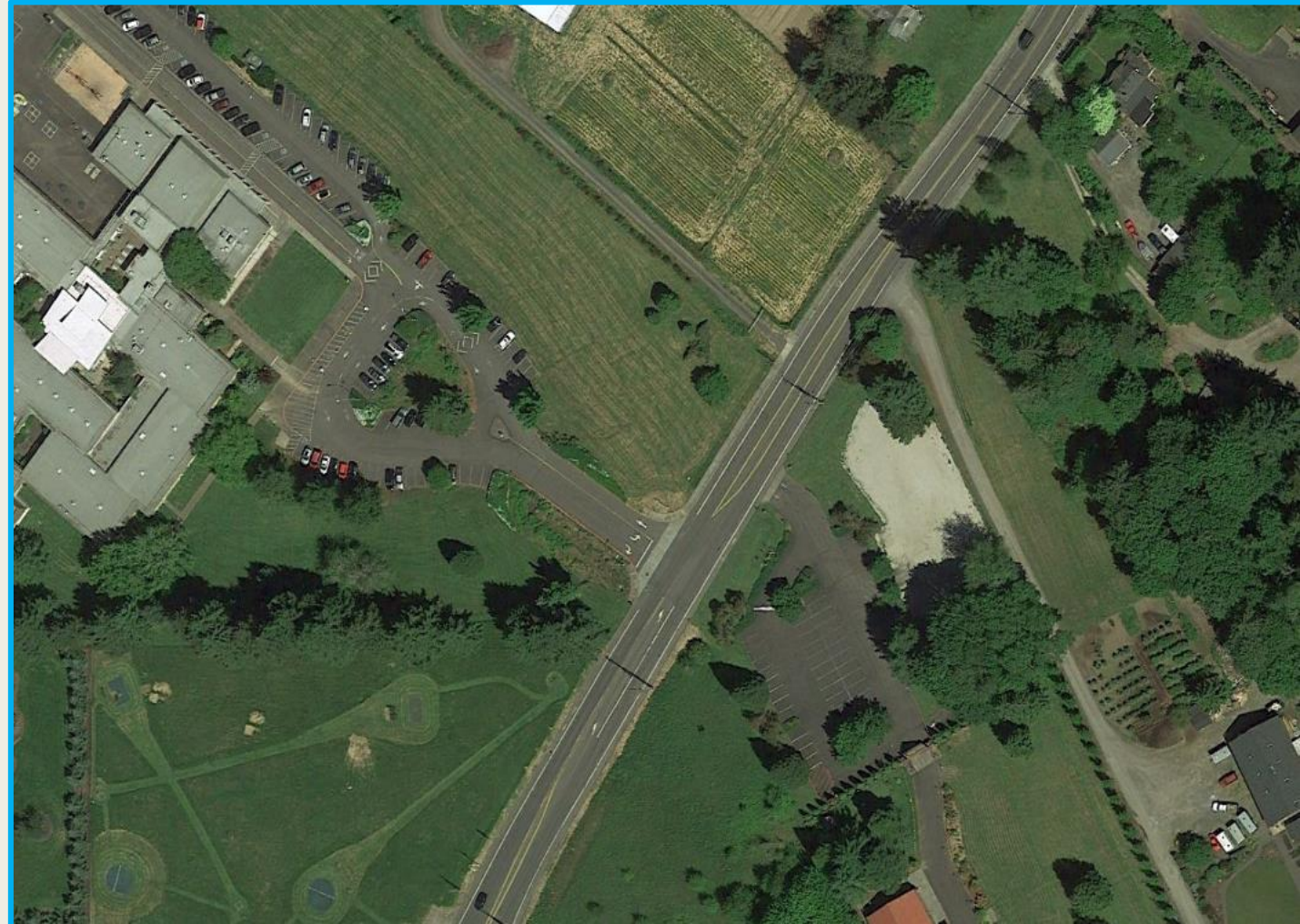
# Mountain Road

Verify and update signs



# Stafford Primary School

- Ask school district to separate bus and car circulation
  - *Bus access off Stafford*
  - *Car access of Borland*
- Let parents know they can use Borland for U-turns
- Convert driveway access to right-in, right-out only



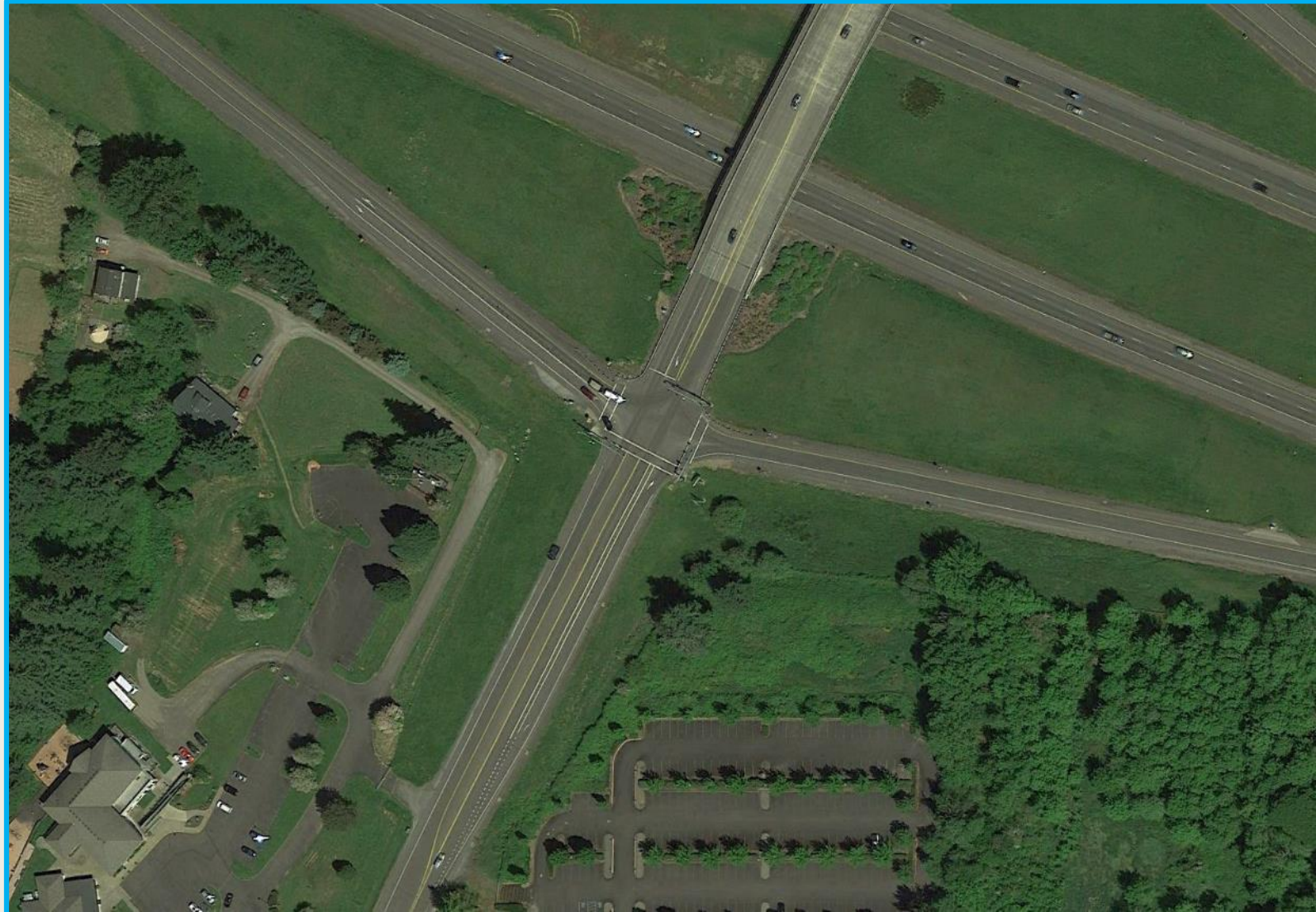
# Borland Road

- Add third right turn lane arrow on west leg
- Add “gore” striping to separate right-turn lane and combined left-through lane
- Update one-way roundabout direction arrows
- Place pedestrian crossing signs at single-lane exits of the roundabout, adjacent to the outside curb
- Update hospital sign
- Remove DO NOT ENTER sign on east leg



# I-205 Northbound Ramp

- Adjust signal timing to eliminate permissive left-turns and only permit protected left turns
- Update pedestrian facilities



# Newland Road

- **Widen stop bar**
- **Ensure people know private driveway is not a public roadway**
  - *Update and maintain edge marking by private driveway*
  - *Provide private property signs*



# Schatz Road

## ■ Reconfigure intersection

- *Create more perpendicular angles*
- *Remove right-turn bypass lane*
- *Create a smaller-radius curve for right turns*





# 65<sup>th</sup> Avenue & Elligsen Road intersections

- Consider placement of chevrons
- Update advance intersection warning signs
- Fill in ditch at corner between southbound Stafford and eastbound 65<sup>th</sup>
- Clear sight lines
- Consider reconfiguring intersections
  - *Southbound stop sign at 65<sup>th</sup>*
  - *Stafford/65<sup>th</sup> roundabout and turn lanes for 65<sup>th</sup>/Elligsen*
  - *One roundabout that realigns the roads into one intersection*





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Stafford Road/65th Avenue - Roundabout Concept and  
65th Avenue/Elligsen Road - Turn Lane Concept  
Clackamas County, Oregon

Exhibit  
18



Stafford Road/65th Avenue - Roundabout Concept and  
65th Avenue/Elligsen Road - Turn Lane Concept  
Clackamas County, Oregon

Exhibit  
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Stafford Road/65th Avenue/Elligsen Road  
 Roundabout Concept with Westbound Left-turn Lane  
 Clackamas County, Oregon

# What's next?

Study report findings and place projects in following categories for further action.

## ■ Short-term maintenance projects

- *Fit in maintenance schedule beginning summer 2018*
- *Includes striping, delineators, signage, chevrons, etc.*

## ■ Receiving state ARTS (All Roads Transportation Safety) funds for curve warning signs and for intersection improvement signs at Childs, Johnson, Mountain, Newland, Schatz, Elligsen and Homesteader

## ■ Medium-term projects

- *Complete when paving is done so work doesn't have to be redone*
- *Includes recessed pavement markers, rumble strips, raised pavement markers, speed feedback signs, filling ditches and squaring up intersections*

## ■ Longer-term capital projects

- *Study feasibility and costs*
- *Add to and prioritize with other road safety needs throughout the county, as part of the Transportation Safety Action Plan (TSAP) update*
- *Seek funds*

FOR MORE INFORMATION:

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