Chapter 4

METRO REGION SUMMARY

Oakland

Macomb

Wayne

St. Clair
PERFORMANCE MEASURE 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 TSC.

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 x 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.
Figure 1

2013 Metro Region User Delay Cost per Mile

UDC per Mile
- < $50,000
- $50,000 - $250,000
- $250,000 - $500,000
- > $500,000
Figure 2

2013 Metro Region Congestion Hours Northbound/Eastbound

Map showing congestion hours for different areas in the Metro Region. The map is color-coded to indicate congestion hours as follows:
- < 50
- 50 - 150
- 150 - 250
- > 250

Key areas highlighted include:
- Macomb - St. Clair TSC
- Oakland TSC
- Detroit TSC
- Taylor TSC

Legend:
- Green: < 50
- Yellow: 50 - 150
- Orange: 150 - 250
- Red: > 250
Figure 3

2013 Metro Region Congestion Hours Southbound/Westbound

Map showing congestion hours in the Metro Region Southbound/Westbound, with different colors indicating various duration ranges.
Figure 4

Detroit TSCI-75 Corridor
User Delay Cost

*Recurring/Non-Recurring data not available

Total UDC
20.2: $30,326,752
20.3: $39,626,340
Figure 5

Detroit TSC I-75 Northbound
Average Weekday AM Peak Speed

MM 42 - MM 59

MM 42 - MM 59

Detroit TSC I-75 Northbound
Average Weekday PM Peak Speed
Figure 6
Figure 7

**Detroit TSCI I-75 Corridor - Northbound**
Summer Friday Peak Speed

- 2012: 17:00
- 2013: 16:00
- Ave: 17:00

**Detroit TSCI I-75 Corridor - Southbound**
Summer Suncay Peak Speed

- 2012: 2:00
- 2013: 1:00
- Ave: 2:00
Figure 8
Figure 9

Detroit TSC I-75 Corridor - Southbound
2012 Congestion

2013 Congestion
Figure 10
Figure 11

Detroit TSC I94 Eastbound
Average Weekday AM Peak Speed

Detroit TSC I94 Eastbound
Average Weekday PM Peak Speed
Figure 12

Detroit TSC I-94 Westbound
Average Weekday AM Peak Speed

Detroit TSC I-94 Westbound
Average Weekday PM Peak Speed
Figure 13
Figure 14

Detroit TSCI-94 Corridor - Westbound
2012 Congestion

Detroit TSCI-94 Corridor - Westbound
2013 Congestion
Figure 15

Detroit TSCI-96 Corridor User Delay Cost

2012: $5,026,464
2013: $6,723,354

*Recurring/Non-Recurring data not available
**Figure 16**

*Detroit TSC I-96 Eastbound*

**Average Weekday AM Peak Speed**
- 2012
- 2013

**Average Speed (mph)**
- **M-59 Interchange**
- **1-94 Interchange**
- **1-75 Interchange**

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*Detroit TSC I-96 Eastbound*

**Average Weekday PM Peak Speed**
- 2012
- 2013

**Average Speed (mph)**
- **M-59 Interchange**
- **1-94 Interchange**
- **1-75 Interchange**

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Figure 17

Detroit TSC I-96 Westbound
Average Weekday AM Peak Speed

Detroit TSC I-96 Westbound
Average Weekday PM Peak Speed
Figure 18

Detroi TSC I-96 Corridor - Eastbound
2012 Congestion

Detroi TSC I-96 Corridor - Eastbound
2013 Congestion
Figure 19

Detroit TSCI-96 Corridor - Westbound
2012 Congestion

Detroit TSCI-96 Corridor - Westbound
2013 Congestion
Figure 20

Detroit TSC I-375 Corridor
User Delay Cost

Total UDC
2012: $2,163,238
2013: $2,784,113

Detroit TSC I-375 Corridor
2012 User Delay Cost

39%
33%
39%

Car $812,078
Truck $228,292
Truck $39,880
Car $1289,028

61%

2012 LDC: $2,163,238

Detroit TSC I-375 Corridor
2013 User Delay Cost

40%
54%

Car $1,051,417
Truck $32,899
Truck $48,251
Car $1,611,511

2013 UDC: $2,784,113
Figure 21

Detroit TSC I-375 Northbound
Average Weekday AM Peak Speed

Detroit TSC I-375 Northbound
Average Weekday PM Peak Speed
Figure 22

**Detroit TSC I-375 Southbound**

**Average Weekday AM Peak Speed**

**Detroit TSC I-375 Southbound**

**Average Weekday PM Peak Speed**
Figure 23

Detroit TSC M-10 Corridor
User Delay Cost

2012: $11,684,254
2013: $13,899,962

*Recurring/Non-Recurring data not available
Figure 26
Figure 27

Detroit TSC M-10 Corridor - Southbound
2012 Congestion

2013 Congestion

(M-10)

(M-10)
Figure 28

Detroit TSC M-39 Corridor User Delay Cost

2012: $16,528,788
2013: $19,618,857

*Recurring/Non-Recurring data not available
Figure 29

Detroit TSC M-39 Northbound
Average Weekday AM Peak Speed

Detroit TSC M-39 Northbound
Average Weekday PM Peak Speed
Figure 30

Detroit TSC M-39 Southbound
Average Weekday AM Peak Speed

Detroit TSC M-39 Southbound
Average Weekday PM Peak Speed
Figure 31

Detroit TSC M-39 Corridor - Northbound
2012 Congestion

2013 Congestion
Figure 32
Figure 33

Macomb/St. Clair TSC I-69 Corridor
User Delay Cost

2012 User Delay Cost
- Recurring
- Non Recurring

2013 User Delay Cost
- Recurring
- Non Recurring

Total UDC
2012: $1,500,217
2013: $1,485,746
Figure 34

Maconb/St. Clair TSC I-69 Eastbound
Average Weekday AM Peak Speed

Maconb/St. Clair TSC I-69 Eastbound
Average Weekday PM Peak Speed
**Figure 35**

**Macomb/St. Clair TSC I-69 Westbound**

**Average Weekday AM Peak Speed**

- **MM173-MM199**

- **Capac Road Interchange**
- **M-19 Interchange**
- **Bath Road Interchange**

**Macomb/St. Clair TSC I-69 Westbound**

**Average Weekday PM Peak Speed**

- **MM173-MM199**

- **Capac Road Interchange**
- **M-19 Interchange**
- **Bath Road Interchange**
Figure 36
Figure 37
Figure 38

Macomb - St. Clair TSC I-94 Corridor
User Delay Cost

2012 User Delay Cost
- Recurring
- Non Recurring

2013 User Delay Cost
- Recurring
- Non Recurring

Total UDC
2012: $19,289,967
2013: $24,144,591

2012 UDC: $19,289,967
2013 UDC: $24,144,591
Figure 39

Macomb/St. Clair TSC I-94 Eastbound
Average Weekday AM Peak Speed

Macomb/St. Clair TSC I-94 Eastbound
Average Weekday PM Peak Speed
Figure 40

Maconb/St. Clair TSC I-94 Westbound
Average Weekday AM Peak Speed

Maconb/St. Clair TSC I-94 Westbound
Average Weekday PM Peak Speed
Figure 42

Nacomb/St. Clair TSC I-94 Corridor - Westbound
2012 Congestion

8 Mile interchange
1696 interchange

Nacomb/St. Clair TSC I-94 Corridor - Westbound
2013 Congestion

8 Mile interchange
1696 interchange
Figure 43

**Macon - St. Clair TSC I-696 Corridor**

**User Delay Cost**

- 2012 Recurring
- 2012 Non-Recurring
- 2013 Recurring
- 2013 Non-Recurring

**Total UDC**
- 2012: $11,662,107
- 2013: $14,393,012

- **2012 UDC:** $11,662,107
- **2013 UDC:** $14,393,012
Figure 44

Macomb/St. Clair TSC I-696 Eastbound
Average Weekday AM Peak Speed

Macomb/St. Clair TSC I-696 Eastbound
Average Weekday PM Peak Speed
Figure 45

Macomb/St. Clair TSC I-696 Westbound
Average Weekday AM Peak Speed

Macomb/St. Clair TSC I-696 Westbound
Average Weekday PM Peak Speed
Figure 46

Nacomb/St. Clair TSC I-596 Corridor - Eastbound
2012 Congestion

Nacomb/St. Clair TSC I-596 Corridor - Eastbound
2013 Congestion
Figure 47

Macomb/St. Clair TSC I-696 Corridor - Westbound
2012 Congestion

Macomb/St. Clair TSC I-696 Corridor - Westbound
2013 Congestion
Figure 48
Figure 49
Figure 50

Macomb/St. Clair TSCM-53 Southbound
Average Weekday AM Peak Speed

Macomb/St. Clair TSCM-53 Southbound
Average Weekday PM Peak Speed
Figure 51

Macomb/St. Clair TSC M-53 Corridor - Northbound
2012 Congestion

Macomb/St. Clair TSC M-53 Corridor - Northbound
2013 Congestion
Figure 52

Macomb/St. Clair TSC M-53 Corridor - Southbound
2012 Congestion

Macomb/St. Clair TSC M-53 Corridor - Southbound
2013 Congestion
**Figure 53**

**Oakland TSC I-75 Corridor**

**User Delay Cost**

- **2012 Recurring**
- **2012 Non-Recurring**
- **2013 Recurring**
- **2013 Non-Recurring**

**Total UDC**

- **2012**: $45,179,445
- **2013**: $54,513,982

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**Oakland TSC I-75 Corridor**

- **2012 User Delay Cost**
  - **Recurring**: $22,033,697
  - **Non-Recurring**: $2,161,084

- **Truck**: $1,450,790
- **Car**: $90,675,874

**2012 UDC**: $45,179,445

- **48%**
- **52%**

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**Oakland TSC I-75 Corridor**

- **2013 User Delay Cost**
  - **Recurring**: $27,745,464
  - **Non-Recurring**: $2,034,808

- **Truck**: $1,667,128
- **Car**: $423,083,181

**2013 UDC**: $54,513,982

- **45%**
- **55%**
Figure 54

Oakland TSC I-75 Northbound Average Weekday AM Peak Speed (2012 vs. 2013)

Oakland TSC I-75 Northbound Average Weekday PM Peak Speed (2012 vs. 2013)
Figure 55

Oakland TSC I-75 Southbound
Average Weekday AM Peak Speed

Oakland TSC I-75 Southbound
Average Weekday PM Peak Speed
Figure 56
Figure 57

Oakland TSCI I-75 Corridor - Northbound
2012 Congestion

- Off Peak
- AM Peak
- Afternoon Peak
- PM Peak

Weighted Congestion Hours

2013 Congestion

- Off Peak
- AM Peak
- Afternoon Peak
- PM Peak

Weighted Congestion Hours
Figure 58

Oakland TSC I-75 Corridor - Southbound
2012 Congestion

Oakland TSC I-75 Corridor - Southbound
2013 Congestion
Figure 59

Oakland TSC I-96 Corridor
User Delay Cost

Total UDC
2012: $13,131,240
2013: $18,526,116

2012 User Delay Cost
- Recurring
- Non Recurring

2013 User Delay Cost
- Recurring
- Non Recurring

2012 UDC: $13,131,240
2013 UDC: $18,526,116
Figure 60

Oakland TSC I-96 Eastbound
Average Weekday AM Peak Speed

Oakland TSC I-96 Eastbound
Average Weekday PM Peak Speed
Figure 61

Oakland TSC I-96 Westbound
Average Weekday AM Peak Speed

Oakland TSC I-96 Westbound
Average Weekday PM Peak Speed
Figure 62

Oakland TSC I-96 Corridor - Eastbound
2012 Congestion

Oakland TSC I-96 Corridor - Eastbound
2013 Congestion
Figure 63

Oakland TSC I-96 Corridor - Westbound
2012 Congestion

2013 Congestion
Figure 64

Oakland TSCI-696 Corridor
User Delay Cost

2012 Recurring  2012 Non-Recurring  2013 Recurring  2013 Non-Recurring

Total UDC
2012: $30,816,249
2013: $45,000,954

Oakland TSCI-696 Corridor
2012 User Delay Cost

Recurring  Non Recurring

2012 UDC: $30,816,249

Oakland TSCI-696 Corridor
2013 User Delay Cost

Recurring  Non Recurring

2013 UDC: $45,000,954
Figure 67

Oakland TSCI I-696 Corridor - Eastbound
2012 Congestion

Oakland TSCI I-696 Corridor - Eastbound
2013 Congestion
Figure 68
Figure 69

Oakland TSC M-10 Corridor
User Delay Cost

Total UDC
2012: $7,434,689
2013: $9,571,494

*Recurring/Non-Recurring data not available.
Figure 70

Oakland TSC M-10 Northbound
Average Weekday AM Peak Speed

- 2012
- 2013

Average Speed (mph)

Oakland TSC M-10 Northbound
Average Weekday PM Peak Speed

- 2012
- 2013

Average Speed (mph)
Figure 71

Oakland TSC M-10 Southbound
Average Weekday AM Peak Speed

Oakland TSC M-10 Southbound
Average Weekday PM Peak Speed
Figure 72

Oakland TSC M-10 Corridor - Northbound 2012 Congestion

Oakland TSC M-10 Corridor - Northbound 2013 Congestion
Figure 73

Oakland TSC M-10 Corridor - Southbound
2012 Congestion

Oakland TSC M-10 Corridor - Southbound
2013 Congestion
Figure 74

Oakland TSCM-59 Corridor
User Delay Cost

2012 User Delay Cost
Recurring  Non-Recurring
40%  60%
Car $1,374,049  Truck $119,922

Truck $183,261  Car $1,083,809

2012 UDC: $8,761,442

Oakland TSC M-59 Corridor
2013 User Delay Cost
Recurring  Non-Recurring
39%  61%
Car $9,345,432  Truck $197,288

Truck $125,905  Car $412,153

2013 UDC: $5,240,748

Total UDC
2012: $8,761,442
2013: $5,240,748
Figure 75

Oakland TSC M-59 Eastbound
Average Weekday AM Peak Speed

Oakland TSC M-59 Eastbound
Average Weekday PM Peak Speed
Figure 76

Oakland TSC M-59 Westbound
Average Weekday AM Peak Speed

Oakland TSC M-59 Westbound
Average Weekday PM Peak Speed
Figure 77

Oakland TSC M-59 Corridor - Eastbound
2012 Congestion

Oakland TSC M-59 Corridor - Eastbound
2013 Congestion
Figure 78

Oakland TSC M-59 Corridor - Westbound 2012 Congestion

Oakland TSC M-59 Corridor - Westbound 2013 Congestion
Figure 79

Taylor TSCI-75 Corridor
User Delay Cost

<table>
<thead>
<tr>
<th>Month</th>
<th>2012 Recurring</th>
<th>2012 Non-Recurring</th>
<th>2013 Recurring</th>
<th>2013 Non-Recurring</th>
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<td>Jan</td>
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<td>Feb</td>
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<tr>
<td>Mar</td>
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<tr>
<td>Apr</td>
<td>$7,903,724</td>
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<td>May</td>
<td></td>
<td>$1,949,444</td>
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<td></td>
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<tr>
<td>Jun</td>
<td>$5,007,967</td>
<td>$1,490,817</td>
<td>$3,935,753</td>
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<td>Jul</td>
<td>$635,171</td>
<td>$2,774,683</td>
<td>$3,129,753</td>
<td>$741,861</td>
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<td>Aug</td>
<td>$5,889,832</td>
<td>$1,641,351</td>
<td>$3,829,577</td>
<td>$713,641</td>
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<td>$1,641,351</td>
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<td>$713,641</td>
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<td>Oct</td>
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<td>$1,582,351</td>
<td>$3,573,357</td>
<td>$713,641</td>
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<td>Nov</td>
<td>$5,079,034</td>
<td>$1,582,351</td>
<td>$3,573,357</td>
<td>$713,641</td>
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<td>Dec</td>
<td>$5,079,034</td>
<td>$1,582,351</td>
<td>$3,573,357</td>
<td>$713,641</td>
</tr>
</tbody>
</table>

Total UDC
2012: $12,347,953
2013: $7,272,423

Taylor TSCI I-75 Corridor
2012 User Delay Cost

- Recurring: 39%
- Non Recurring: 61%

Car: $5,007,967
Truck: $1,490,817

2012 UDC: $12,347,953

Taylor TSCI I-75 Corridor
2013 User Delay Cost

- Recurring: 47%
- Non Recurring: 53%

Car: $3,129,753
Truck: $741,861

2013 UDC: $7,272,423
Figure 80
Figure 82

Taylor TSC I-75 Corridor - Northbound
Summer Friday Peak Speed

Taylor TSC I-75 Corridor - Southbound
Summer Sunday Peak Speed
Figure 83
**Figure 85**

Taylor TSCI-94 Corridor

**User Delay Cost**

<table>
<thead>
<tr>
<th>Year</th>
<th>Recurring</th>
<th>Non-Recurring</th>
<th>Total UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$15,637,618</td>
<td>$4,016,350</td>
<td>$19,653,968</td>
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<td>2013</td>
<td>$15,141,989</td>
<td>$9,928,910</td>
<td>$25,070,899</td>
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</tbody>
</table>

**Taylor TSCI I-54 Corridor**

**2012 User Delay Cost**

- Car: $4,123,314 (30%)
- Truck: $617,090 (70%)

**2012 UDC:** $15,637,618

**Taylor TSCI I-94 Corridor**

**2013 User Delay Cost**

- Car: $1,386,994 (29%)
- Truck: $605,731 (71%)

**2013 UDC:** $15,141,989
Figure 86

Taylor TSC I-94 Eastbound
Average Weekday AM Peak Speed

Taylor TSC I-94 Eastbound
Average Weekday PM Peak Speed
Figure 87

Taylor TSC I-94 Westbound
Average Weekday AM Peak Speed

Taylor TSC I-94 Westbound
Average Weekday PM Peak Speed
Figure 88
Figure 90

Taylor TSCI-96 Corridor User Delay Cost

2012 User Delay Cost
- Recurring 36%
- Non-Recurring 64%

2013 User Delay Cost
- Recurring 33%
- Non-Recurring 67%

Total UDC
2012: $16,897,106
2013: $21,856,559
Figure 91

Taylor TSC I-96 Eastbound
Average Weekday AM Peak Speed

Taylor TSC I-96 Eastbound
Average Weekday PM Peak Speed
Figure 92

Taylor TSC I-96 Westbound
Average Weekday AM Peak Speed

Taylor TSC I-96 Westbound
Average Weekday PM Peak Speed
Figure 93

Taylor TSC I-96 Corridor - Eastbound
2012 Congestion

Weighted Congestion Hours

Taylor TSC I-96 Corridor - Eastbound
2013 Congestion

Weighted Congestion Hours
Figure 94

Taylor TSC I-96 Corridor - Westbound
2012 Congestion

Taylor TSC I-96 Corridor - Westbound
2013 Congestion
Figure 95

Taylor TSC I-275 Corridor
User Delay Cost

2012 Recurring  2012 Non-Recurring  2013 Recurring  2013 Non-Recurring

Total UDC
2012: $21,349,074
2013: $4,348,039

Taylor TSC I-275 Corridor
2012 User Delay Cost

Recurring  Non Recurring

30%  70%

Car $1,487,542
Truck $637,670

2012 UDC: $21,349,074

Taylor TSC I-275 Corridor
2013 User Delay Cost

Recurring  Non Recurring

37%  63%

Car $4,705,673
Truck $2,750,389

2013 UDC: $4,348,039
Figure 96

Taylor TSC I-275 Northbound
Average Weekday AM Peak Speed

Taylor TSC I-275 Northbound
Average Weekday PM Peak Speed
Figure 97

Taylor TSC I-275 Southbound
Average Weekday AM Peak Speed

Taylor TSC I-275 Southbound
Average Weekday PM Peak Speed
Figure 98

Taylor TSC I-275 Corridor - Northbound
2012 Congestion

Michigan Department of Transportation
Figure 99

Taylor TSC I-275 Corridor - Southbound
2012 Congestion

Taylor TSC I-275 Corridor - Southbound
2013 Congestion
Figure 100

Taylor TSC M-14 Corridor
User Delay Cost

2012 User Delay Cost

- Recurring
- Non Recurring

2012 UDC: $3,631,009

Taylor TSC M-14 Corridor
2013 User Delay Cost

- Recurring
- Non Recurring

2013 UDC: $4,265,900

Total UDC
2012: $3,631,000
2013: $4,265,900
Figure 101

Taylor TSC M-14 Eastbound
Average Weekday AM Peak Speed

Taylor TSC M-14 Eastbound
Average Weekday PM Peak Speed
Figure 102

Taylor TSC M-14 Westbound
Average Weekday AM Peak Speed

Taylor TSC M-14 Westbound
Average Weekday PM Peak Speed
Figure 103

**Taylor TSC M-14 Corridor - Eastbound**

**2012 Congestion**

- Off Peak
- AM Peak
- Afternoon Peak
- PM Peak

**2013 Congestion**

- Off Peak
- AM Peak
- Afternoon Peak
- PM Peak
Figure 104

Taylor TSC M-14 Corridor - Westbound
2012 Congestion

Taylor TSC M-14 Corridor - Westbound
2013 Congestion
Providing the highest quality integrated transportation services for economic benefit and improved quality of life.