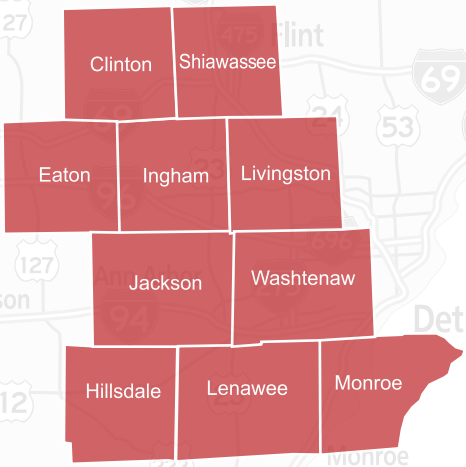
MDOT
Michigan Department of Transportation

2014 Congestion & Mobility Report

Chapter 8
UNIVERSITY REGION
SUMMARY



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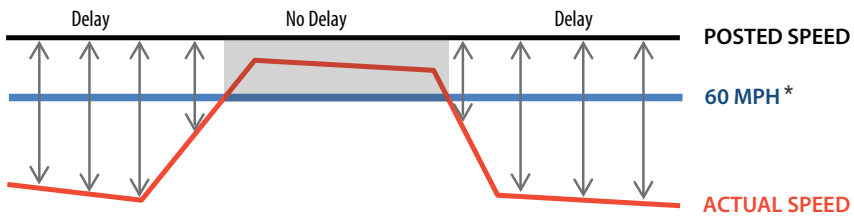
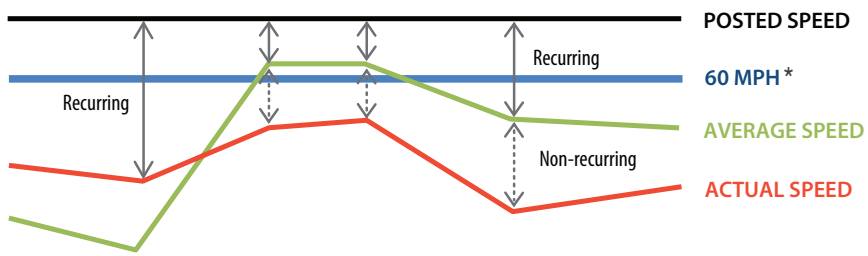
Performance Measures Definitions



Total delay > Delay is calculated by taking the difference between actual speeds when they fall below 60 mph and the posted speed limit for freeways posted at 70 mph. This is to take out the delay caused by the lower average speeds from commercial vehicles.

Total delay per mile > Delay per mile is calculated by taking the total delay and dividing it by the length of the freeway. This was performed for each route in each county.

Non-recurring/recurring delay > Non-recurring delay is calculated by taking the difference between the actual speed (any time the speed falls below 60 mph) and the average speed. Recurring is measured by taking the difference of the total delay and non-recurring delay.



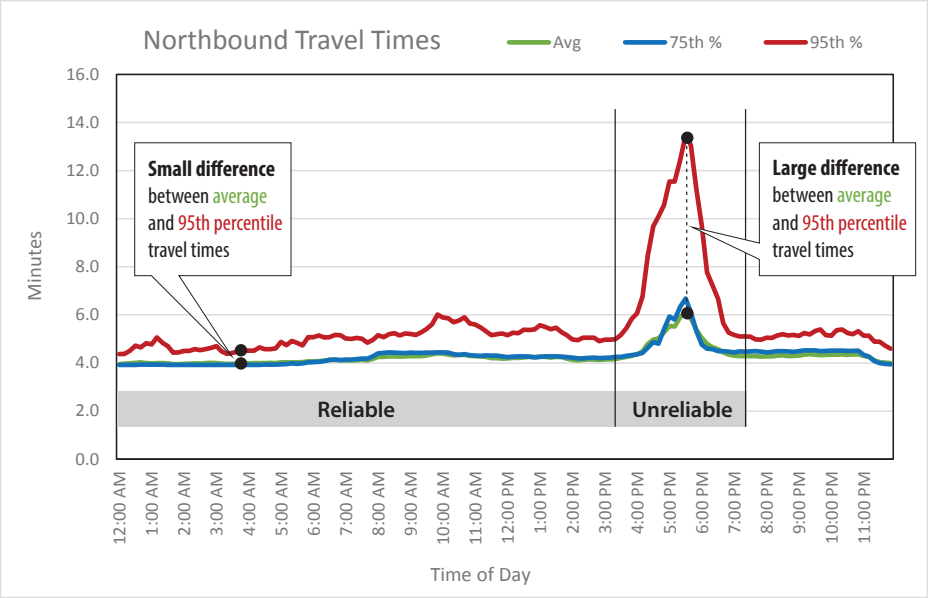
User Delay Cost > User Delay Costs (UDC) is calculated by multiplying delay x hourly volume per hourly user cost. Delay is calculated by taking the difference between actual speeds when they fall below 60 mph and the posted speed limit. Hourly volumes are derived from Average Daily Traffic (ADT) and Commercial Average Daily Traffic (CADT). Hourly user costs are based on Federal Highway Administration (FHWA) publication number FHWA-SA-98-079, "Life-Cycle Cost Analysis in Pavement Design."

Congestion > Congestion is calculated as the number of hours below 45 mph per Traffic Message Channel (TMC). A TMC is a standard for delivering real-time traffic information. They vary from tenths of a mile long to several miles long.

Weighted Congestion > Number of congestion hours multiplied by the segment length. Congestion along longer segments will get more consideration than congestion along shorter segments.

*** On segments with a speed limit of 55 mph, delay is calculated when speeds fall below 55 mph.**

Performance Measures Definitions



Travel Time Reliability > A measure of travel time consistency over a period of time. When travel times are unreliable, customers are more likely to experience unexpected delays. Travel times are shown to be reliable when the 95th percentile travel time remains close to the average travel time.

75th Percentile Travel Time > The amount of time a customer should budget to be on-time three out of four days (75% of the time).

95th Percentile Travel Time > The amount of time a customer should budget to be on-time nineteen out of twenty days (95% of the time). The 95th percentile travel time is also known as the planning time.

Figure 1. 2014 University Region user delay cost per mile

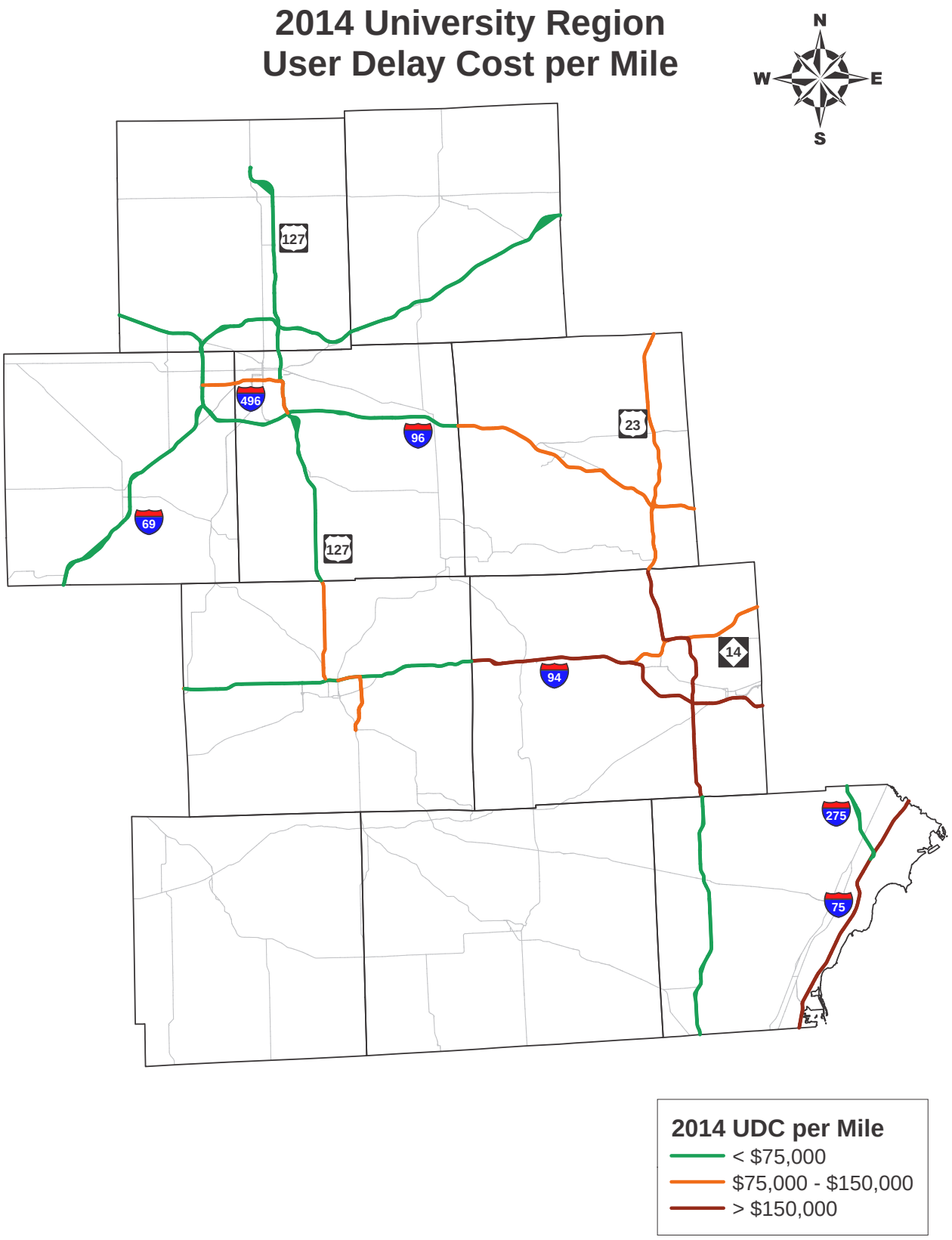


Figure 2. 2014 University Region congestion hours northbound/eastbound

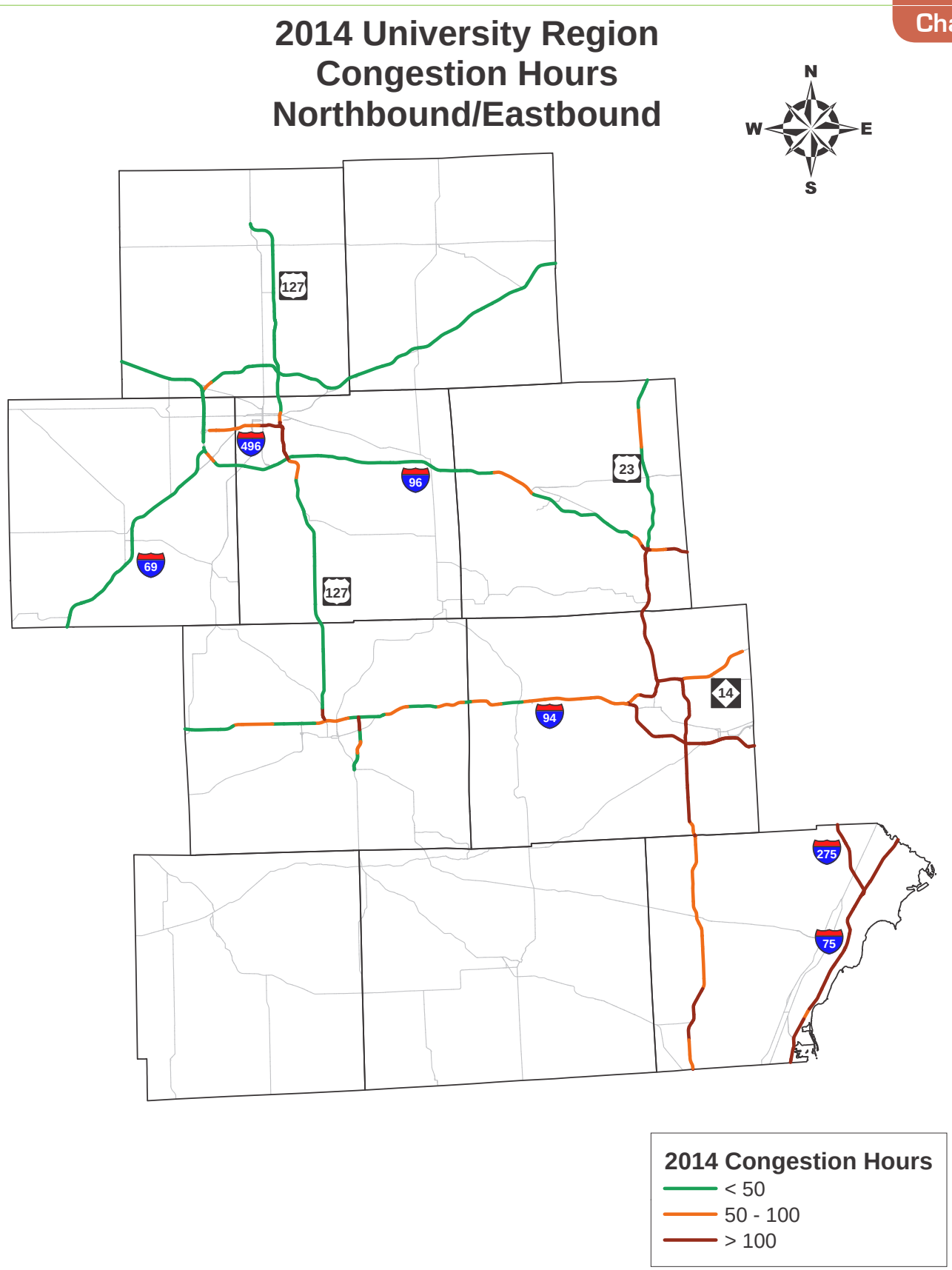


Figure 3. 2014 University Region congestion hours southbound/westbound

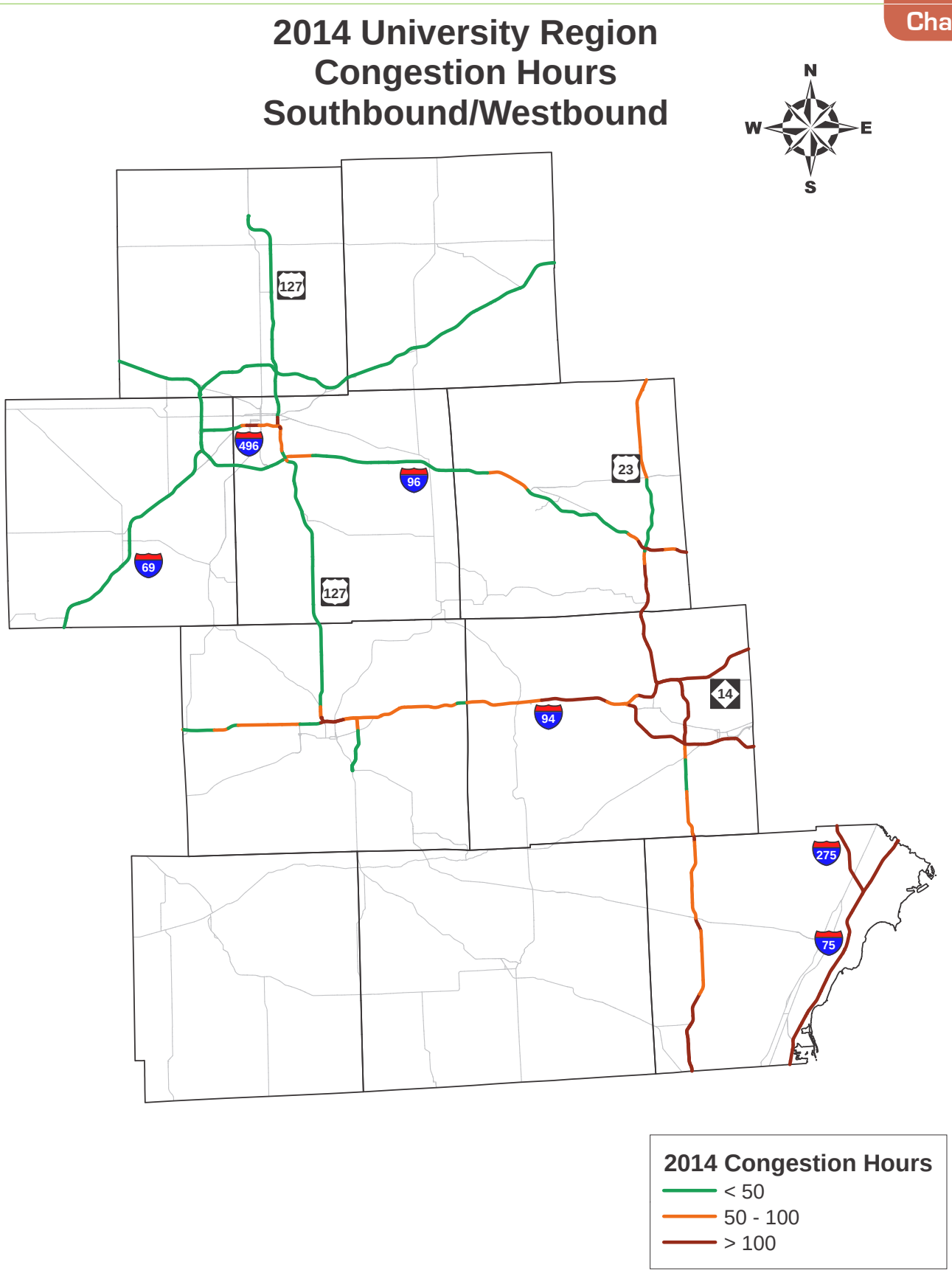


Figure 4. Ranked UDC by location

	2012-2013 Average	
Rank	UDC Per Mile	Location (Route, County)
1	$268,016	US-23 Washtenaw Co.
2	$180,538	I-94 Washtenaw Co.
3	$156,676	I-496 Eaton/Ingham Co. (Excludes US-127)
4	$146,816	M-14 Washtenaw Co. (Excludes US-23 portion)
5	$112,491	I-75 Monroe Co.
6	$112,081	US-23 Livingston Co.
7	$85,812	I-96 Livingston Co.
8	$77,726	US-23 Monroe Co.
9	$75,883	I-94 Jackson Co.
10	$68,261	US-127 Ingham Co.
11	$59,053	US-127 Jackson Co. (Excludes I-94 portion)
12	$46,152	I-96 Ingham Co.
13	$43,187	I-69 Eaton Co. (Excludes I-96 portion)
14	$42,399	I-96 Clinton/Eaton Co.
15	$38,385	I-275 Monroe Co.
16	$25,767	I-69 Clinton Co.
17	$23,708	I-69 Shiawassee Co.
18	$18,794	US-127 Clinton Co. (70mph section)

	2014	
Rank	UDC Per Mile	Location (Route, County)
1	$318,177	US-23 Washtenaw Co.
2	$247,347	I-94 Washtenaw Co.
3	$158,069	I-75 Monroe Co.
4	$131,232	US-23 Livingston Co.
5	$129,100	I-496 Eaton/Ingham Co. (Excludes US-127)
6	$121,255	M-14 Washtenaw Co. (Excludes US-23 portion)
7	$95,561	I-96 Livingston Co.
8	$75,372	US-127 Jackson Co. (Excludes I-94 portion)
9	$73,948	I-94 Jackson Co.
10	$64,636	US-127 Ingham Co.
11	$61,195	I-275 Monroe Co.
12	$57,045	US-23 Monroe Co.
13	$49,341	I-96 Ingham Co.
14	$44,945	I-96 Clinton/Eaton Co.
15	$44,556	I-69 Eaton Co. (Excludes I-96 portion)
16	$28,520	I-69 Clinton Co.
17	$22,047	I-69 Shiawassee Co.
18	$12,724	US-127 Clinton Co. (70mph section)

	2012-2013 Average	
Rank	Total UDC	Location (Route, County)
1	$14,740,860	US-23 Washtenaw Co.
2	$11,734,955	I-94 Washtenaw Co.
3	$6,074,538	I-75 Monroe Co.
4	$5,604,065	US-23 Livingston Co.
5	$5,084,165	I-94 Jackson Co.
6	$4,991,755	M-14 Washtenaw Co. (Excludes US-23 portion)
7	$4,805,459	I-96 Livingston Co.
8	$3,964,045	US-23 Monroe Co.
9	$3,735,252	US-127 Ingham Co.
10	$3,290,197	I-496 Eaton/Ingham Co. (Excludes US-127)
11	$2,446,077	I-96 Ingham Co.
12	$2,288,922	I-69 Eaton Co. (Excludes I-96 portion)
13	$1,948,734	US-127 Jackson Co. (Excludes I-94 portion)
14	$1,738,344	I-96 Clinton/Eaton Co.
15	$1,209,118	I-69 Shiawassee Co.
16	$953,374	I-69 Clinton Co.
17	$806,075	I-275 Monroe Co.
18	$789,343	US-127 Clinton Co. (70mph section)
Total =	$76,205,280	

	2014	
Rank	Total UDC	Location (Route, County)
1	$17,499,755	US-23 Washtenaw Co.
2	$16,077,558	I-94 Washtenaw Co.
3	$8,535,749	I-75 Monroe Co.
4	$6,561,614	US-23 Livingston Co.
5	$5,351,440	I-96 Livingston Co.
6	$4,954,532	I-94 Jackson Co.
7	$4,122,660	M-14 Washtenaw Co. (Excludes US-23 portion)
8	$3,536,895	US-127 Ingham Co.
9	$2,909,280	US-23 Monroe Co.
10	$2,711,106	I-496 Eaton/Ingham Co. (Excludes US-127)
11	$2,615,076	I-96 Ingham Co.
12	$2,487,271	US-127 Jackson Co. (Excludes I-94 portion)
13	$2,361,473	I-69 Eaton Co. (Excludes I-96 portion)
14	$1,842,756	I-96 Clinton/Eaton Co.
15	$1,285,089	I-275 Monroe Co.
16	$1,124,372	I-69 Shiawassee Co.
17	$1,055,249	I-69 Clinton Co.
18	$534,409	US-127 Clinton Co. (70mph section)
Total =	$85,566,284	

Chapter 8

Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

Interstate 75: Monroe

Interstate 94: Jackson and Washtenaw

Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

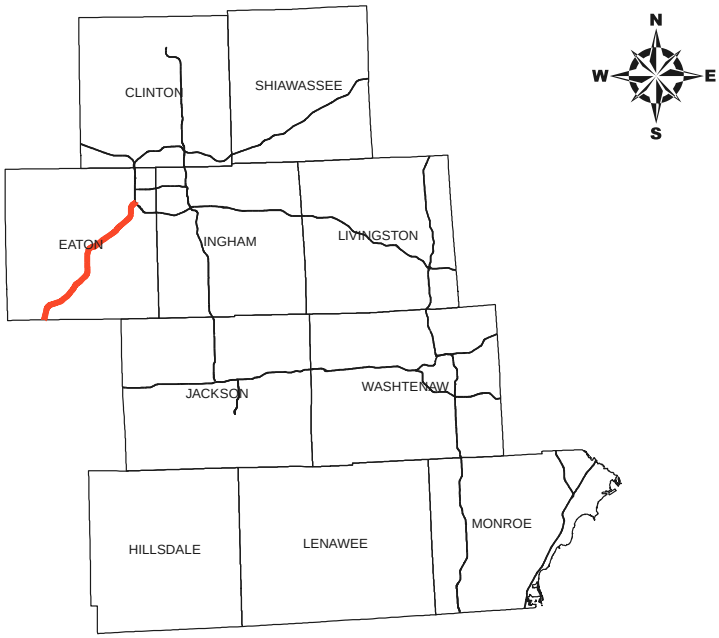
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 5. Eaton County I-69 Corridor total user delay cost



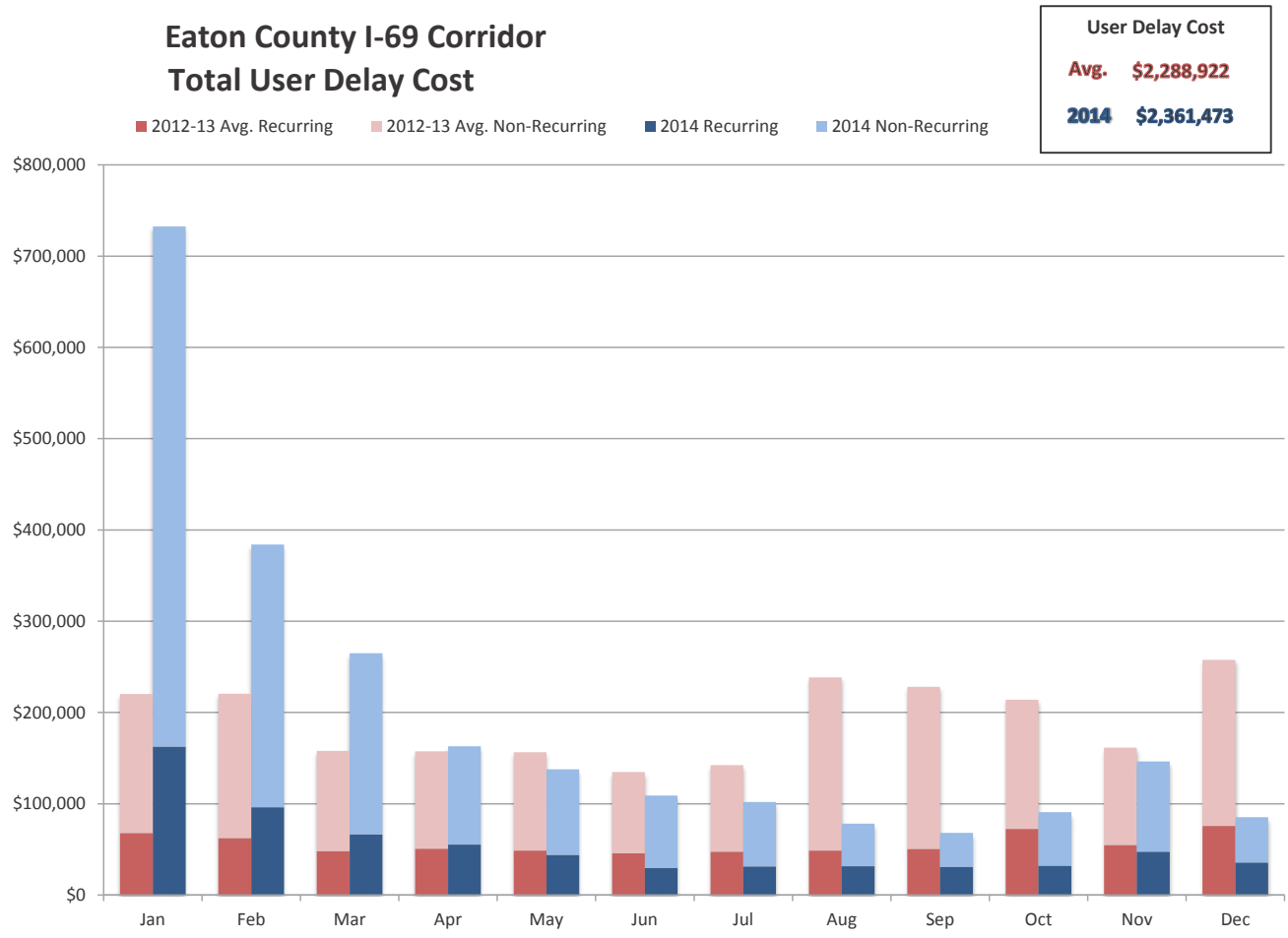
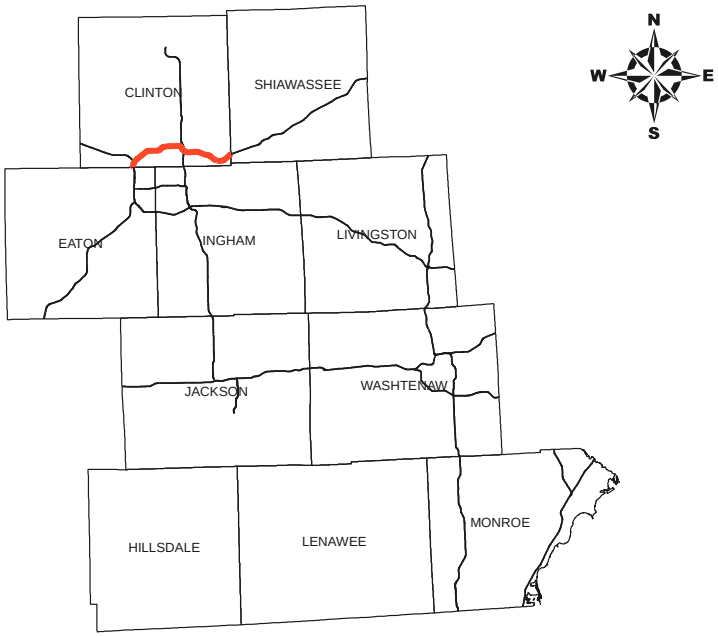


Figure 6. Clinton County I-69 Corridor total user delay cost



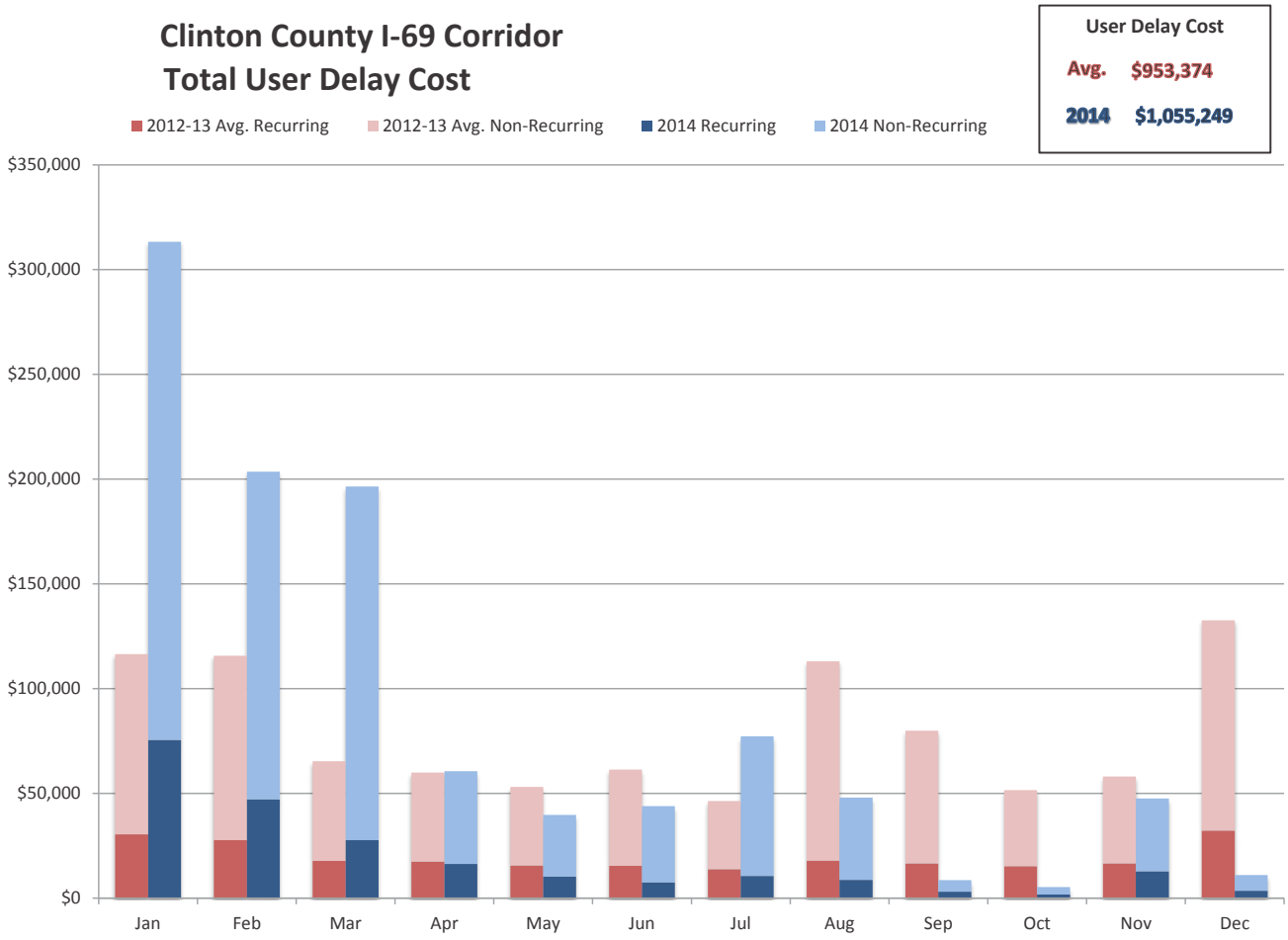
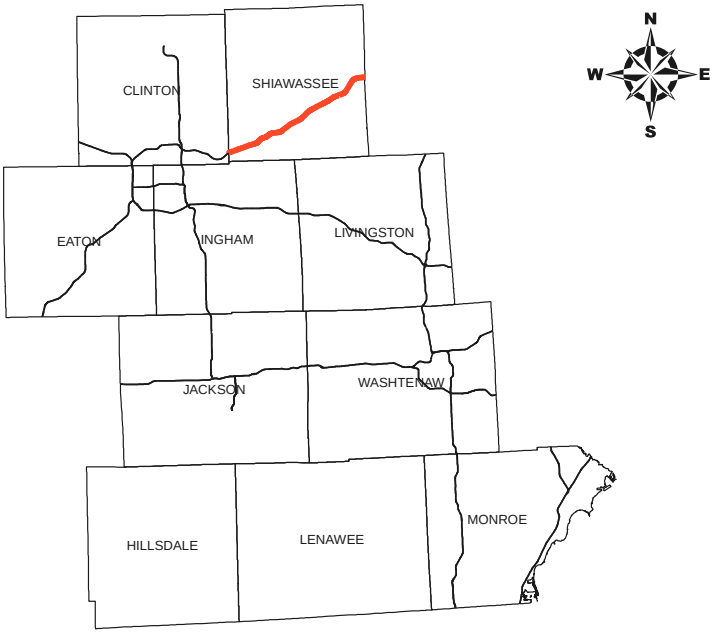


Figure 7. Shiawassee County I-69 Corridor total user delay cost



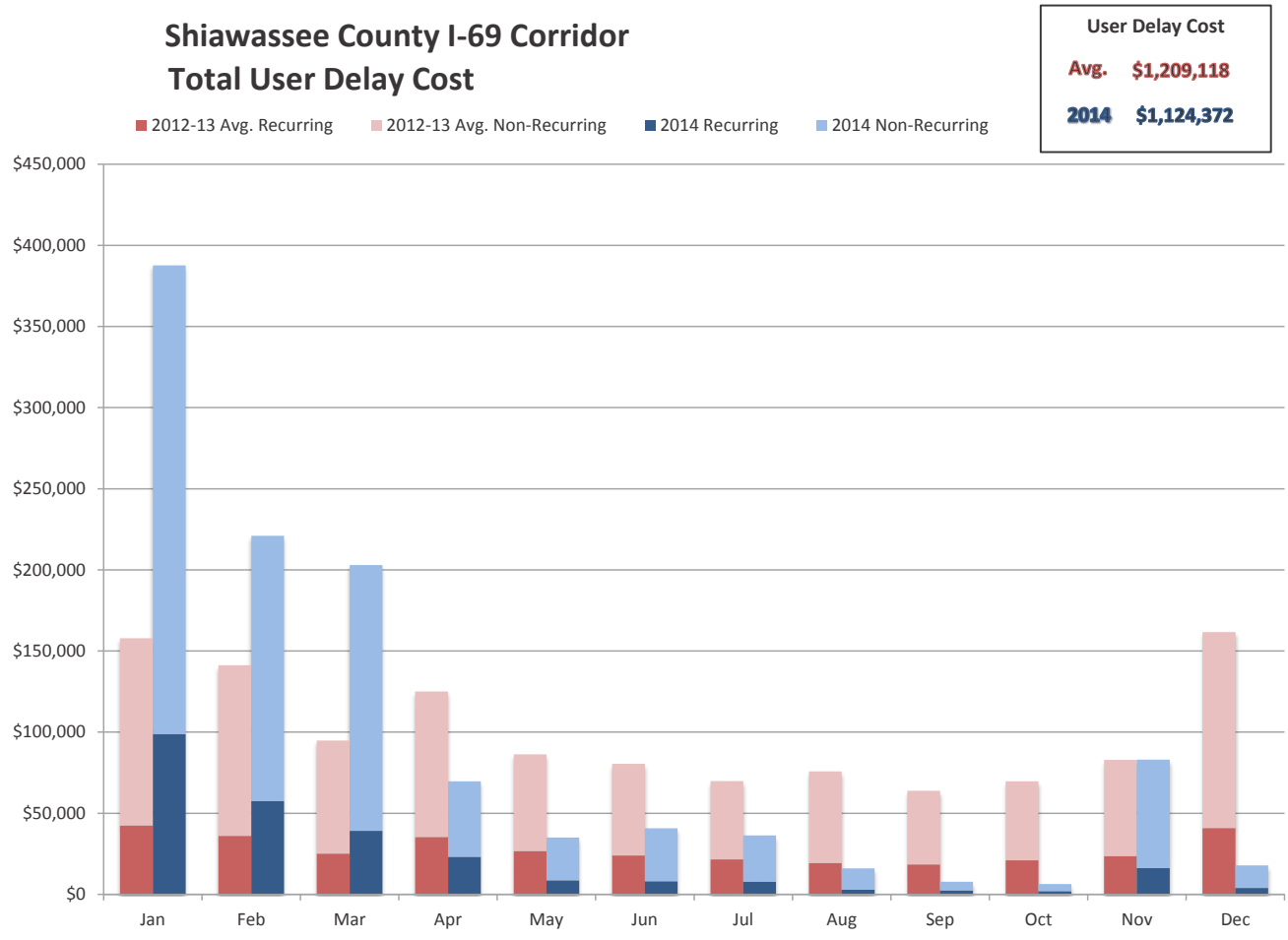


Figure 8. University Region I-69 northeastbound

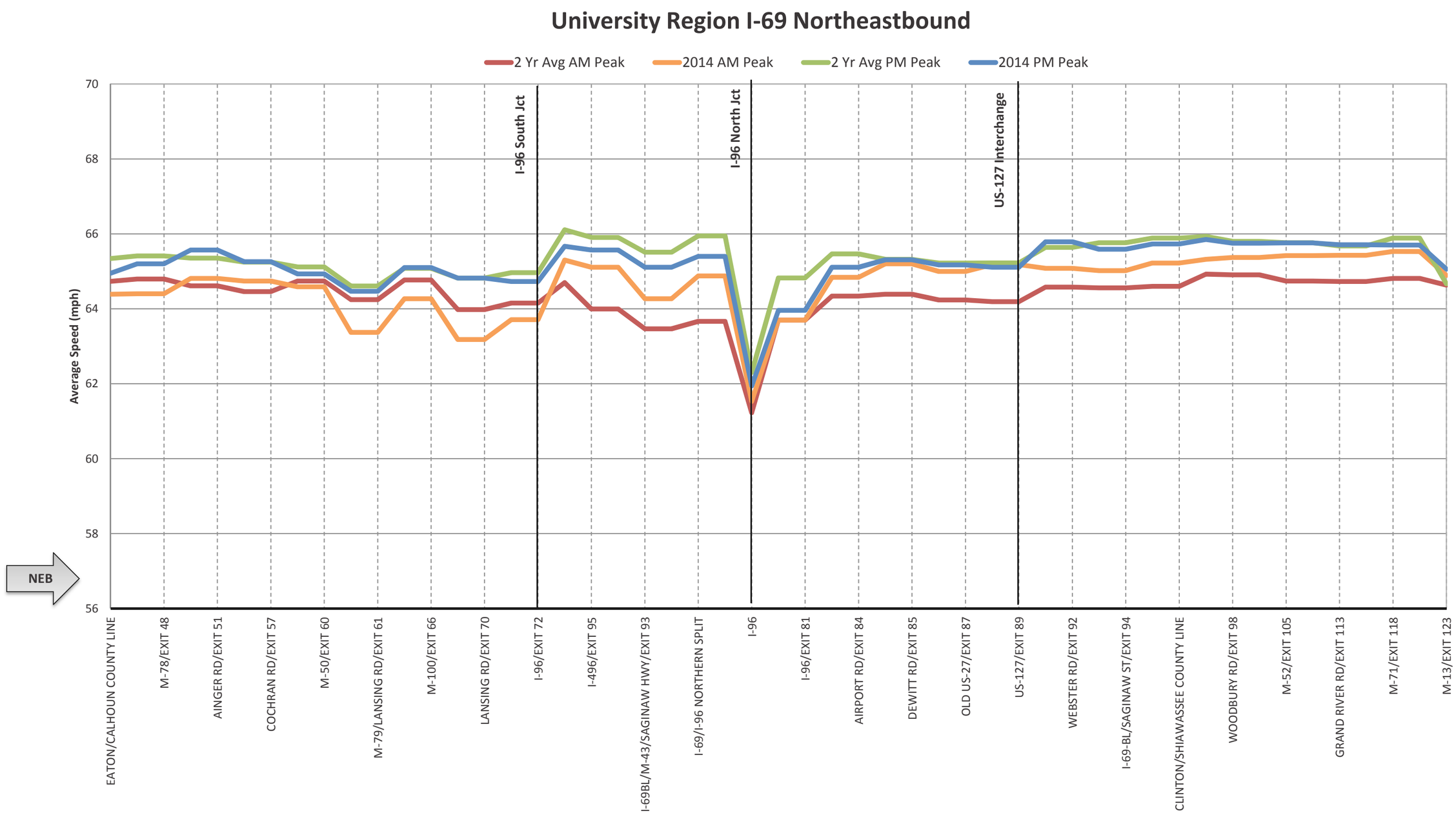
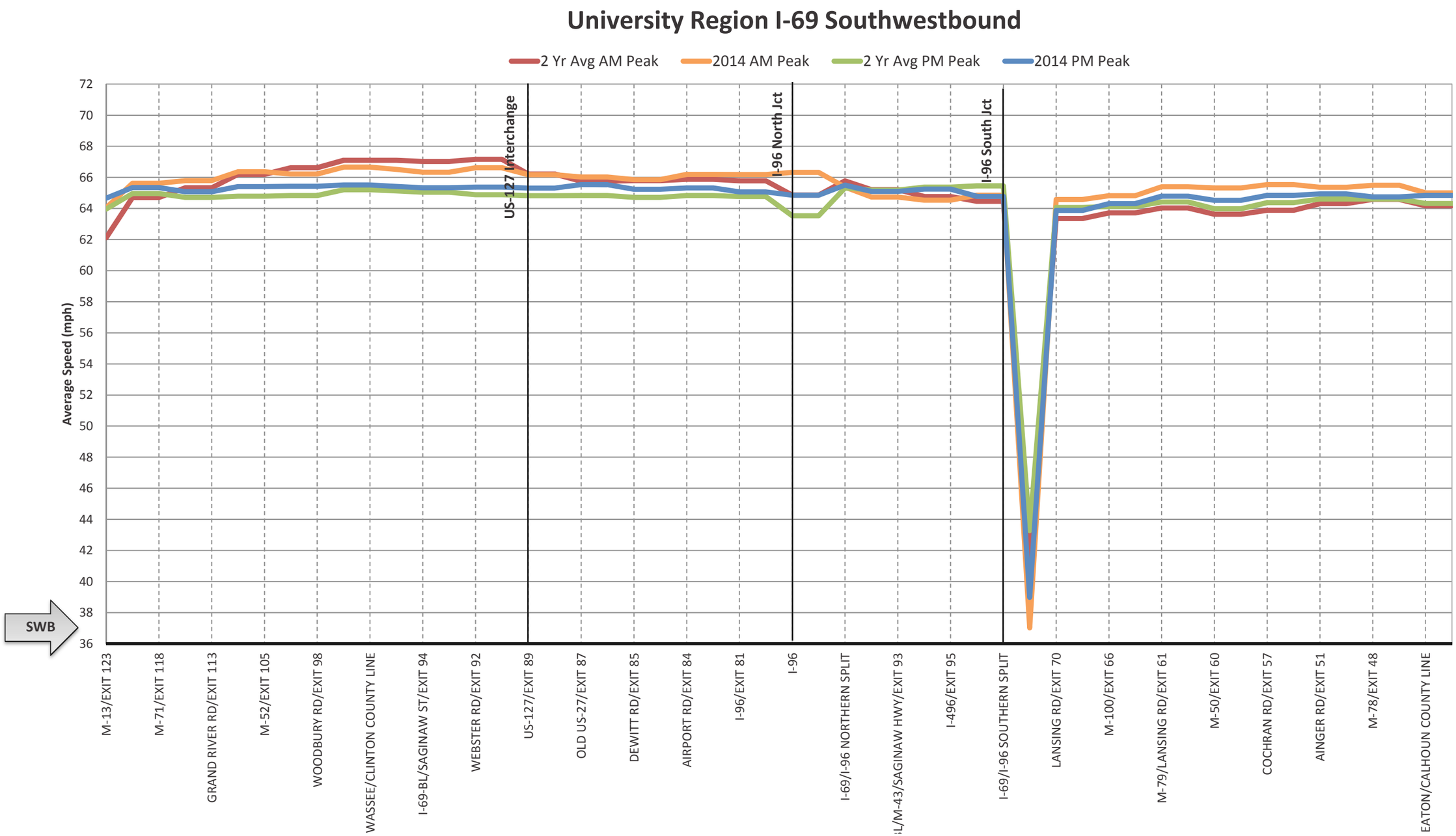


Figure 9. University Region I-69 southwestbound



Chapter 8

Travel Time Reliability

Figure 10. Travel time reliability I-69

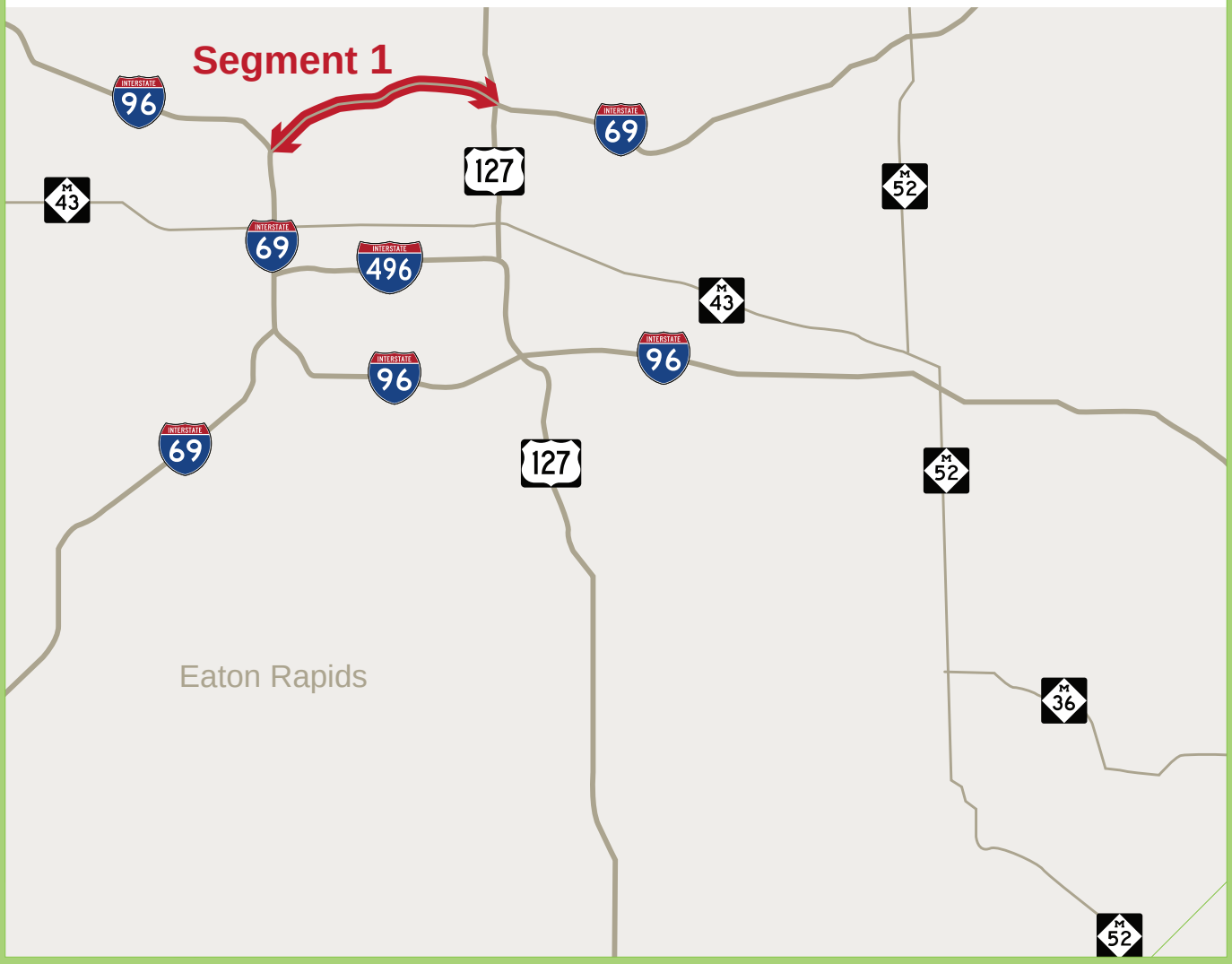
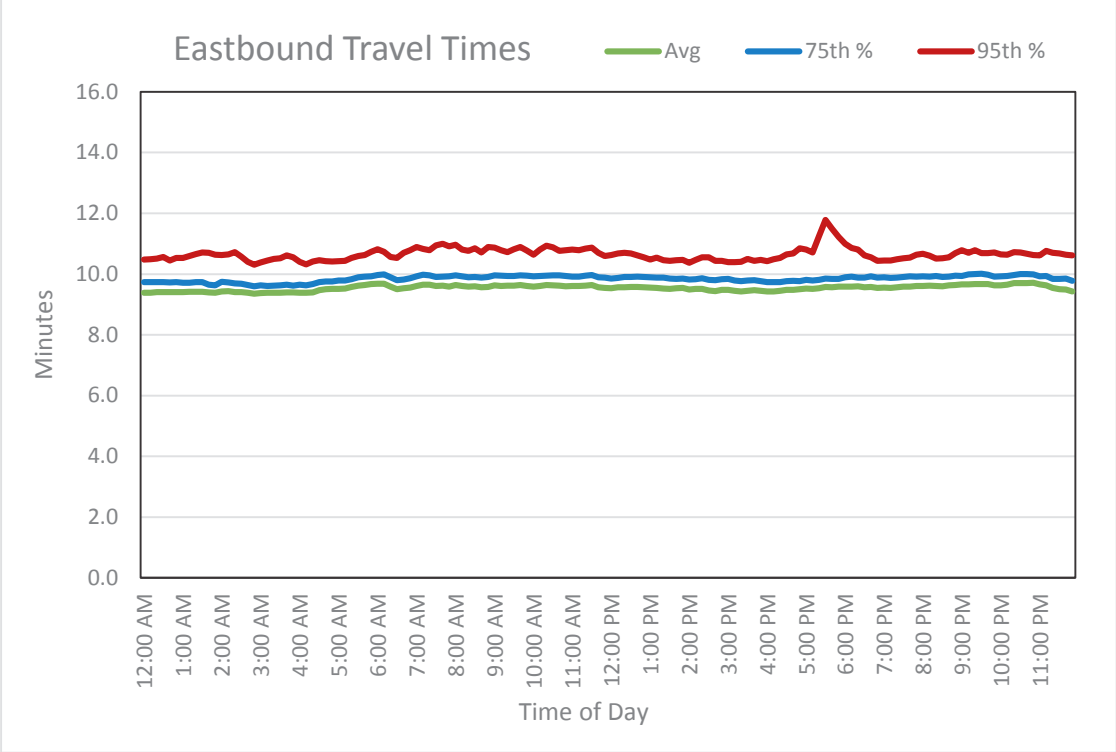
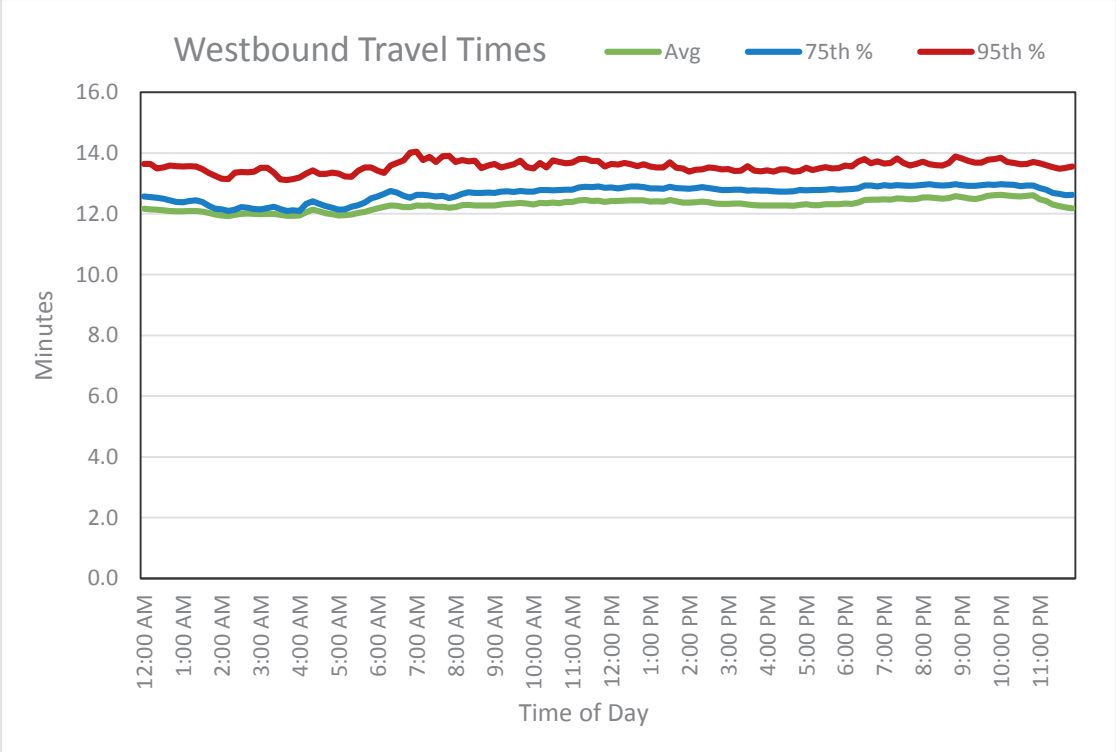


Figure 11. Segment 1- I-69 between US-127 and I-96

Segment 1

Travel time (minutes) for I-69 between US-127/Exit 89 and I-96





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Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

Interstate 75: Monroe

Interstate 94: Jackson and Washtenaw

Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

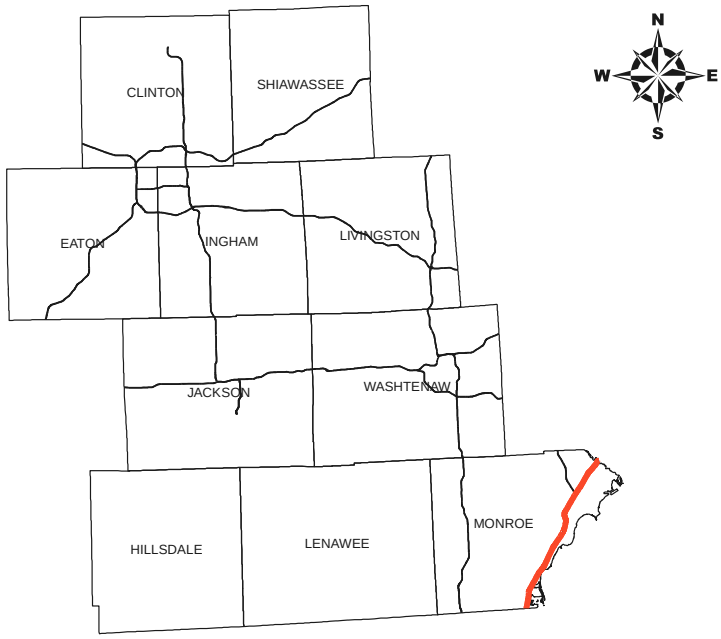
Interstate 496: Eaton and Ingham

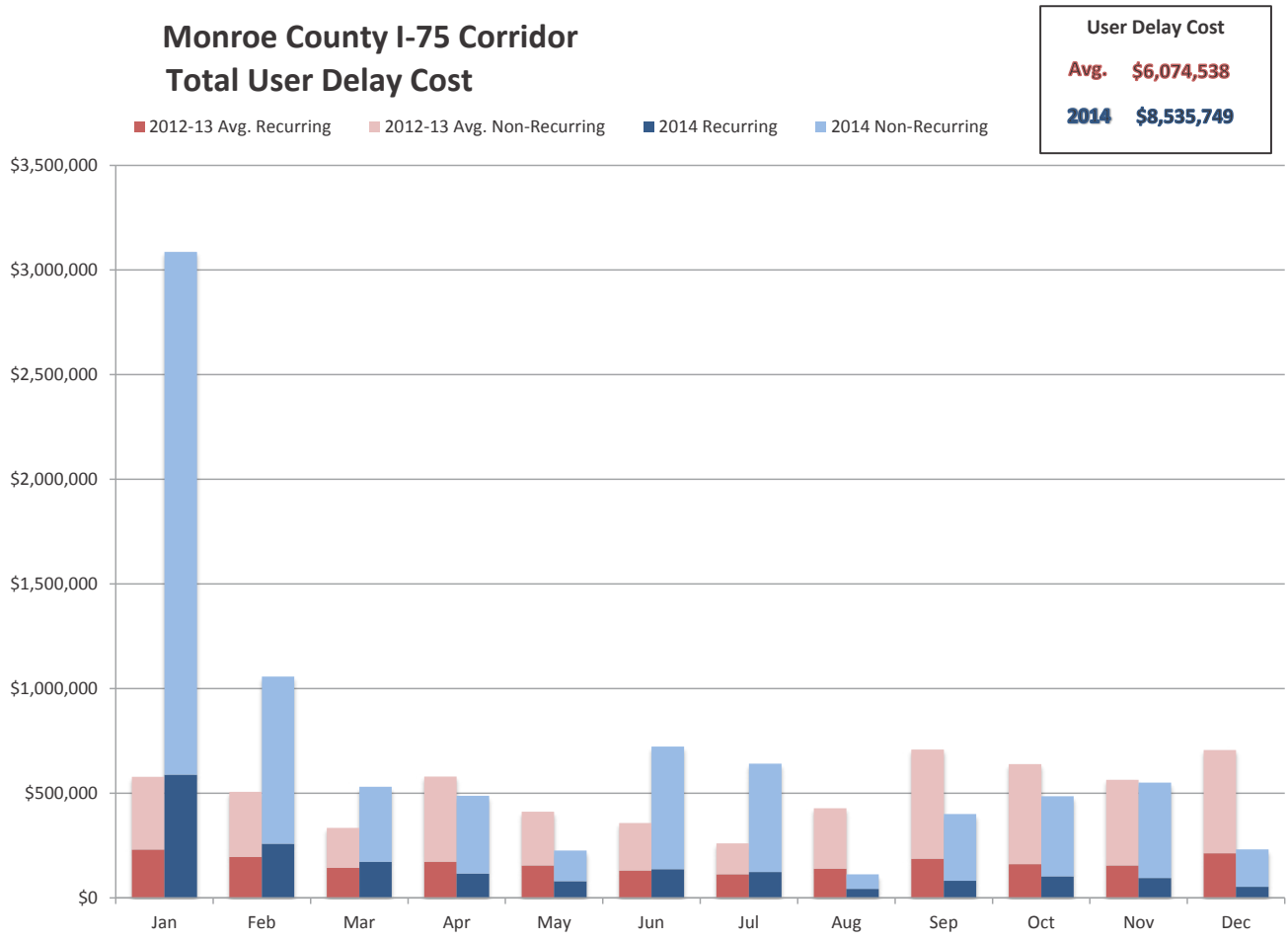
Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 12. Monroe County I-75 Corridor total user delay cost





Ch8_Figure 13. University Region I-75 northbound

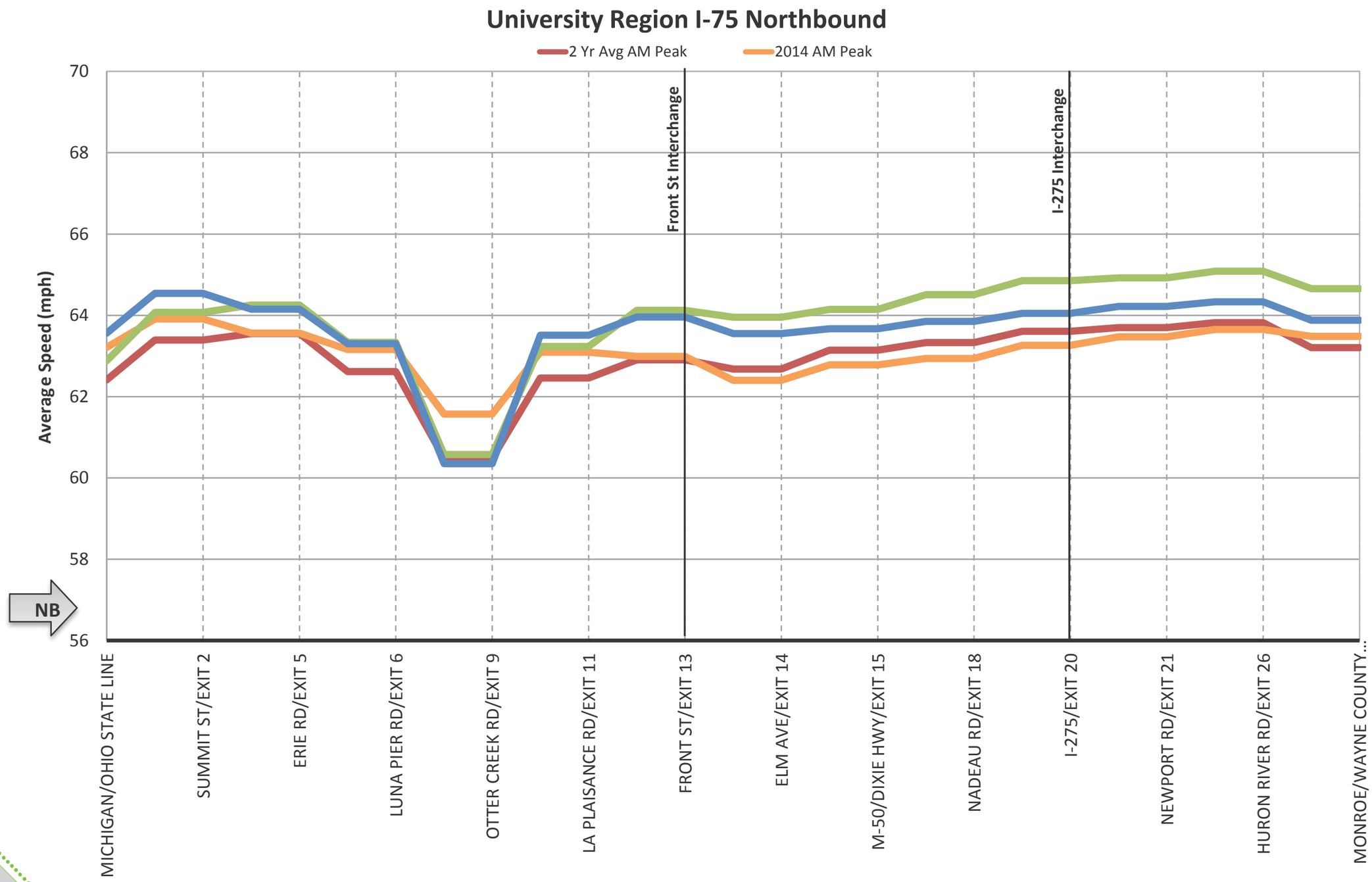
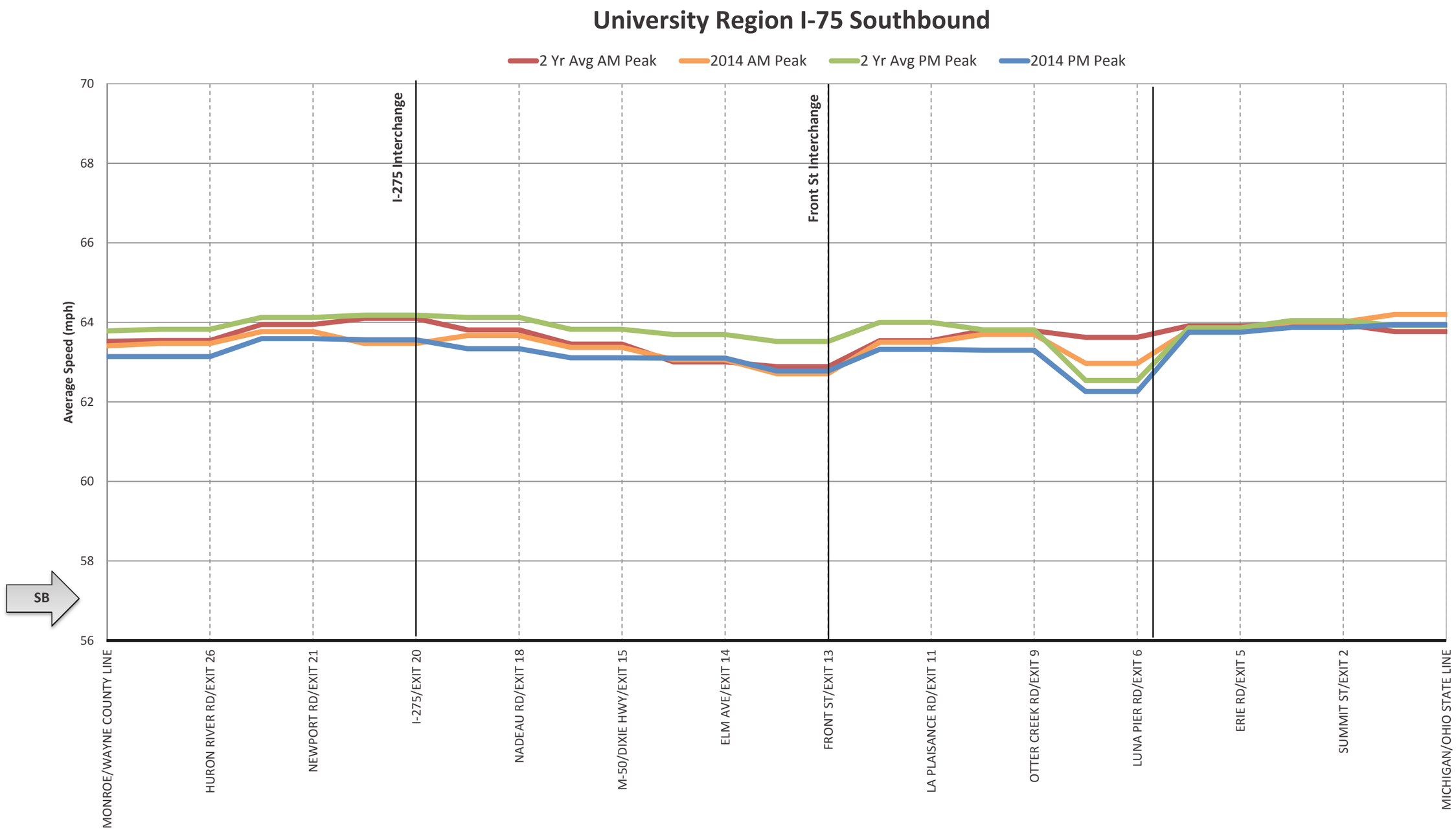


Figure 14. University Region I-75 southbound



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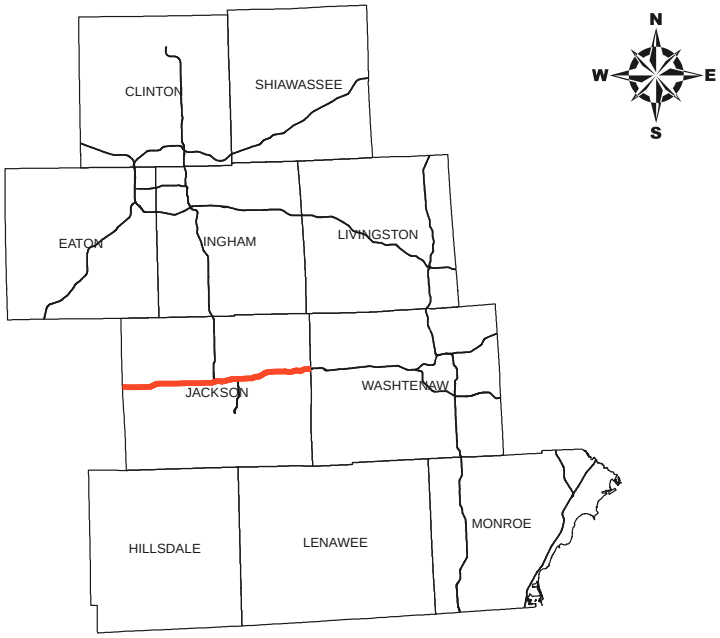
US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 15. Jackson County I-94 Corridor total user delay cost



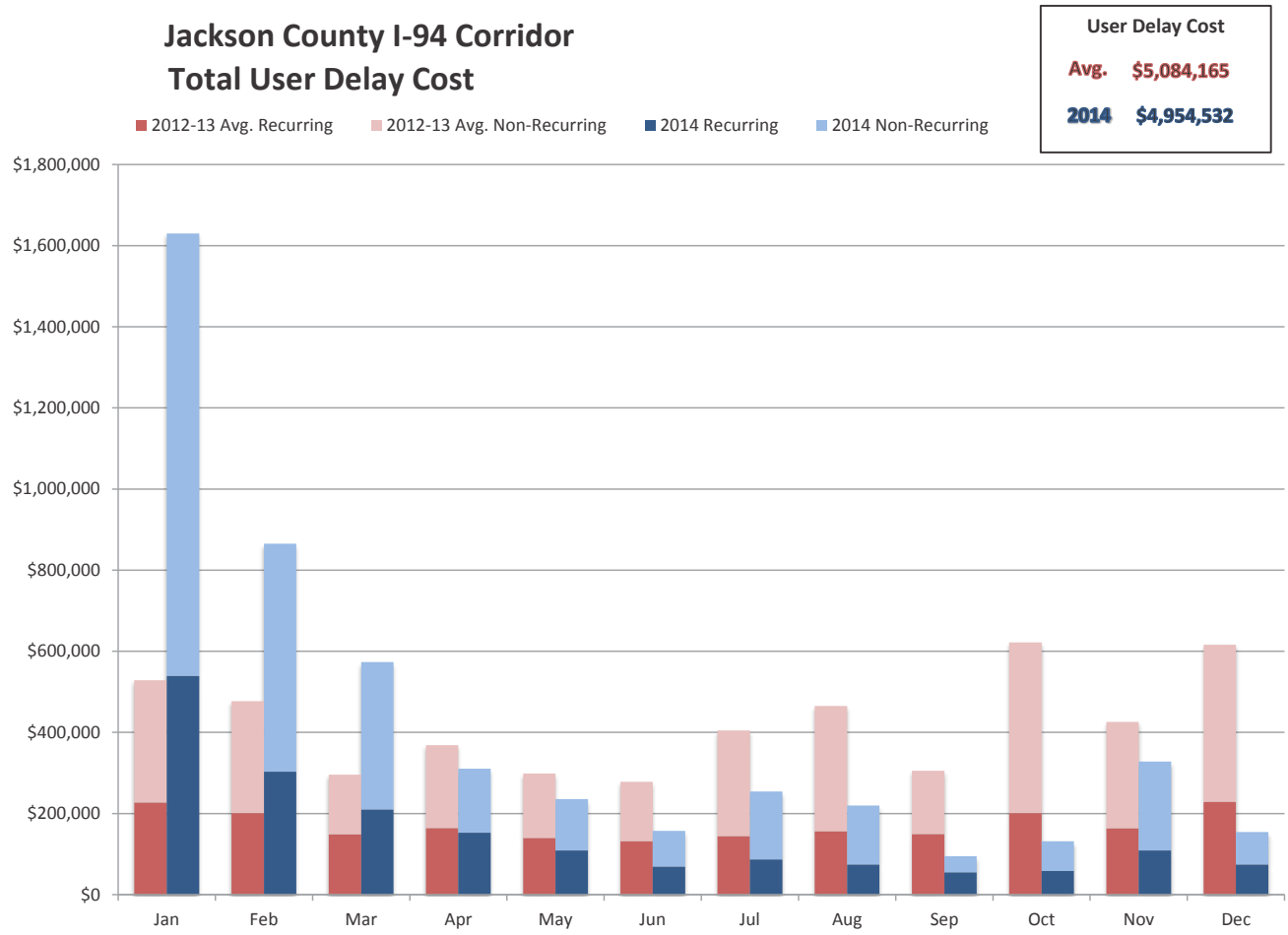
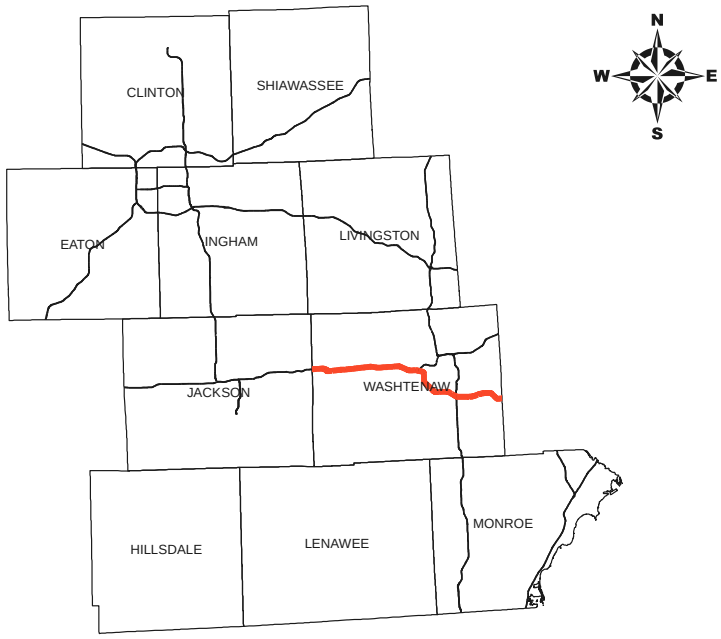


Figure 16. Washtenaw County I-94 Corridor total user delay cost



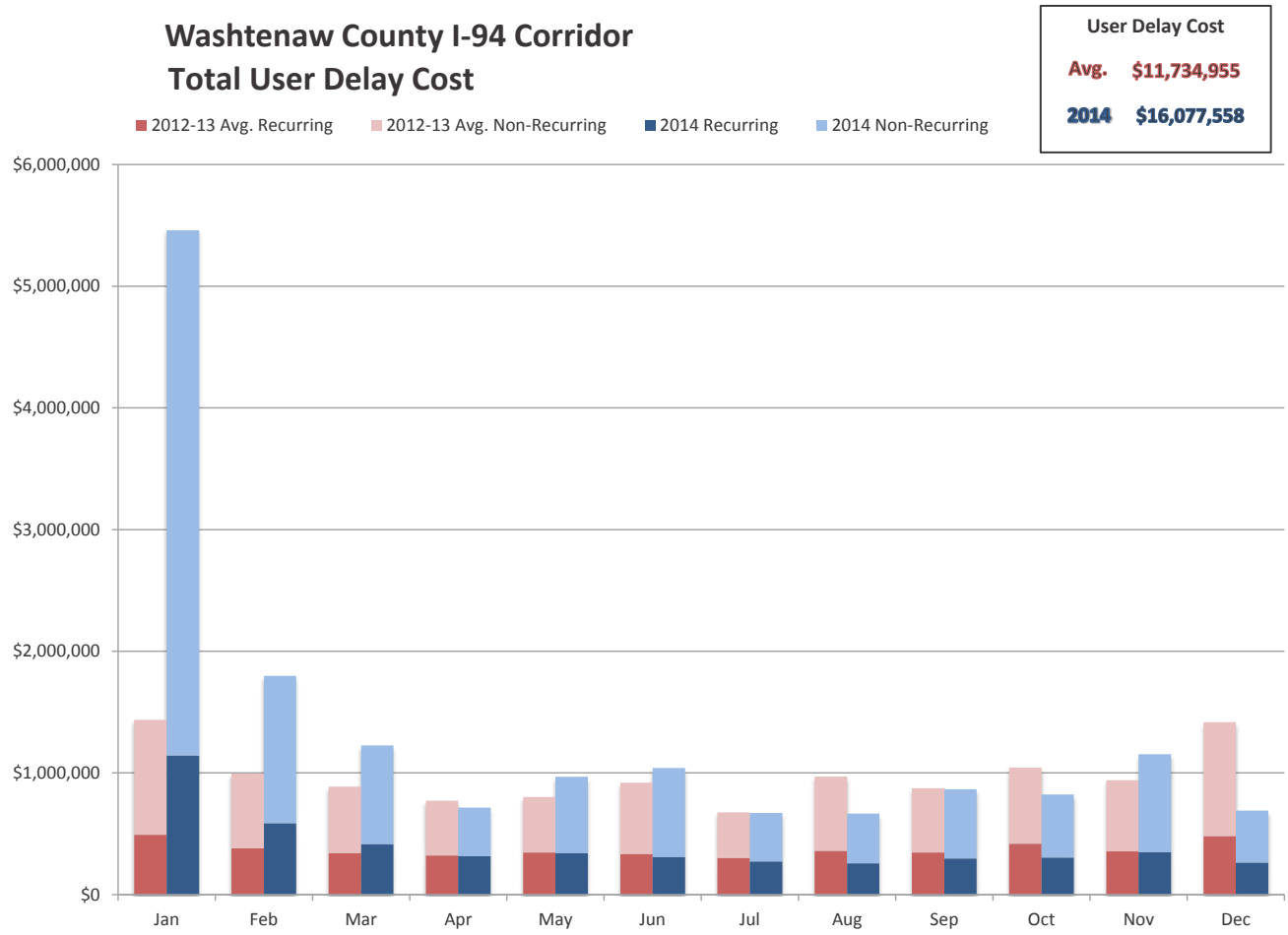


Figure 17. University Region I-94 eastbound

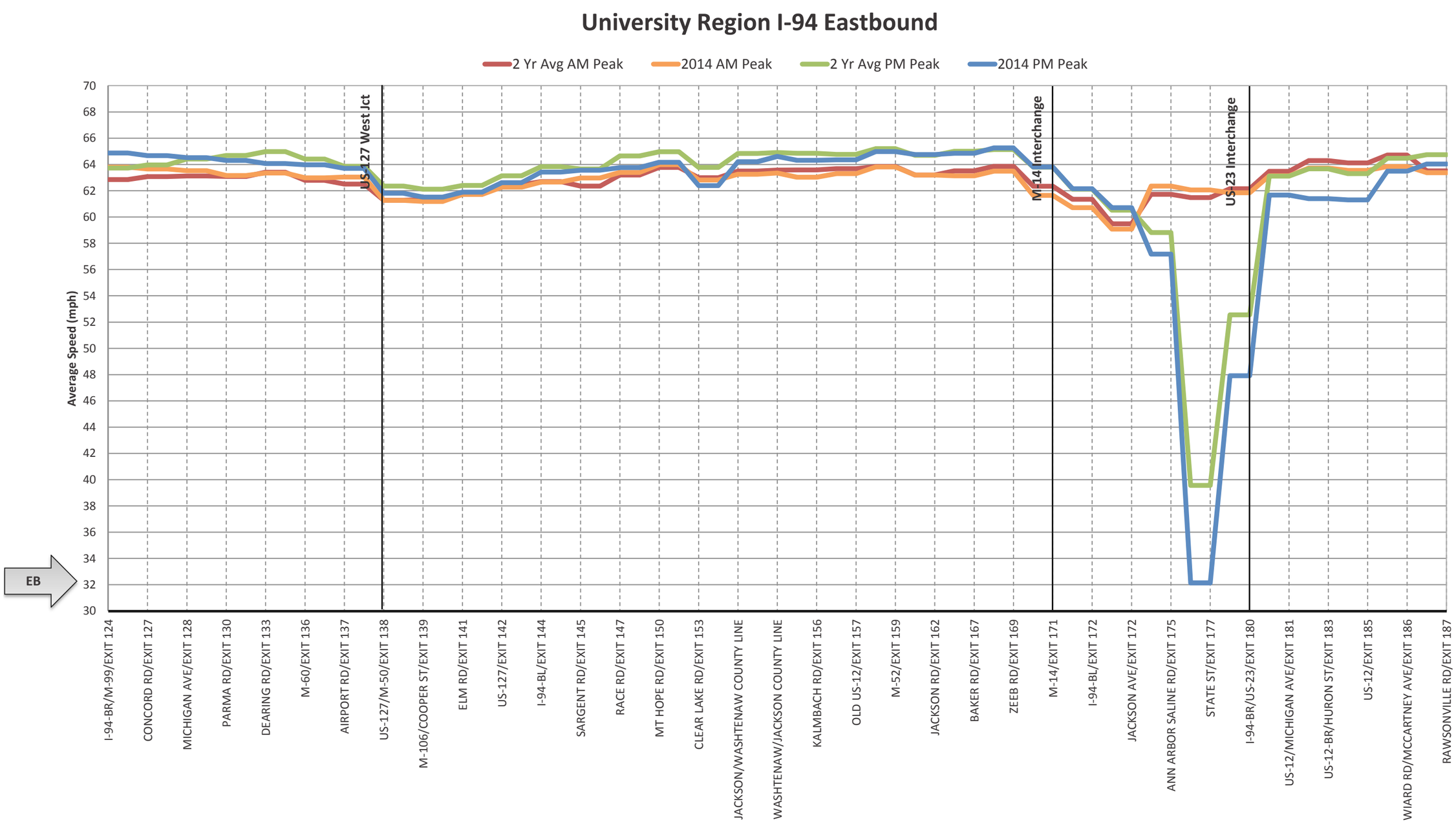
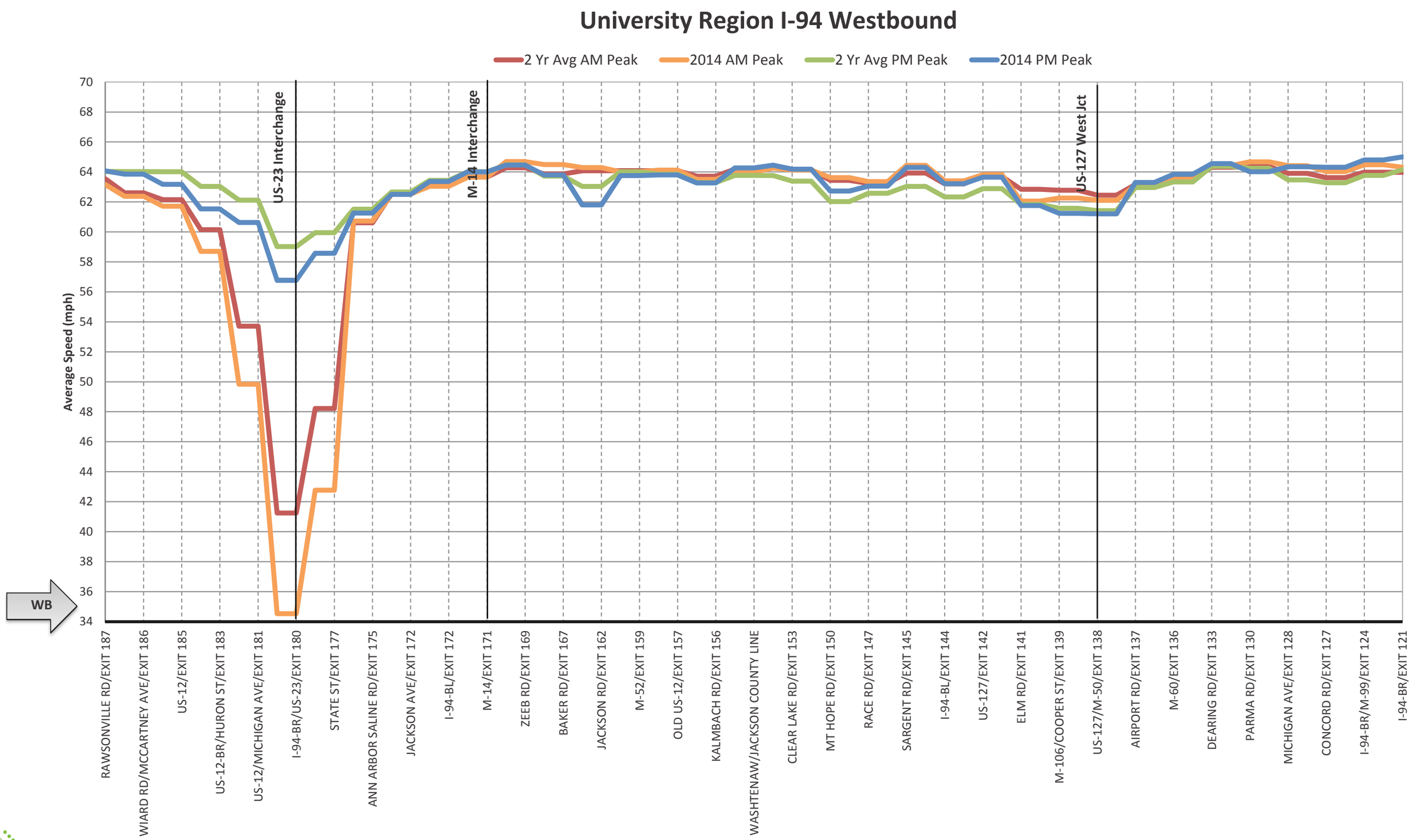


Figure 18. University Region I-94 westbound



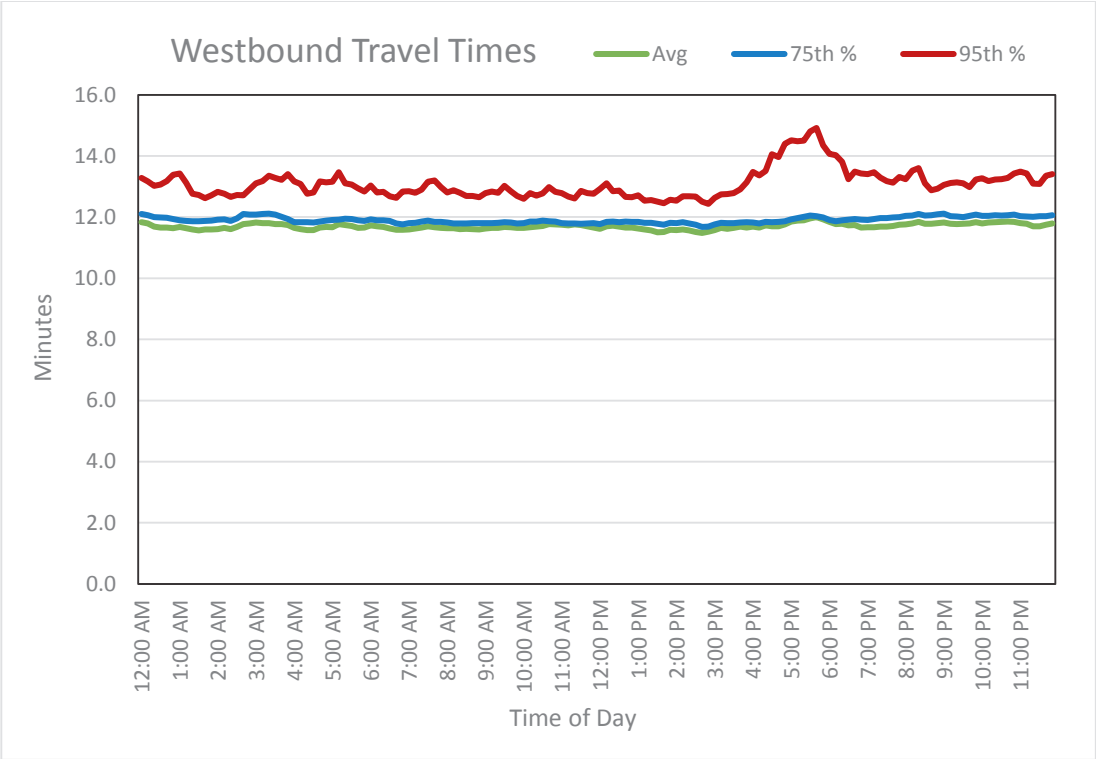
Travel Time Reliability

Figure 19. Travel time reliability I-94

Figure 20. Segment 1- I-94 between M-25 and M-14

Segment 1

Travel time (minutes) for I-94 between M-25/Exit 159 and M-14/Exit 171



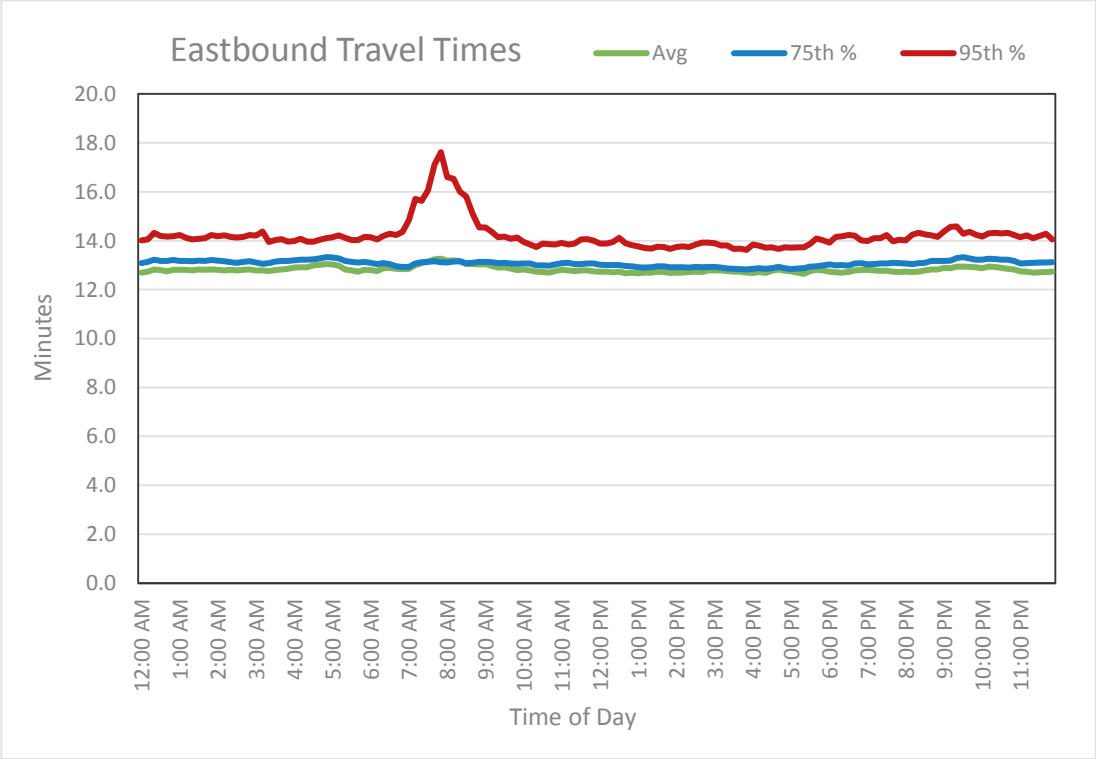
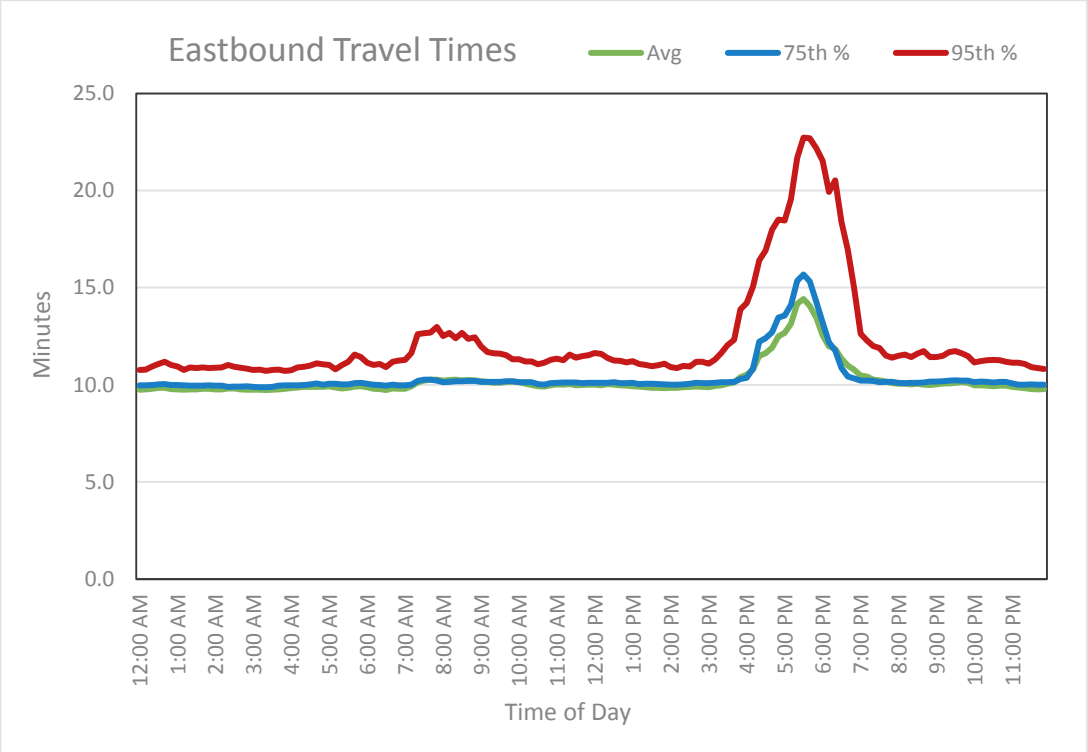


Figure 21. Segment 2- I-94 between M-14 and I-94-BR/US-23

Segment 2

Travel time (minutes) for I-94 between M-14/Exit 171 and I-94-BR/US-23/Exit 180



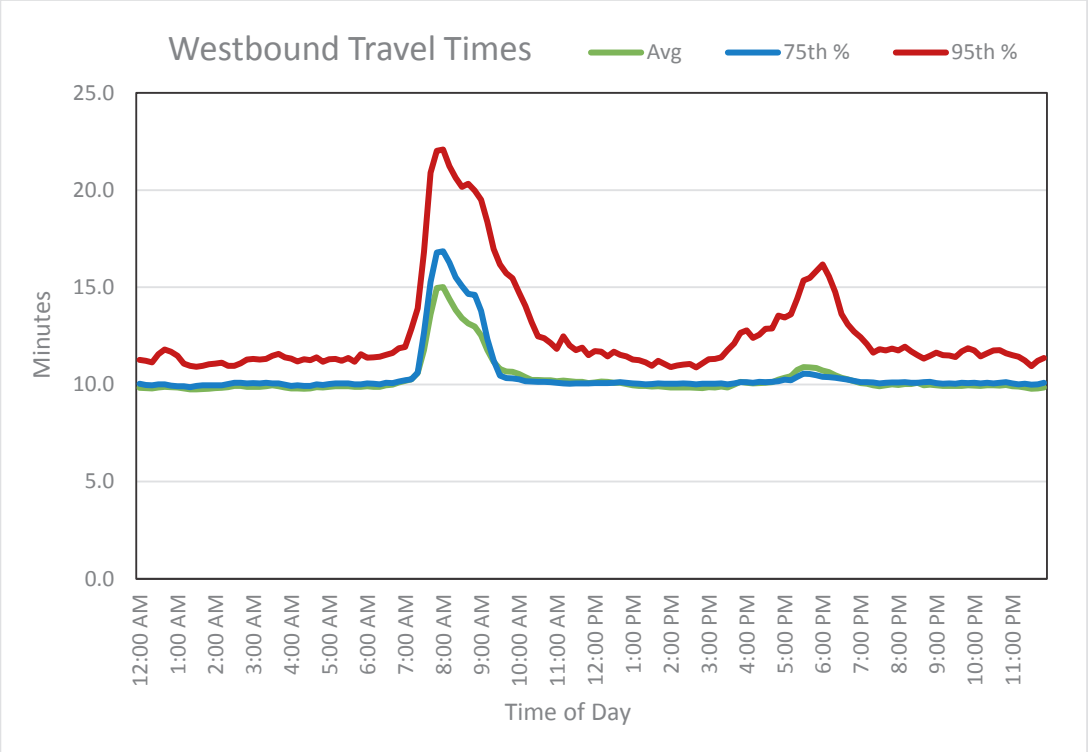
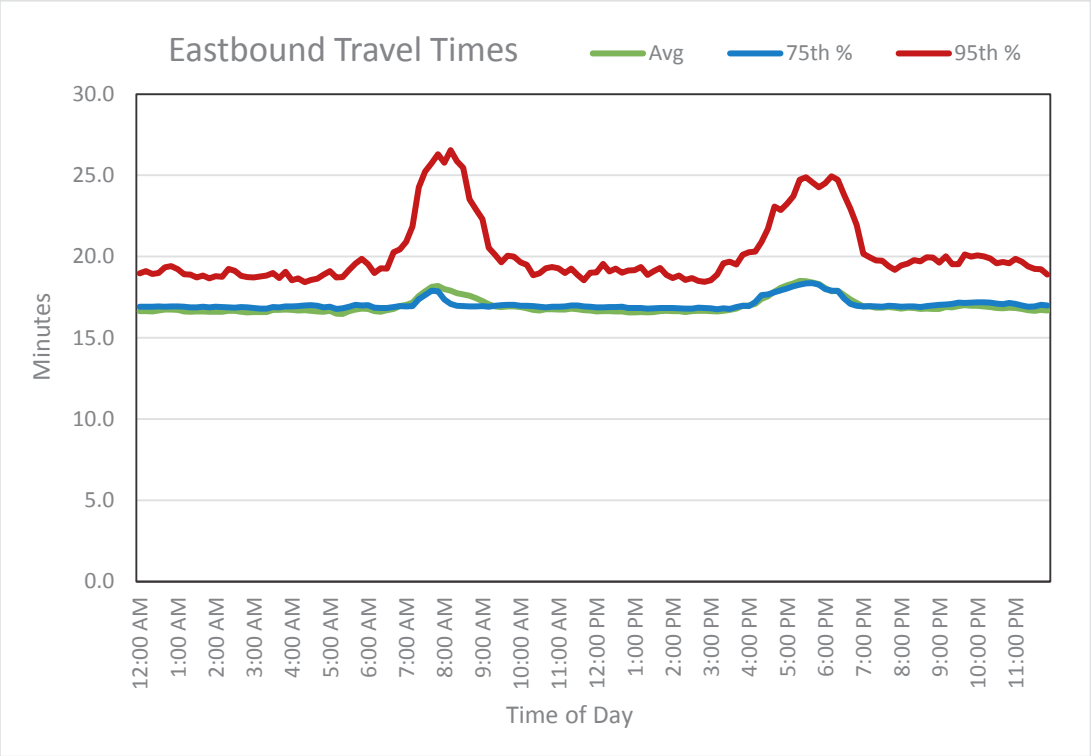


Figure 22. Segment 3- I-94 between I-94-BR/US-23 and I-275

Segment 3

Travel time (minutes) for I-94 between I-94-BR/US-23/Exit 180 and I-275/Exit 194



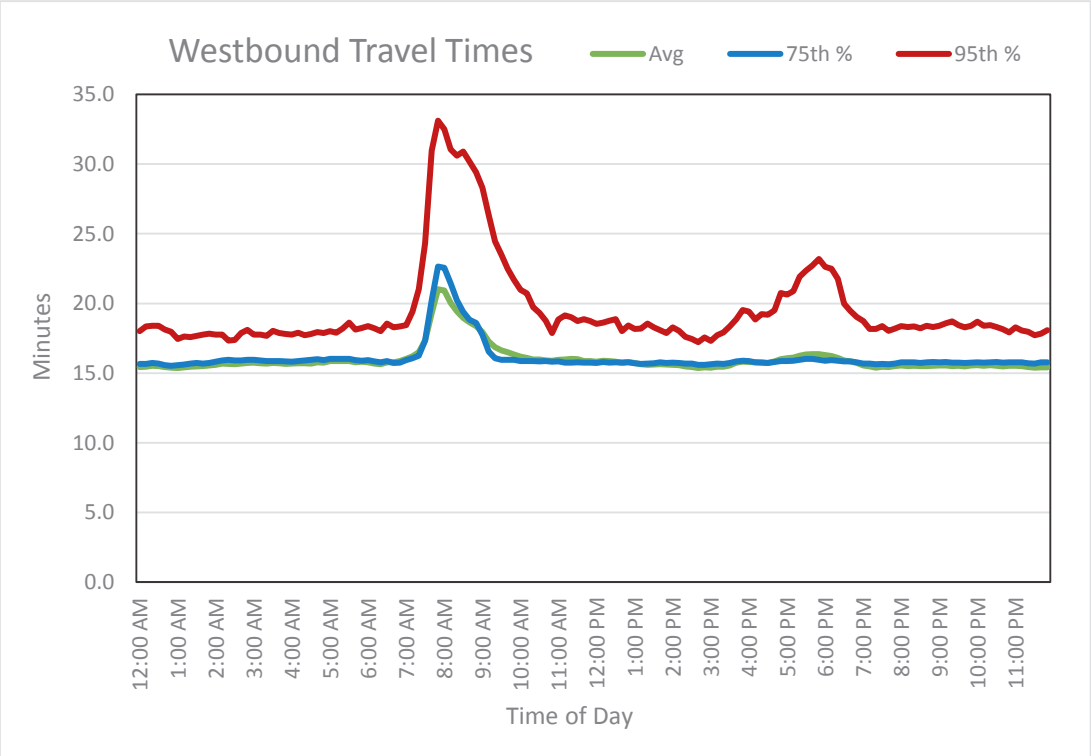
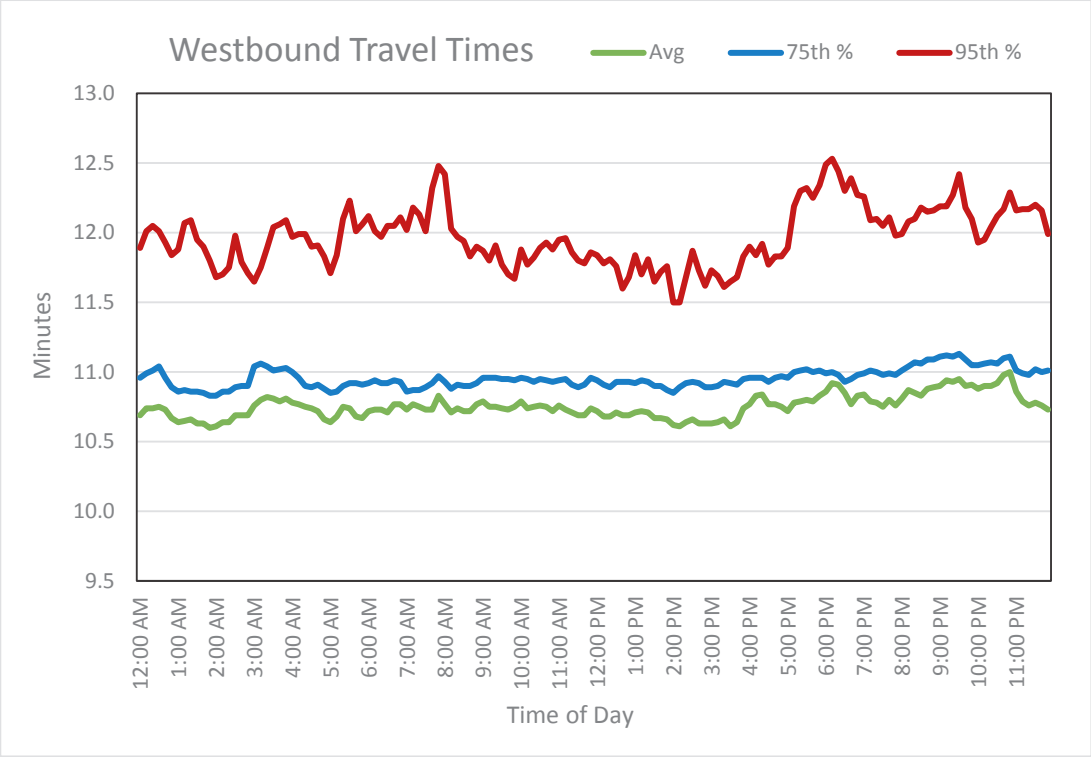
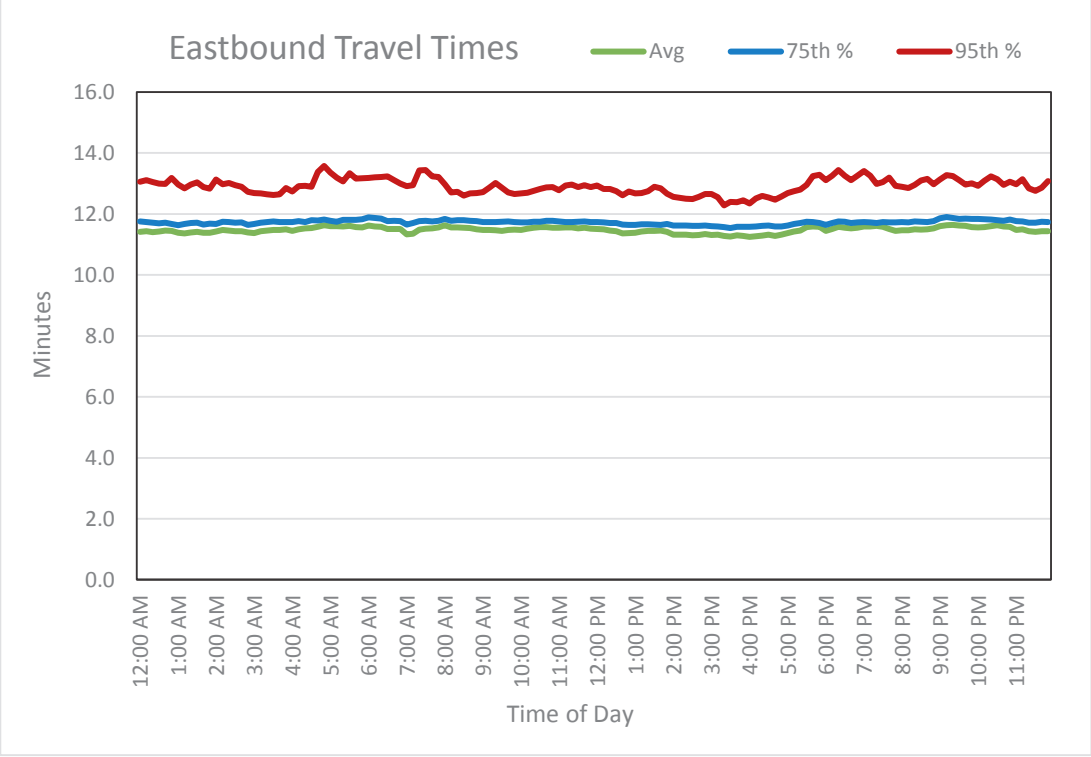


Figure 23. Segment 4- I-94 between M-60 and Sargent Rd

Segment 4

Travel time (minutes) for I-94 between M-60/Exit 136 and Sargent Rd/Exit 145





Chapter 8

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Interstate 75: Monroe

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Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

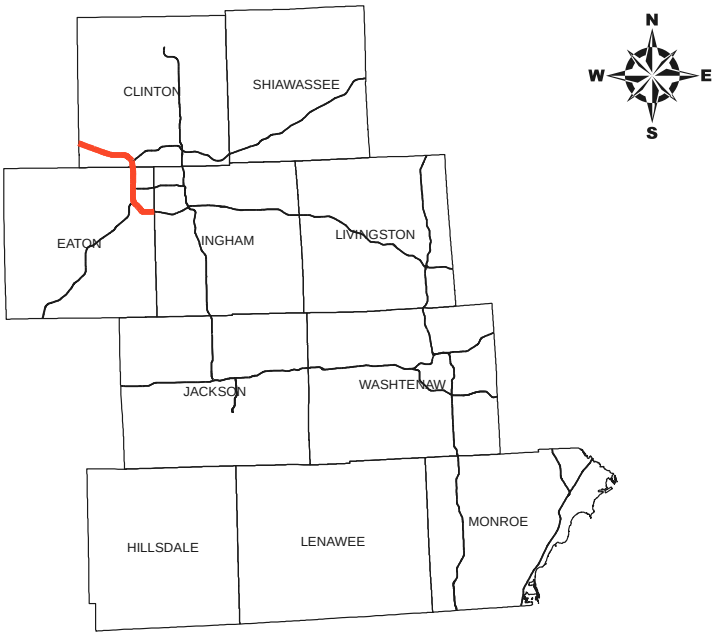
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 24. Clinton/Eaton Counties I-96 Corridor total user delay cost



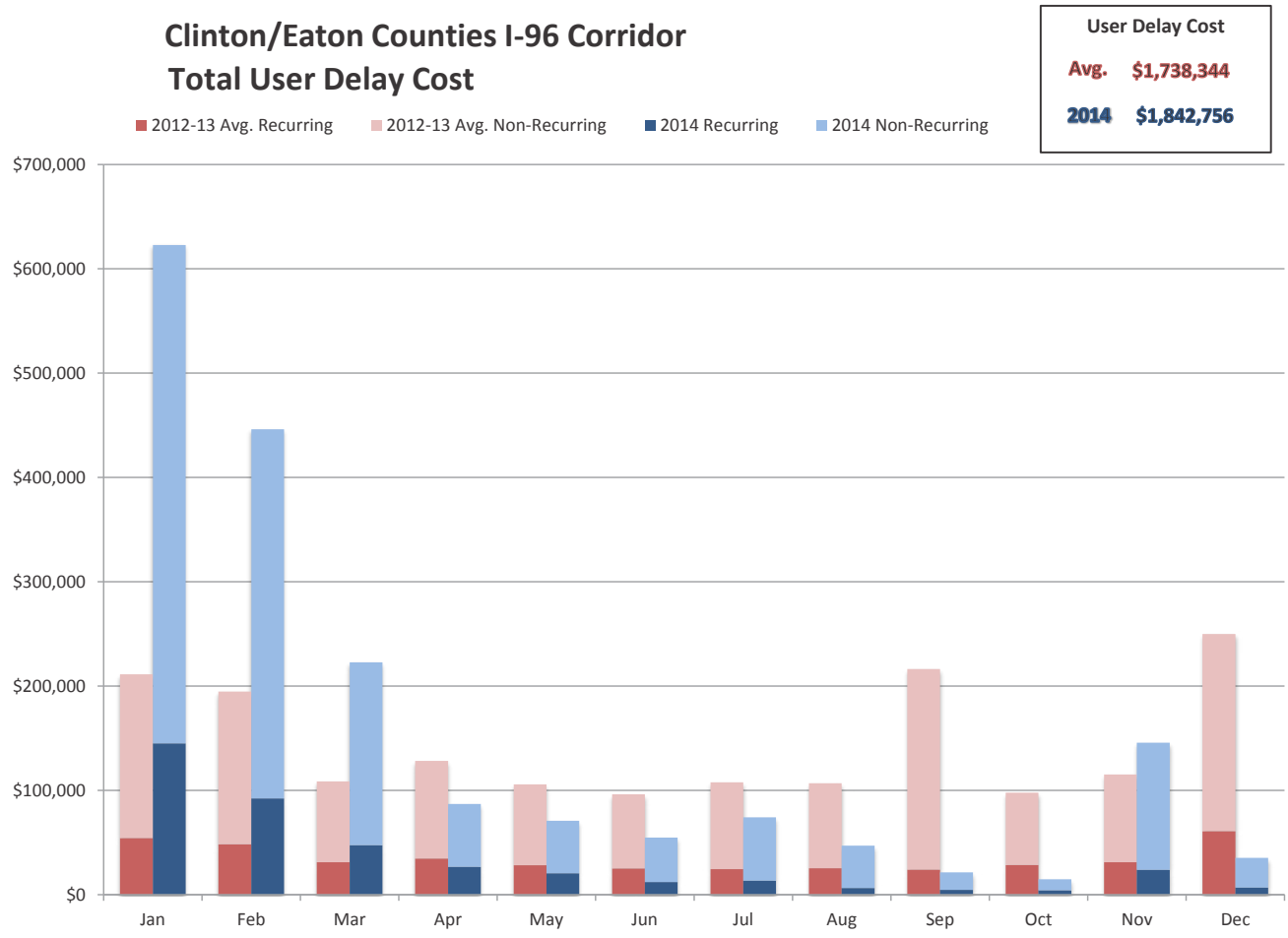
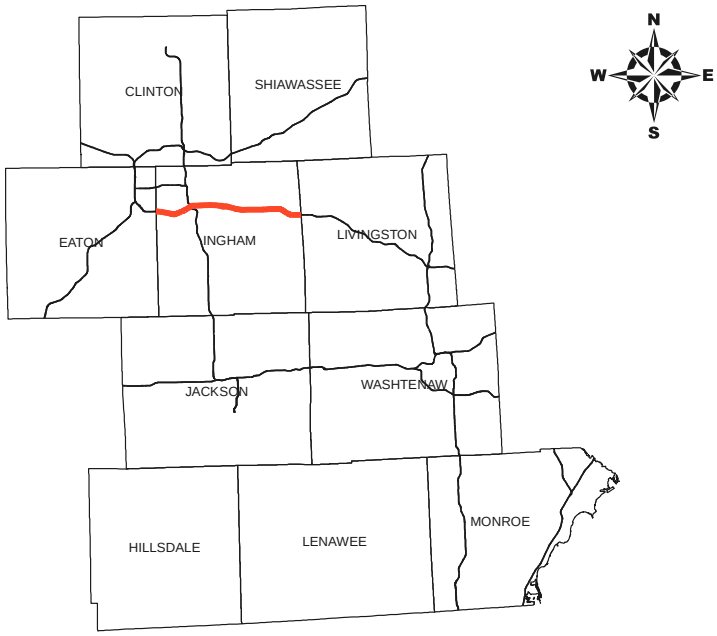


Figure 25. Ingham County I-96 Corridor total user delay cost



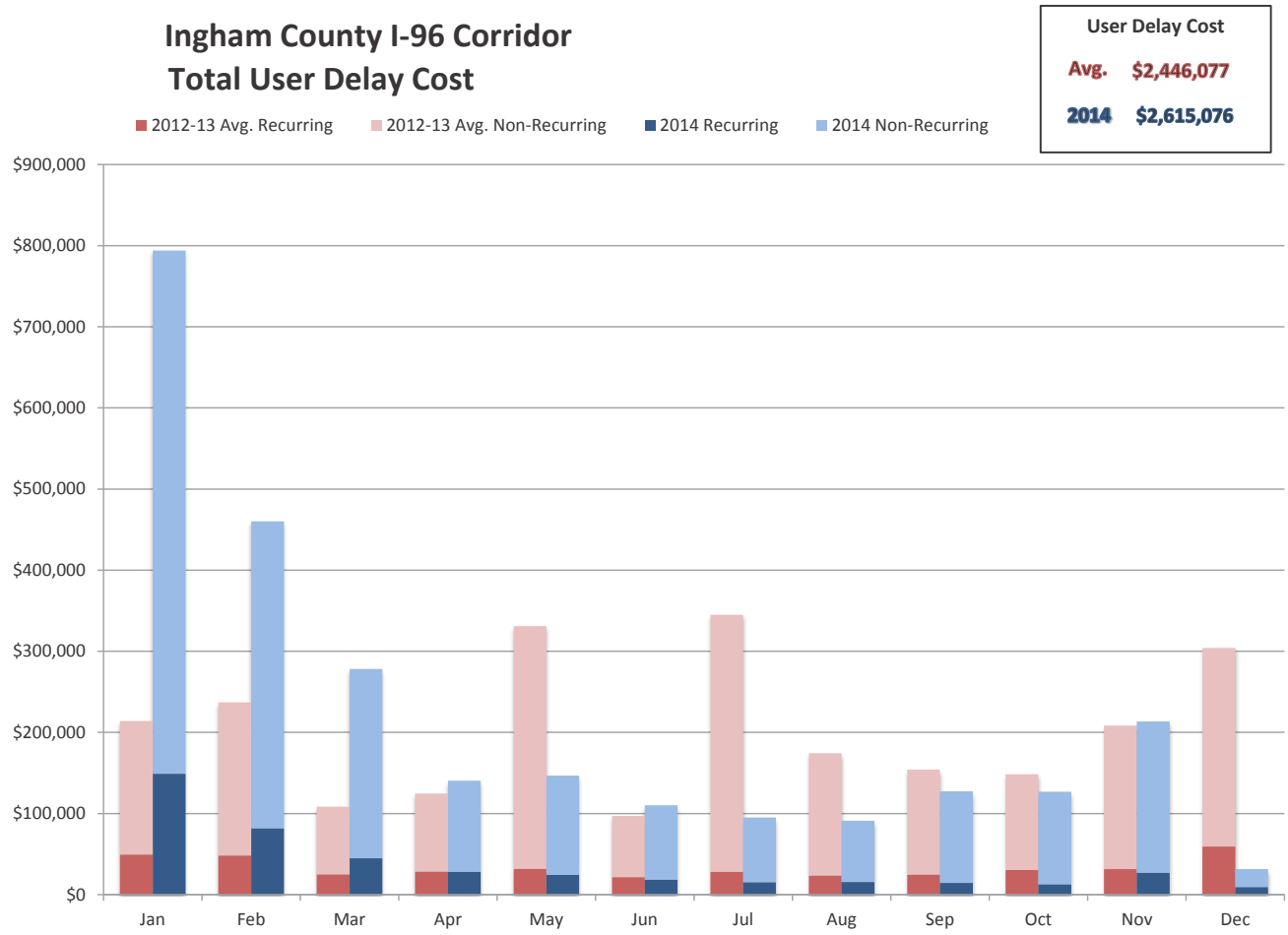
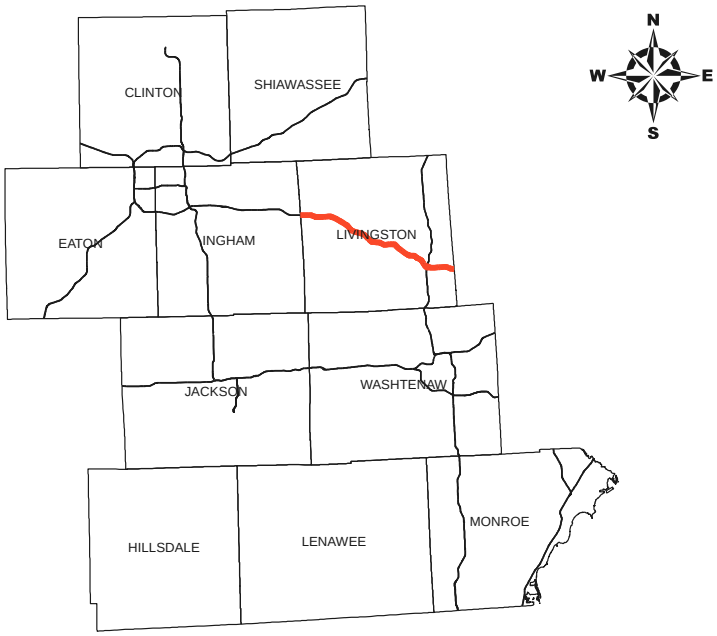


Figure 26. Livingston County I-96 Corridor total user delay cost



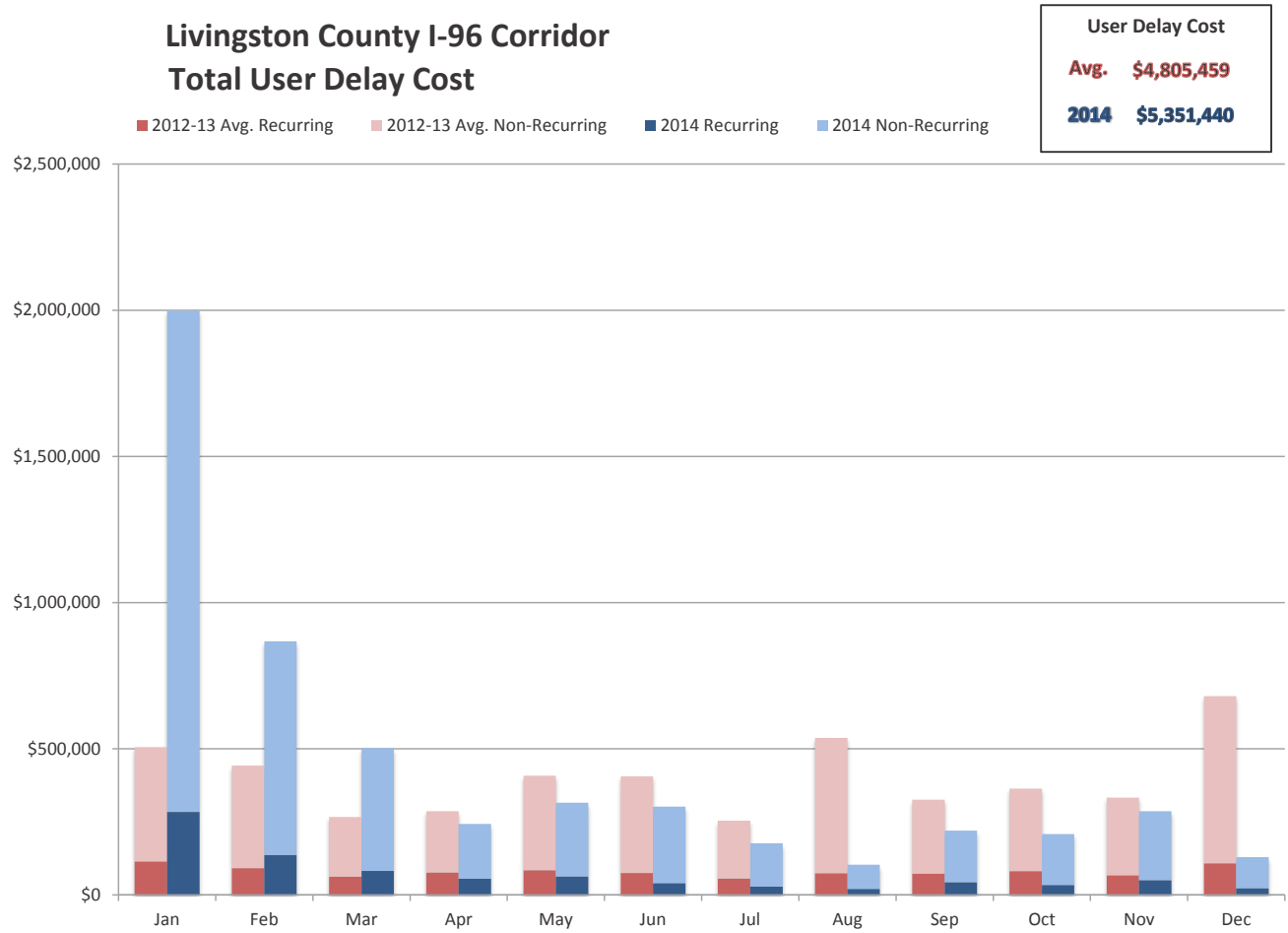


Figure 27. University Region I-96 eastbound

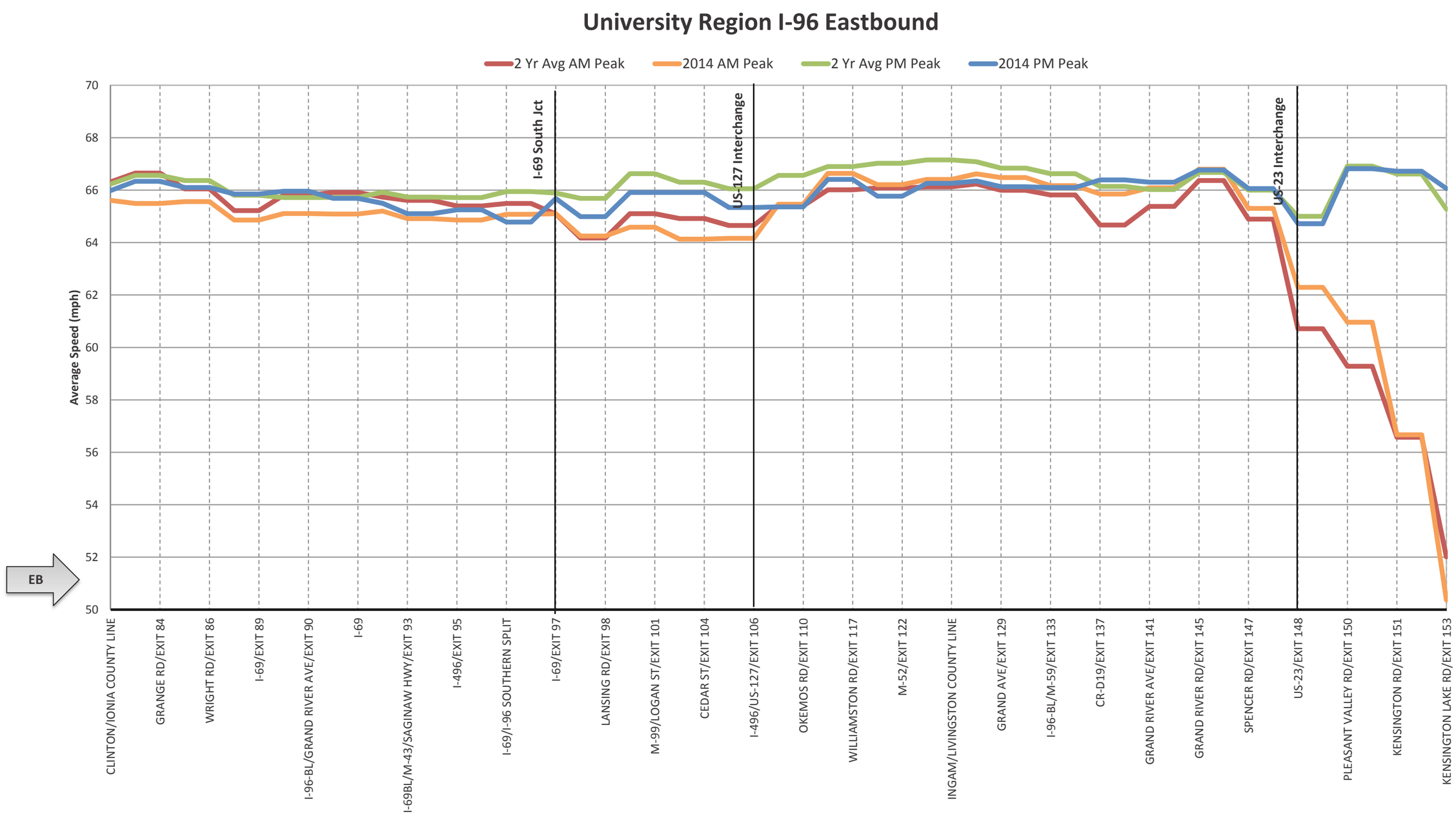
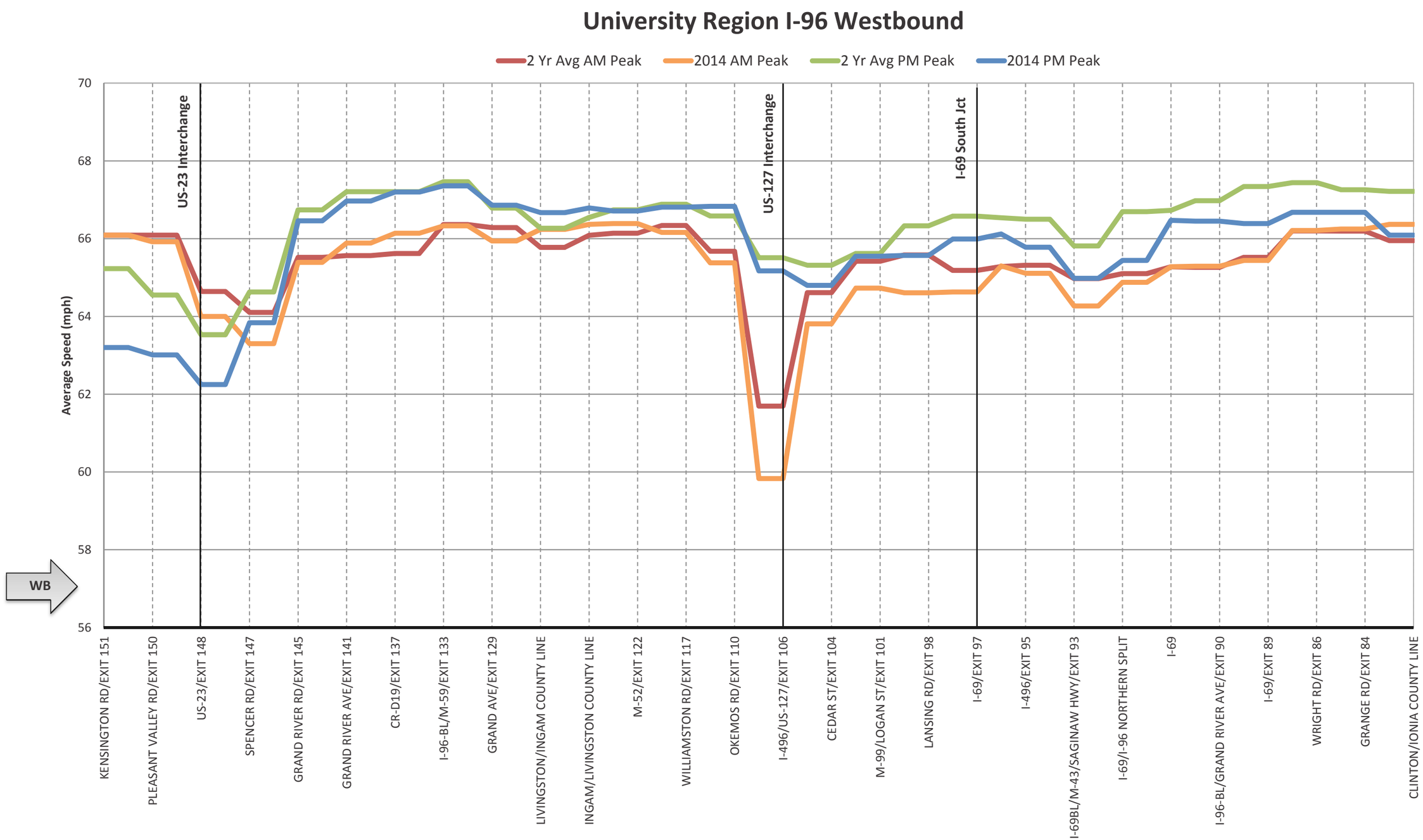


Figure 28. University Region I-96 westbound



Chapter 8

Travel Time Reliability

Figure 29. Travel time reliability I-69/I-96

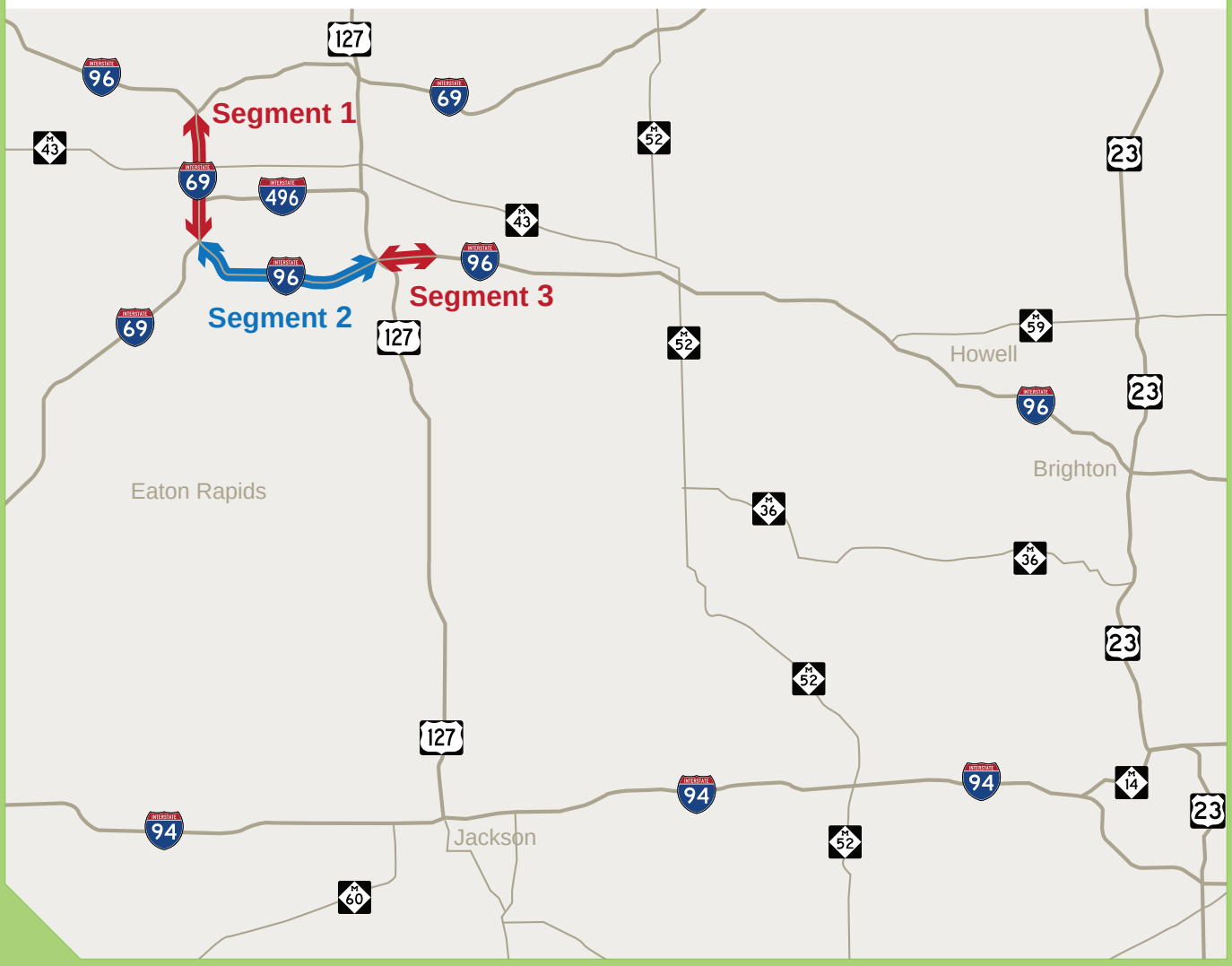
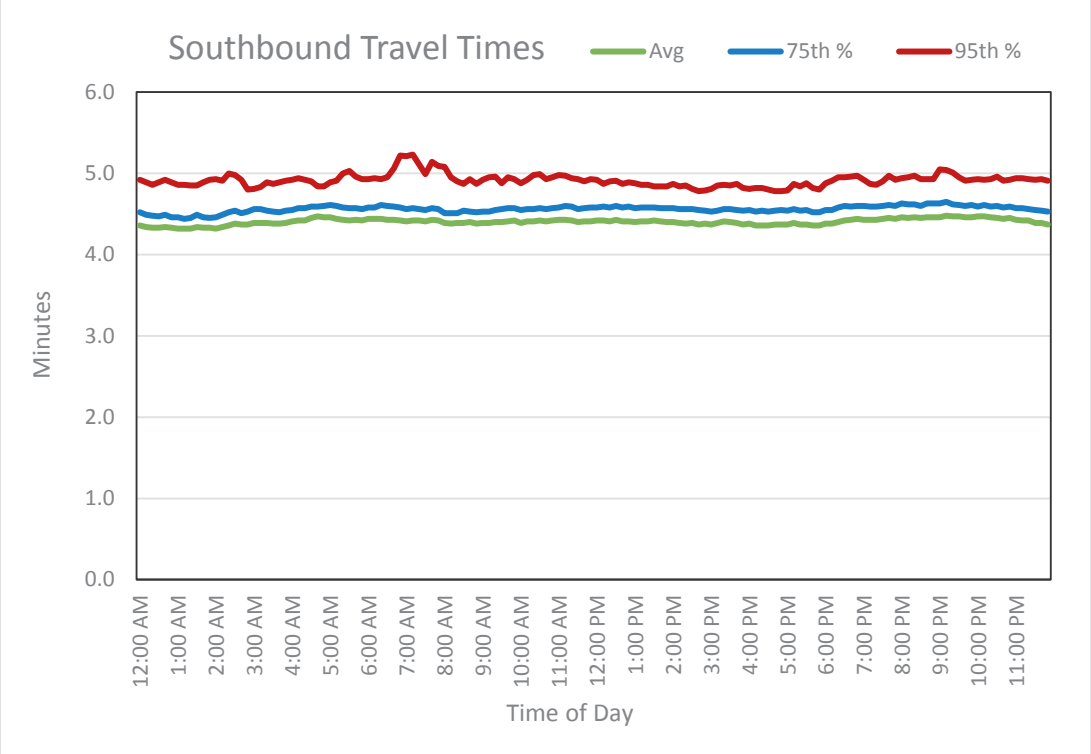


Figure 30. Segment 1- I-69/I-96

Segment 1

Travel time (minutes) for I-69/I-96



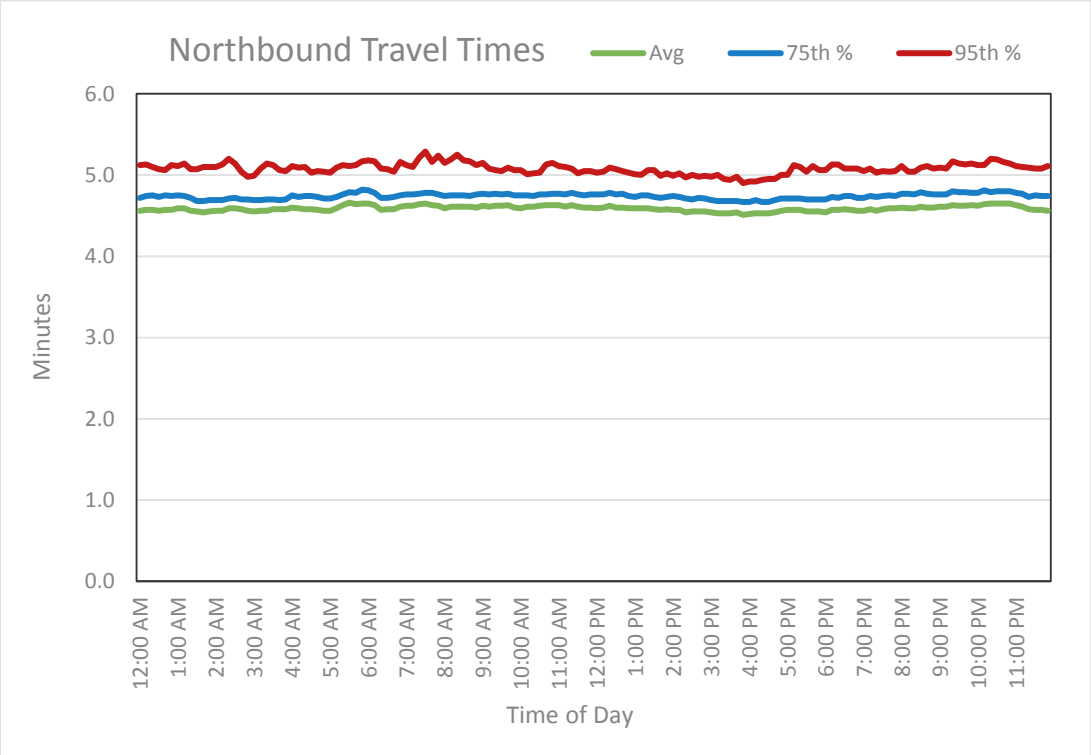
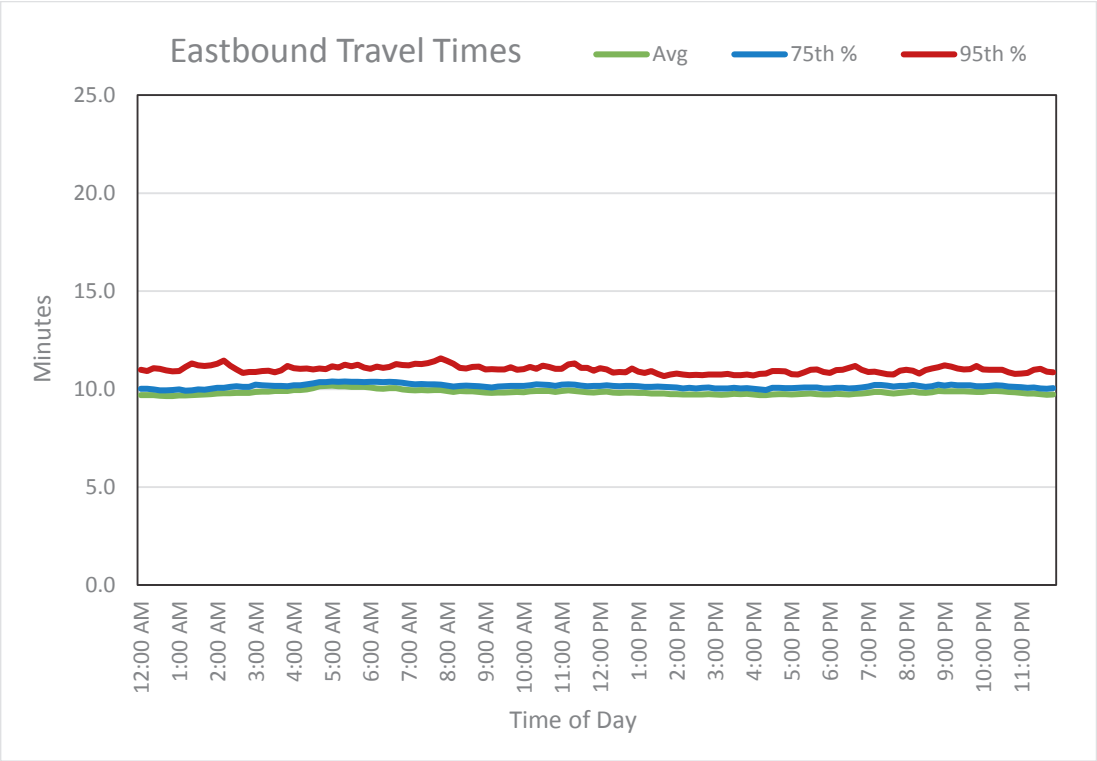


Figure 31. Segment 2- I-96 between I-496/US-127 and I-69

Segment 2

Travel time (minutes) for I-96 between I-496/US127/Exit 106 and I-69/Exit 97



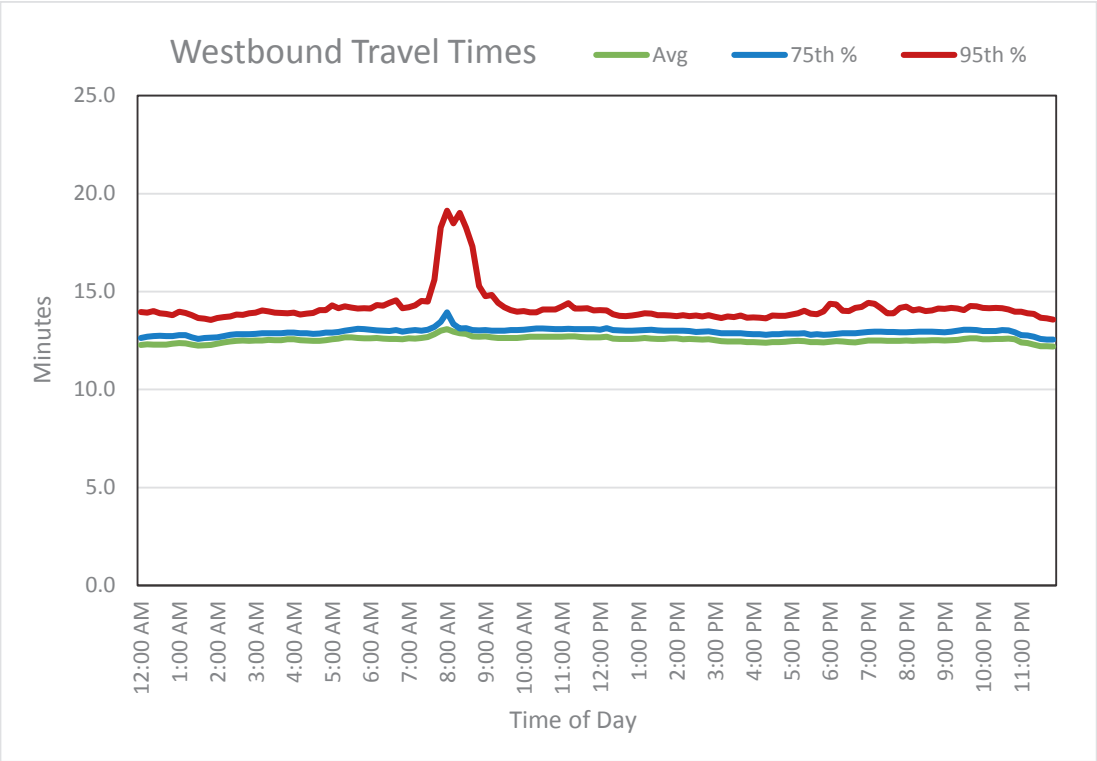
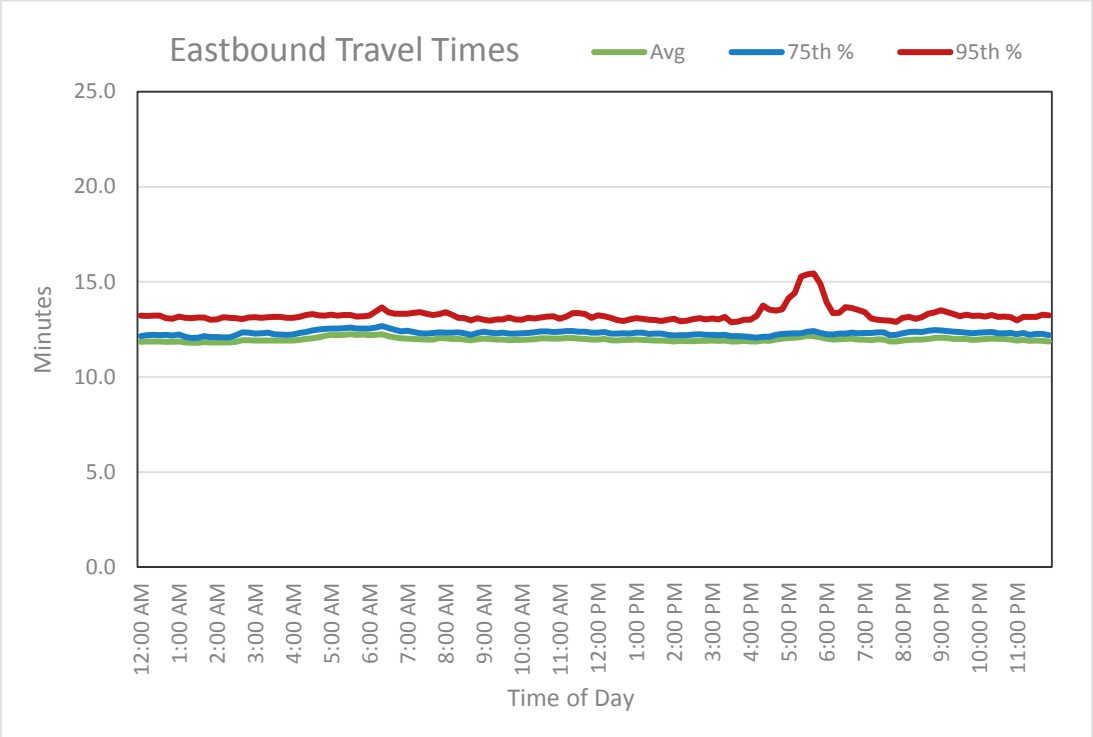
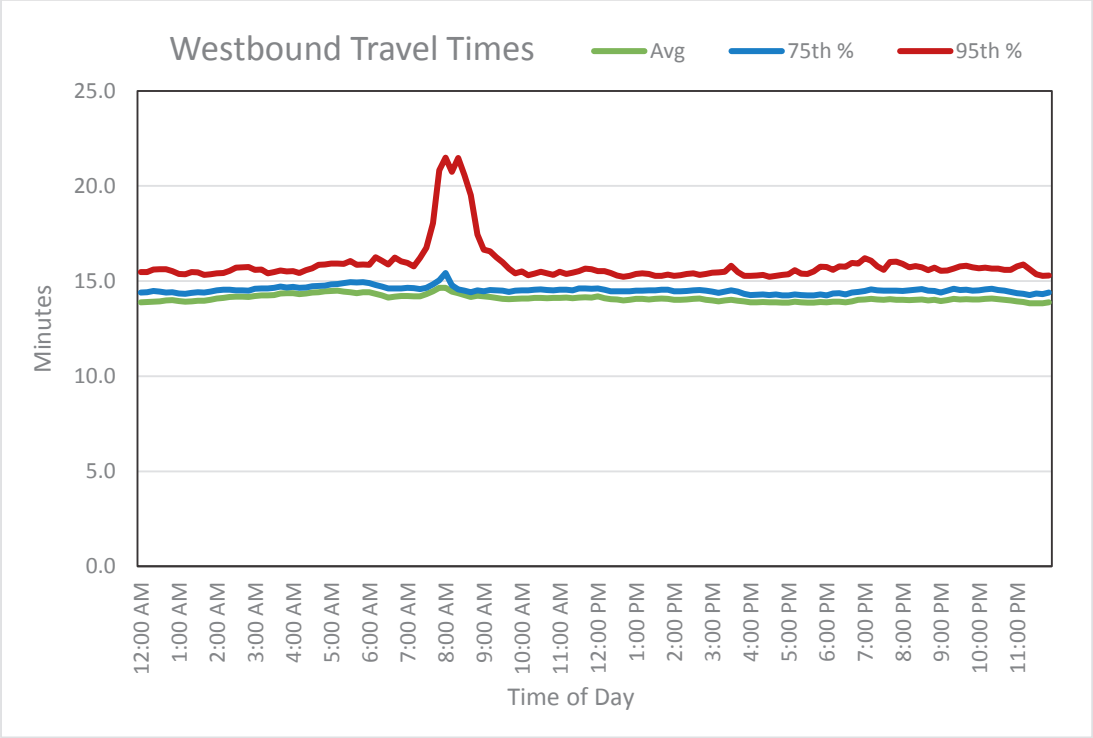


Figure 32. Segment 3- I-96 between I-496/US-127 and Williamston Rd

Segment 3

Travel time (minutes) for I-96 between I-496/US127/Exit 106 and Williamston Rd/Exit 117





Chapter 8

Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

Interstate 75: Monroe

Interstate 94: Jackson and Washtenaw

Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

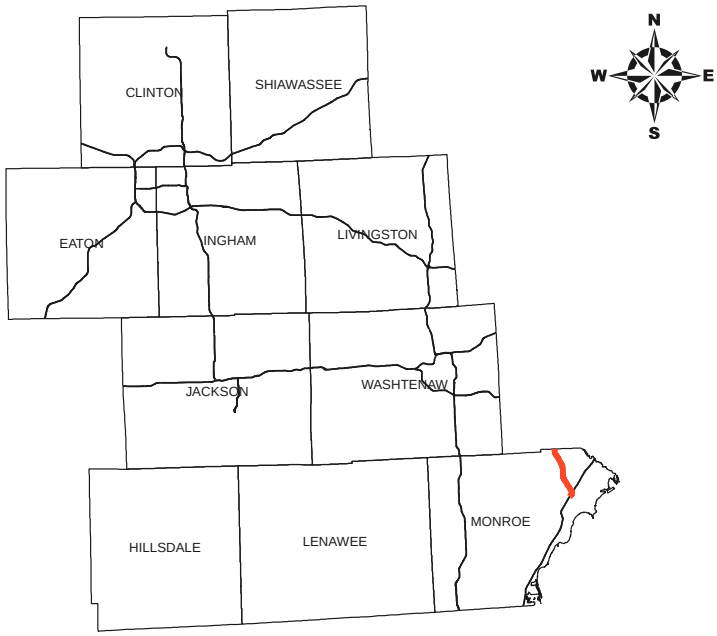
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 33. Monroe County I-275 Corridor total user delay cost



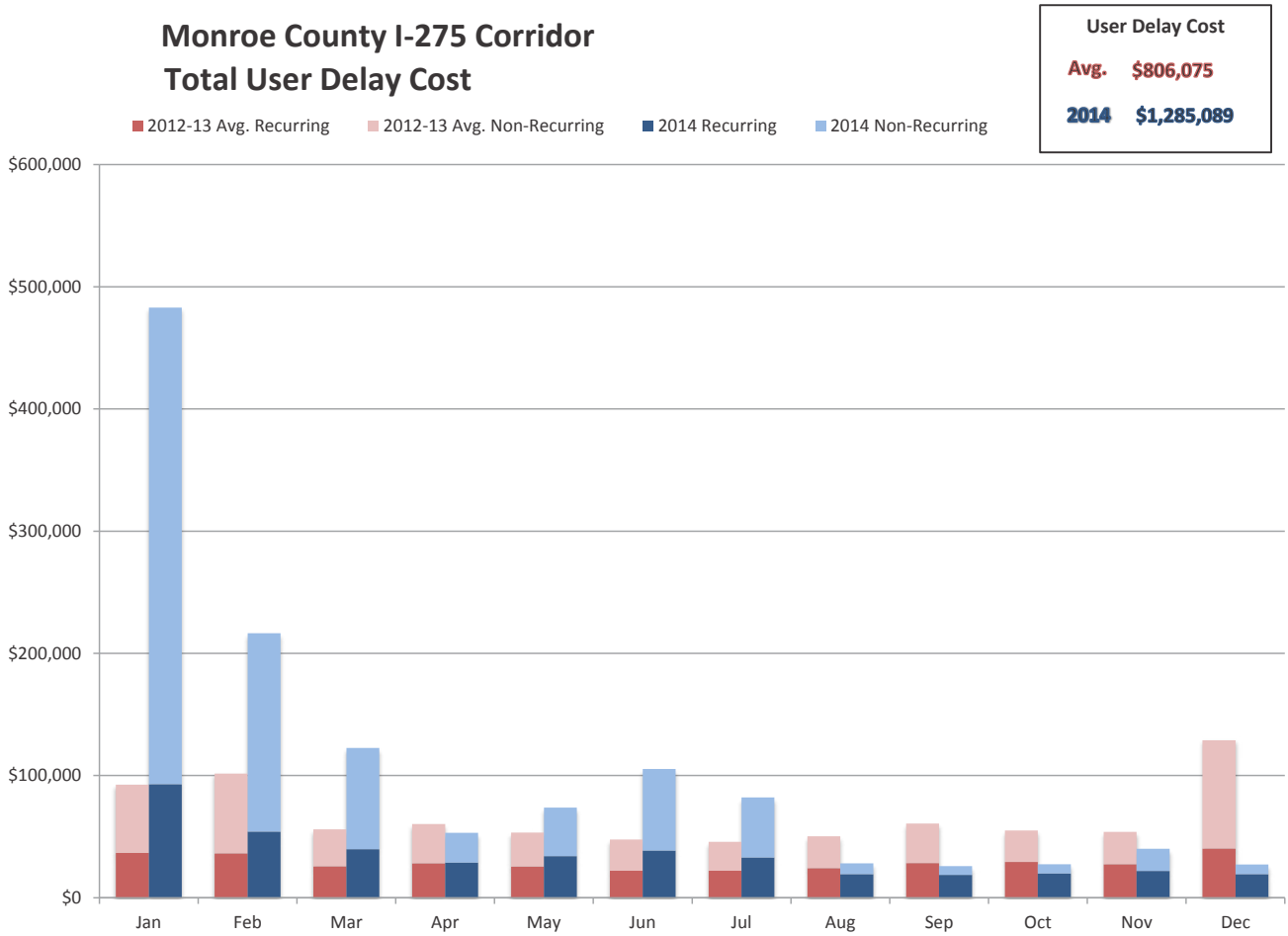


Figure 34. University Region I-275 northbound

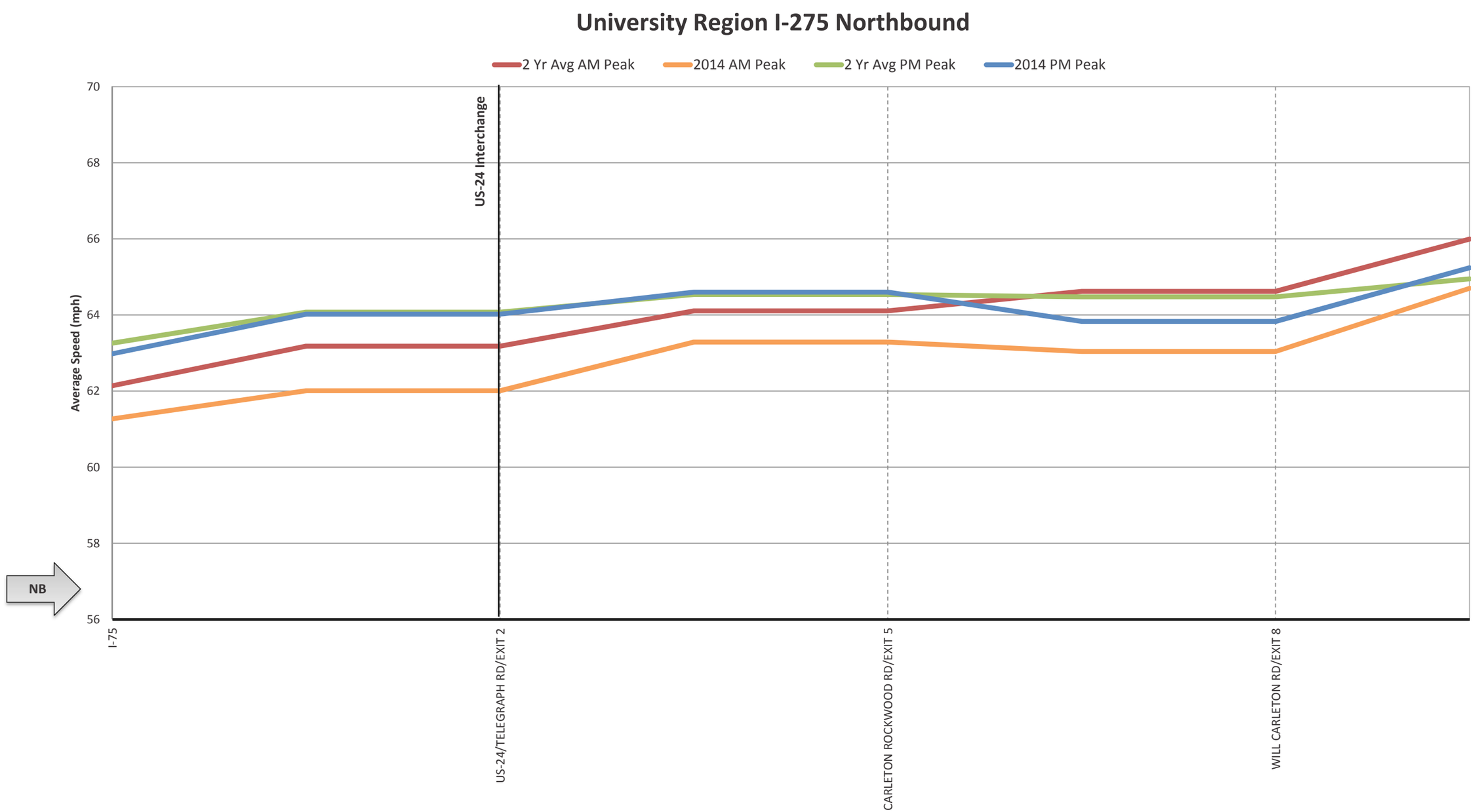
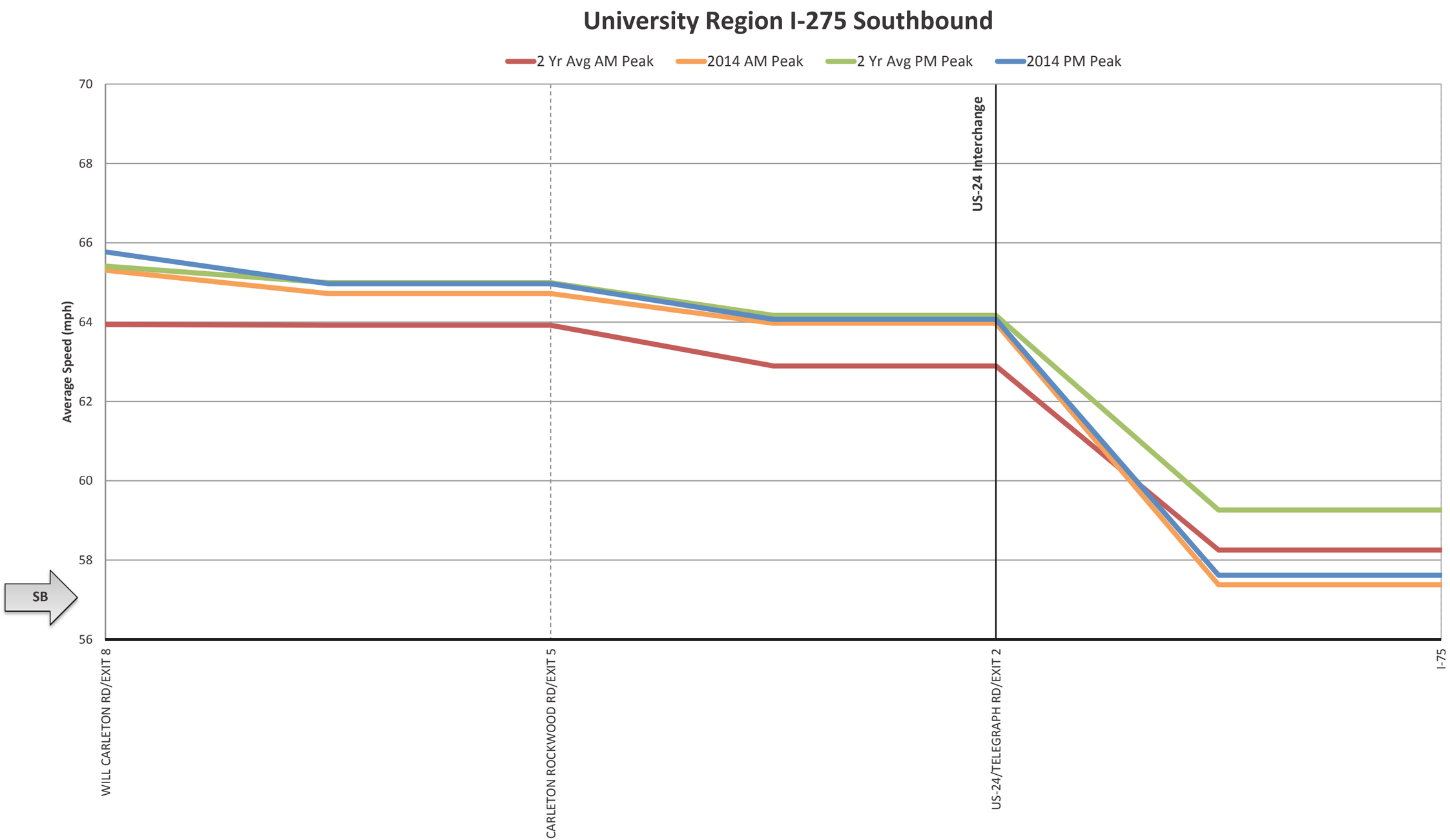


Figure 35. University Region I-275 southbound



Chapter 8

Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

Interstate 75: Monroe

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Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

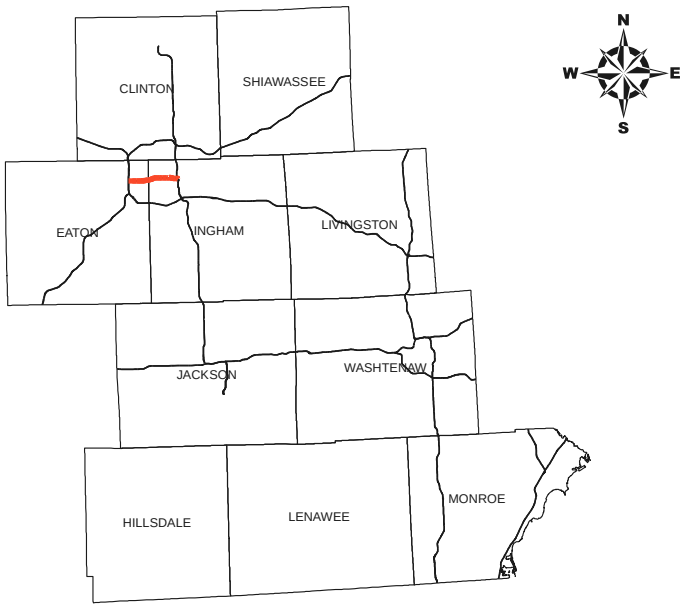
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 36. Eaton/Ingham Counties I-496 Corridor total user delay cost



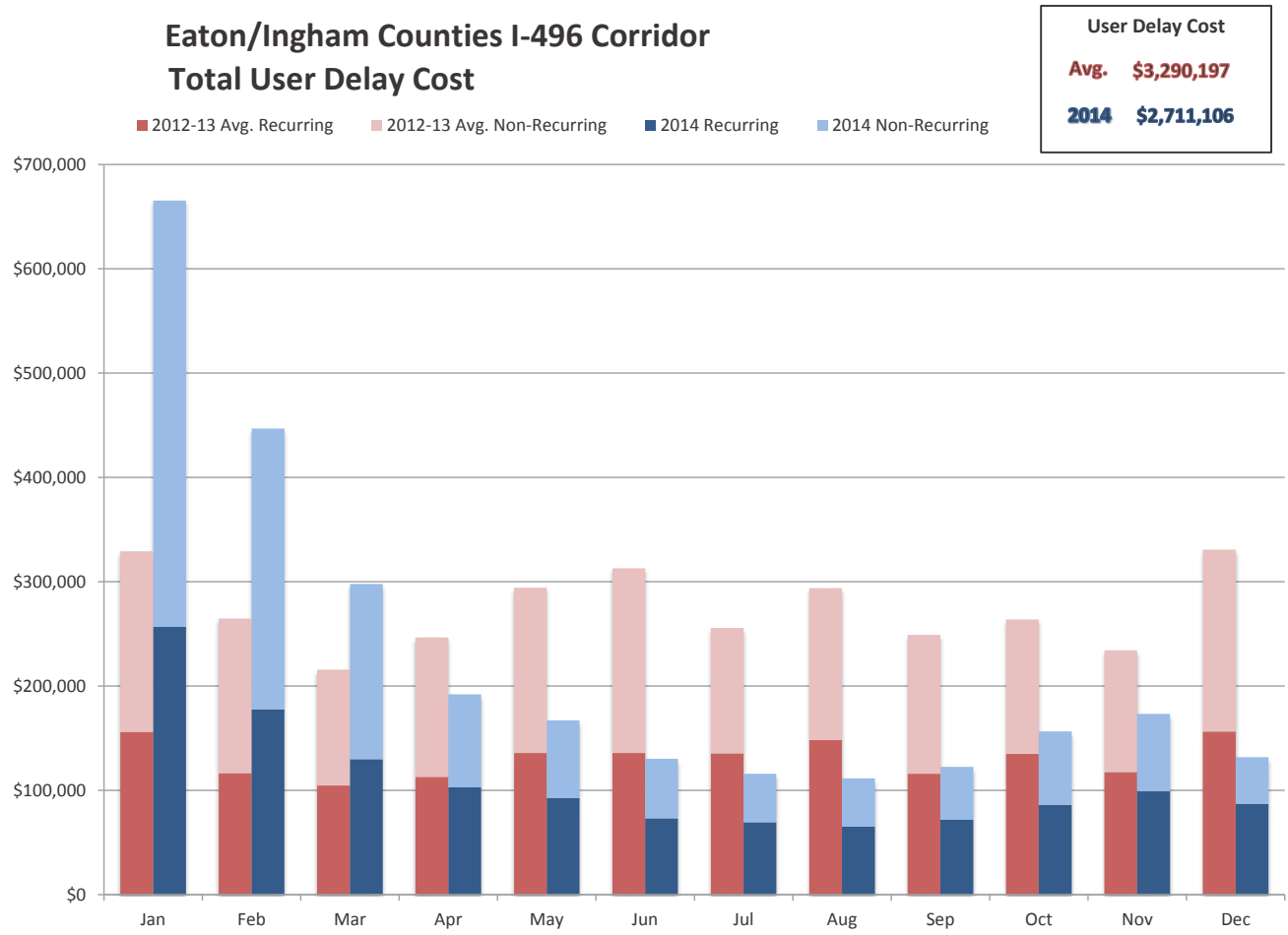


Figure 37. University Region I-496 eastbound

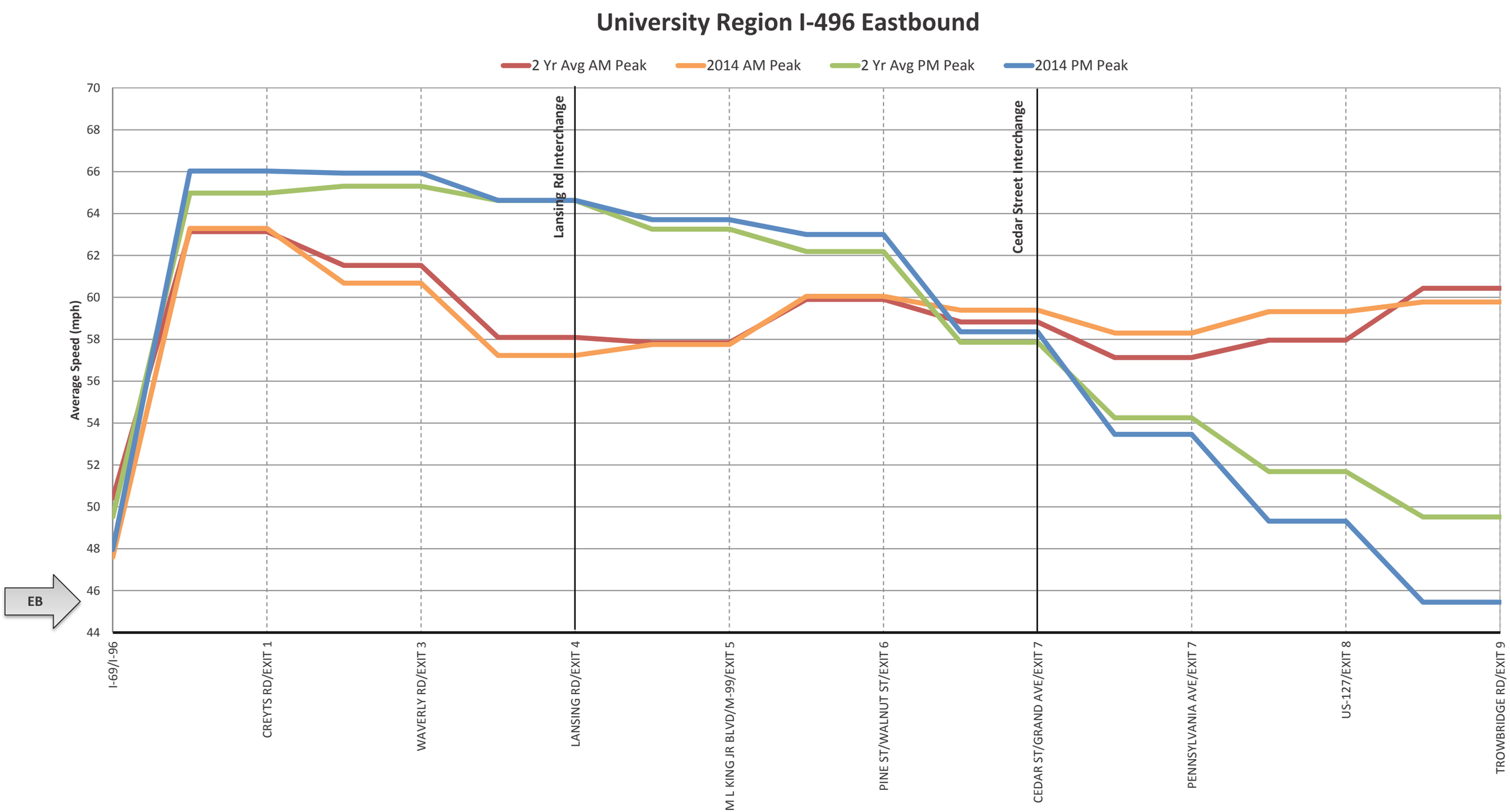
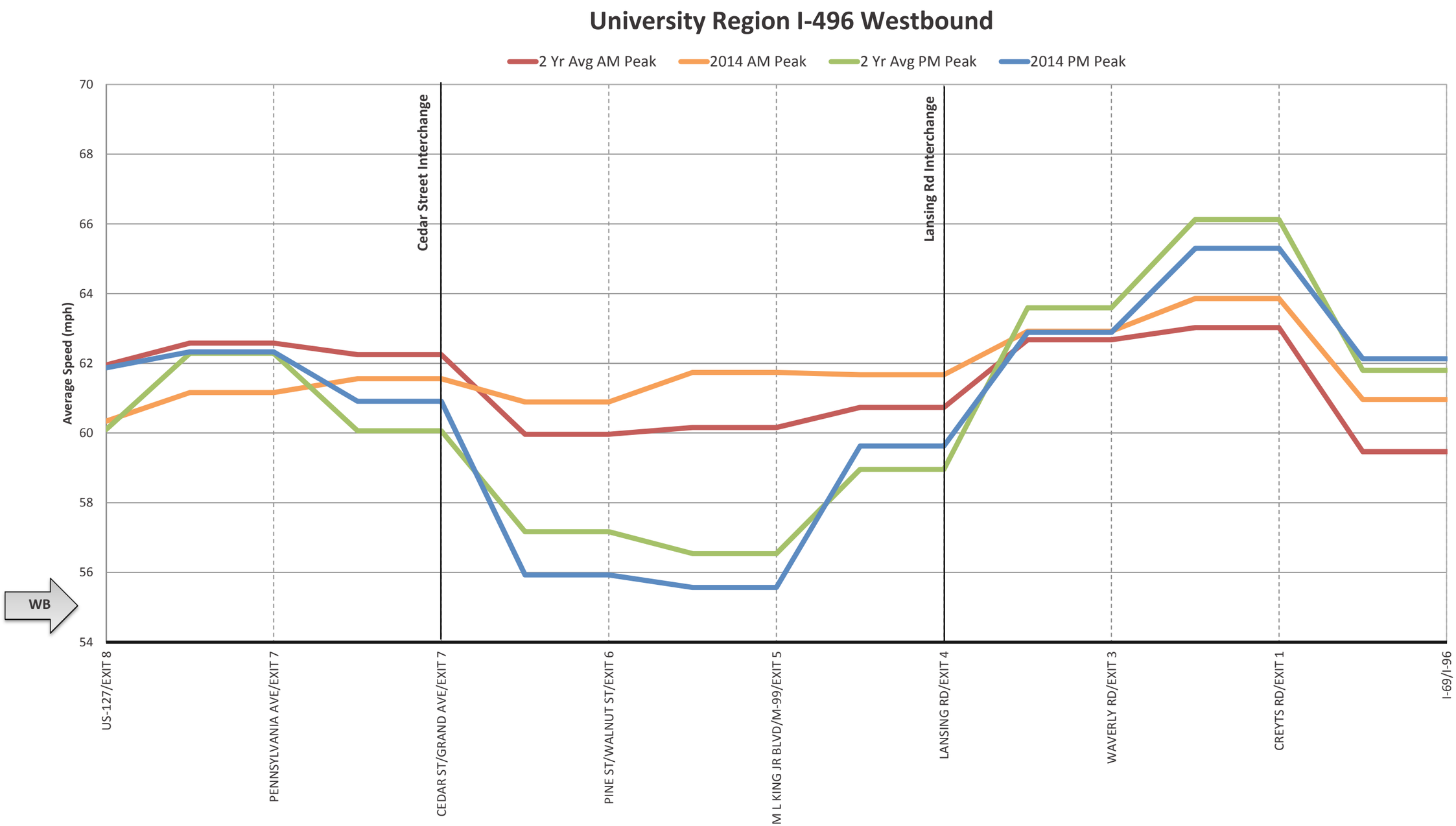


Figure 38. University Region I-496 westbound



Chapter 8

Travel Time Reliability

Figure 39. Travel time reliability I-496

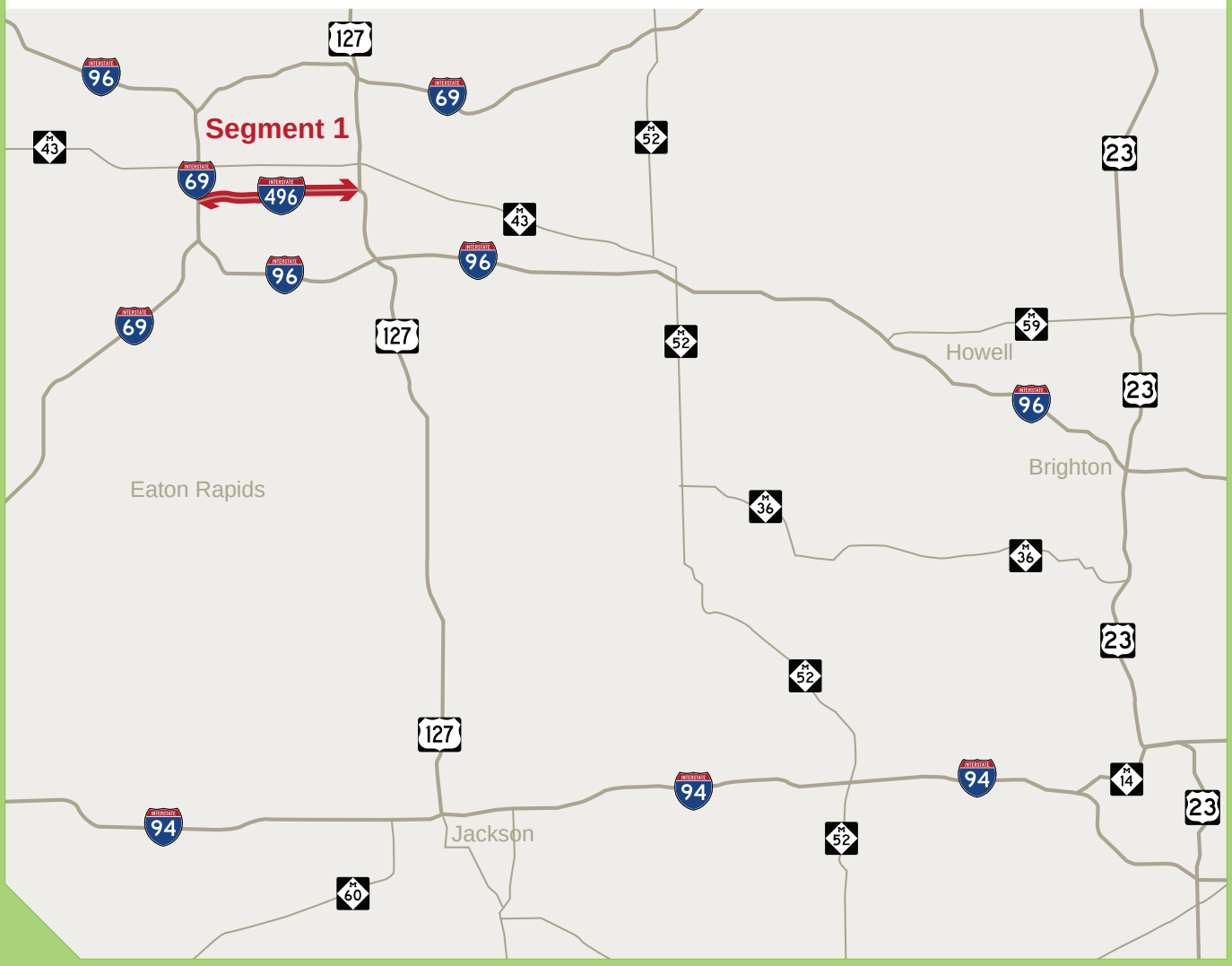
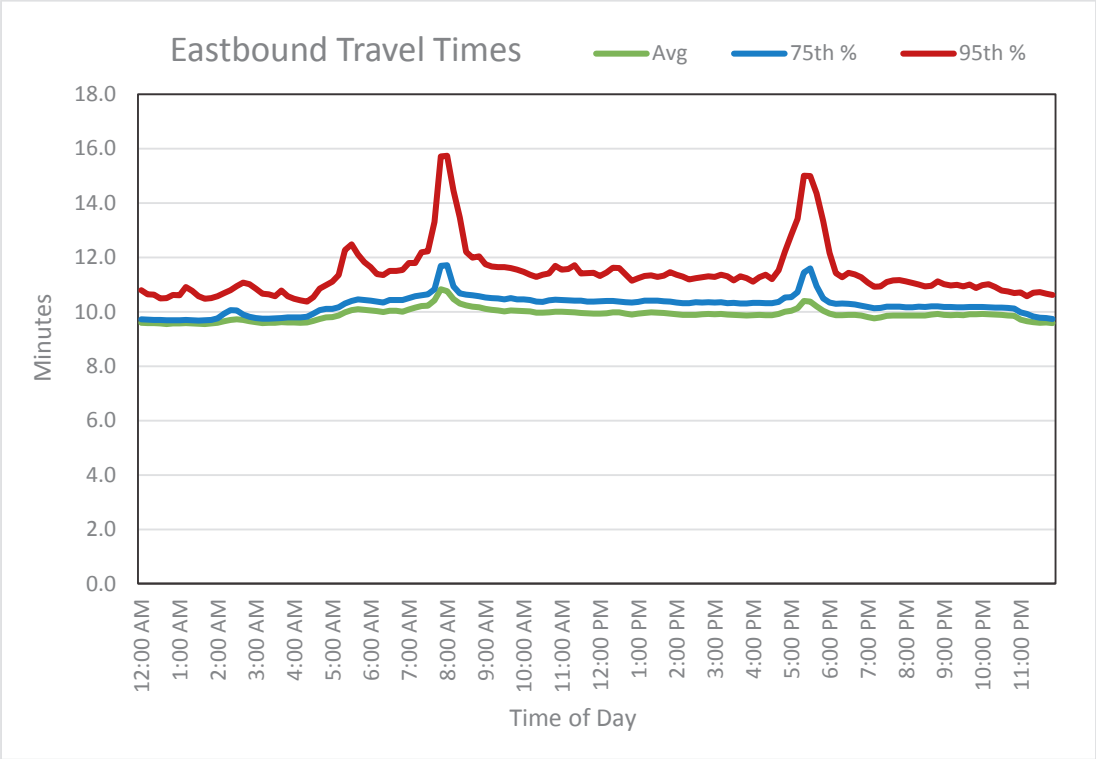
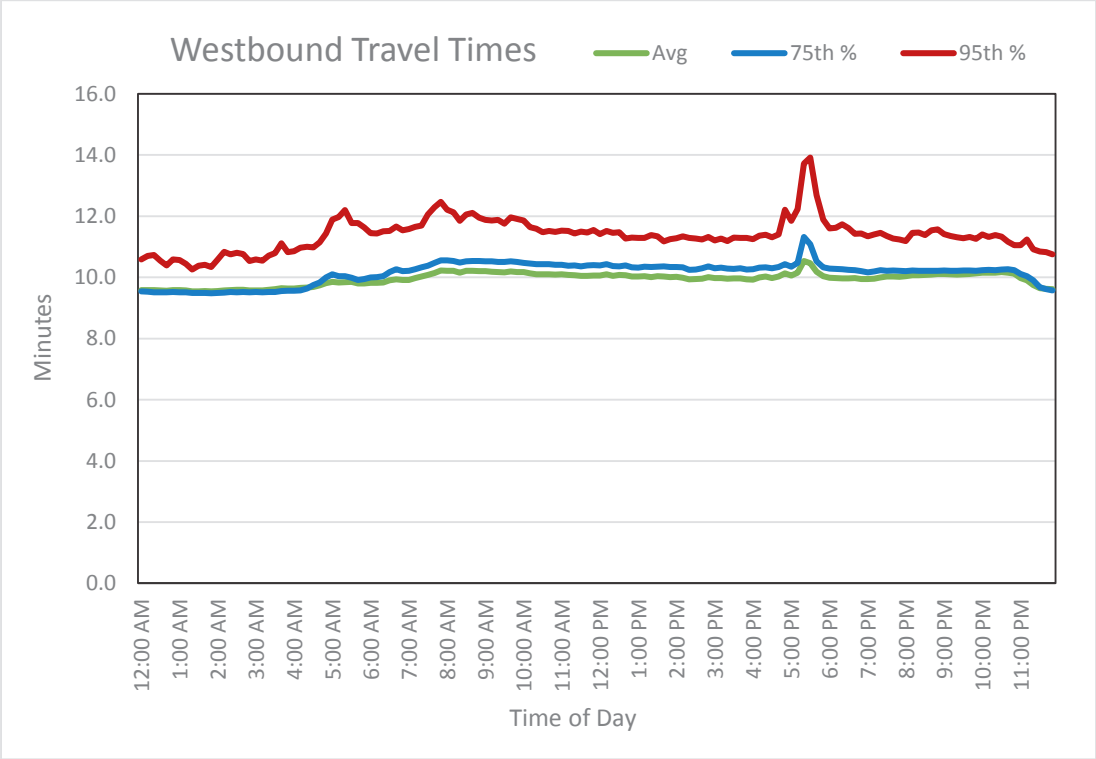


Figure 40. Segment 1- I-496 between US-127 and I-69/I-96

Segment 1

Travel time (minutes) for I-496 between US-127/Exit 8 and I-69/I-96





Chapter 8

Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

Interstate 75: Monroe

Interstate 94: Jackson and Washtenaw

Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

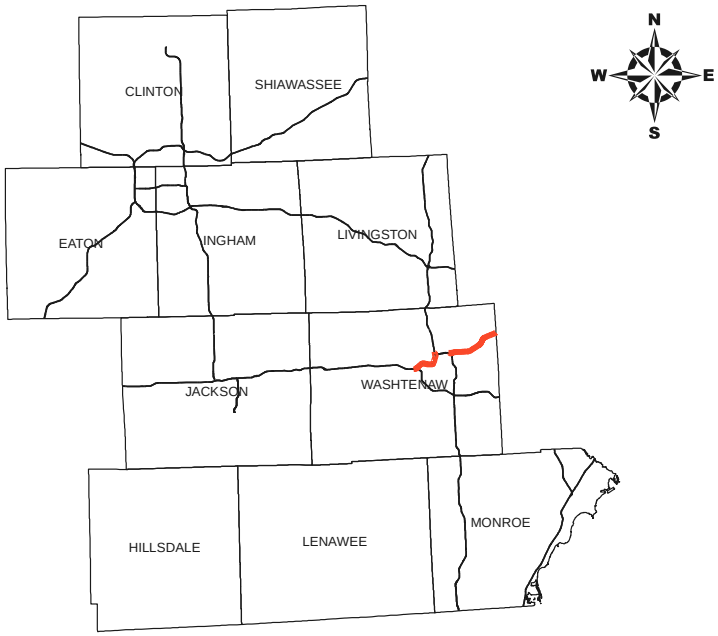
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 41. Washtenaw County M-14 Corridor total user cost delay



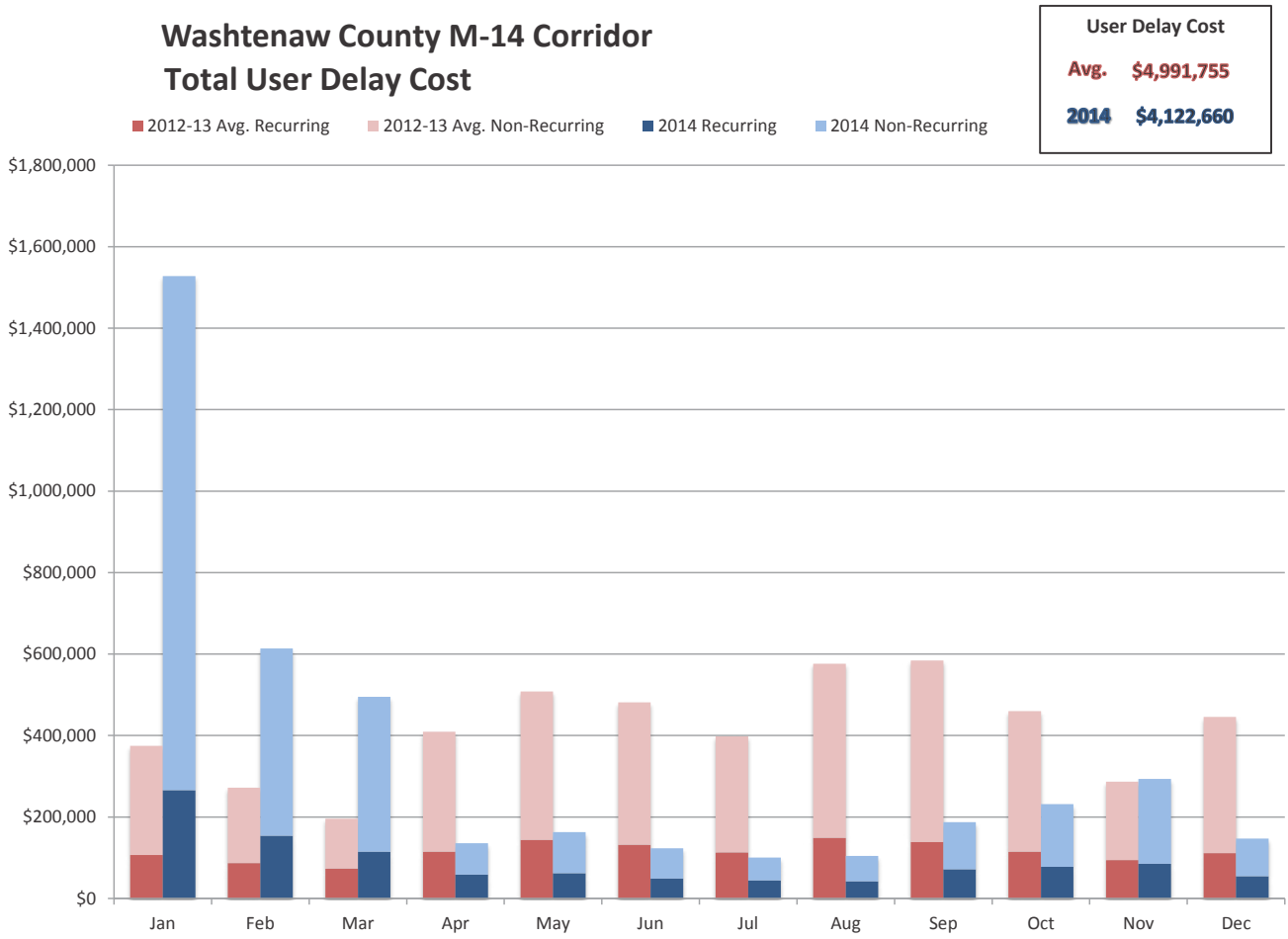


Figure 42. University Region M-14 eastbound

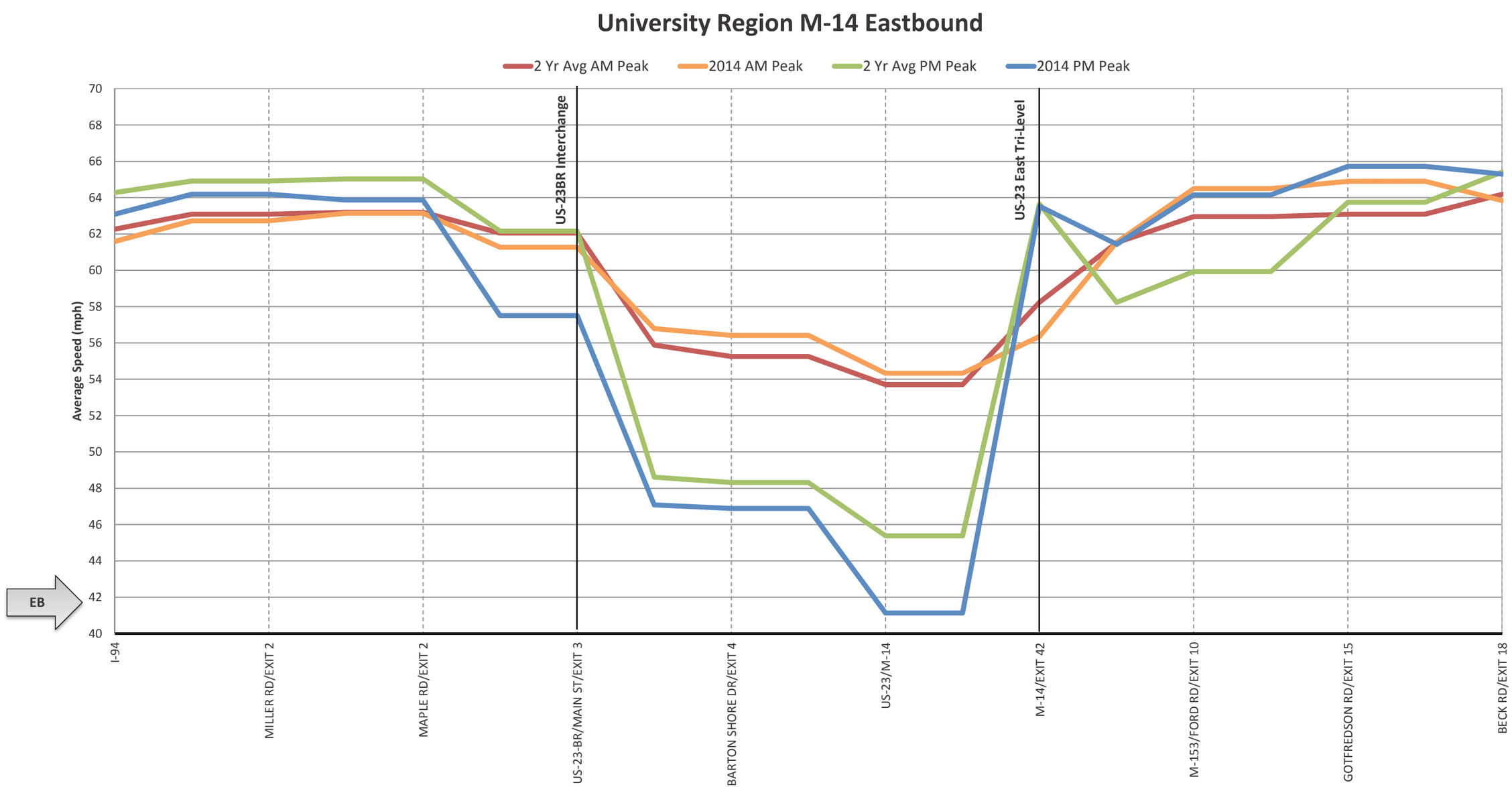
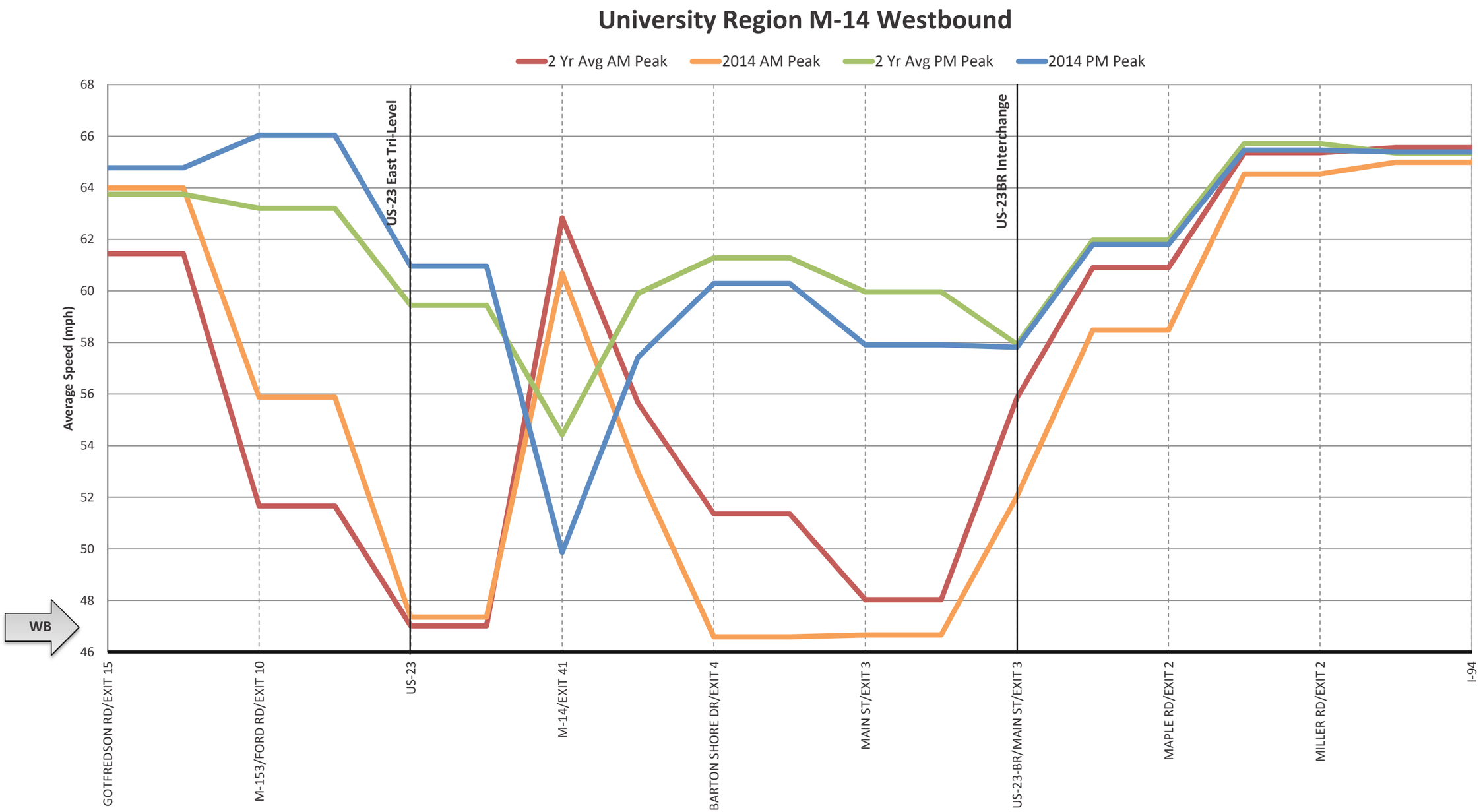


Figure 43. University Region M-14 westbound



Chapter 8

Travel Time Reliability

Figure 44. Travel time reliability M-14

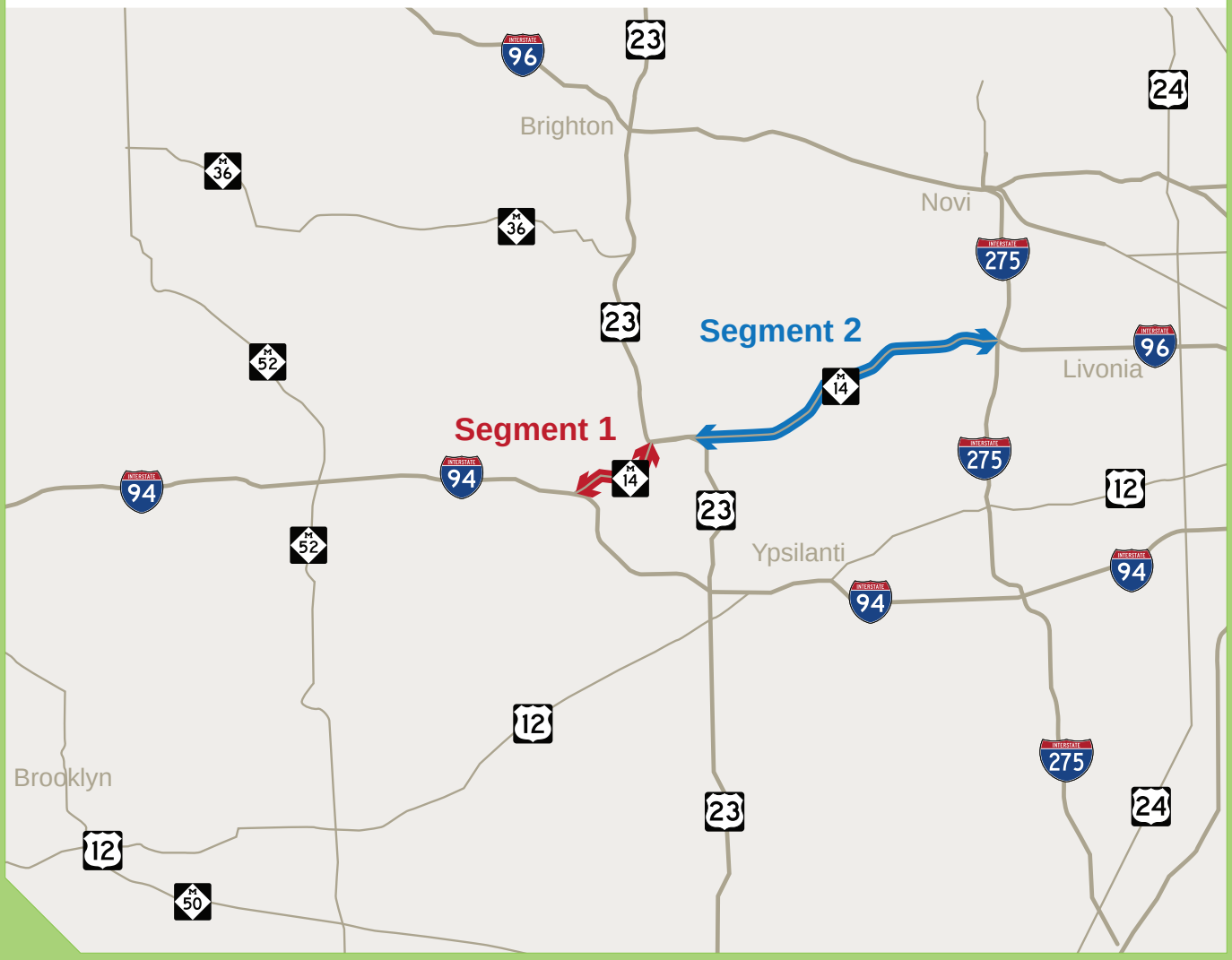
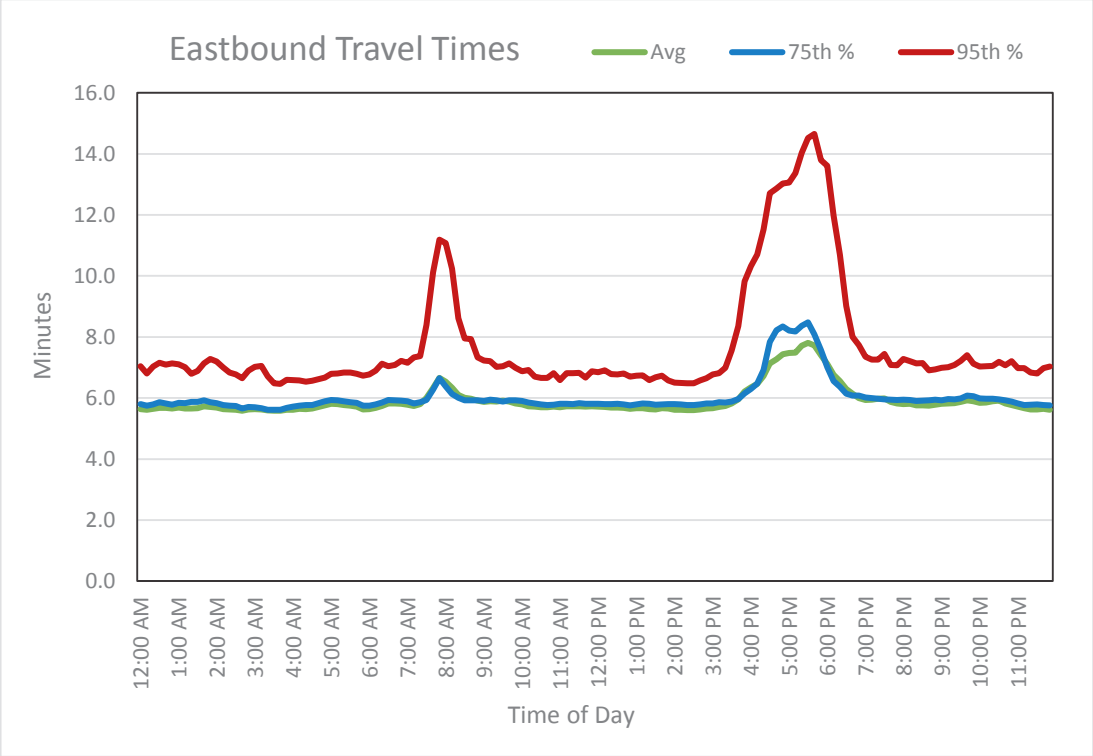


Figure 45. Segment 1- M-14 between I-94 and US-23/M-14

Segment 1

Travel time (minutes) for M-14 between I-94 and US-23/M-14



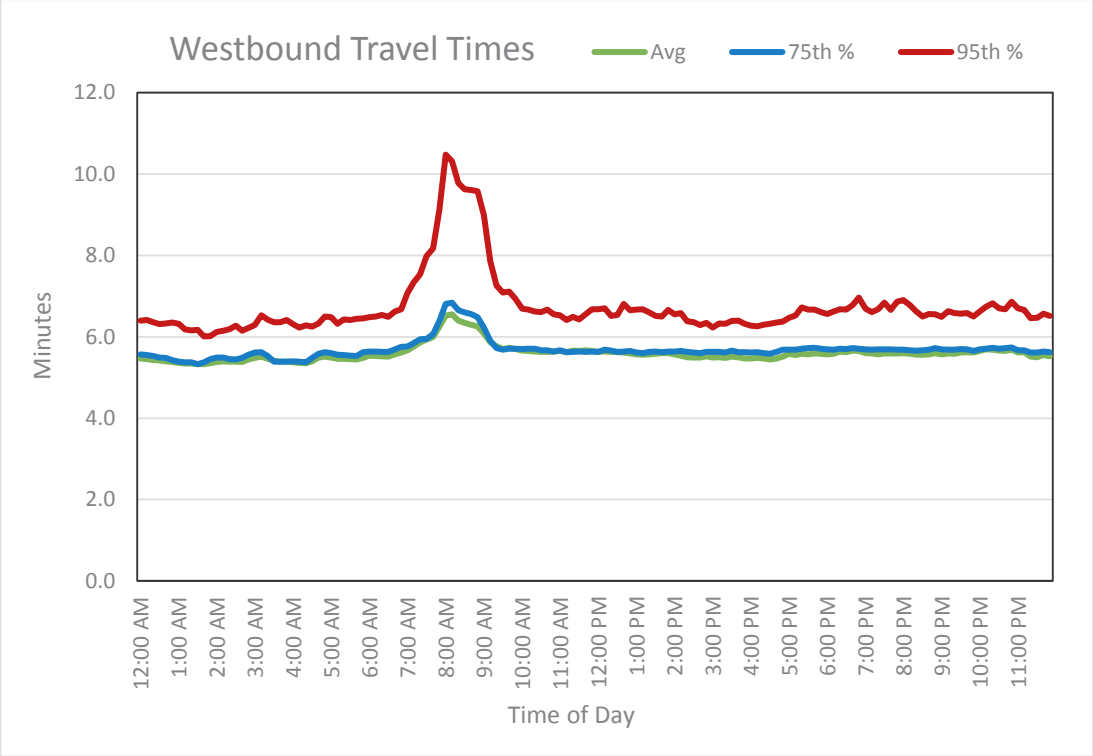
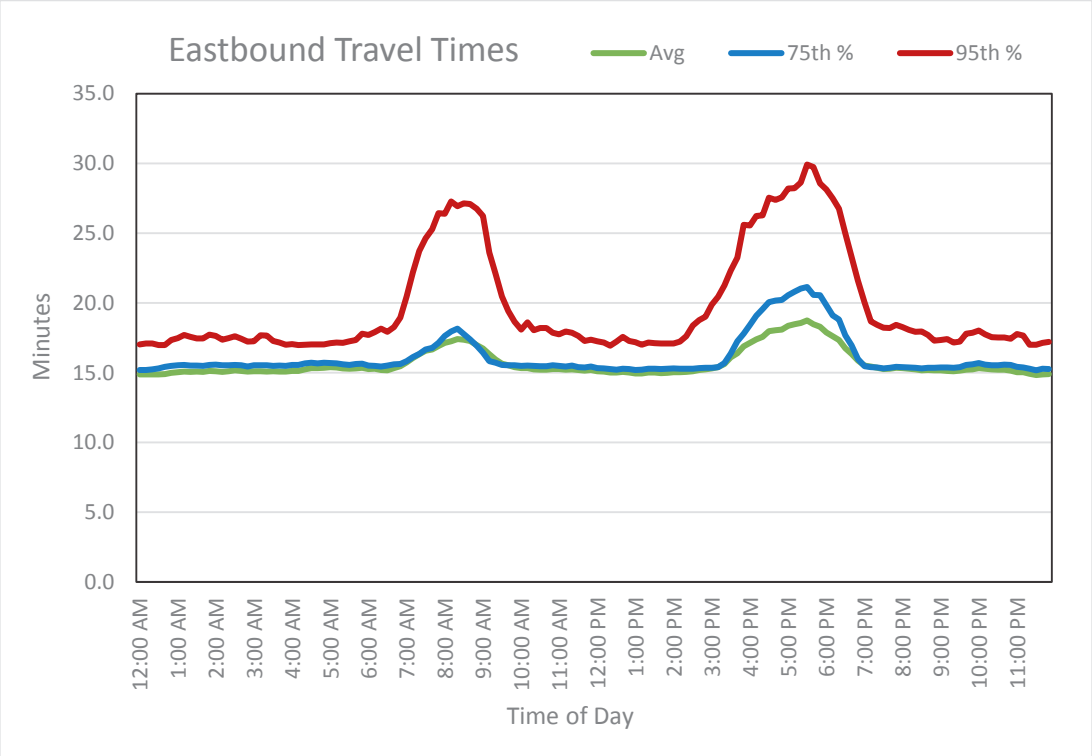
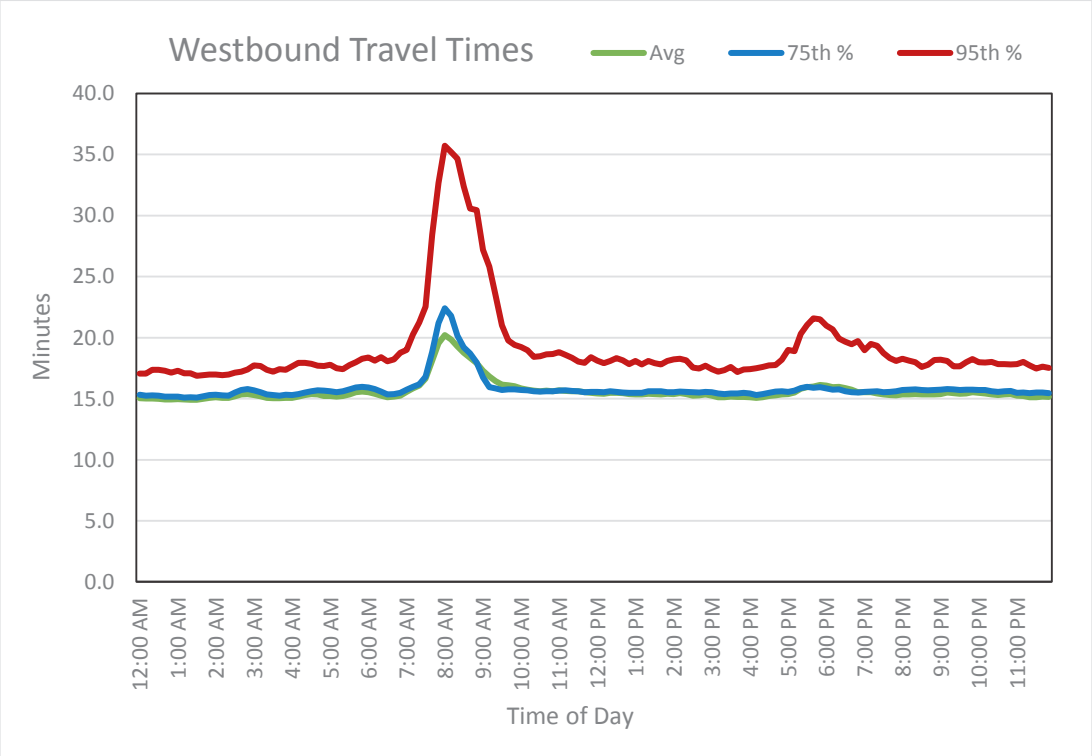


Figure 46. Segment 2- M-14 between US-23 and I-275

Segment 2

Travel time (minutes) for M-14 between US-23 and I-275





Chapter 8

Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

Interstate 75: Monroe

Interstate 94: Jackson and Washtenaw

Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

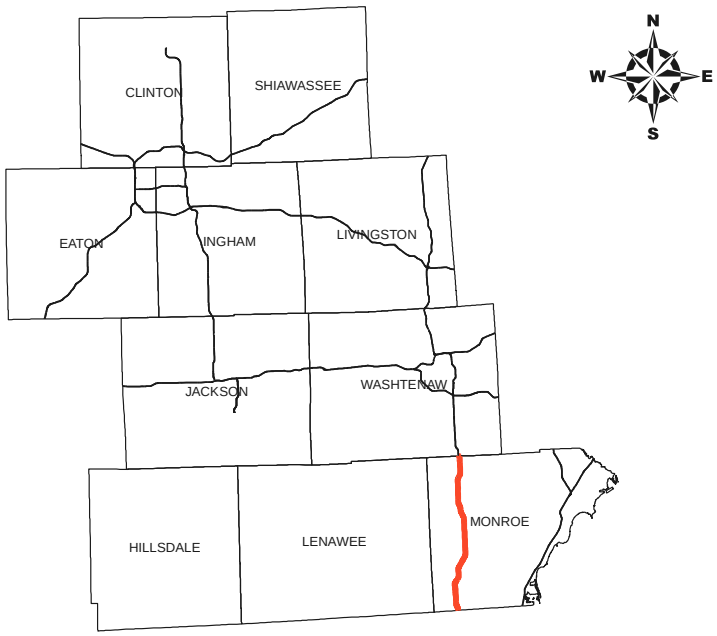
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 47. Monroe County US-23 Corridor total user cost delay



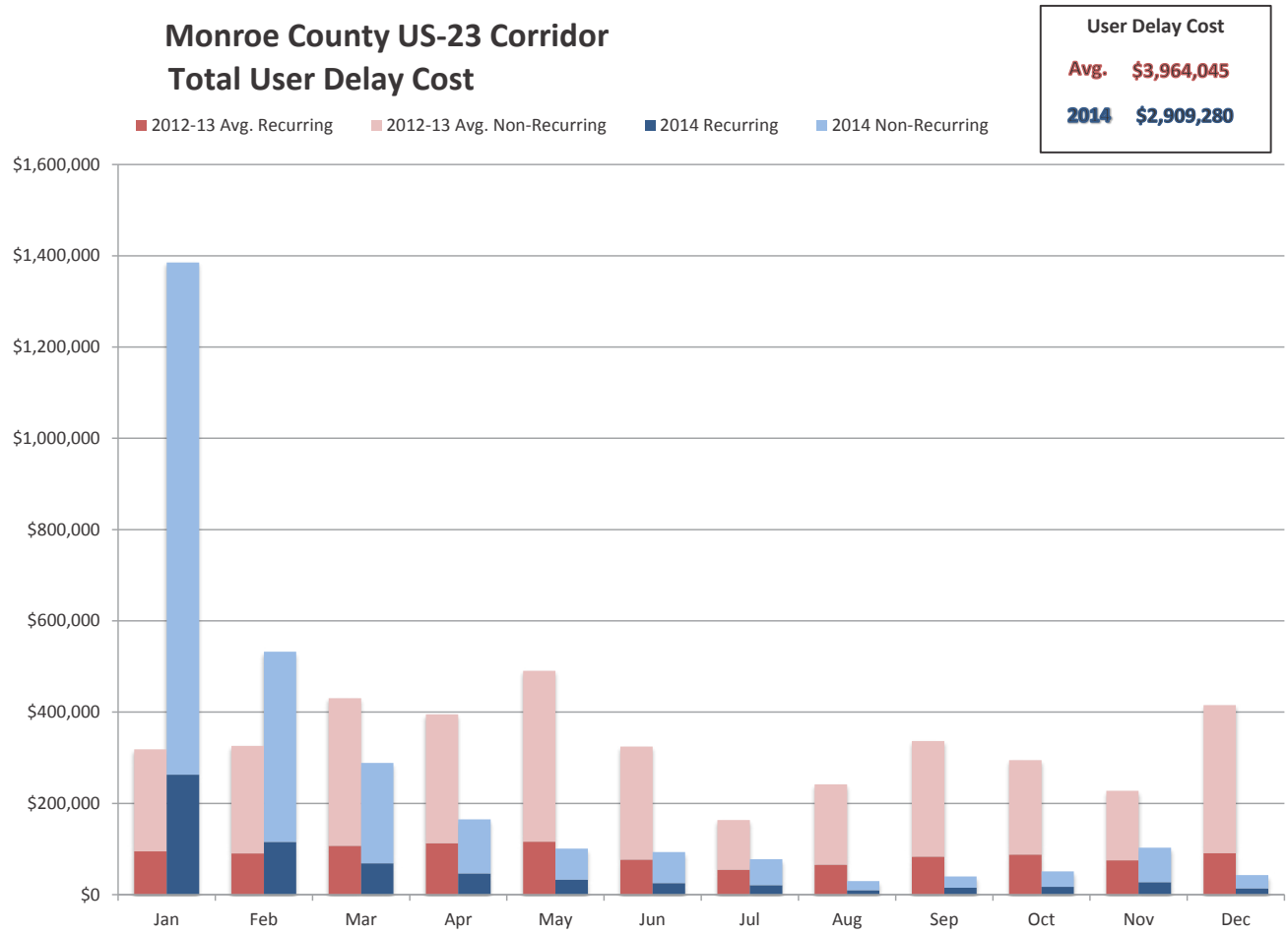
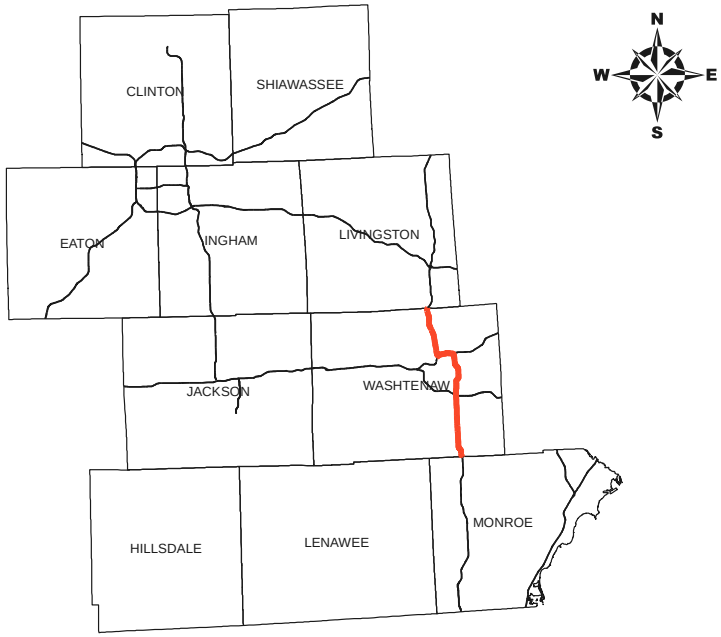


Figure 48. Washtenaw County US-23 Corridor total user cost delay



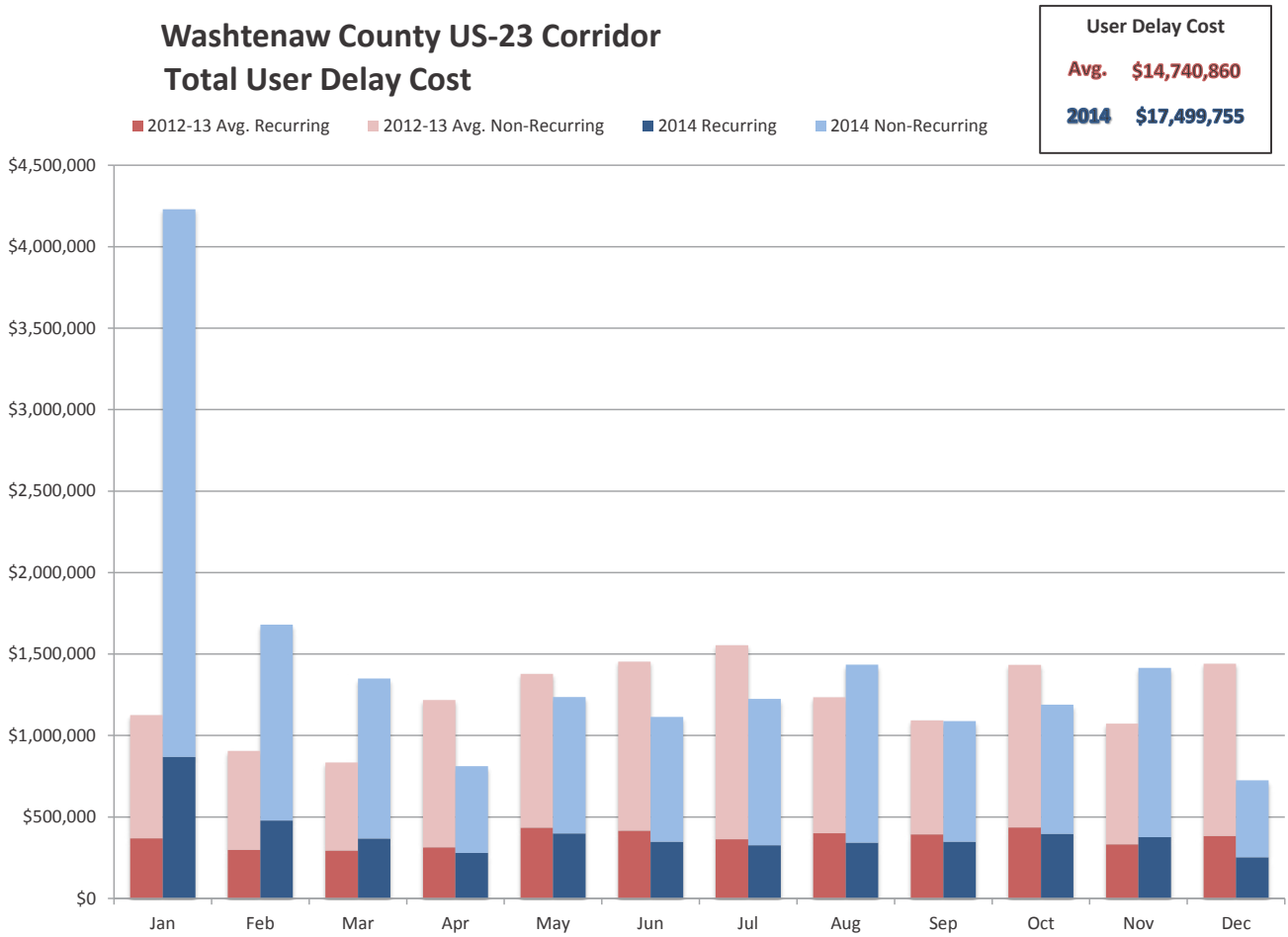
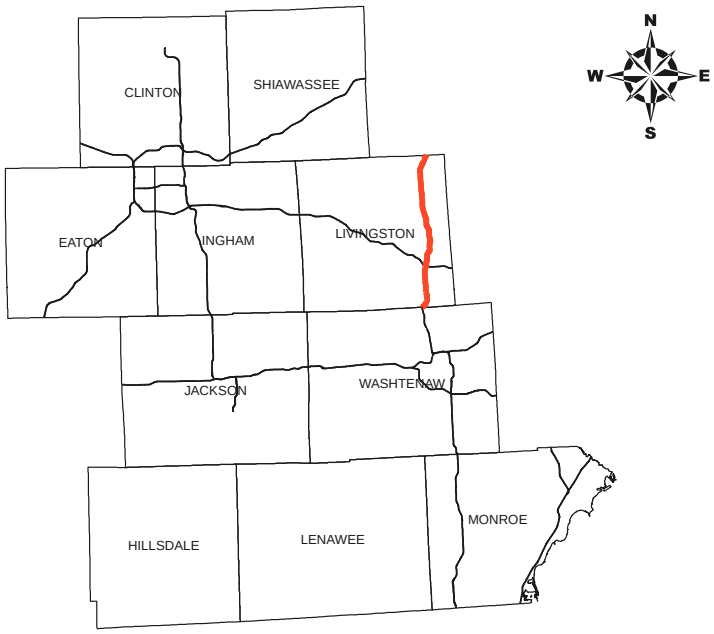


Figure 49. Livingston County US-23 Corridor total user cost delay



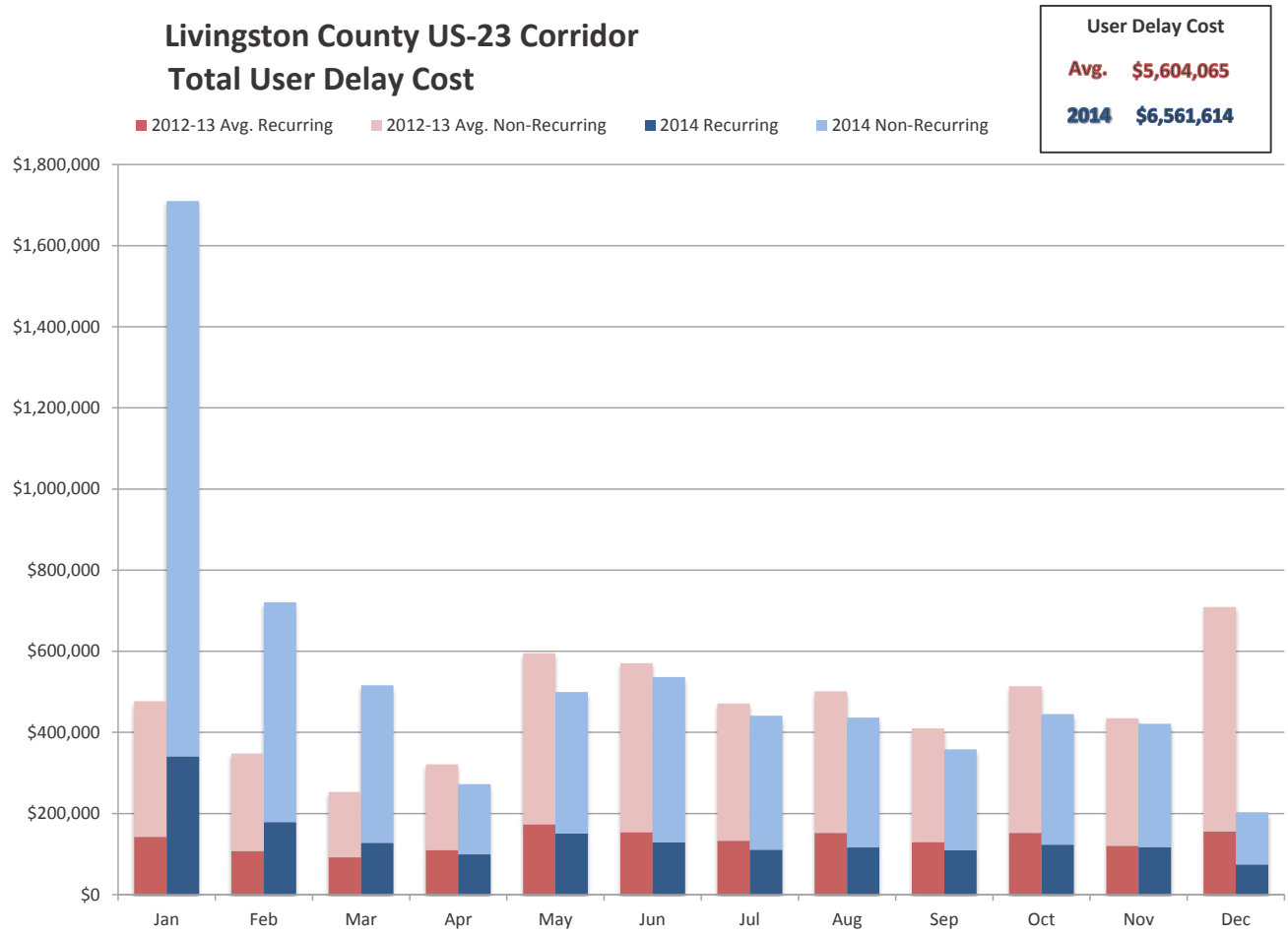


Figure 50. University Region US-23 northbound

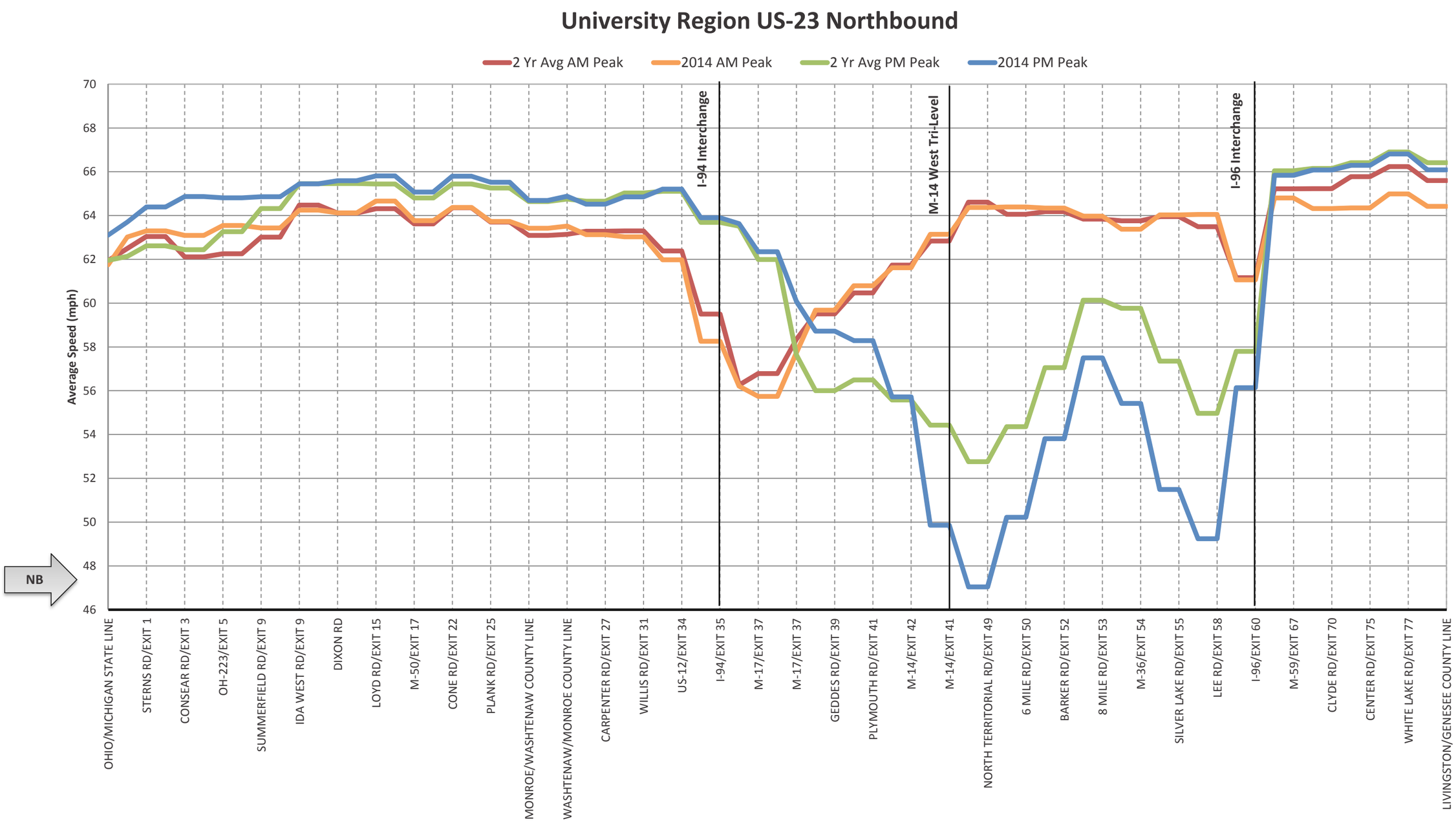
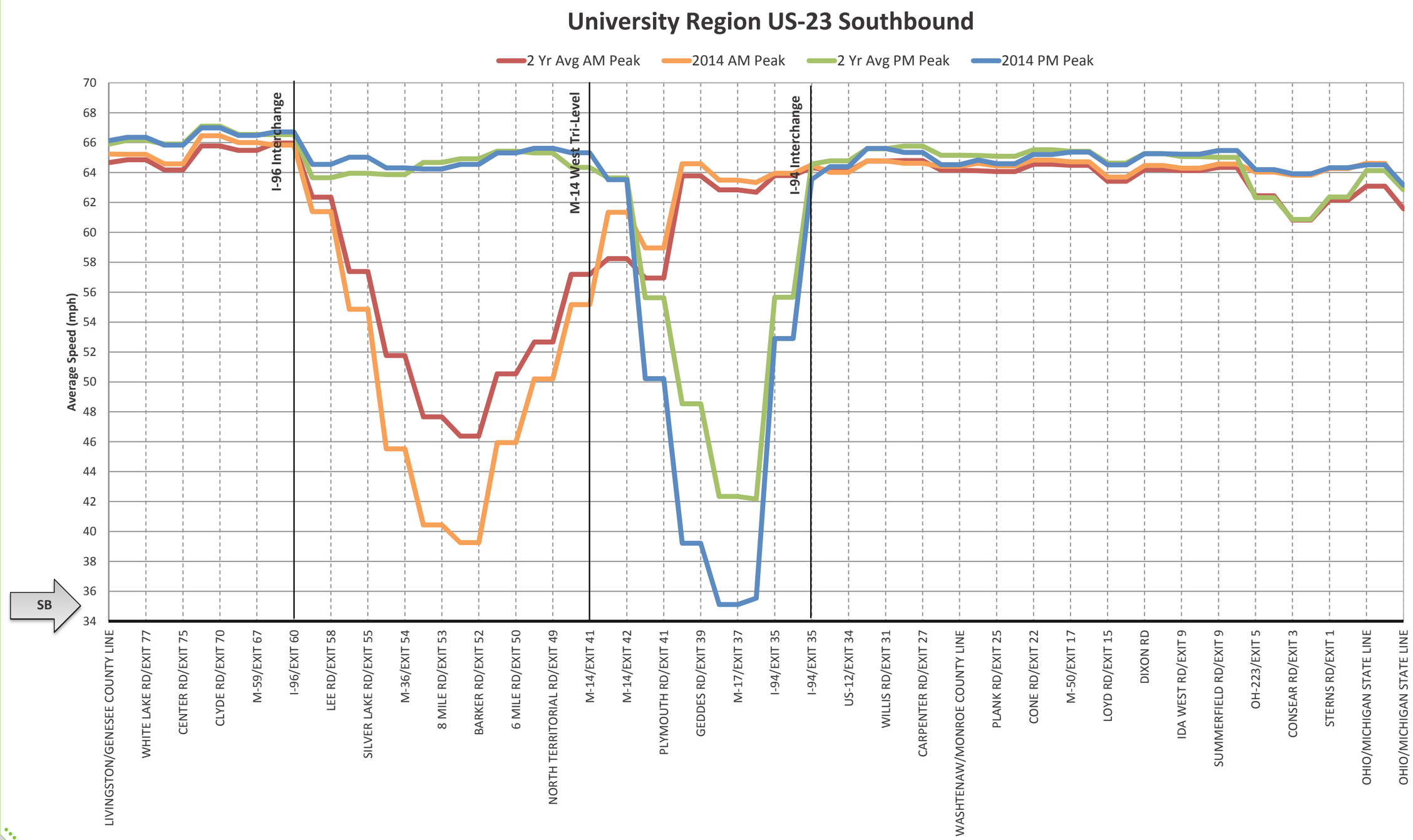


Figure 51. University Region US-23 southbound



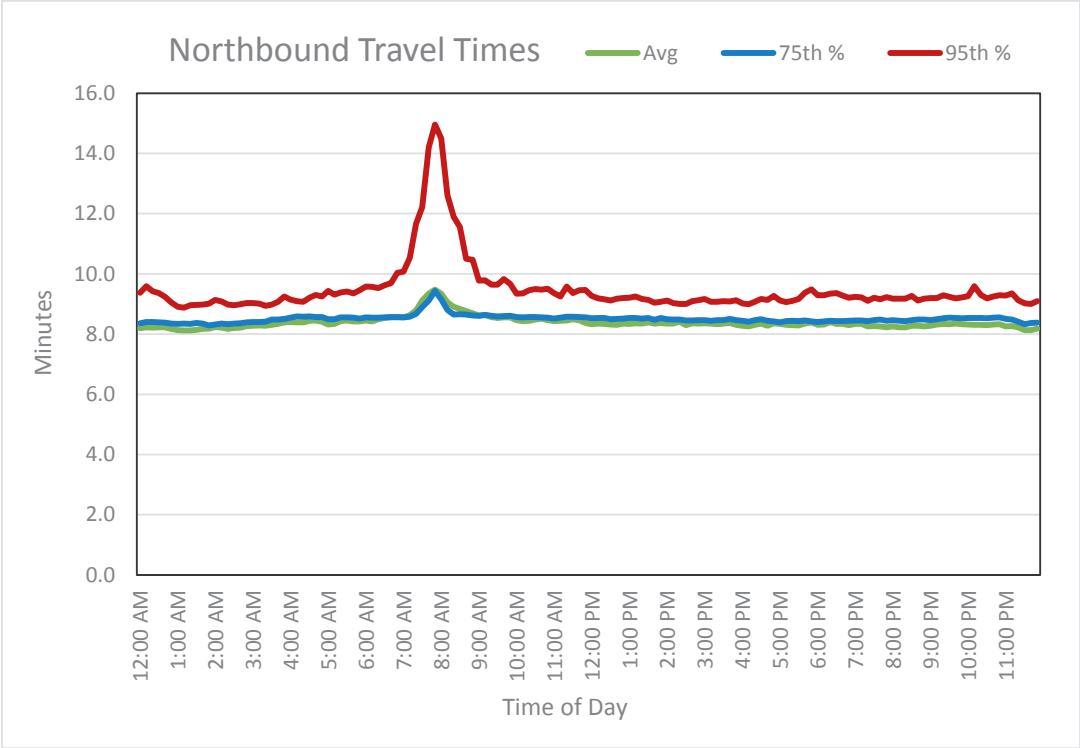
Travel Time Reliability

Figure 52. Travel time reliability US-23

Figure 53. Segment 1- US-23 between I-94 and Willis Rd

Segment 1

Travel time (minutes) for US-23 between I-94/Exit 35 and Willis Rd/Exit 31



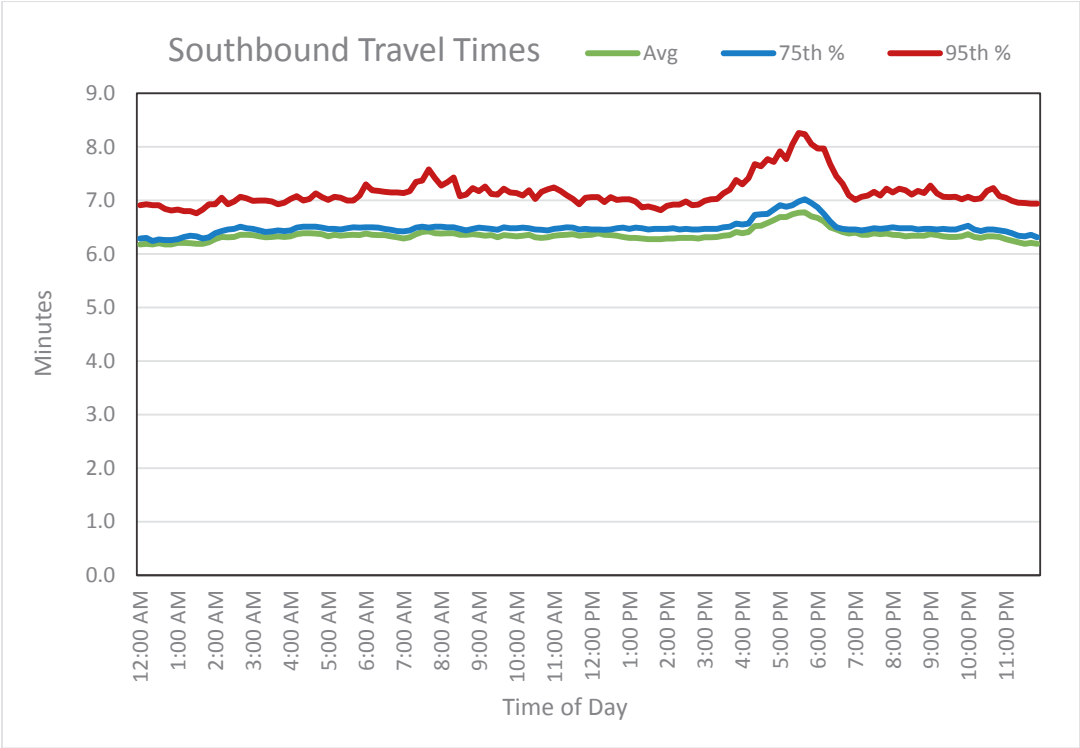
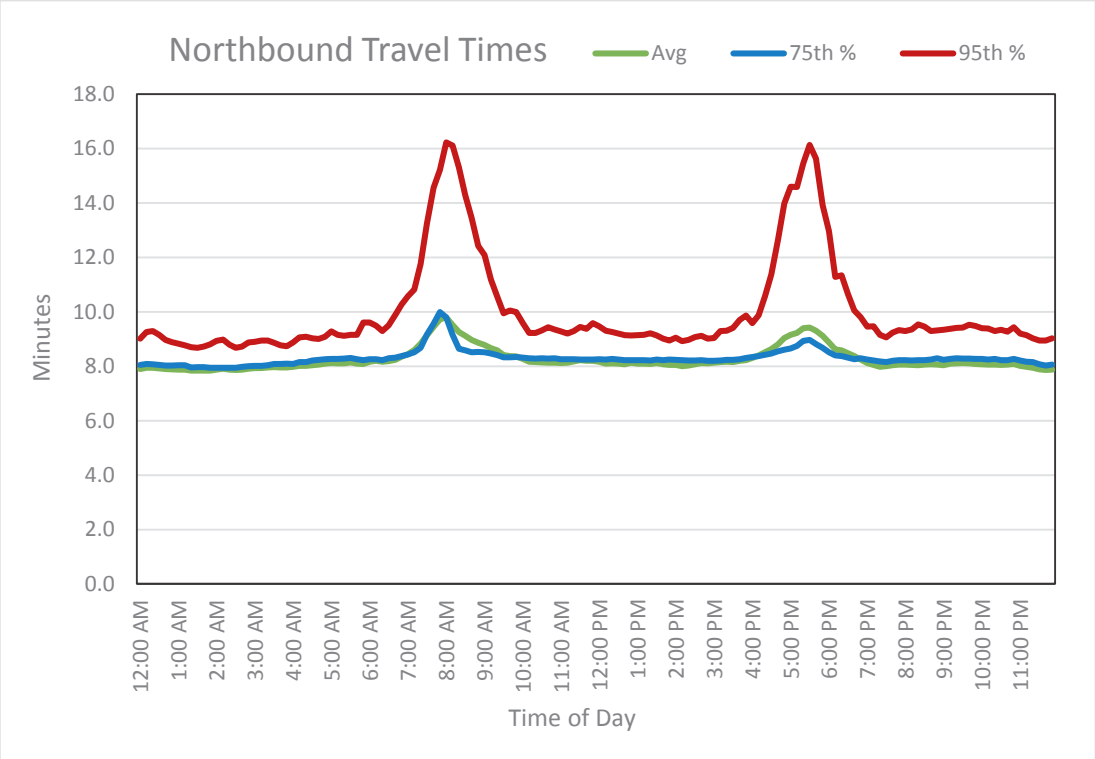


Figure 54. Segment 2- US-23 between I-94 and M-14

Segment 2

Travel time (minutes) for US-23 between I-94/Exit 35 and M-14/Exit 42



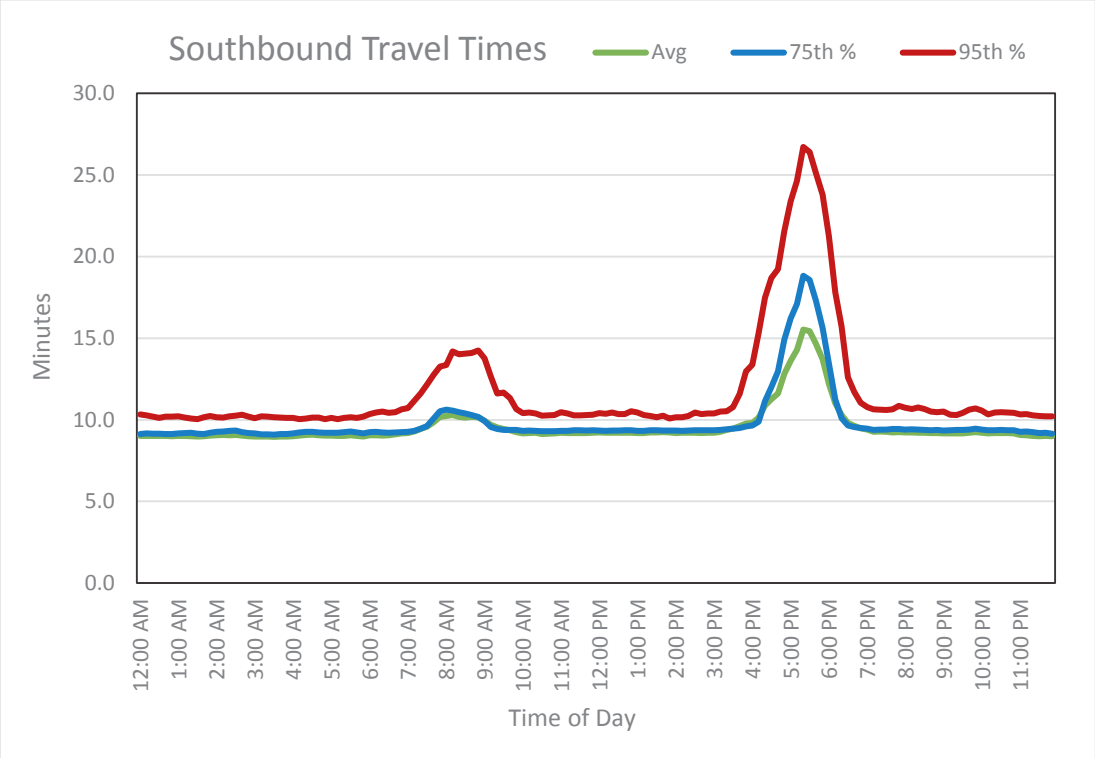
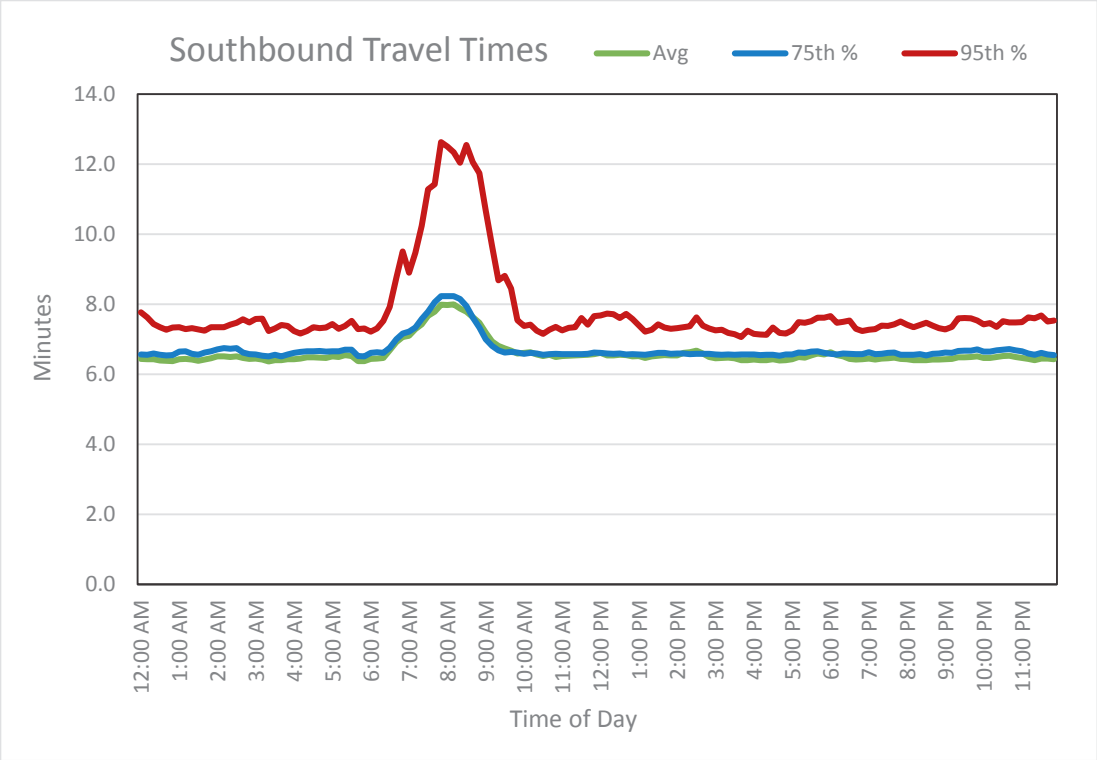


Figure 55. Segment 3- US-23 between M-14/Exit 42 and M-14/Exit 41

Segment 3

Travel time (minutes) for US-23 between M-14/Exit 42 and M-14/Exit 41



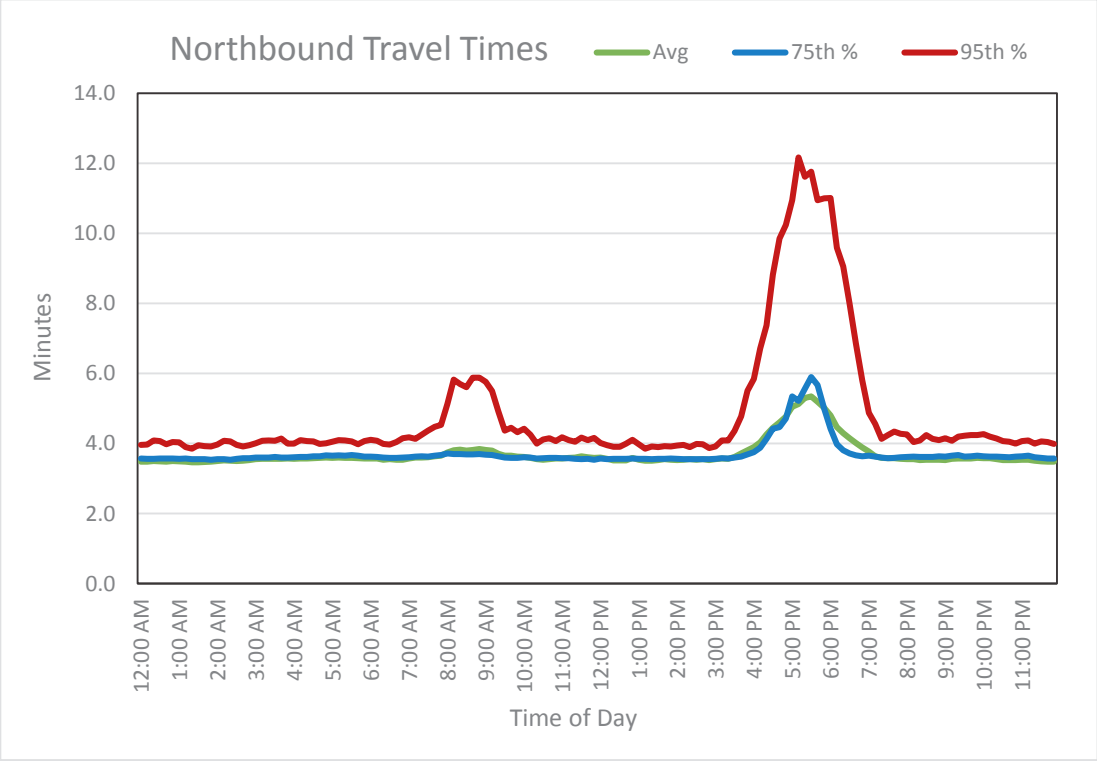
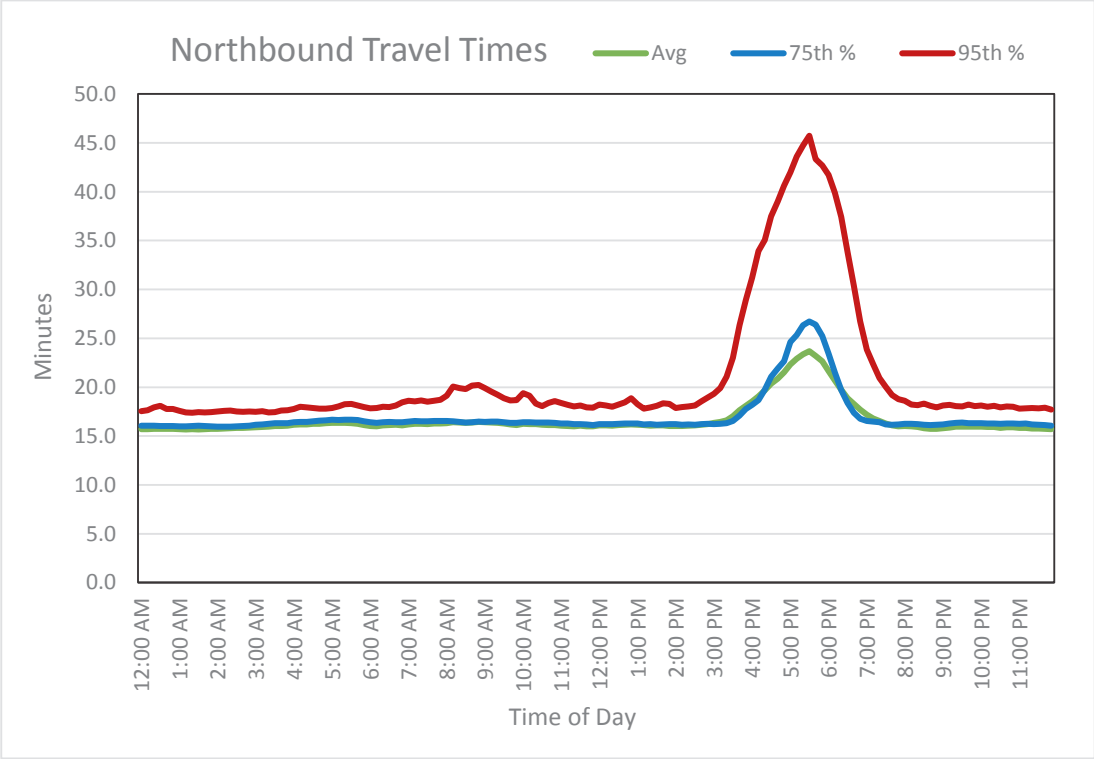
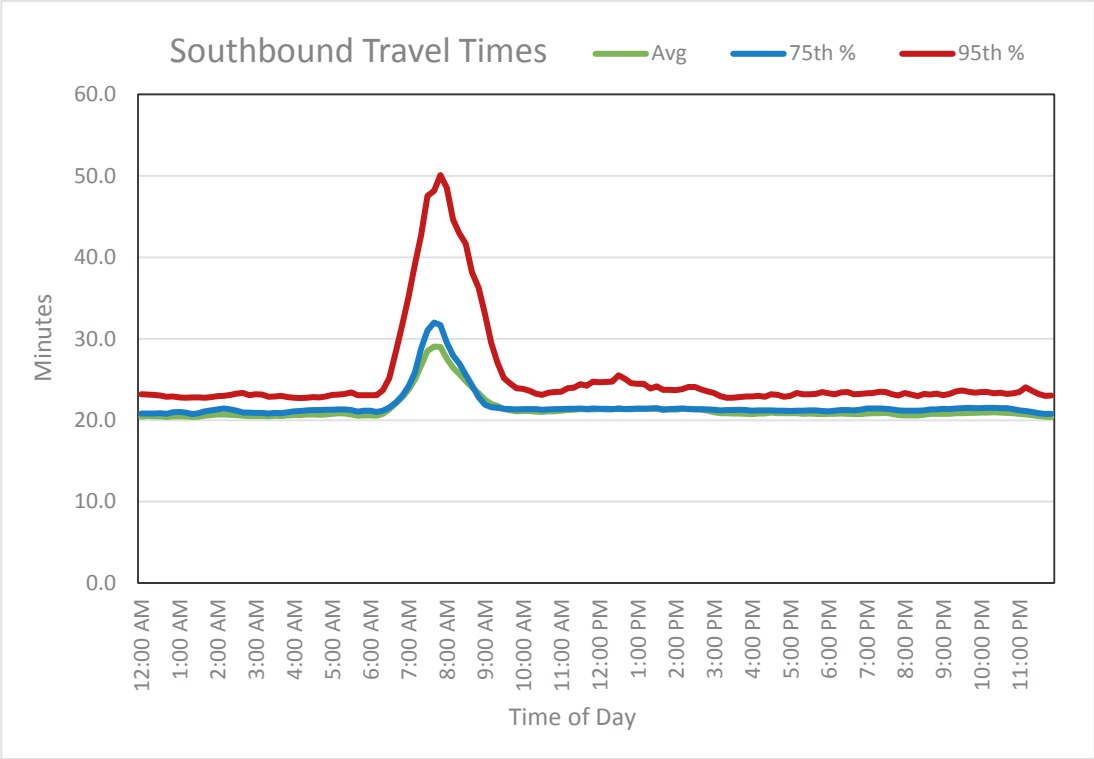


Figure 56. Segment 4- US-23 between I-96 and M-14

Segment 4

Travel time (minutes) for US-23 between I-96/Exit 60 and M-14/Exit 41





Chapter 8

Corridor

Interstate 69: Eaton, Clinton, and Shiawassee

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Interstate 94: Jackson and Washtenaw

Interstate 96: Clinton, Eaton, Ingham, and Livingston

Interstate 275: Monroe

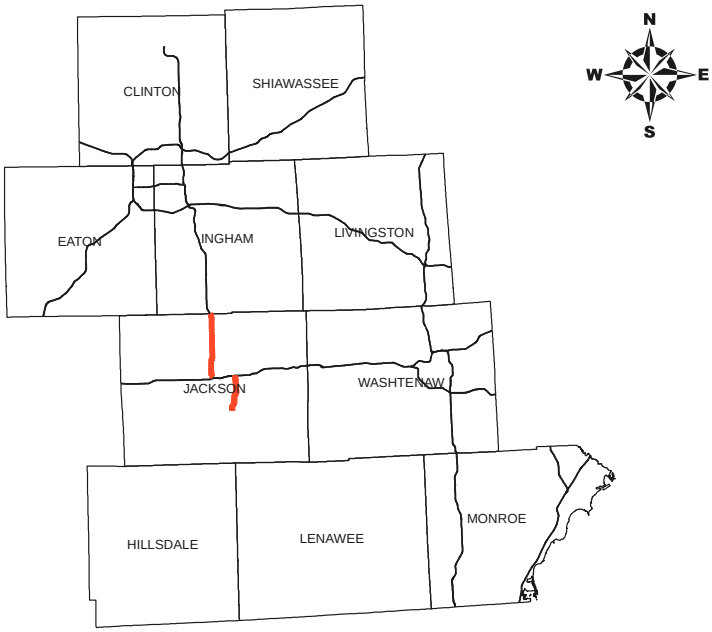
Interstate 496: Eaton and Ingham

Michigan 14: Washtenaw

US-23: Monroe, Washtenaw, and Livingston

US-127: Jackson, Ingham, and Clinton

Figure 57. Jackson County US-127 Corridor total user cost delay



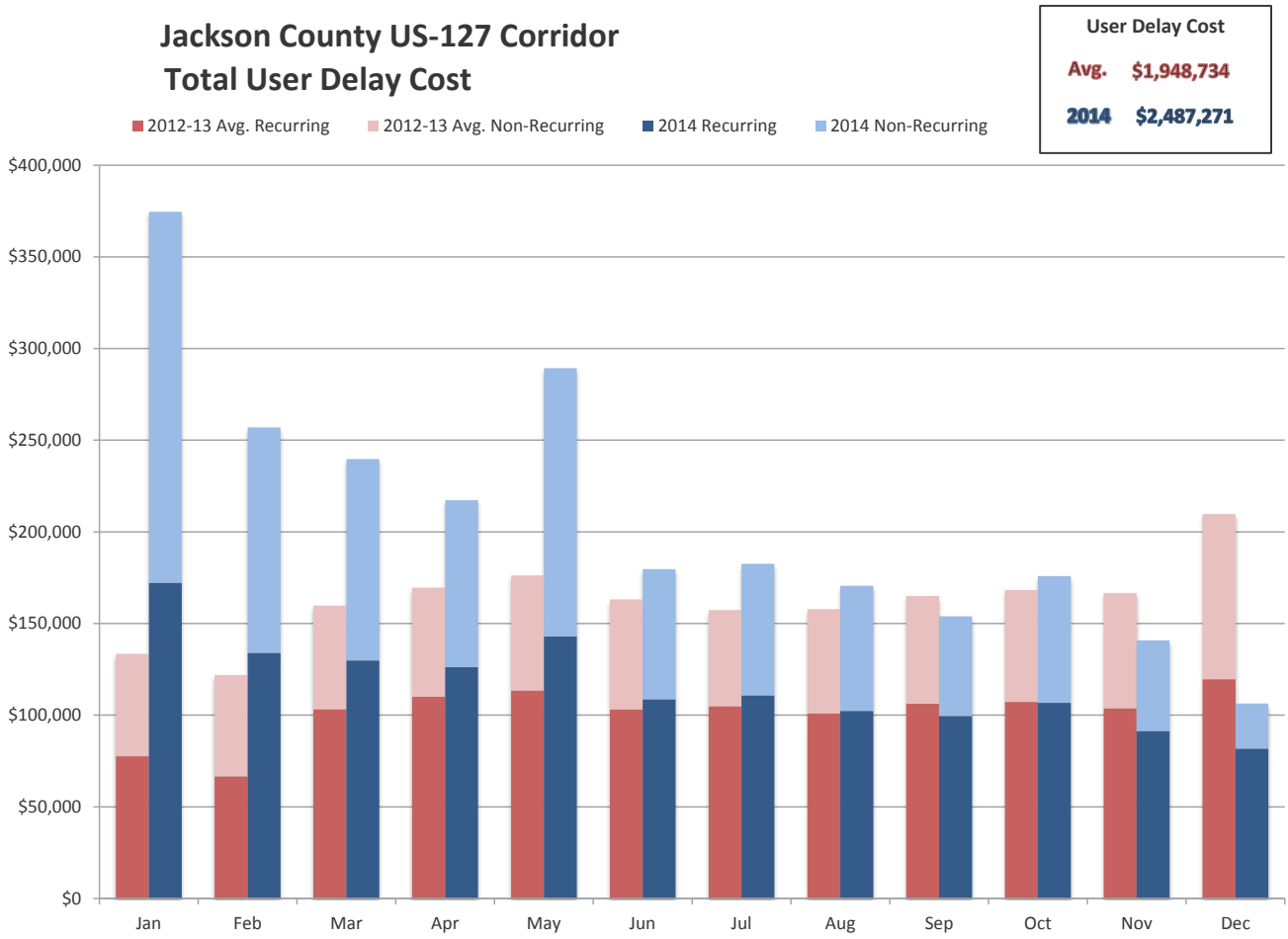
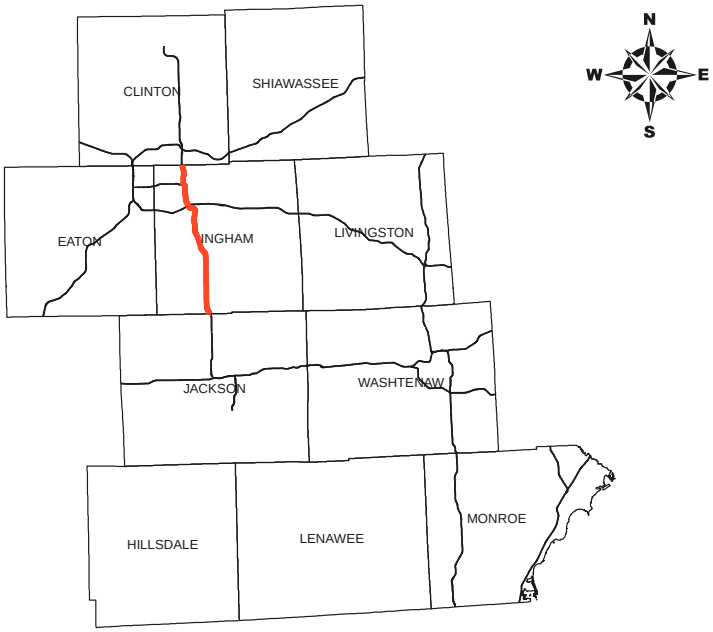


Figure 58. Ingham County US-127 Corridor total user cost delay



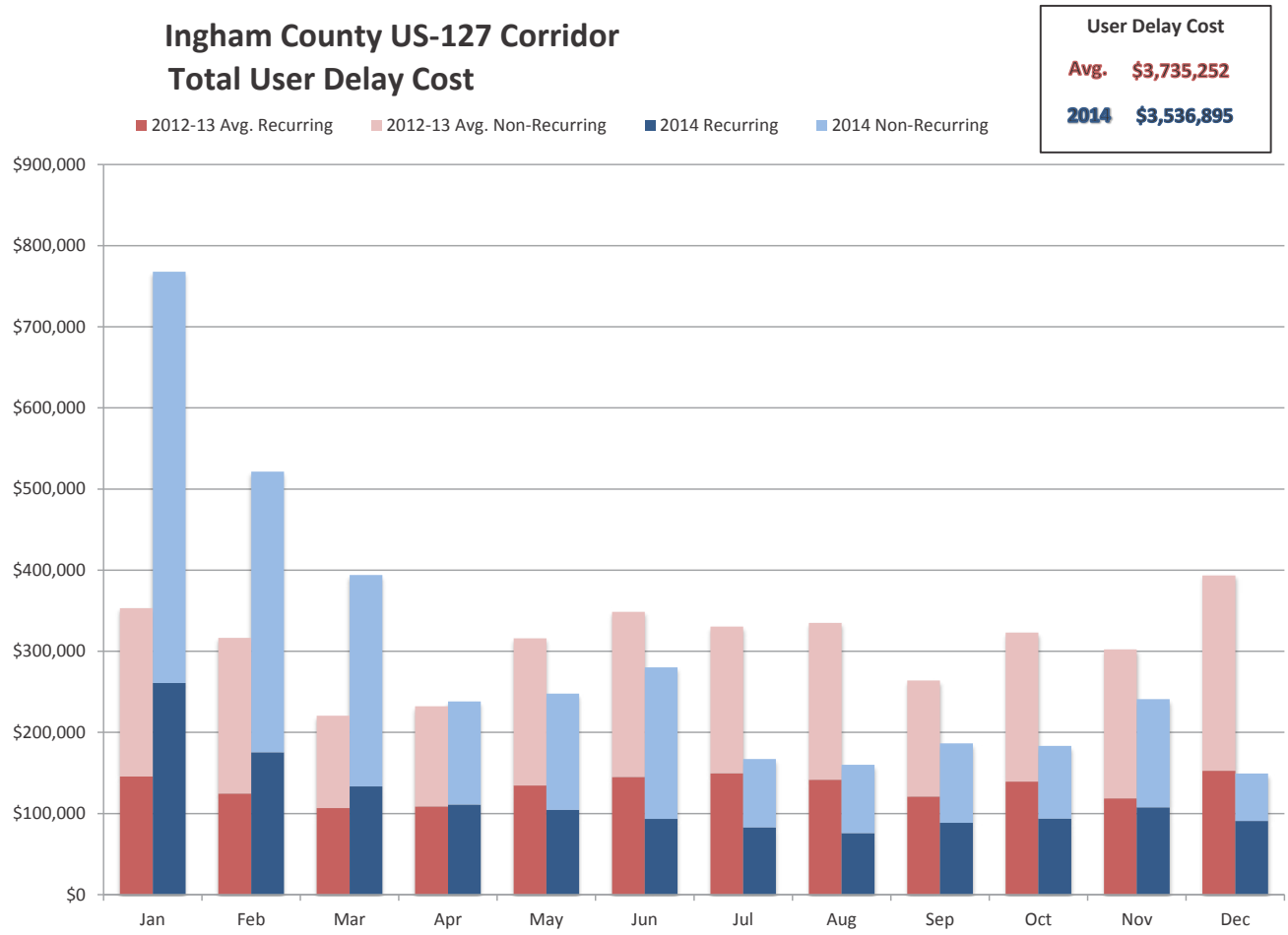
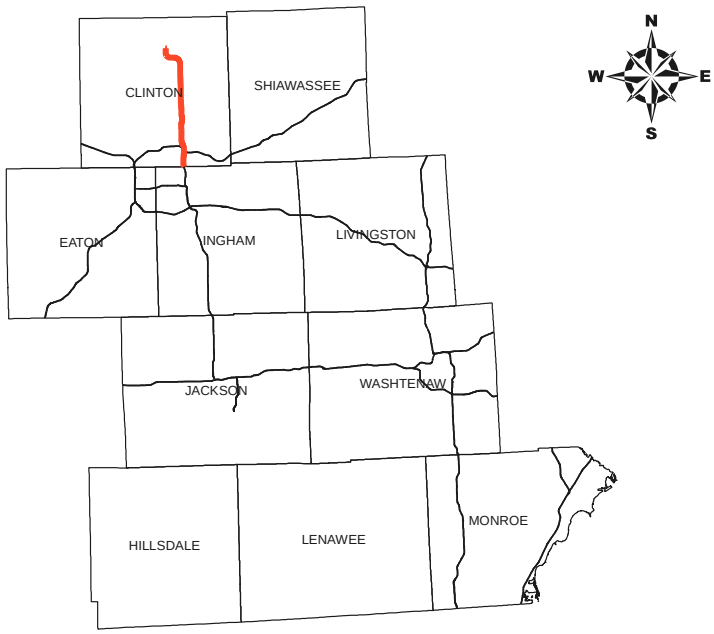


Figure 59. Clinton County US-127 Corridor total user cost delay



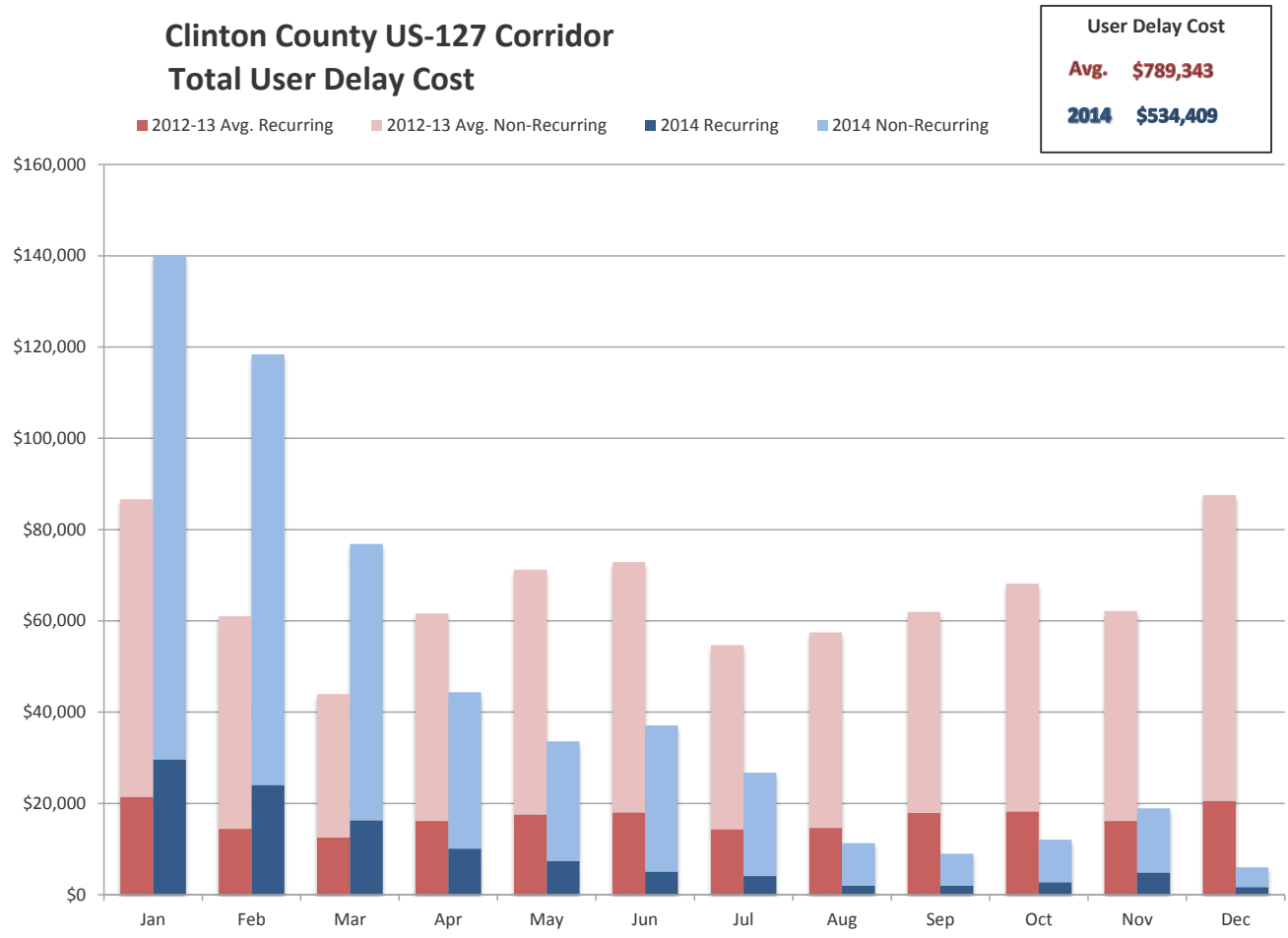


Figure 60. University Region US-127 northbound

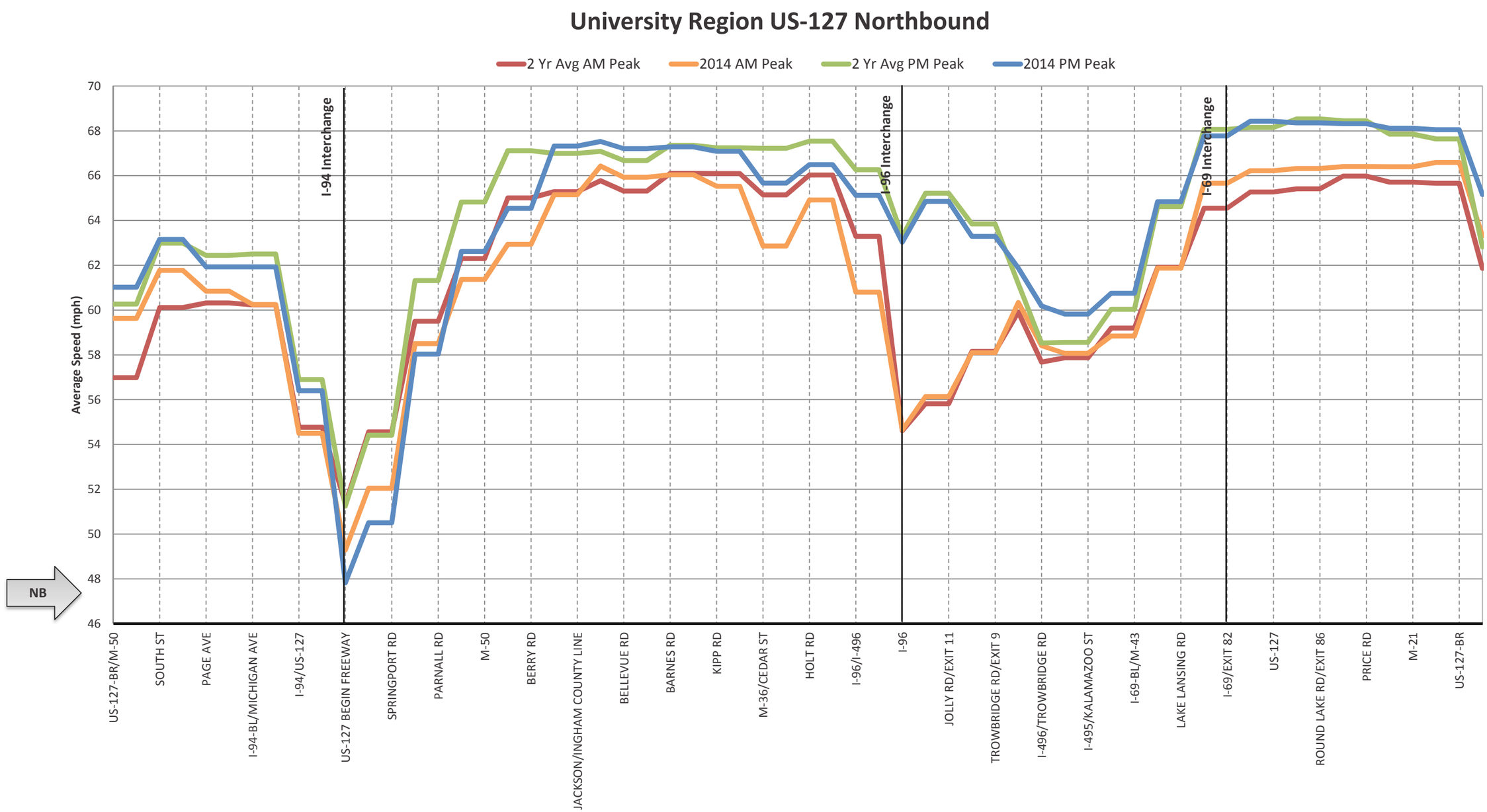
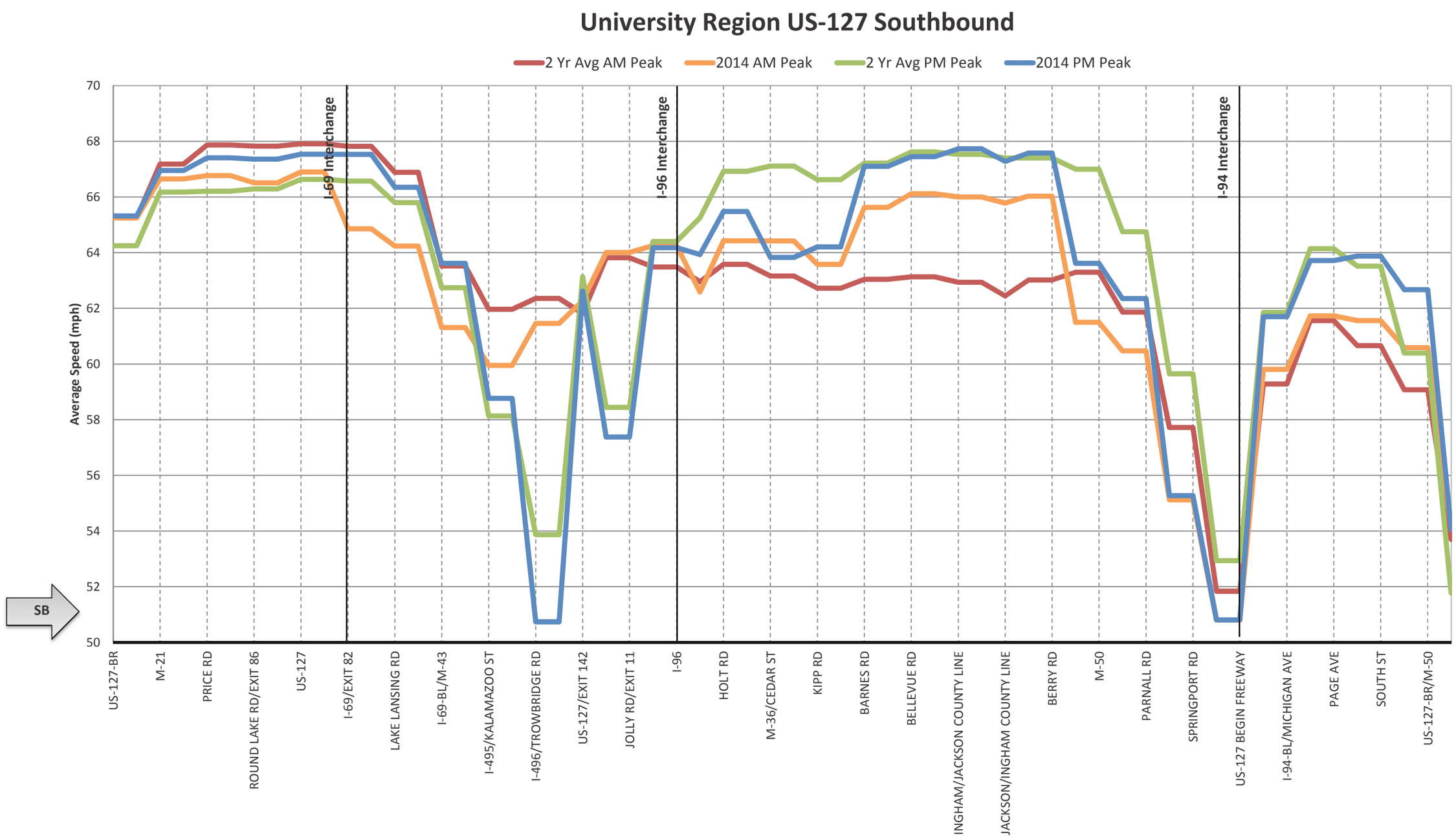


Figure 61. University Region US-127 southbound



Travel Time Reliability

Figure 62. Travel time reliability US-127

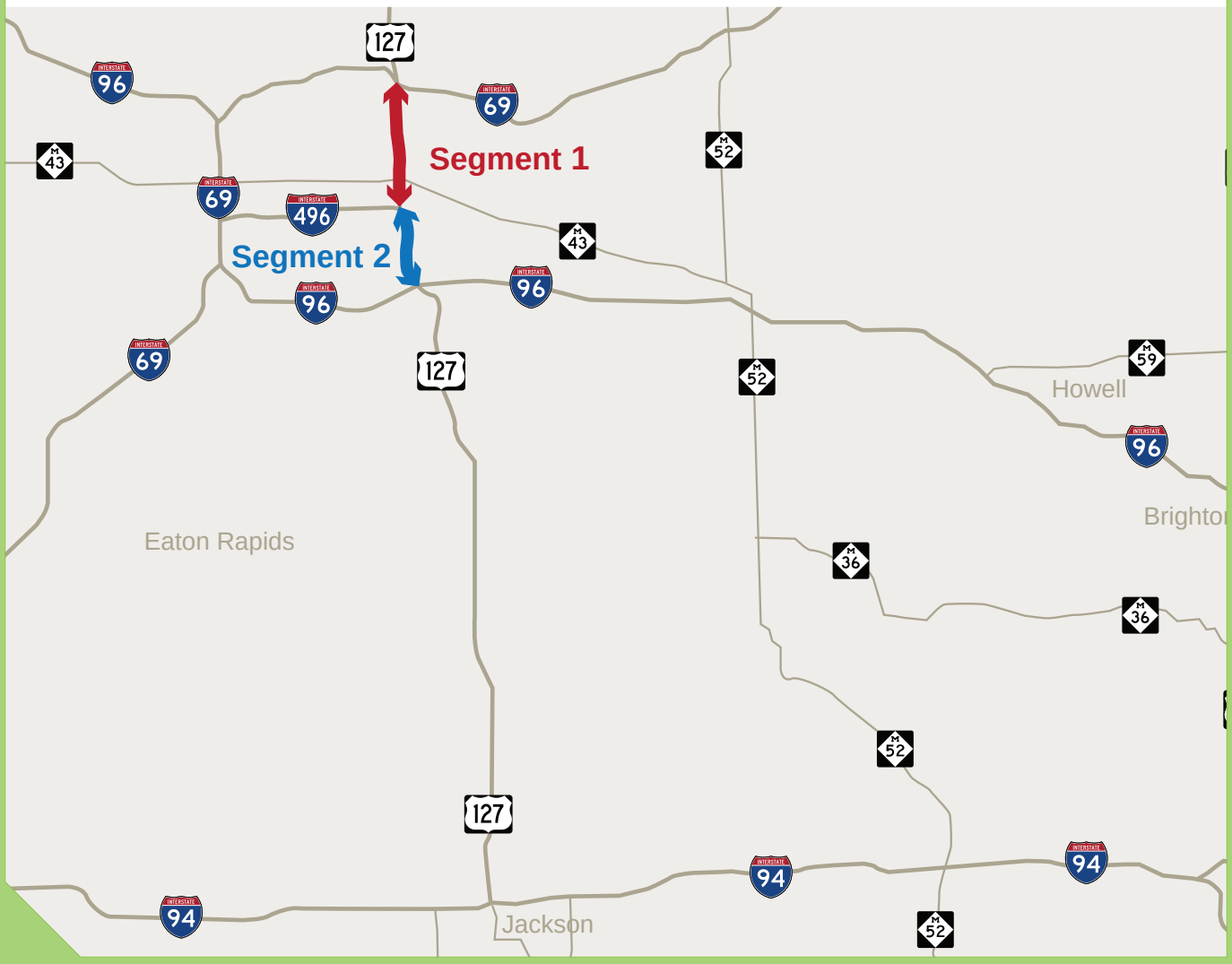
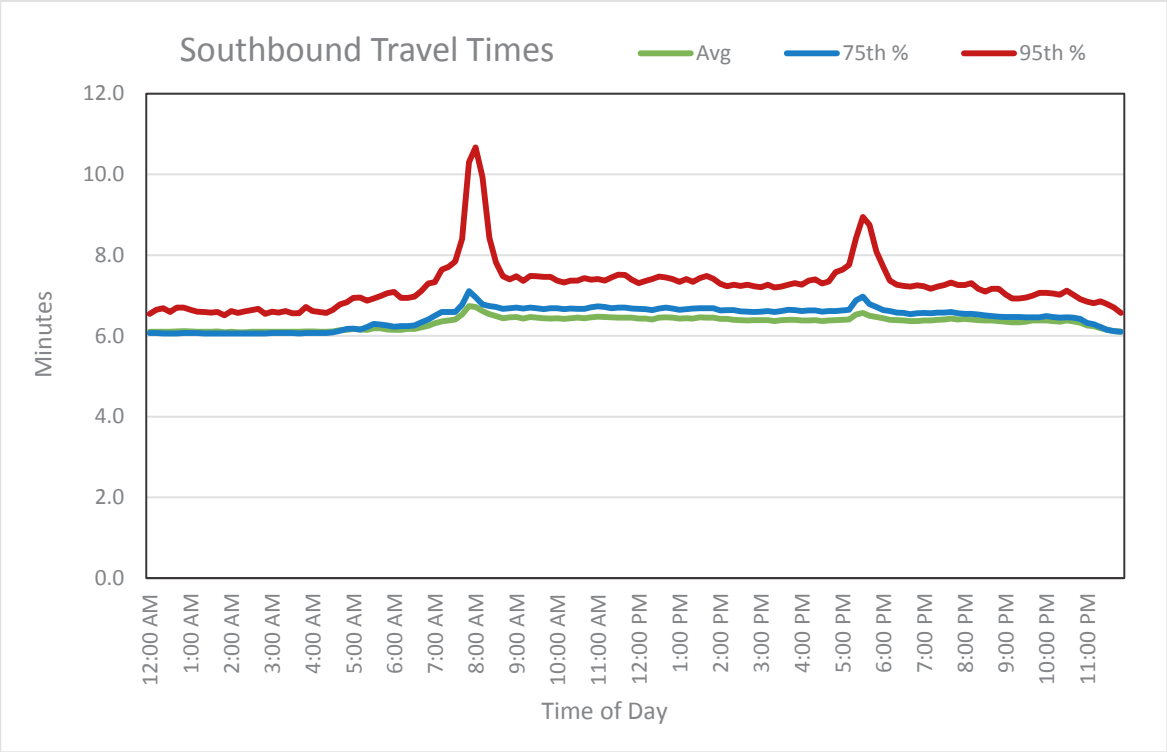


Figure 63. Segment 1- US-127 between I-496/Trowbridge Rd and I-69

Travel time (minutes) for US-127 between I-496/Trowbridge Rd and I-69/Exit 82



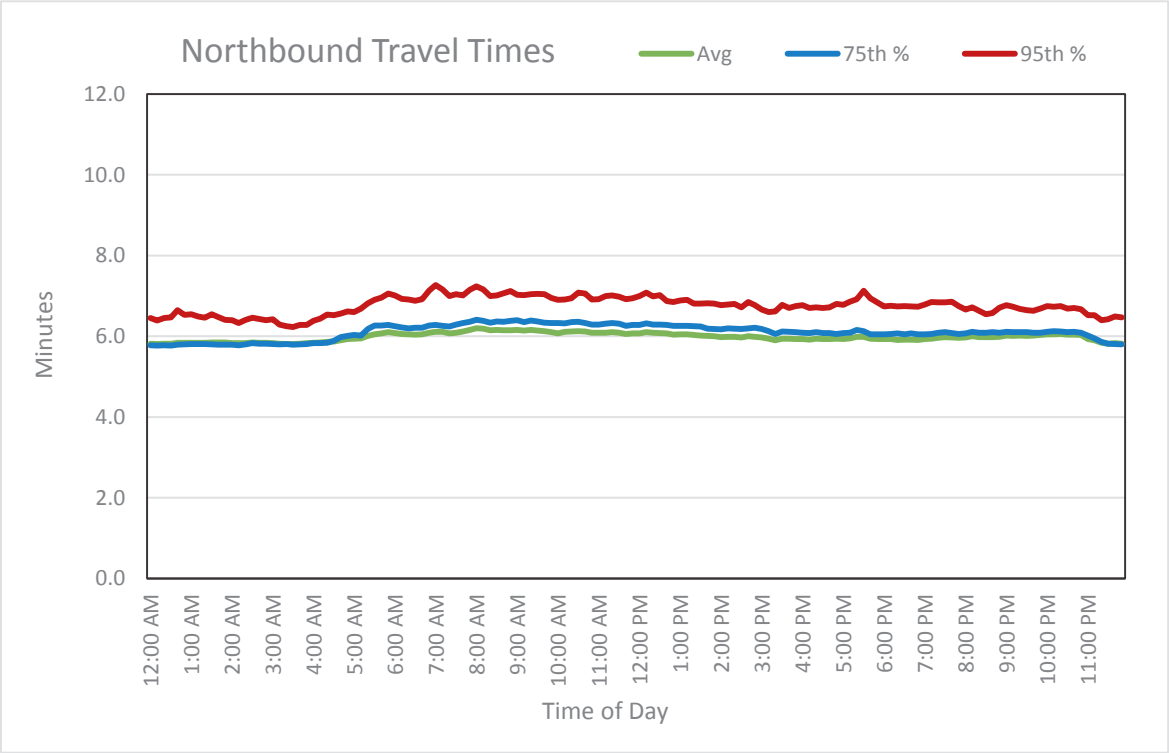
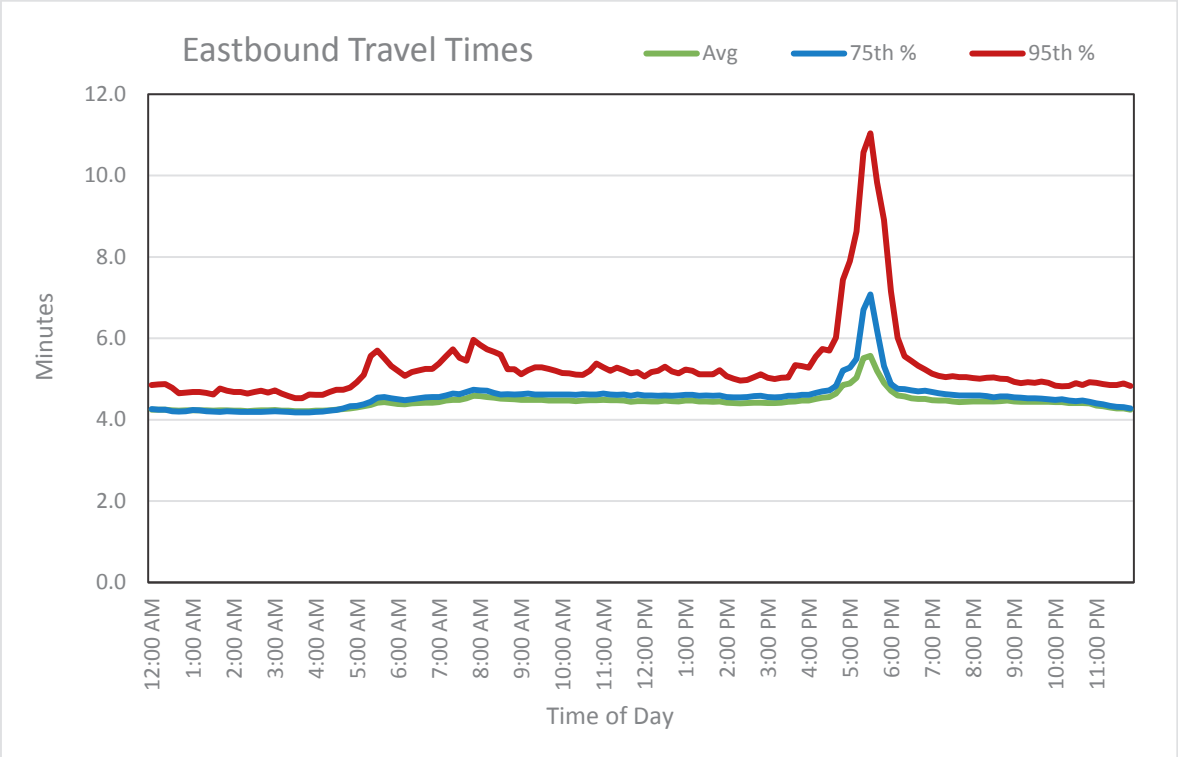
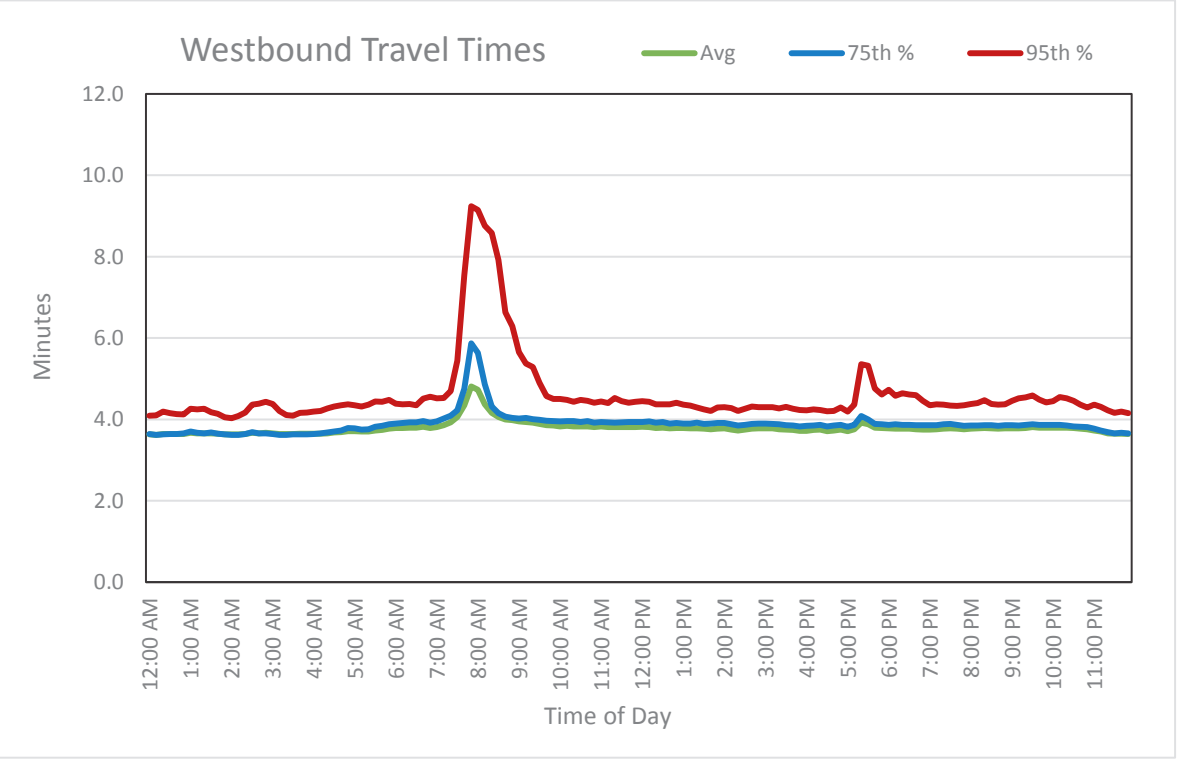


Figure 64. Segment 2- US-127 between I-496 and I-96

Travel time (minutes) for US-127 between I-496 and I-96





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