Preliminary Analysis of Speed Limit Changes in Eastern Oregon

Portland State
Civil & Environmental Engineering

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Oregon Transportation Commission Meeting

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Method

Compare changes in speed and safety on segments with increased speed limits to control locations.

Control

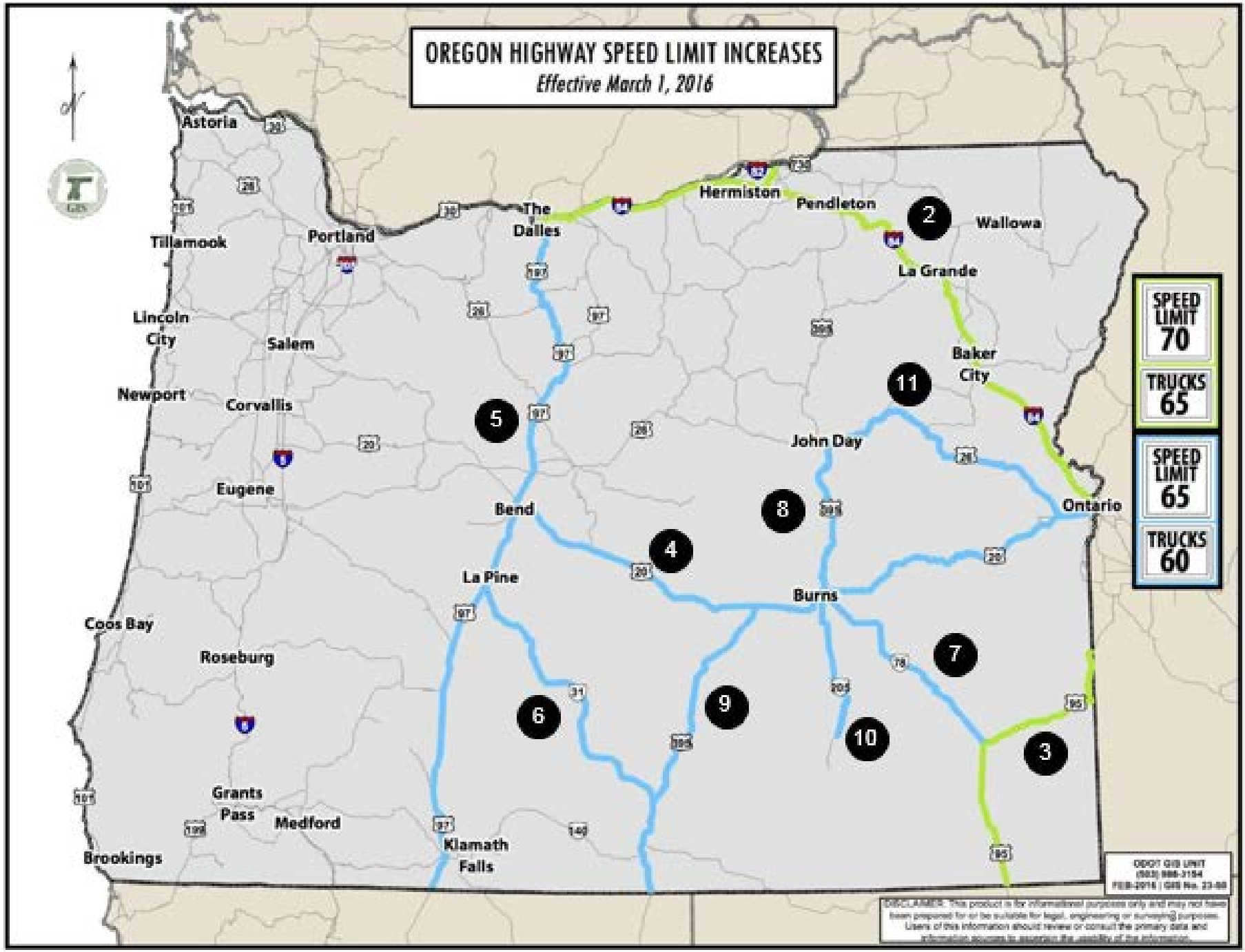
65 mph segments
- 151 miles
- 5 speed stations
- I-5 and I-84 freeway

55 mph segments
- 539 miles
- 10 speed stations
- Some in Eastern Oregon, others in Valley/Coast

Increased Posted Speed

65 → 70 mph segments
- 417 miles
- 6 speed stations
- I-84, I-82 and US-395 (a 2- lane segment)

55 → 65 mph segments
- 1,009 miles
- 11 speed stations
- Mostly 2-lane segments in Eastern Oregon


OREGON HIGHWAY SPEED LIMIT INCREASES
Effective March 1, 2016
Astoria
Tillamook
Portland
The Dalles
Hermiston
Pendleton
Wallowa
La Grande
Lincoln City
Salem
Baker City
Newport
Corvallis
Eugene
John Day
Ontario
Bend
La Pine
Burns
Coos Bay
Roseburg
Grants Pass
Medford
Brookings
Klamath Falls
2
11
5
8
4
7
6
9
10
3
SPEED LIMIT 70
TRUCKS 65
SPEED LIMIT 65
TRUCKS 60
ODOT GIS UNIT
(503) 986-3154
FEB-2016 | GIS No. 23-60
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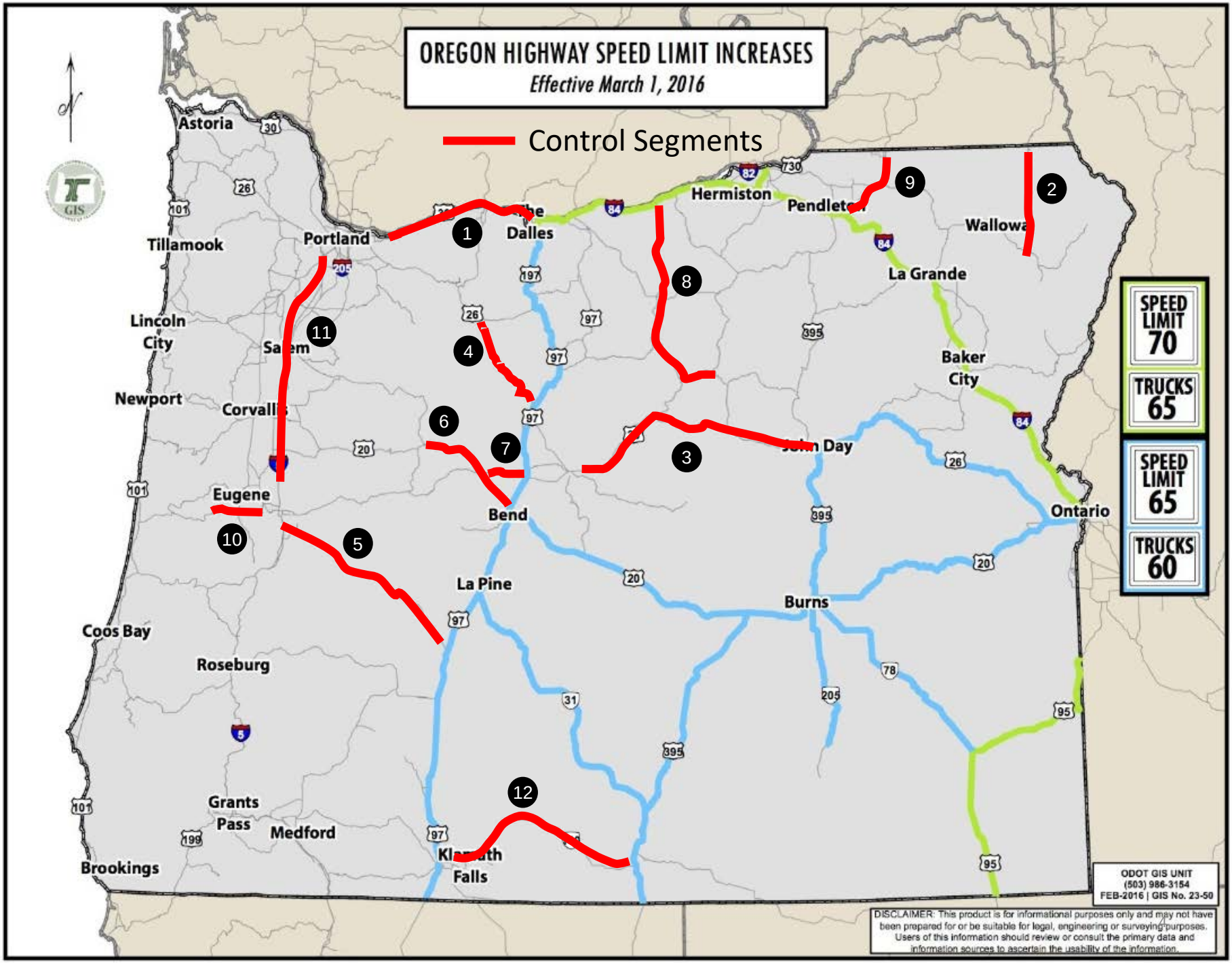
OREGON HIGHWAY SPEED LIMIT INCREASES
Effective March 1, 2016
Control Segments
Astoria
Tillamook
Portland
Dalles
Hermiston
Pendleton
Wallowa
La Grande
Lincoln City
Salem
Newport
Corvallis
Baker City
John Day
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Bend
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Burns
Coos Bay
Roseburg
Grants Pass
Medford
Brookings
Klamath Falls
1
2
3
4
5
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7
8
9
10
11
12
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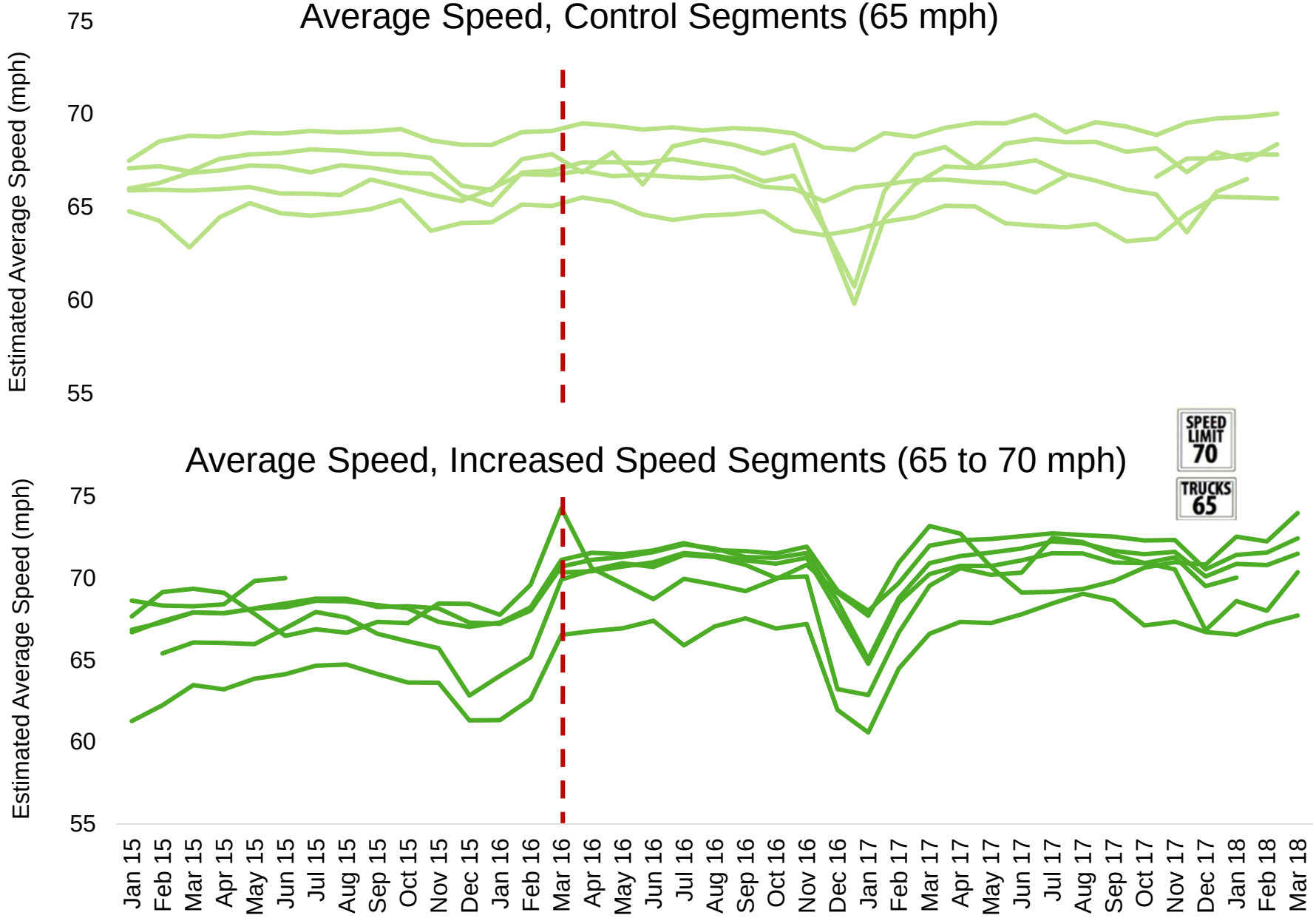
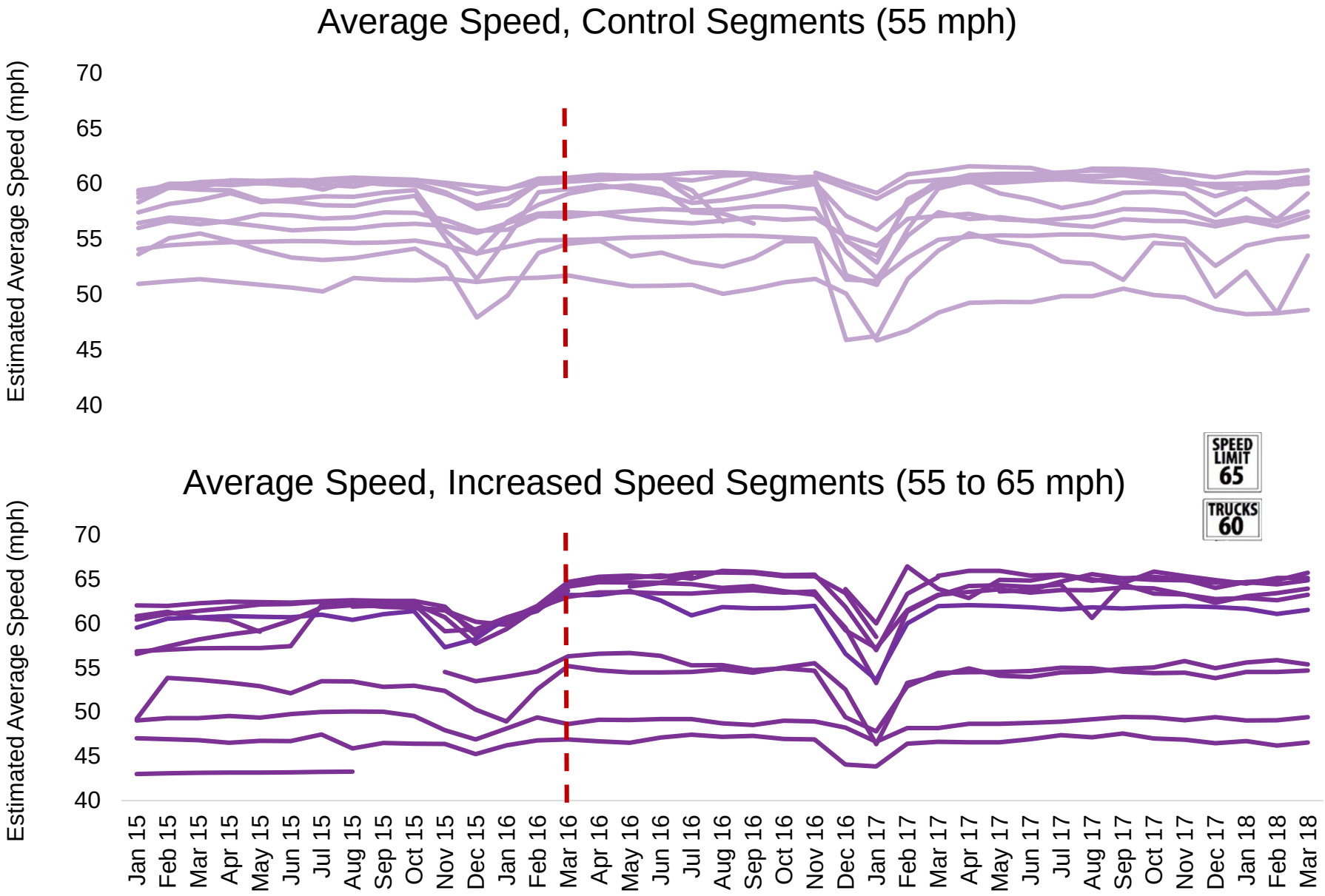
Speed Comparisons

- Source
  - Automatic Traffic Recorders (ATR) – all vehicles by month
  - *HERENow, as proof of concept*
- Comparison Periods
  - Data from January 2015 to March 2018
  - *May to October months only (without snow/ice)*
  - *December to February months only (winter months)*
- Measures (all vehicles, by month)
  - Estimated average speed
  - Percent of vehicles exceeding 65 mph, 75 mph and 85 mph
- Statistical Tests
  - T-test of means (unequal variance)
  - Paired t-test of means (2015 to 2018)


Average Speed, Control Segments (65 mph)
Estimated Average Speed (mph)
75
70
65
60
55
Average Speed, Increased Speed Segments (65 to 70 mph)
SPEED LIMIT 70
TRUCKS 65
Jan 15
Feb 15
Mar 15
Apr 15
May 15
Jun 15
Jul 15
Aug 15
Sep 15
Oct 15
Nov 15
Dec 15
Jan 16
Feb 16
Mar 16
Apr 16
May 16
Jun 16
Jul 16
Aug 16
Sep 16
Oct 16
Nov 16
Dec 16
Jan 17
Feb 17
Mar 17
Apr 17
May 17
Jun 17
Jul 17
Aug 17
Sep 17
Oct 17
Nov 17
Dec 17
Jan 18
Feb 18
Mar 18


Average Speed, Control Segments (55 mph)
Estimated Average Speed (mph)
70
65
60
55
50
45
40
Average Speed, Increased Speed Segments (55 to 65 mph)
SPEED LIMIT 65
TRUCKS 60
Estimated Average Speed (mph)
70
65
60
55
50
45
40
Jan 15
Feb 15
Mar 15
Apr 15
May 15
Jun 15
Jul 15
Aug 15
Sep 15
Oct 15
Nov 15
Dec 15
Jan 16
Feb 16
Mar 16
Apr 16
May 16
Jun 16
Jul 16
Aug 16
Sep 16
Oct 16
Nov 16
Dec 16
Jan 17
Feb 17
Mar 17
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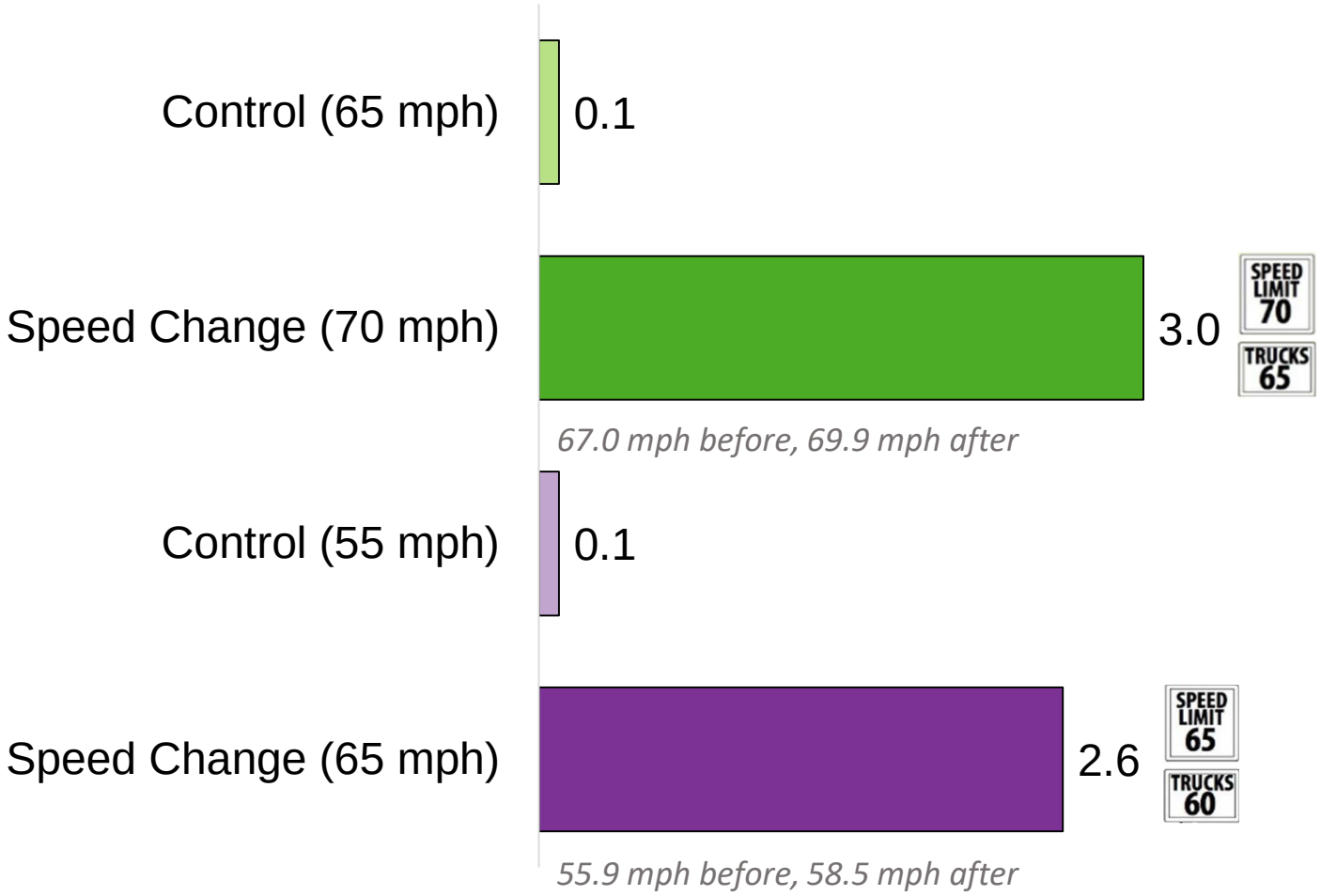
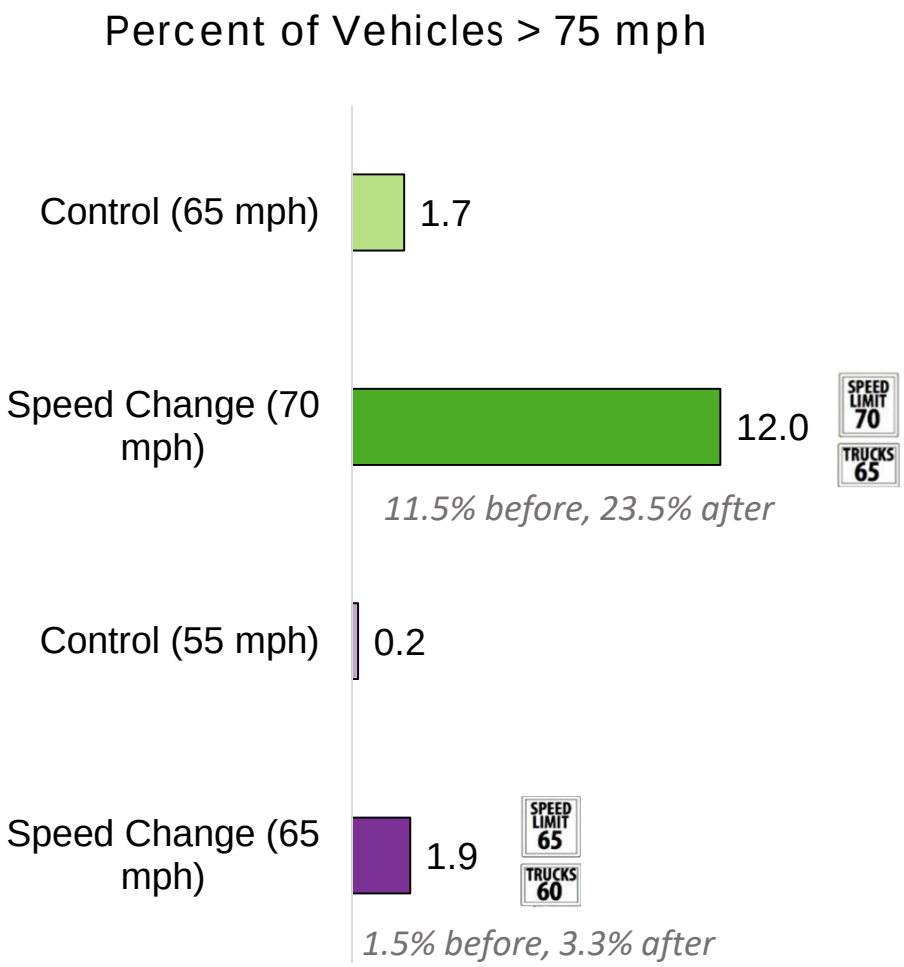
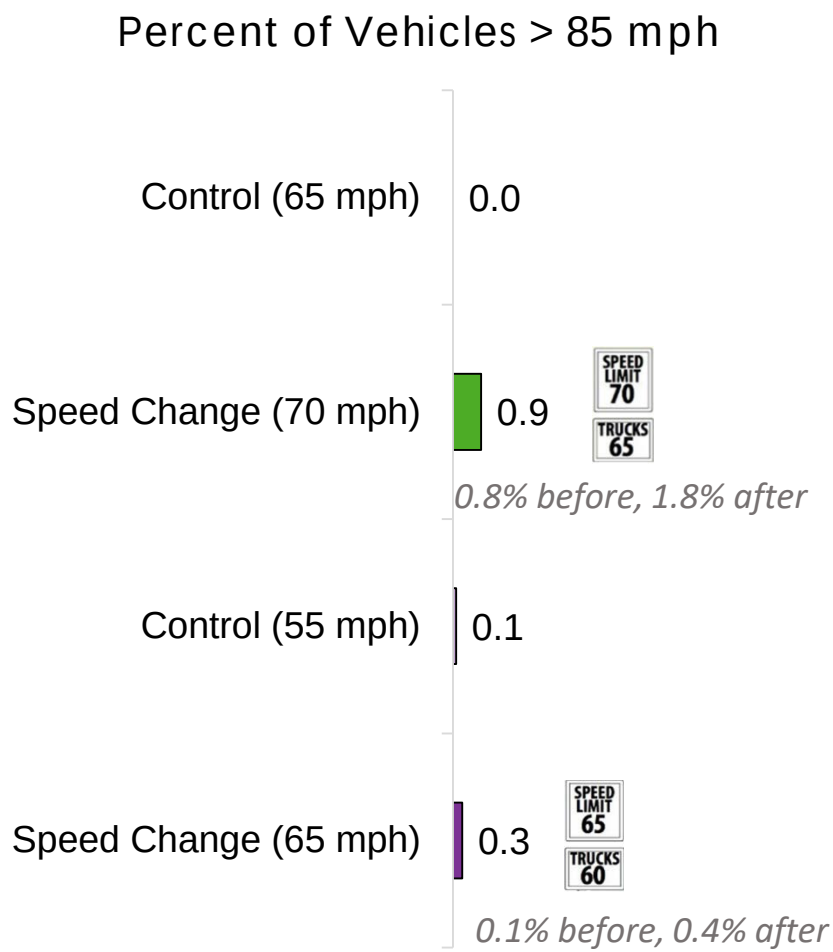
Sep 17
Oct 17
Nov 17
Dec 17
Jan 18
Feb 18
Mar 18

Change in Average Speed Change (mph)



Change in Percent Exceeding





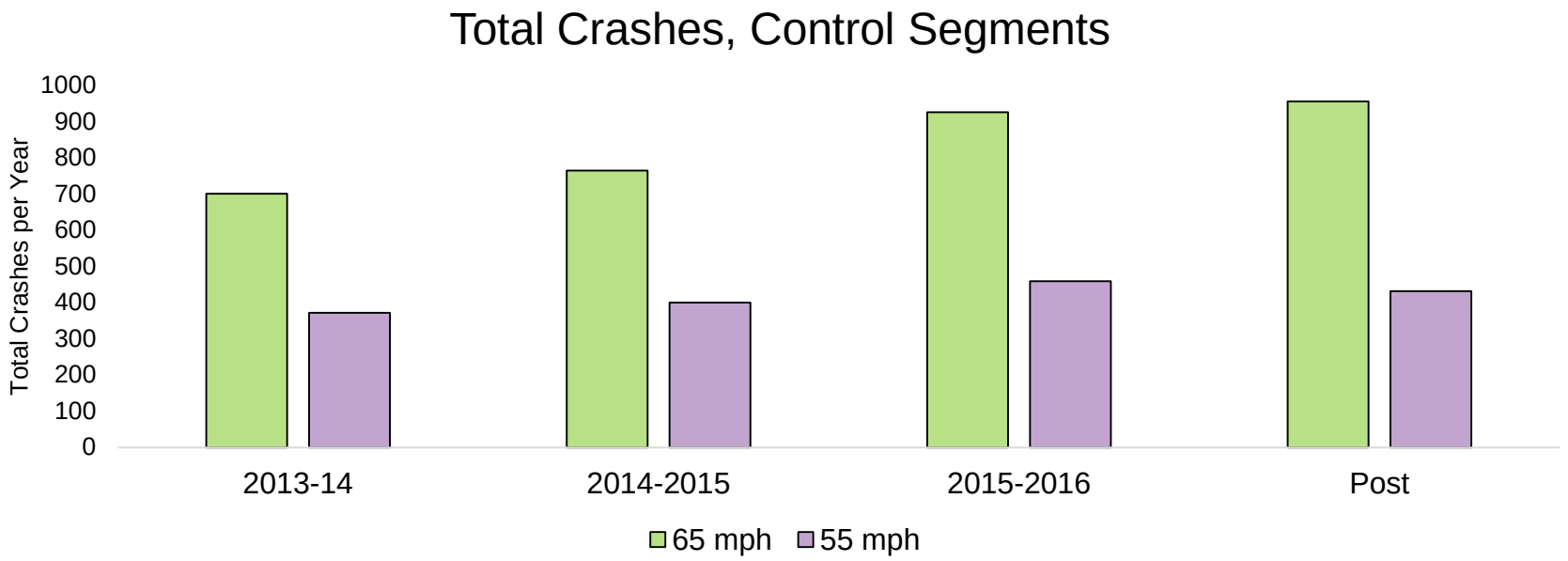
Crash Comparisons

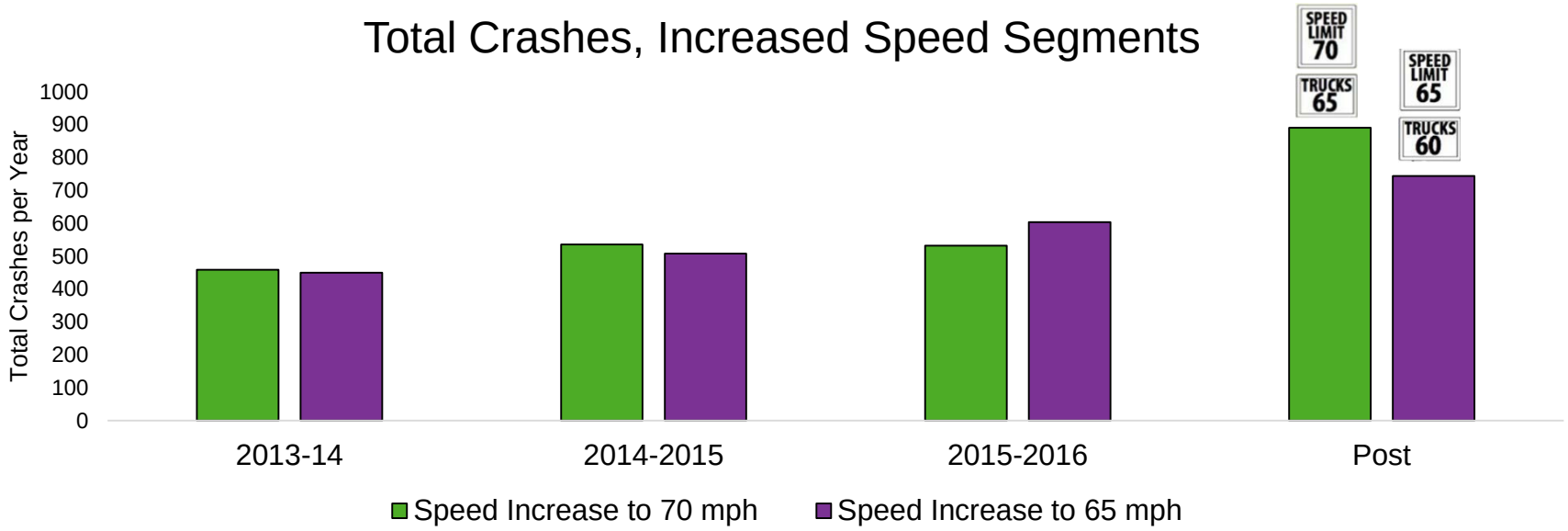
- Measures
  - All vehicle traffic volume
  - All vehicles: 1) Total crashes 2) Fatal + Injury A crashes
  - Truck-involved: 1) Total crashes 2) Fatal + Injury A crashes
  - *Proportions by Crash Types*

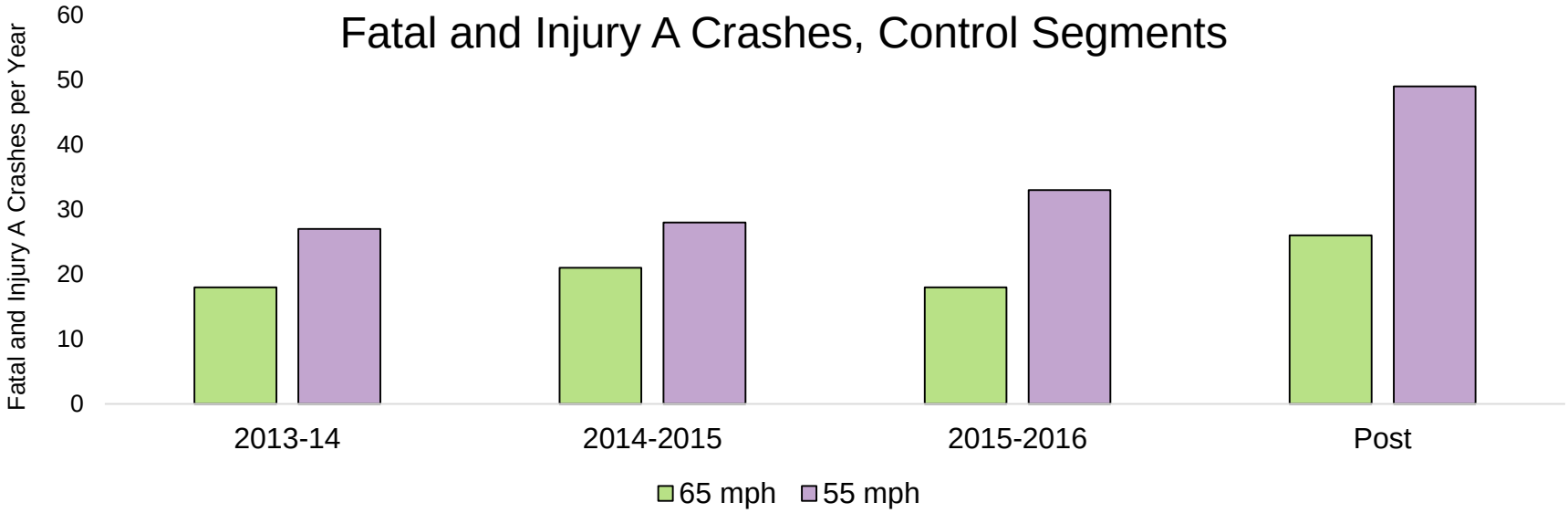
- Comparison Periods
  - Data from March 2013 to February 2017
  - Year is March to February
  - *March to October*

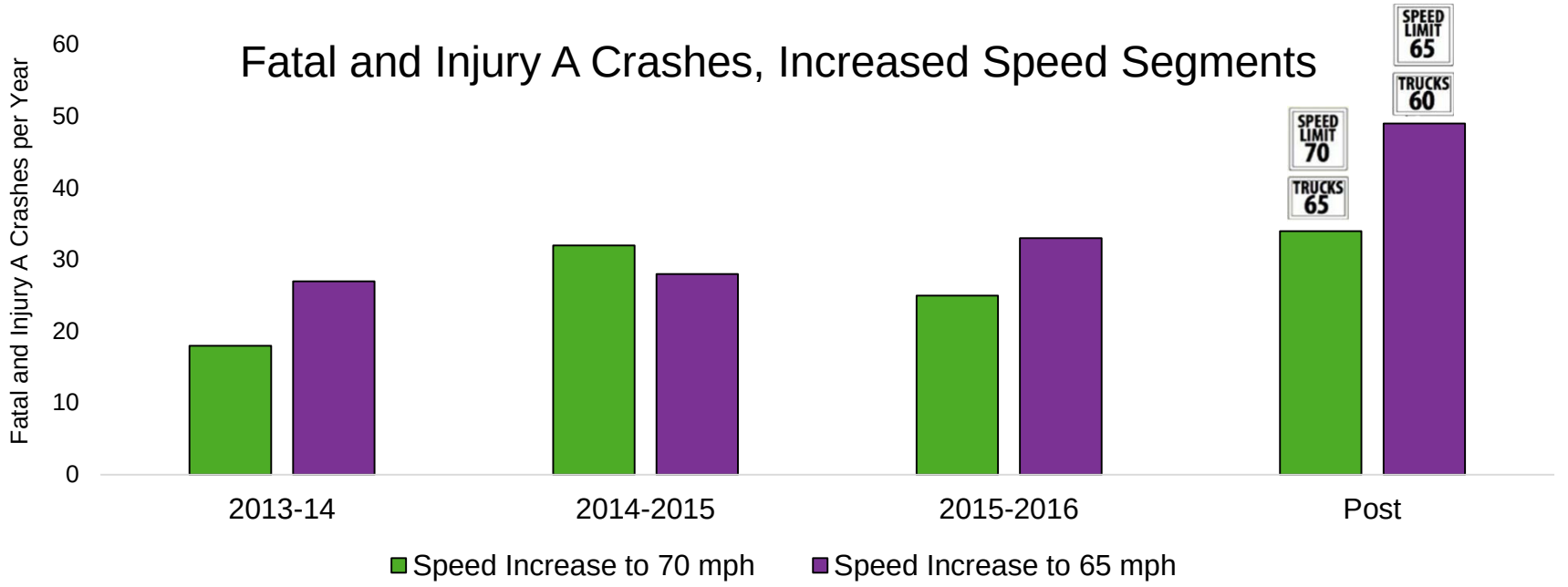
- Index (> 1.0 is increase in crashes)
  - Index = $\frac{Crashes\ in\ the\ post\ 1\ year\ period}{Average\ crashes\ per\ year\ in\ the\ 3\ year\ pre-period}$

  - also calculated index for 1 year prior, not shown in this PPT

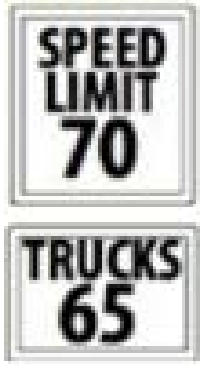

Total Crashes, Control Segments
Total Crashes per Year
1000
900
800
700
600
500
400
300
200
100
0
2013-14
2014-2015
2015-2016
Post
65 mph
55 mph

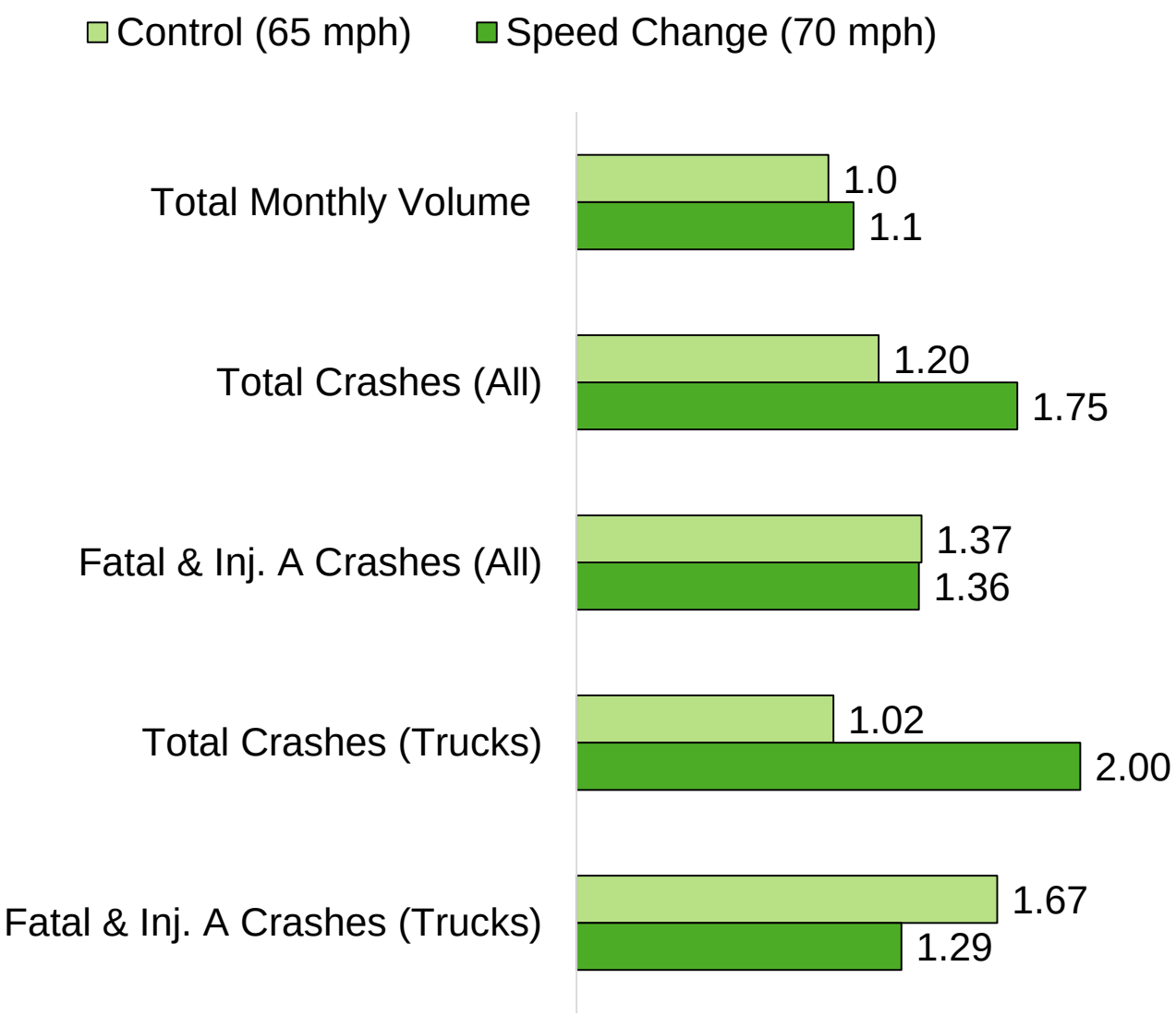

Total Crashes, Increased Speed Segments
Total Crashes per Year
1000
900
800
700
600
500
400
300
200
100
0
2013-14
2014-2015
2015-2016
Post
SPEED LIMIT 70
TRUCKS 65
SPEED LIMIT 65
TRUCKS 60
Speed Increase to 70 mph
Speed Increase to 65 mph


Fatal and Injury A Crashes, Control Segments
Fatal and Injury A Crashes per Year
60
50
40
30
20
10
0
2013-14
2014-2015
2015-2016
Post
65 mph
55 mph

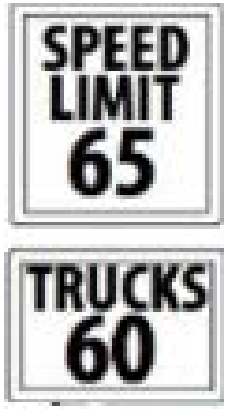

Fatal and Injury A Crashes, Increased Speed Segments
Fatal and Injury A Crashes per Year
60
50
40
30
20
10
0
SPEED LIMIT 65
TRUCKS 60
SPEED LIMIT 70
TRUCKS 65
2013-14
2014-2015
2015-2016
Post
Speed Increase to 70 mph
Speed Increase to 65 mph

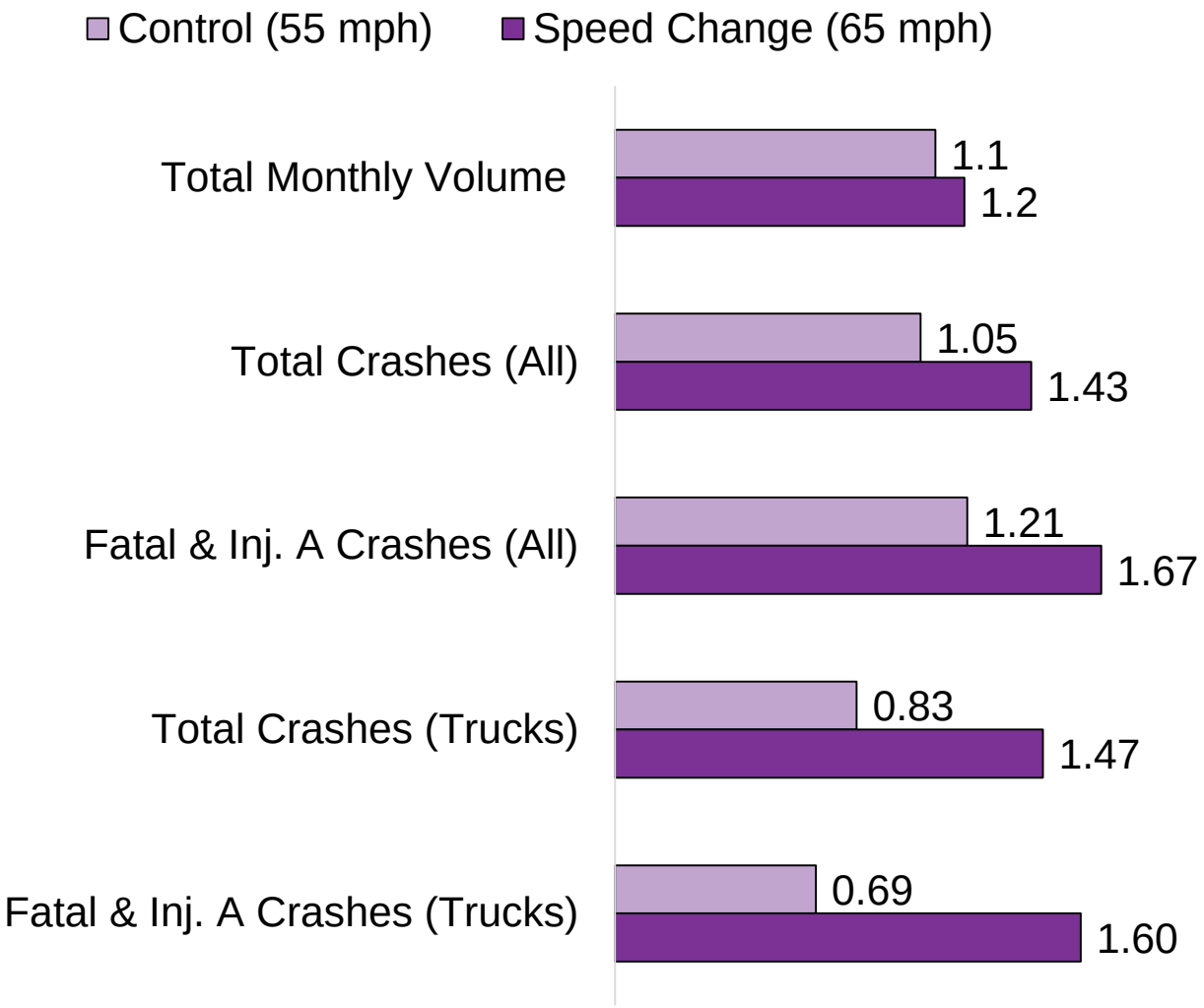
Changes in Crash and Volumes (Index)





Changes in Crash and Volumes (Index)





Preliminary Observations

- Speeds
  - ↑ Increase in average speeds (+ *3 mph*)
  - More vehicles traveling at higher speeds (i.e. >75 mph)
- Crashes – Speeds raised to 70 mph cars / 65 mph trucks
  - ↑ Increase in total crashes (~+*382 cr/yr*)
  - No apparent change in fatal and injury A crashes
  - ↑ Increase in truck-involved crashes (~+*140 cr/yr*)
  - A possible decrease in truck-involved fatal injury A crashes
- Crashes – Speeds raised to 65 mph cars / 60 mph trucks
  - ↑ Increase in total crashes (~+*223 cr/yr*)
  - ↑ Increase in fatal and injury A crashes (~+*20 cr/yr*)
  - ↑ Increase in truck-involved crashes (~+*37 cr/yr*)
  - ↑ Increase in truck-involved fatal and injury A crashes (~+*3 cr/yr*)

Limitations of Study

- Speed analysis
  - ATR speed data includes trucks and some ATRs have heavy truck volumes
  - ATR coverage is somewhat sparse for 2-lane segments in Eastern Oregon
  - Did not look at speed differences between cars/trucks

- Safety analysis is preliminary
  - Method is basic and is not statistically rigorous
  - Control highways not ideally matched
  - 2017 crash data is preliminary and subject to change
  - Post year includes Jan 2017 and Feb 2017 (winter weather conditions)

Questions

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Civil & Environmental Engineering

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