



Implementing Variable Speed Limits on Portland Area Freeways

2011 Traffic Engineering Conference

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ODOT
TEC
2011

Why would we vary the speed?

- Safety
 - o Traffic conditions
 - High Volumes
 - Conflicts
 - o Weather conditions
 - Snow, ice, rain, etc.
- Congestion
 - o Traffic conditions
 - Turbulent flow

What measures would we use?

- Volume
- Speed
- Precipitation
- Surface condition

Staley's Junction

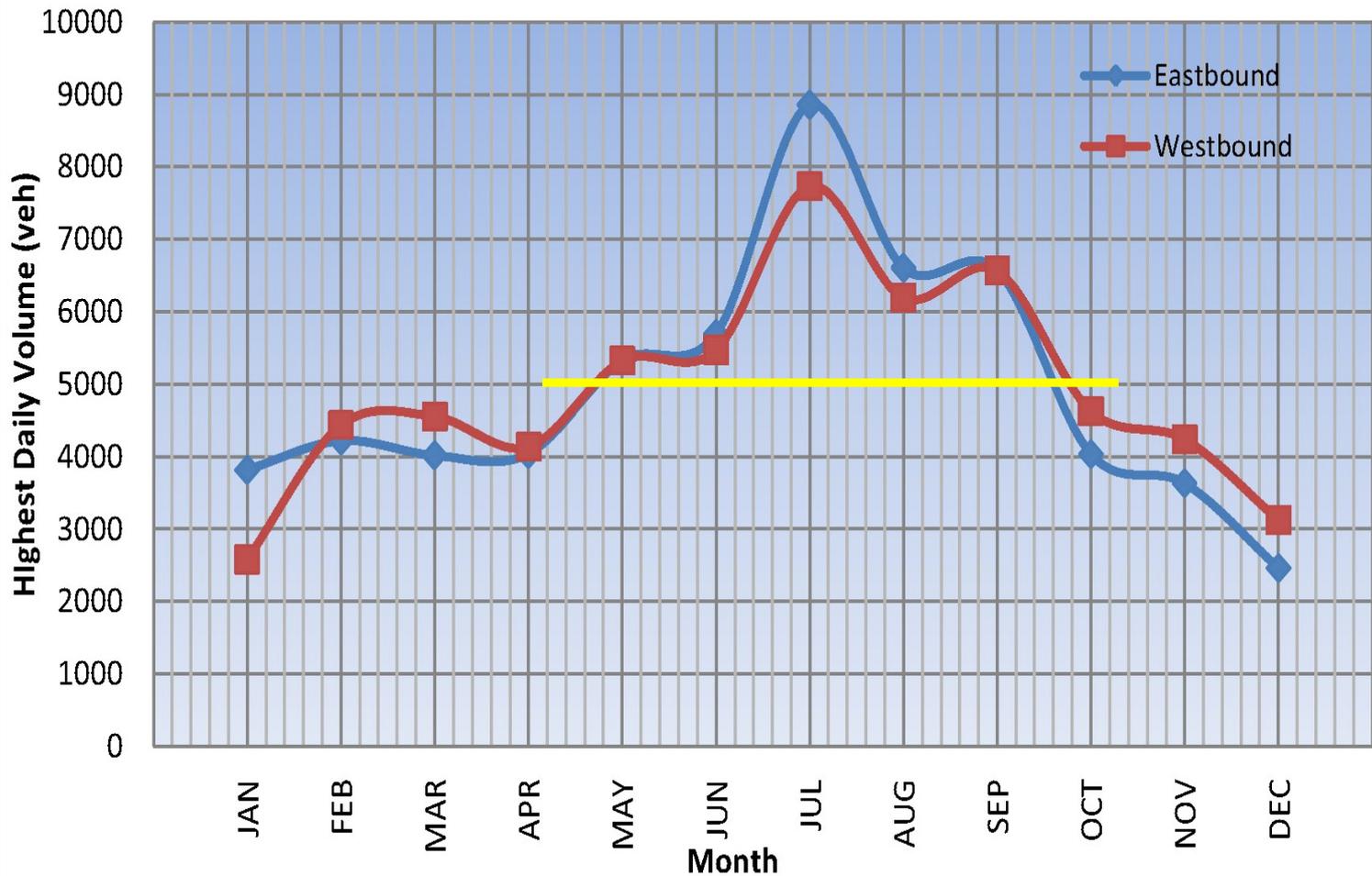
- Interim Project



US26 Staley's Junction

- Two lane, two-way rural location through intersection
- Safety and delay for left turns from side streets
- Long delays from recreation traffic
- This is a relatively simple system application

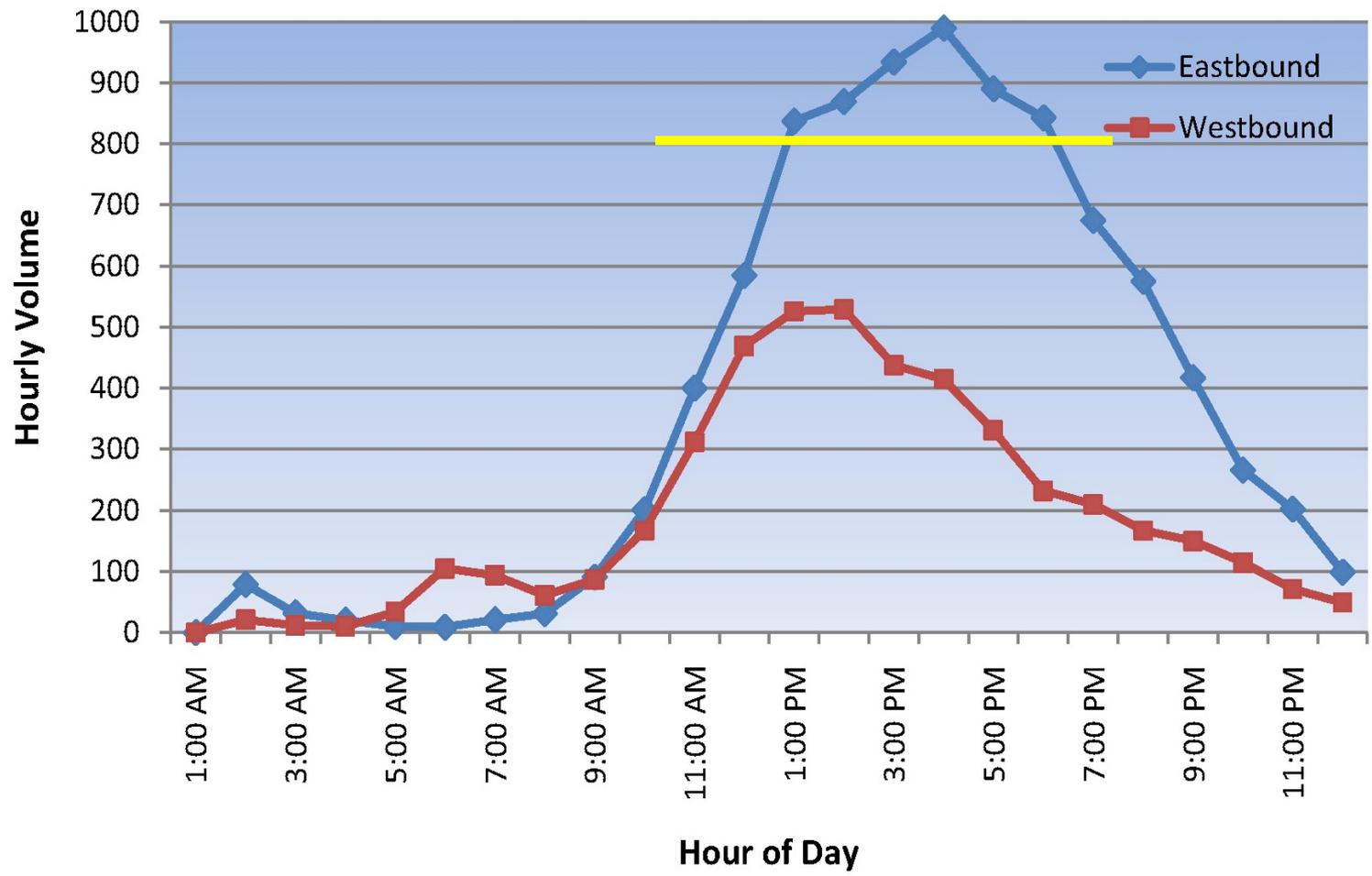
Highest Daily Volume by Month (Average Daily Volumes from Year 2005-2007)



Source: Data from ODOT Automated Traffic Recorder # 34-005, located at Timber Junction on US 26.

Figure 4: Monthly Variation of Peak Traffic on Mainline US 26

Hourly Volumes at Staley's Junction on Sunday, 08/28/2005



Source: Data from ODOT 24-hour count conducted on Sunday August 28, 2005, at Staley's Junction

Figure 5: 24-Hour EB and WB Hourly Volumes

Staley's

- Speed Signs
- Warning Signs
- Detection
- Cameras
- Battery Backup



LEGEND

- Project Area
- Variable Speed Sign
- Advance Warning Sign "Speed Reduced Ahead" "When Flashing"
- Traffic Detector
- Traffic Detector (Future)
- Mile Post Number

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Figure 1

PROJECT AREA WITH PROPOSED DEVICES

Not to Scale

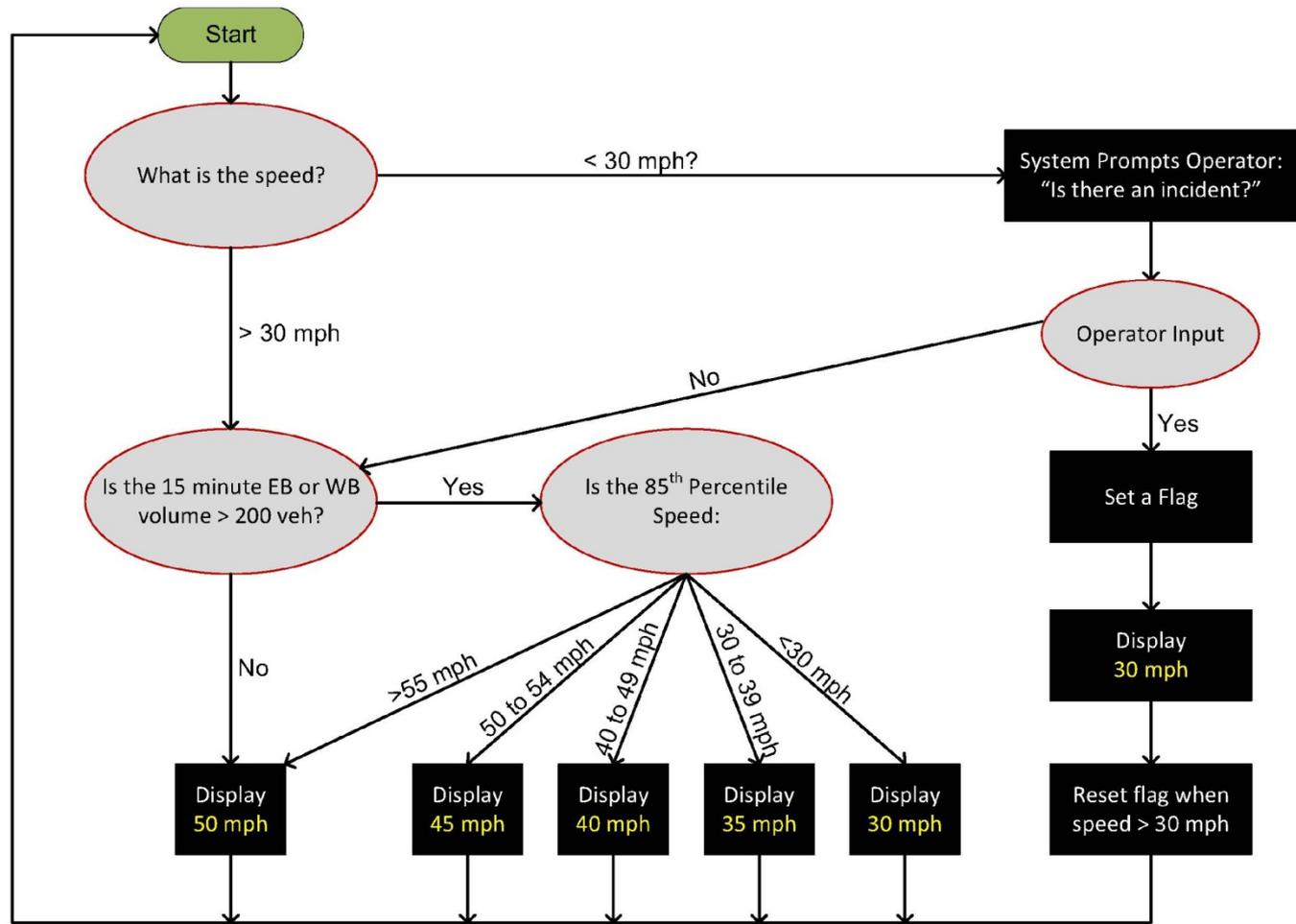


Figure 11: VS System Operations Flow Chart

Staley's

- Based on 85th percentile speed
- Threshold volume
- Sidestreet vehicles

Operational Scenario A - Recurrent

Figure 13

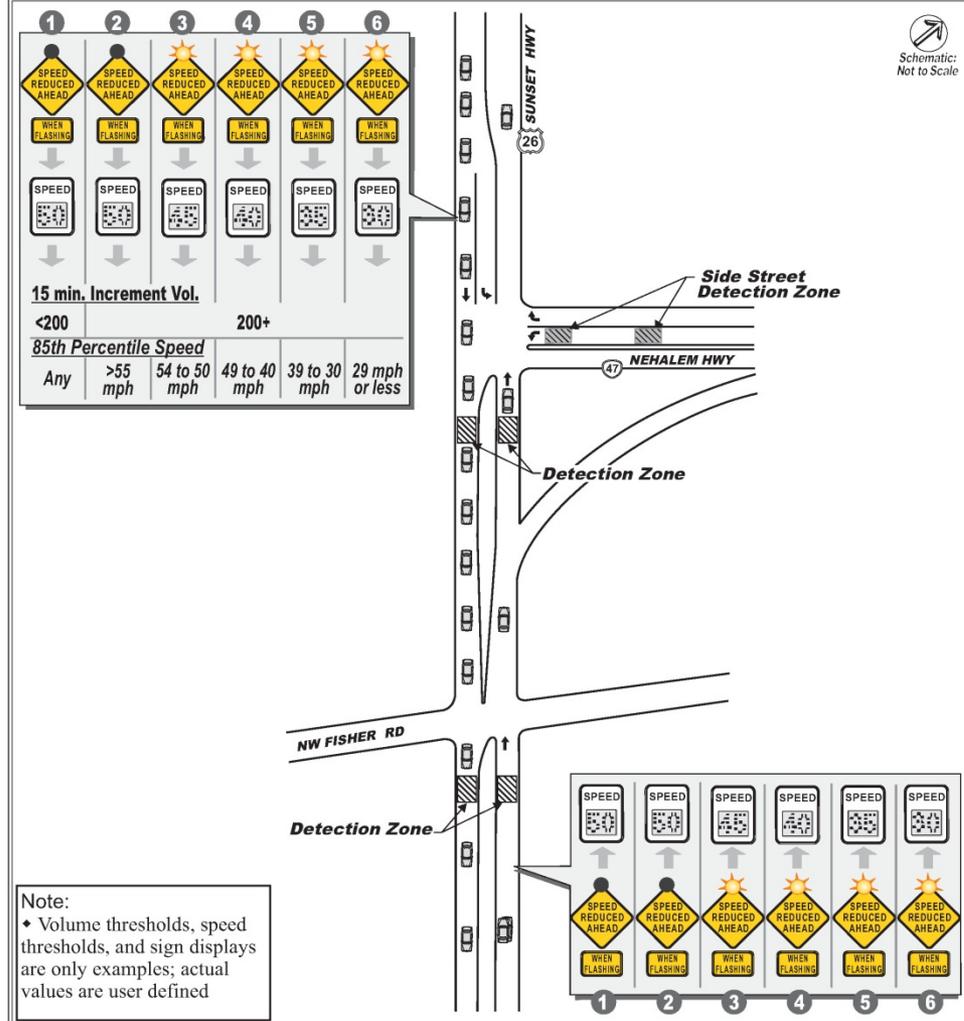
EB - High Volume / WB - Free Flow

Recreational traffic returning from coastal areas make up the major portion of the high volume EB traffic.

- Volume Thresholds Met by EB Detectors
- 85th Percentile Speed Based on EB Detectors
- Flashing Beacons are Turned On when Speeds Lower than 50mph are Posted on VS Signs

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Schematic:
Not to Scale



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I-5 / I-405 Southbound Merge

- Significant merging/weaving and lane changing
- Recurring congestion
- Top 5% SPIS Site
- 65% rear-end accidents
- 47% between 3 and 7 pm

I-5



7/13/2009 Hwy 001 (1) Pacific MP 300.730 I-5

I-5



7/13/2009 Hwy 001 (1) Pacific MP 300.280 I-5

I-5



7/13/2009 Hwy 001 (1) Pacific MP 300.175 I-5

I-5



I-405



9/15/2009 Hwy 061 (2) Stadium Freeway MP 0.710 I-405

I-405



I-405



I-405

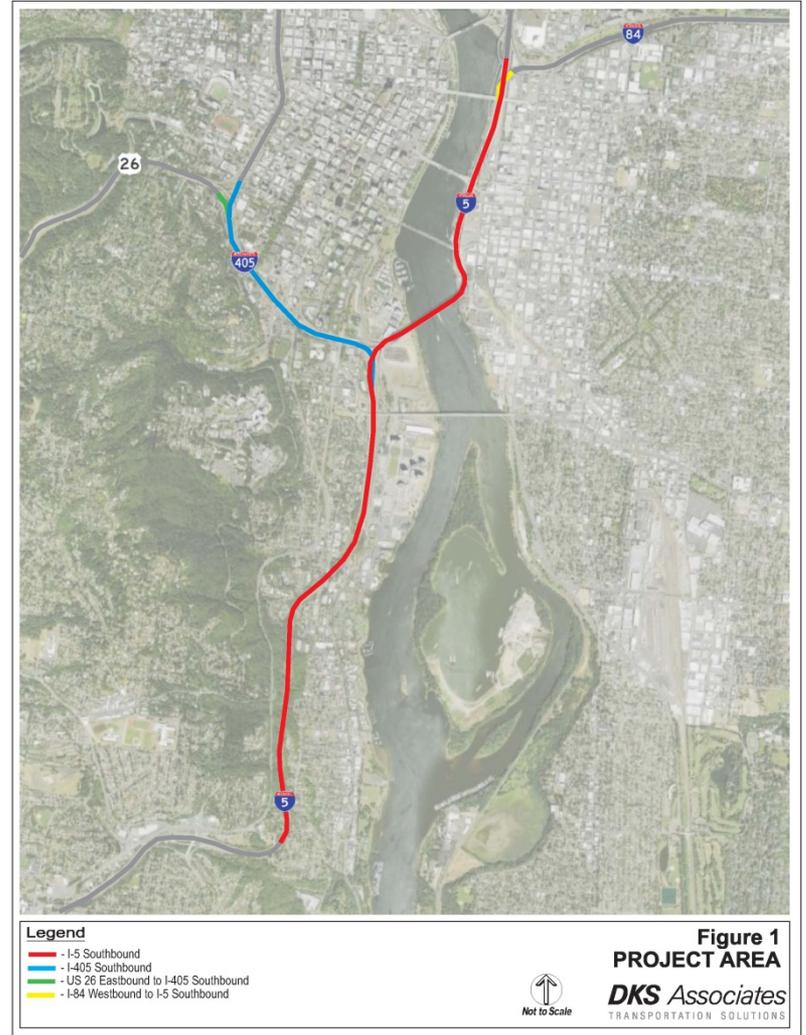
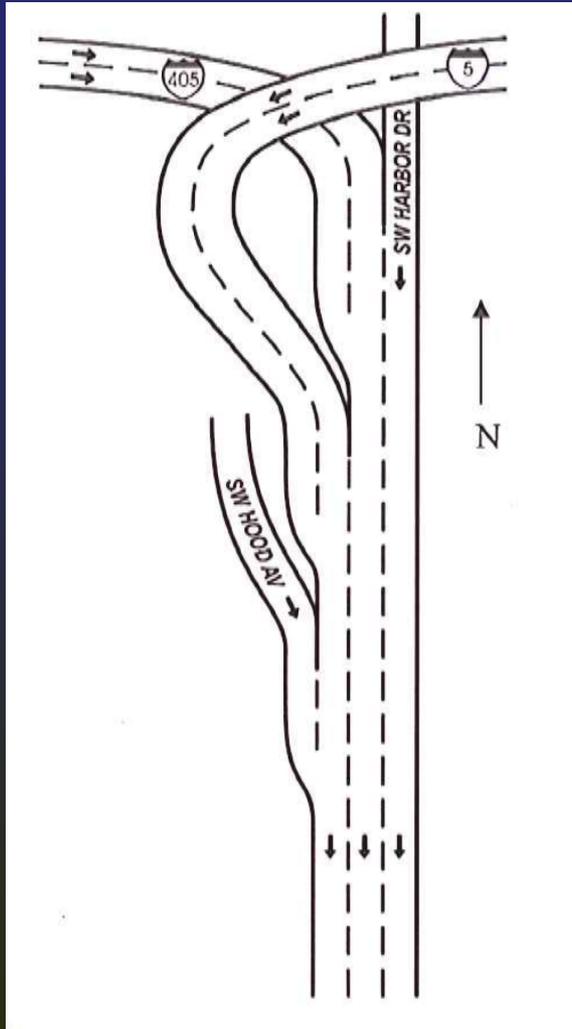


9/15/2009 Hwy 061 (2) Stadium Freeway MP 0.385 I-405

I-5 / I-405

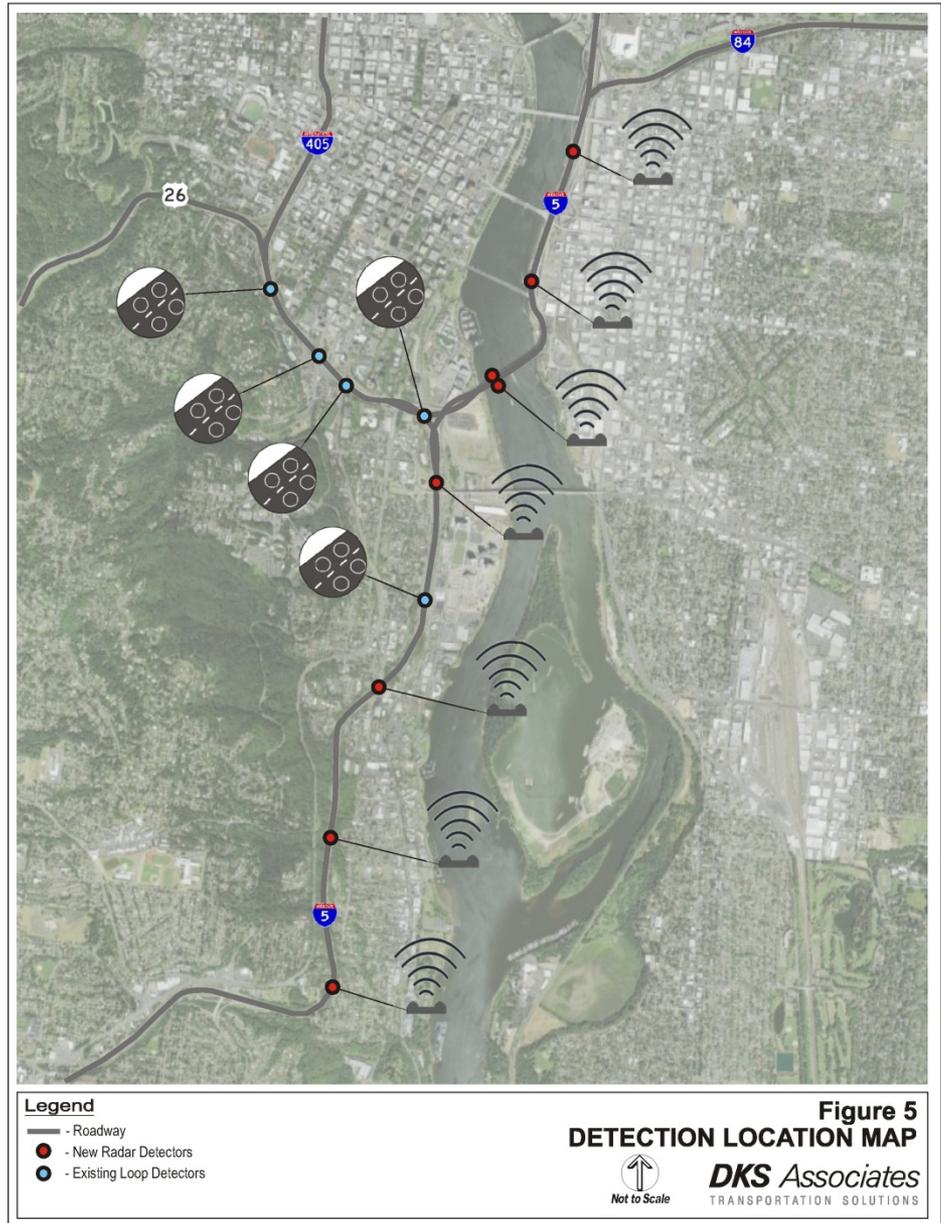


I-5 / I-405



I-5 / I-405

- Existing Loop Detection
- New Radar Detection
- Fiber and wireless comm



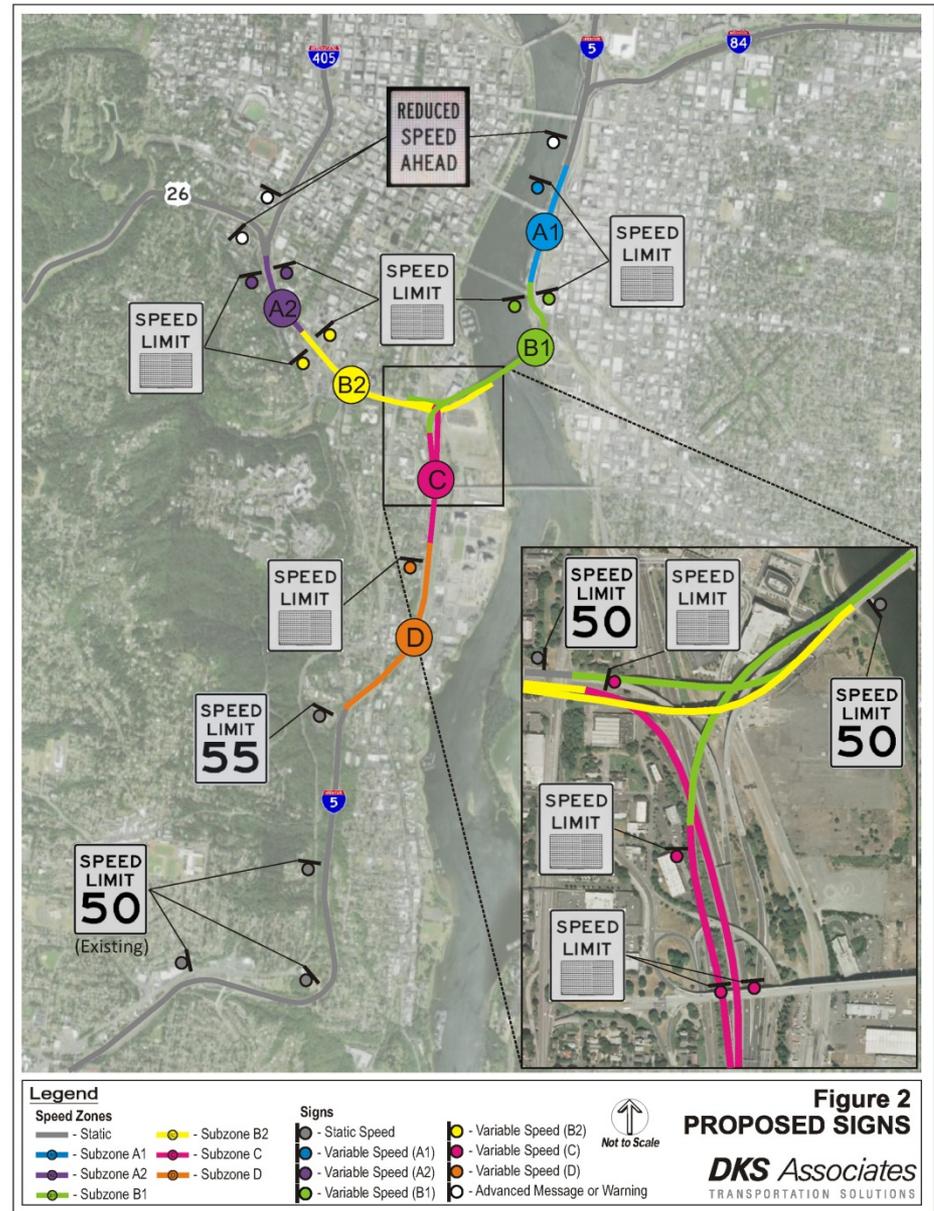
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Radars Detector



I-5 / I-405

- Multiple zones



I-5 / I-405

- Detector Data Processing

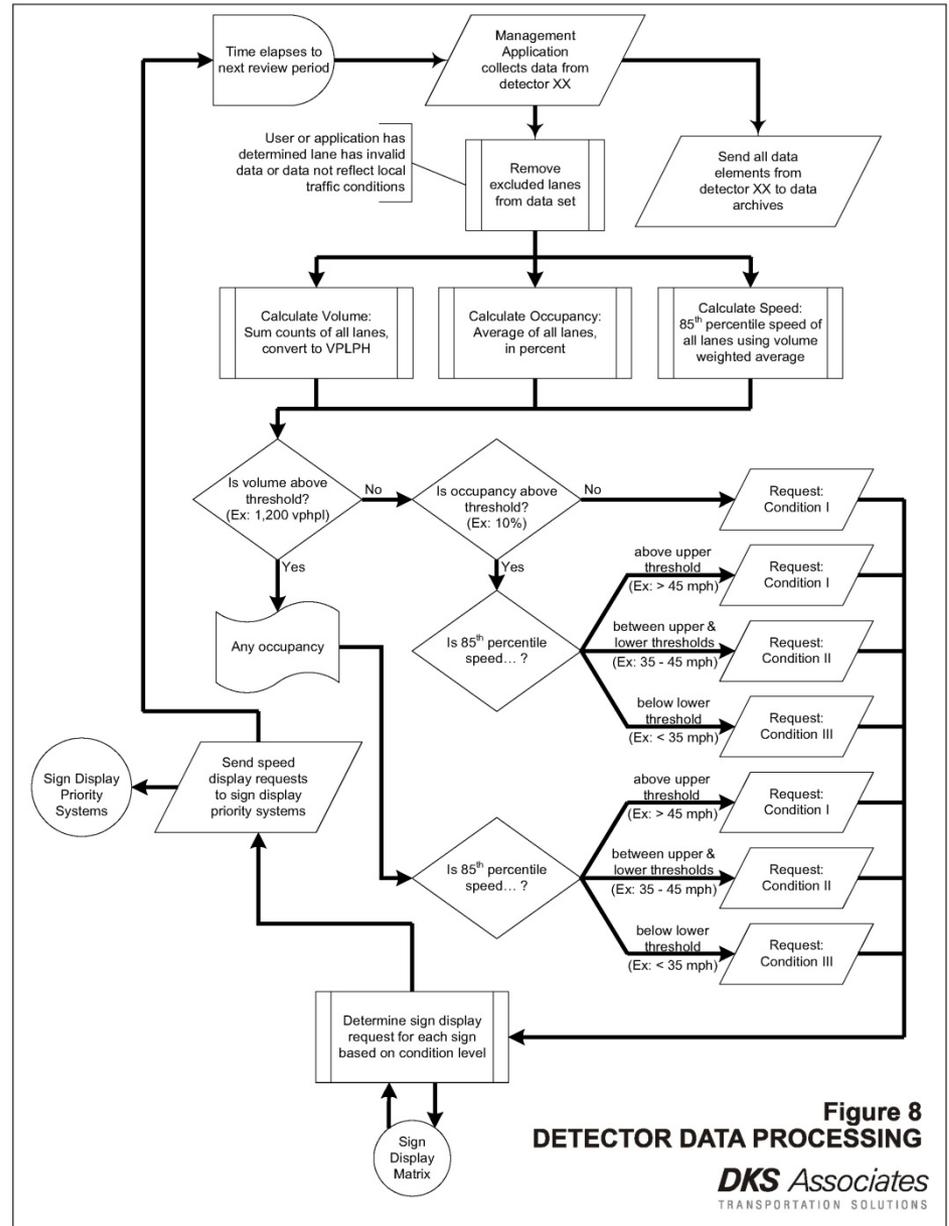


Figure 8
DETECTOR DATA PROCESSING
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I-5 / I-405

- VMS Display Processing System

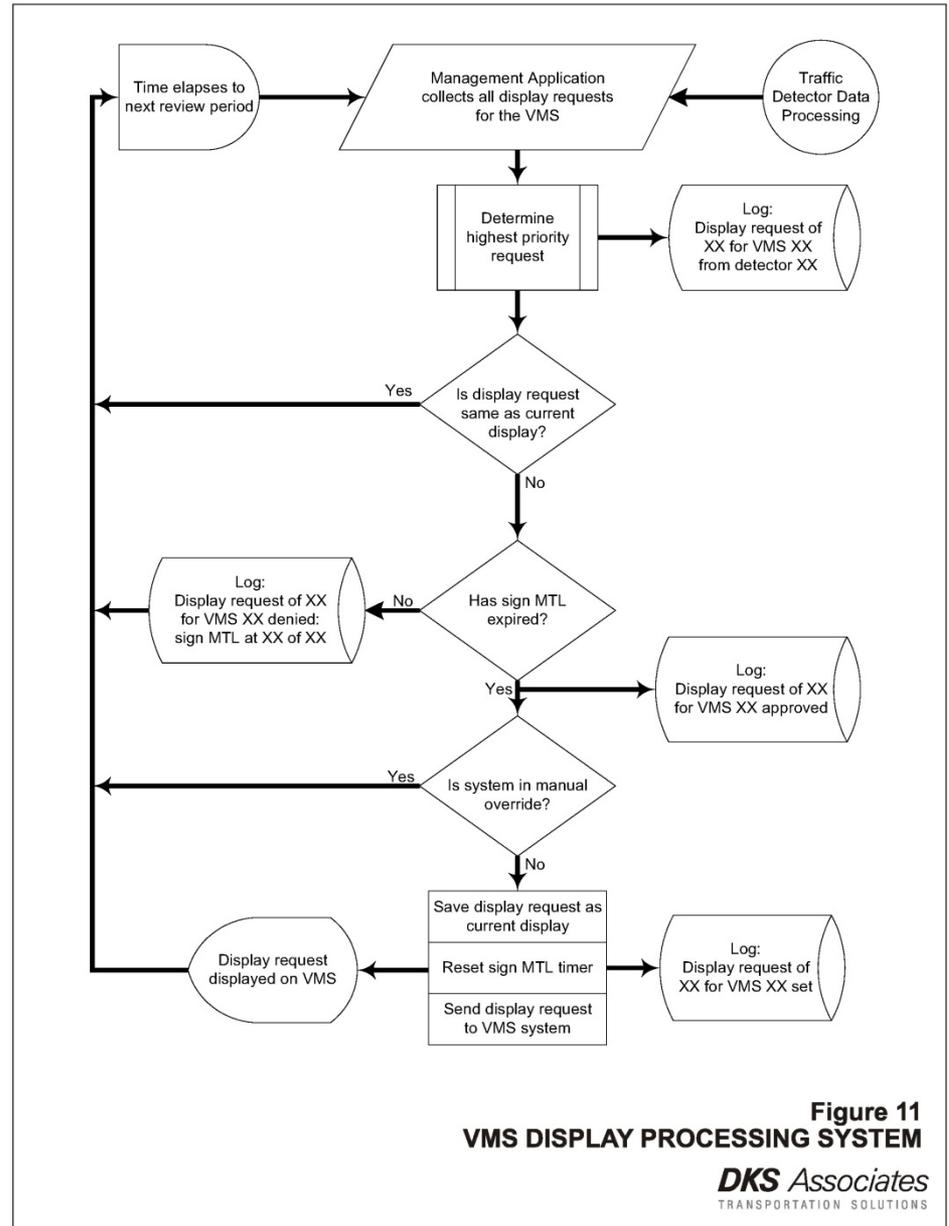
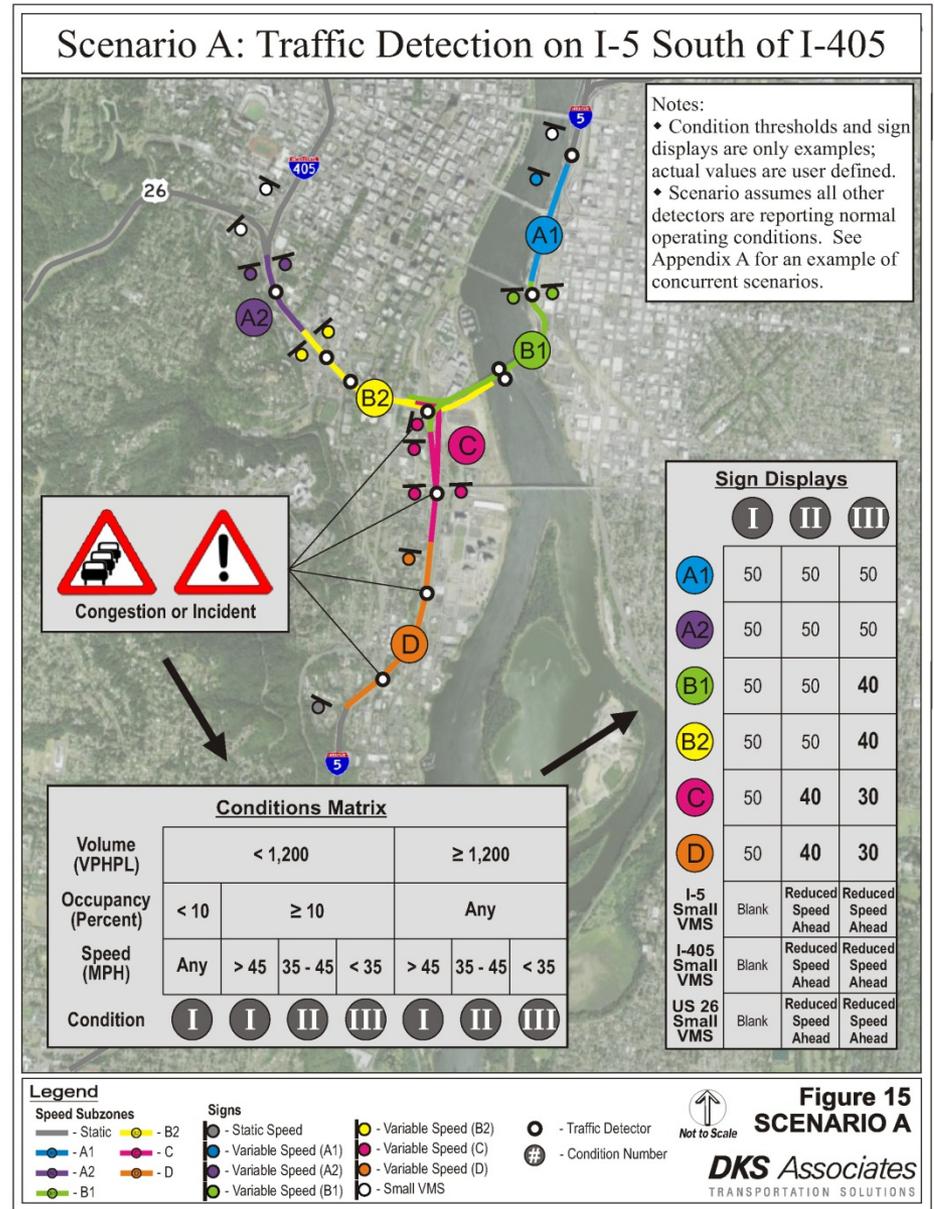


Figure 11
VMS DISPLAY PROCESSING SYSTEM

I-5 / I-405

- Scenarios part of Concept of Operations



I-405 at Broadway



I-405 at Ross Island Bridge



I-5 at Hood Avenue



Implementation

- Design issues
- Schedule
 - Construction
 - Software
- Oregon Administrative Rule
- Evaluation

US26 / ORE217 Ramps



Problem

- Substandard geometry
- Poor sight distance
- Speeds too high

- Ramp versus mainline
 - o Less weaving
 - o Speeds are less
 - o Alignment

Countermeasures

- Speed warning signs
- Curve warning signs
- Flashing yellow beacons
- Profiled striping
- Barrier reflectors

Eastbound to Southbound



4/8/2008 Hwy 047BW (1) Beaverton-Tigard Conn No 1 MP 69.110

Eastbound to Southbound



Northbound to Westbound



4/8/2008 Hwy 144AG (1) Sunset Hwy Conn No 7 MP 0.055

Northbound to Westbound



4/8/2008 - Hwy 144AG (1) Sunset Hwy Conn No 7 MP 0.095

Northbound to Westbound



4/8/2008 Hwy 144AG (1) Sunset Hwy Conn No 7 MP 0.235

Westbound to Southbound



4/3/2008 Hwy 047BZ (1) Beaverton-Tigard Conn No 4 MP 69.415

Westbound to Southbound



4/3/2008 Hwy 047BZ (1) Beaverton-Tigard Conn No 4 MP 69.445

US26 / ORE217 Ramps



Proposed Solution

- Variable speed system
 - o Volume
 - o Speed
 - o Weather conditions

Implementation

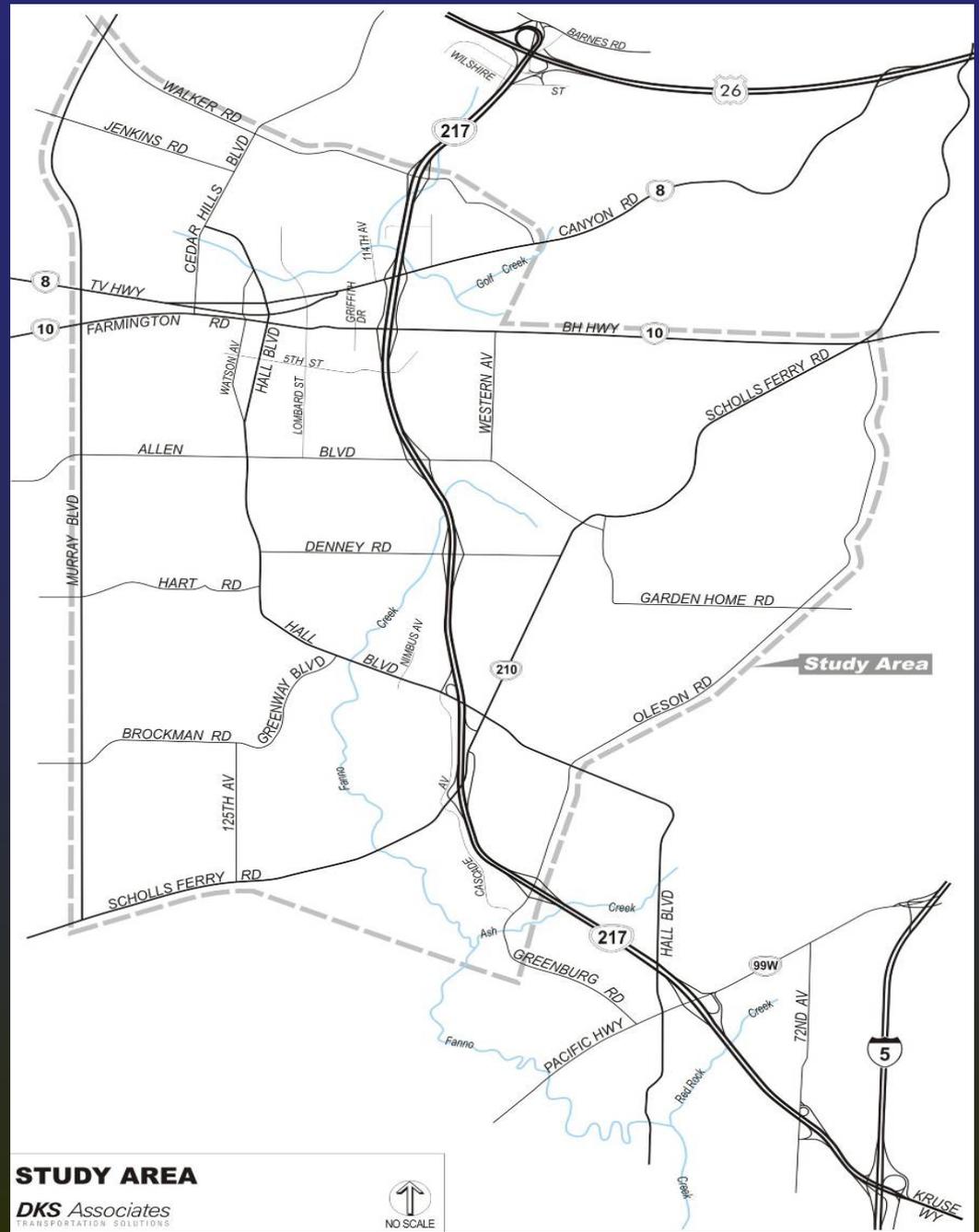
- ODOT research project
 - o Develop algorithm
 - o Evaluate system
- 2012 project

Design Issues

- Target ramp traffic
- Warning speed versus regulatory



ORE 217



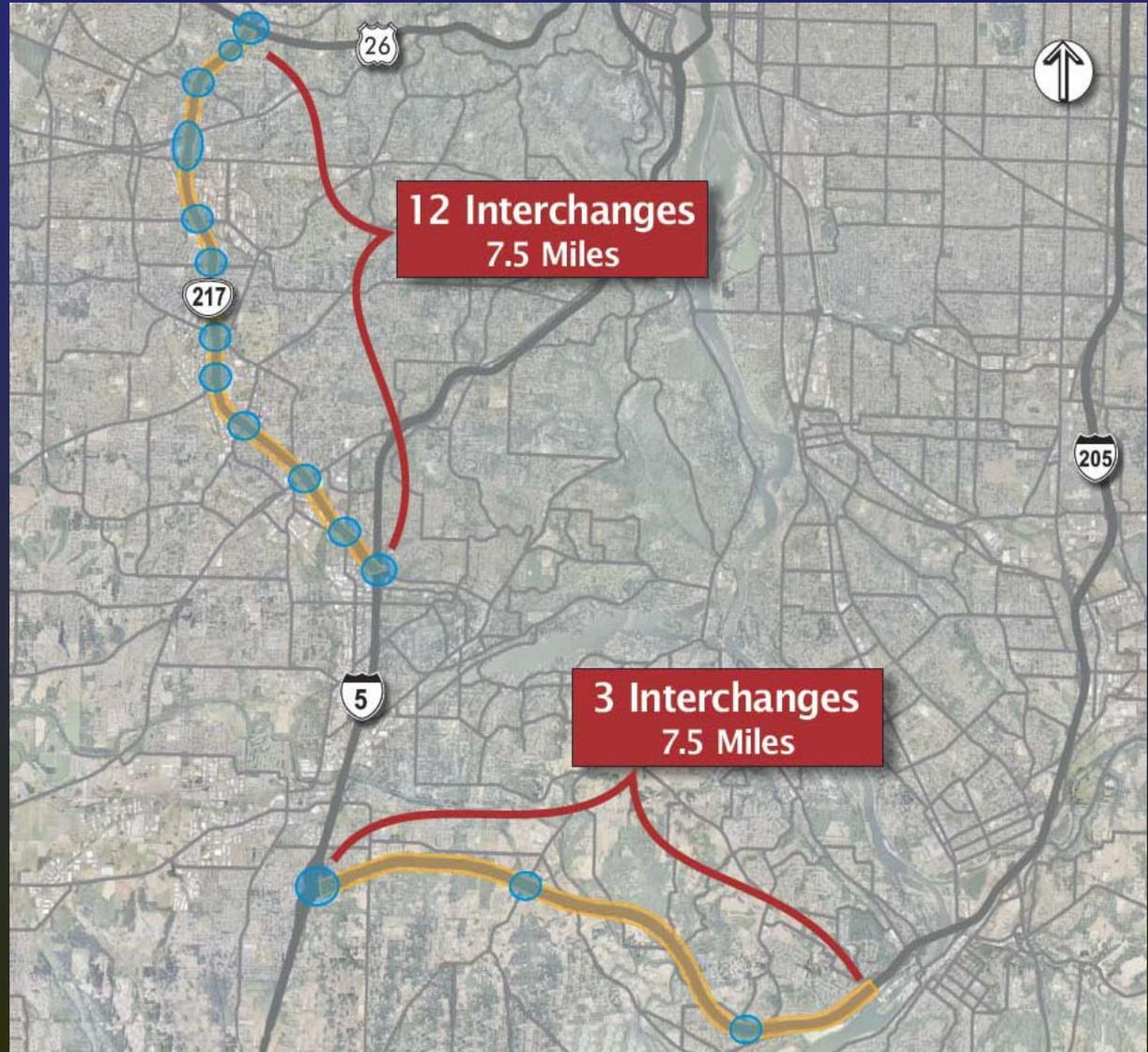
STUDY AREA

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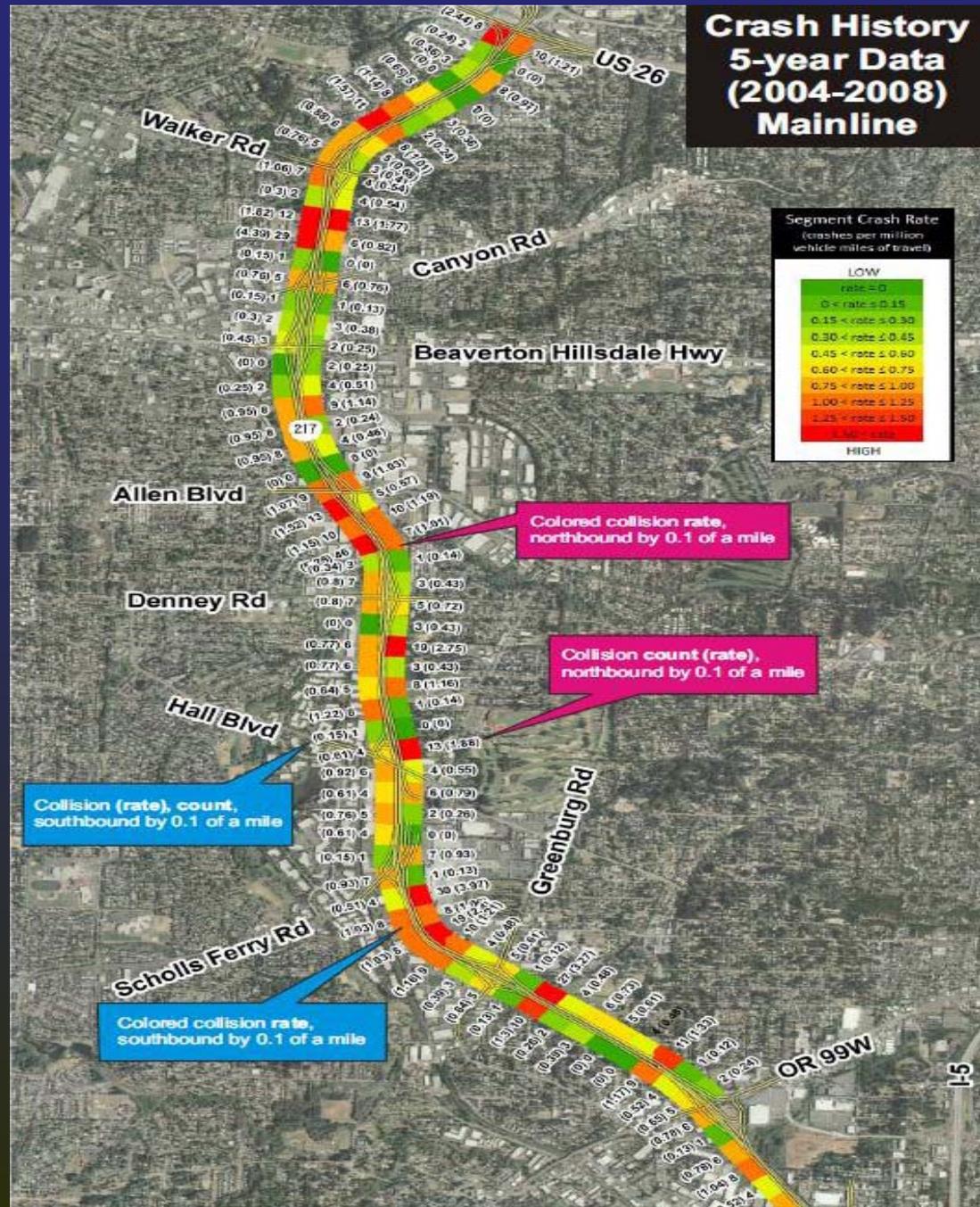
ORE 217

- Closely spaced interchanges



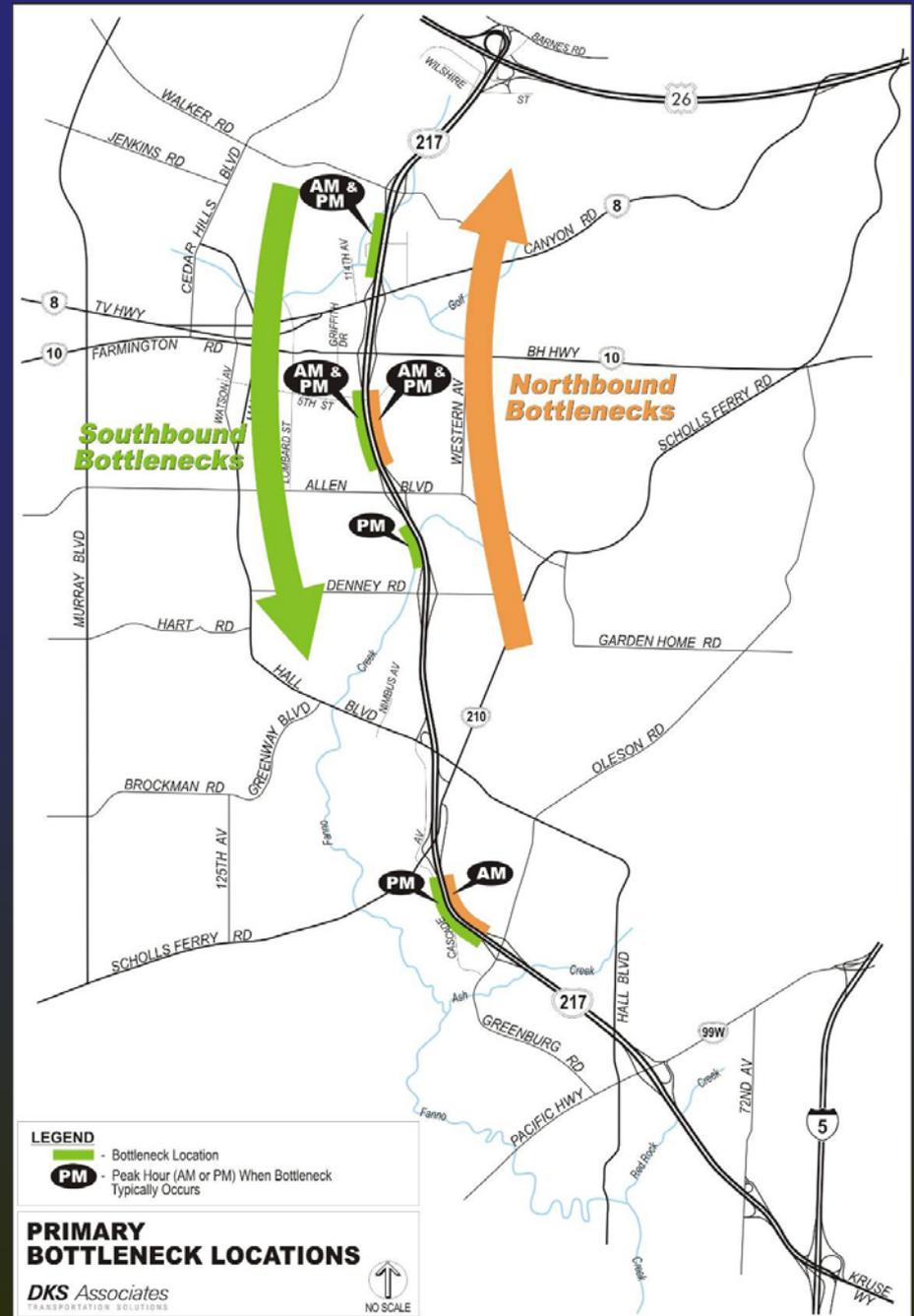
ORE 217

- 200 crashes per year
- 70% rear-end crashes
- Crash every other day



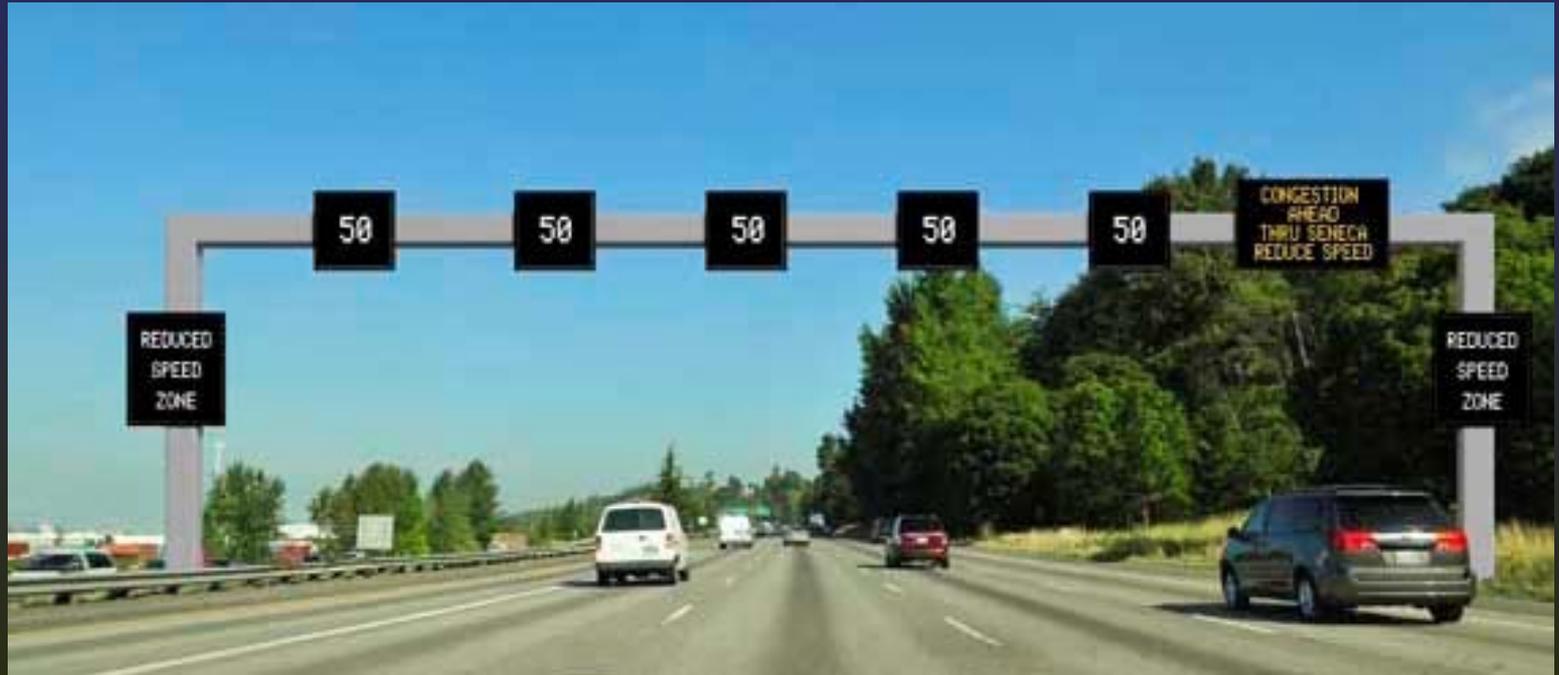
ORE 217

- Queues form and extend back from bottlenecks
- Secondary crashes



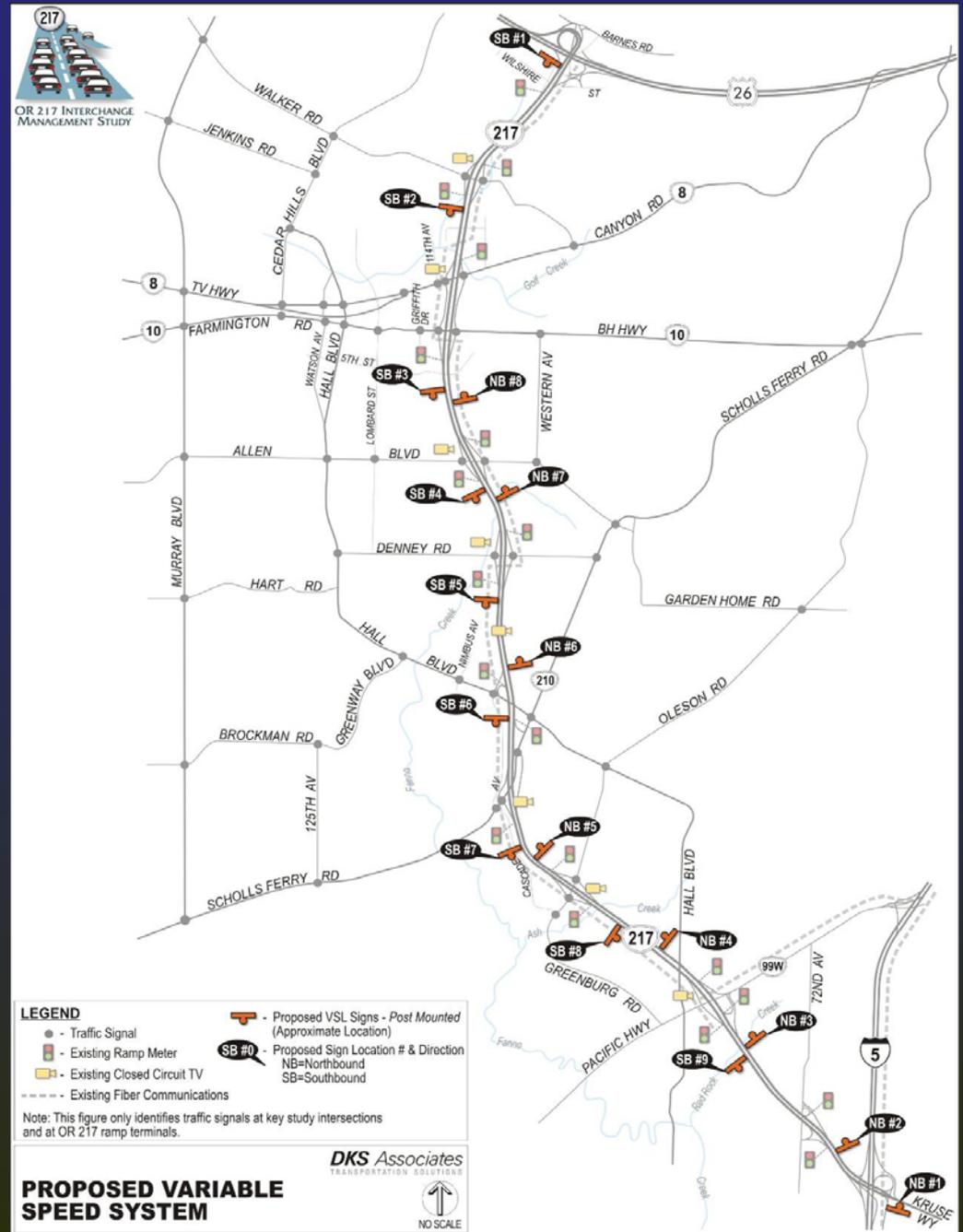
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- Variable speed
- Traveler information



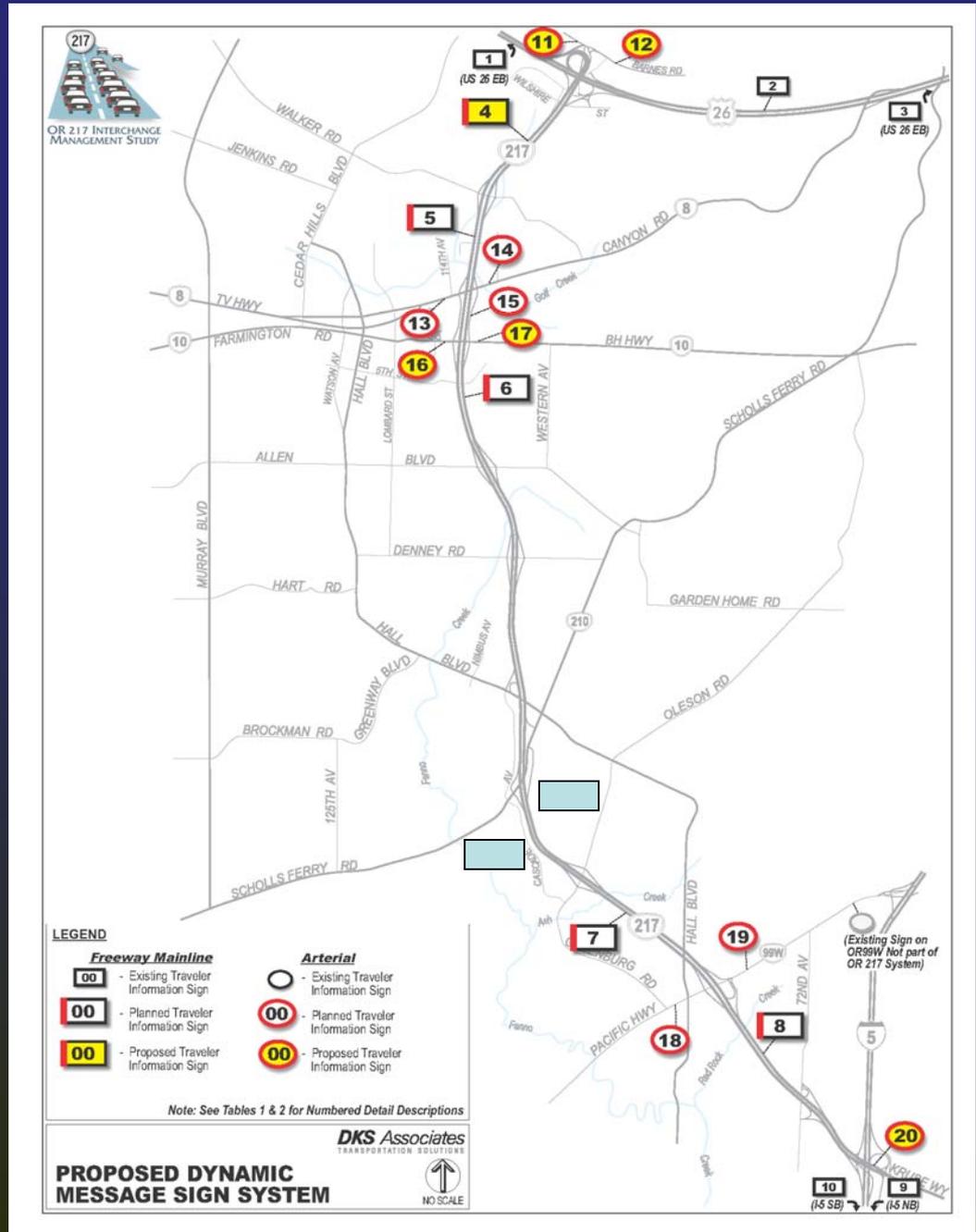
ORE 217

- Variable speed limits



ORE 217

- Variable message signs used for queue warning and travel time
- Freeway and arterial



ORE 217

- VMS warning message

The image displays three VMS message panels. The top panel shows a yellow message: "CRASH 1 MILE AHEAD PREPARE TO STOP". The middle panel shows a yellow message: "LEFT LANE BLOCKED AT HALL BLVD" next to a diamond-shaped sign with a vertical bar and a downward arrow. The bottom panel shows a red message: "WRECK 1/4 MILE AHEAD" next to a diamond-shaped sign that says "RIGHT SHOULDER CLOSED".

ORE 217

- Travel time message

US 26	5	Min
185th Ave	9	Min
Downtown	12	Min

Travel Time To:

US 26:	8	Min
185th Ave:	12	Min

Minutes to:

	5	7
	205	13

US26 Mt. Hood Variable Speed Limits

