Travel Time Data Collection Program:
Principal Arterials—Phase 2
Final Report
March 2011
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1. Introduction

The Genesee Transportation Council (GTC) retained C&S Engineers, Inc. to implement Principal Arterials – Phase 2 of the regional Travel Time Data Collection Program. The program supports the GTC Congestion Management Process (CMP). A CMP, required in metropolitan areas with population exceeding 200,000, presents a systematic process for managing traffic congestion and provides information on transportation system performance. Required elements of a CMP include the development of performance measures, data collection and monitoring performance.

In January 2007, the Travel Time Data Collection Assessment\(^1\) was prepared for the GTC. Using the findings of this document, GTC began a data collection program in fall 2007. This program uses GPS equipment and the “floating car” method to collect travel time and speed data to document the following mobility measures:

- travel time – the amount of time needed to traverse a segment or corridor;
- travel speed – the length of a segment divided by the travel time; and
- travel time index – the ratio of the travel time during the peak period to the time required to make the same trip during mid-day periods.

The following phases have been conducted as part of the GTC Travel Time Data Collection Program:

- Principal Arterials – Phase 1: Fall 2007-Spring 2008
- Minor Arterials – Phase 1: Spring 2010
- Principal Arterials – Phase 2: Fall 2010-Spring 2011

This report documents the findings of the Principal Arterials – Phase 2 data collection effort and compares the results to the Principal Arterials – Phase 1 effort.

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2. Data Collection Methodology

Four Data Collection Vehicles
Up to four vehicles were used at a time for travel time runs. Each vehicle was equipped with a GeoStats Geologger Unit with an external antenna mounted to the roof of the vehicle. The driver then followed the pre-assigned routes from Phase 1 using the “floating car” method guidelines for travel time study.

Data collection vehicles were assigned to designated areas to limit unnecessary travel based on the following sub-areas, which were defined during Phase 1 and shown in Figure 1:

1. Northeast: Monroe County, east of I-590 and the western part of Wayne County
2. North-central: Monroe County, generally bound by I-590 to the east, Route 252 to the south, I-390 to the west and Lake Ontario to the north
3. Northwest: Monroe County, west of I-390 and north of I-490
4. South: Monroe County, south of I-90, northern part of Livingston and Ontario counties

Five Travel Time Runs
Five (5) travel time runs were conducted in each direction in both the morning (AM) peak period, defined as 7:00 AM to 9:00 AM, and evening (PM) peak period defined as 4:00 PM to 6:00 PM, in addition to three (3) travel time runs in each direction in the mid-day period, defined as 9:00 AM to 11:00 AM. Special attention was paid to how long it took to complete the minimum number of runs for each peak period for a particular segment. In order to capture a good cross section of runs during the peak period, if the minimum number of runs was completed within an hour of starting, more runs were added to ensure a peak congestion period was not missed. Run start times were recorded and can be reviewed in Appendix A. Drivers also noted particular areas of unexpected congestion, an accident or construction activity, which affected any runs. These impacted runs were removed from the analysis.

Travel Time Index
For this study, the TTI is calculated using the travel time recorded during the peak period compared to the time required to make the same trip during the mid-day period (assumed to be free-flow speeds). A value of 1.3, for example, indicates a 20-minute free-flow trip requires 26 minutes during the peak period. Generally, a roadway is considered congested if the TTI equals or exceeds 1.3.\(^2\) The TTI for each segment is provided in Appendix A and summarized in Section 4 of this report.

Study Characteristics
As part of the data collection effort, posted speed limit information and existing geometry information including the number of through lanes and turn lanes at major intersections (arterials and major collectors) was recorded in Phase 1 and verified as part of Phase 2. A map summarizing posted speed limits on each segment is included in Appendix B along with an intersection geometry information summary table and aerial photographs of each location.

The following are the observed posted speed limit differences in Phase 2 as compared to Phase 1:

- State Route 31 (Redman Rd) approximately between State Route 31 (Brockport Spencerport Rd) and State Route 31 (West Ave)
  - Phase 1 – 45 mph
  - Phase 2 – 40 mph
- State Route 31 (West Ave) approximately between State Route 31 (Redman Rd) and Monroe Orleans County Line Rd
  - Phase 1 – 45 mph
  - Phase 2 – 55 mph
- State Route 104 (W. Ridge Rd) approximately between State Route 261 (Manitou Rd) and I-390
  - Phase 1 – 35 mph
  - Phase 2 – 40 mph
- I-490 approximately between Exit 12, Brown St/Broad St and Exit 16, Clinton Ave
  - Phase 1 – 55 mph
  - Phase 2 – 40 mph
- A short segment of State Route 33A (Chili Avenue) from I-390 to I-490
  - Phase 1 – 35 mph
  - Phase 2 – 40 mph
- A short segment of State Route 250 between YMCA and State Route 286 (Atlantic Avenue)
  - Phase 1 – 55 mph
  - Phase 2 – 50 mph
- State Route 31 approximately between Macedon Parkway and 500 feet east of Wayneport Road
  - Phase 1 – 55 mph
  - Phase 2 – 50 mph
3. Route Segmentation/Priority

The study area is the same as that used in Phase 1 and includes all principal arterial roadways in the Rochester Transportation Management Area (TMA).

Route segmentation was developed based on the following factors:

1. Segment roadways at logical points, such as major intersections, while avoiding beginning/ending a segment at an overpass that interferes with satellite coverage
2. Segment roadways to capture most, if not all, travel time runs during one peak period
3. Segment roadways so that data collection captures runs throughout the 2-hour peak period (i.e. runs should not be completed in less than an hour)
4. Segment roadways at locations that allow for the vehicle to turn around and gather travel time data in the opposite direction

When the defined segment was short and it was anticipated that all five runs would be completed in one hour, adjacent segments were combined to ensure that the peak period was captured. When short segments could not be combined with other segments, additional travel time runs were collected to ensure a cross-section of the peak period was captured.

Once the routes were segmented, they were sorted by the four sub-areas: Northeast, North-central, Northwest and South. Some adjustments to the order of data collection were made based on construction schedules, geographic considerations and the need to maximize data collection time by focusing on adjacent routes.

It should be noted that along the major highways, such as I-390, I-490 and I-590, the segments evaluated in this analysis were mainline segments and do not include any on- and off-ramps. If there was a queue along the mainline due to an off-ramp, that lane was avoided during that run. The one exception is Segment 48 which was added in Phase 1 to assess the delay associated with the transition between I-490 West and I-590 North. Also, any time spent by a test vehicle waiting at an off-ramp to exit the highway at a turnaround point was not included in the travel time for that segment.

Construction activities were avoided where possible during data collection. An exception included the construction project on Segments 25 and 26, State Route 252 (Jefferson Rd) which was on-going throughout the data collection period. This construction may have also affected the data collected on Segment 27, S. Winton Road that intersects the east end of Segment 26. A utility work lane closure during the mid-day period was observed on Segment 23, State Route 15 (Mt. Hope Ave) between Elmwood Ave and Crittenden Blvd. It was also noted that there was building construction on Segment 8, State St between Jay St and Brown St which did not appear to have a major impact on traffic flow.
4. Data Summary

Data was collected from Tuesday, September 14\textsuperscript{th} through Thursday, October 28\textsuperscript{th}, 2010 with additional data collection conducted on Wednesday, November 3\textsuperscript{rd}, 2010, Wednesday, January 19\textsuperscript{th}, 2011 and Wednesday, February 9\textsuperscript{th}, 2011. Travel time runs were conducted during the:

- Monday mid-day and evening peak periods,
- Tuesday, Wednesday, and Thursday peak periods (morning, mid-day and evening), and
- Friday morning peak period

Data collection did not occur on Monday, October 11\textsuperscript{th} – Columbus Day.

The complete detailed run information is included in Appendix A. These summaries include:

- Segment Number and Direction
- Map Area
- Compass Direction
- Distance of each run and average for segment
- Speed (MPH) of each run and average for segment per period
- Travel Time (min) of each run and average for segment per period
- Number of Stops Recorded
- Date and Start Time of Run
- Stopped Time (min): Time vehicle spent under 5 MPH
- Congested Time (min): Time vehicle spent under 20 MPH
- Travel Time Index of each run and average for segment per period

The following tables and graphics summarize each sub-area and the data collected. To calculate the TTI for a segment, the average travel time for a segment during the AM or PM peak period was divided by the average travel time for the same segment during the mid-day period. The congested segments (segment found to have a TTI over 1.25 – rounded to 1.3) in each sub-area are highlighted and the TTI values are shown in both the tables and accompanying maps. A low TTI (segment found to have a TTI less than 0.9) is an indication of a segment that has greater congestion in the mid-day period as compared to the morning or evening peak period. This typically occurs in retail corridors where the mid-day period generally has greater delay than the morning peak or in the direction opposite of the typical commute.
<table>
<thead>
<tr>
<th>Segment Number</th>
<th>Segment Description</th>
<th>Map Area</th>
<th>Distance (Miles)</th>
<th>Mid-day Average Speed (MPH)</th>
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<th>AM Peak Average Speed (MPH)</th>
<th>AM Peak Travel Time (Min)</th>
<th>PM Peak Average Speed (MPH)</th>
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<td>48N**</td>
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** Phase 1 only has data for the Mid-day and PM Peak. Therefore, there was no TTI calculated for the AM peak. Phase 2 has data for Mid-day, AM Peak, and PM Peak.
Figure 2: Northeastern Segments

Source: Town & County Boundaries from Monroe County Dept. of Environmental Services, Street Data from NYS GIS Clearinghouse, Route and Traffic Data Collected by C&S Companies

GENESEE TRANSPORTATION COUNCIL
Travel Time Data Collection Program
Figure 2: Northeastern Segments
<table>
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<th>Segment Number</th>
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<th>High</th>
<th>Average</th>
<th>Travel Time (Min)</th>
<th>AM Peak</th>
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<th>PM Peak</th>
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<tr>
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<td>NC</td>
<td>1.2</td>
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<td>3.1</td>
<td>2.9</td>
<td>19.4</td>
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<td>2.9</td>
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<td>5.7</td>
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<td>3.0</td>
<td>3.4</td>
<td>3.1</td>
<td>19.1</td>
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<tr>
<td>51N</td>
<td>State Route 104 (W. Ridge Rd); I-390 to State Route 252 (Jefferson Rd) to I-390</td>
<td>NC</td>
<td>2.1</td>
<td>21.1</td>
<td>3.0</td>
<td>3.4</td>
<td>3.1</td>
<td>19.1</td>
<td>2.8</td>
<td>3.5</td>
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<td>21.1</td>
<td>2.6</td>
<td>3.1</td>
<td>2.9</td>
<td>19.4</td>
<td>2.6</td>
<td>3.2</td>
<td>2.9</td>
<td>0.85</td>
<td>26.7</td>
<td>2.1</td>
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<tr>
<td>57N</td>
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<td>NC</td>
<td>2.1</td>
<td>21.1</td>
<td>3.0</td>
<td>3.4</td>
<td>3.1</td>
<td>19.1</td>
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<td>3.2</td>
<td>0.85</td>
<td>26.7</td>
<td>2.1</td>
<td>4.4</td>
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Sub-Area Average TTI = 1.10
Source: Town & County Boundaries from Monroe County Dept. of Environmental Services, Street Data from NYS GIS Clearinghouse, Route and Traffic Data Collected by C&S Companies

GENESEE TRANSPORTATION COUNCIL
Travel Time Data Collection Program
Figure 3 : North-central Segments
### Table 3: Northwest Summary

<table>
<thead>
<tr>
<th>Segment Number</th>
<th>Segment Description</th>
<th>Map Area</th>
<th>Distance (Miles)</th>
<th>Mid-day Average Speed (MPH)</th>
<th>Mid-day Travel Time (Min)</th>
<th>AM Peak Average Speed (MPH)</th>
<th>AM Peak Travel Time (Min)</th>
<th>PM Peak Average Speed (MPH)</th>
<th>PM Peak Travel Time (Min)</th>
<th>TTI</th>
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<tr>
<td>11E</td>
<td>State Route 204 (Chili Ave / Brooks Ave): I-490 to I-390</td>
<td>NW</td>
<td>2.3</td>
<td>Low: 25.9 High: 4.6 Average: 4.2</td>
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<td>1.05</td>
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<td>12N</td>
<td>State Route 259 (Union St): I-490 to State Route 104 (W. Ridge Rd)</td>
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<td>8.6</td>
<td>Low: 36.2 High: 12.9 Average: 14.5</td>
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<td>35.7 13.2 15.3 14.2 1.05</td>
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<td>12S</td>
<td>State Route 259 (Union St): I-490 to State Route 104 (W. Ridge Rd)</td>
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<td>8.6</td>
<td>Low: 37.0 High: 13.1 Average: 15.0</td>
<td>13.9</td>
<td>36.8 13.3 15.0 14.0 1.01</td>
<td>34.4 14.2 16.4 15.0 1.08</td>
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<tr>
<td>14E</td>
<td>State Route 104 (W. Ridge Rd): State Route 261 (Manitou Rd) to I-390</td>
<td>NW</td>
<td>4.0</td>
<td>Low: 37.9 High: 7.8 Average: 12.9</td>
<td>8.3 7.0 7.1 1.11</td>
<td>31.0 7.1 8.1 7.7 1.21</td>
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<td>14W</td>
<td>State Route 104 (W. Ridge Rd): State Route 261 (Manitou Rd) to I-390</td>
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<td>4.0</td>
<td>Low: 37.9 High: 7.8 Average: 12.9</td>
<td>8.3 7.0 7.1 1.11</td>
<td>31.0 7.1 8.1 7.7 1.21</td>
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<tr>
<td>15E</td>
<td>State Route 104 (W. Ridge Rd): Monroe Orleans County Line Rd to State Route 261</td>
<td>NW</td>
<td>12.8</td>
<td>Low: 47.2 High: 15.5 Average: 17.2</td>
<td>16.3</td>
<td>46.5 16.3 18.0 16.6 1.02</td>
<td>45.7 16.2 17.5 16.8 1.03</td>
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<tr>
<td>15W</td>
<td>State Route 104 (W. Ridge Rd): Monroe Orleans County Line Rd to State Route 261</td>
<td>NW</td>
<td>12.8</td>
<td>Low: 47.2 High: 15.5 Average: 17.2</td>
<td>16.3</td>
<td>46.5 16.3 18.0 16.6 1.02</td>
<td>45.7 16.2 17.5 16.8 1.03</td>
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<td>16E</td>
<td>State Route 31/531 (4th Section Rd / Brockport Spencerport Rd / 531): State Route</td>
<td>NW</td>
<td>8.6</td>
<td>Low: 44.1 High: 10.6 Average: 14.5</td>
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<td>42.3 10.7 13.4 12.2 1.04</td>
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<td>16W</td>
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<td>40.7 10.8 15.8 12.9 1.05</td>
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<td>17E</td>
<td>State Route 531: State Route 259 (S. Union St), Spencerport to I-490 Exit 7,</td>
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<td>5.0</td>
<td>Low: 62.6 High: 4.7 Average: 4.9</td>
<td>4.8</td>
<td>61.3 4.7 5.1 4.9 1.02</td>
<td>60.5 4.5 5.4 4.9 1.04</td>
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<td>Low: 61.9 High: 4.5 Average: 5.3</td>
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<td>60.3 4.5 5.9 4.9 1.03</td>
<td>57.0 4.7 5.5 5.2 1.08</td>
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<td>Low: 58.3 High: 3.2 Average: 3.3</td>
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<td>19S</td>
<td>I-490: Exit 2, State Route 33/33A (Clinton St Rd / Chili Riga Center Rd) to Exit 7,</td>
<td>NW</td>
<td>12.9</td>
<td>Low: 66.3 High: 11.6 Average: 11.9</td>
<td>11.7</td>
<td>66.5 11.6 11.8 11.7 1.00</td>
<td>65.6 11.7 12.1 11.8 1.01</td>
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<tr>
<td>19W</td>
<td>I-490: Exit 2, State Route 33/33A (Clinton St Rd / Chili Riga Center Rd) to Exit 7,</td>
<td>NW</td>
<td>12.9</td>
<td>Low: 66.3 High: 11.6 Average: 11.9</td>
<td>11.7</td>
<td>66.5 11.6 11.8 11.7 1.00</td>
<td>65.6 11.7 12.1 11.8 1.01</td>
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Sub-Area Average TTI = 1.05

1.08
GENESEE TRANSPORTATION COUNCIL
Travel Time Data Collection Program
Figure 4: Northwestern Segments
<table>
<thead>
<tr>
<th>Segment Number</th>
<th>Segment Description</th>
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<th>Distance (Miles)</th>
<th>Average Speed (MPH)</th>
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<th>High</th>
<th>Average</th>
<th>Travel Time (Min)</th>
<th>Average Speed (MPH)</th>
<th>Low</th>
<th>High</th>
<th>Average</th>
<th>Travel Time (Min)</th>
<th>TTI</th>
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<td>I-390: Exit 8, Lakeview Rd to Exit 11, State Route 251 (Rush Scottsville Rd)</td>
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<td>10.7</td>
<td>9.4</td>
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<td>46.6</td>
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<td>0.99</td>
<td>46.5</td>
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<td>15.6</td>
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<td>40.5</td>
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<td>12.2</td>
<td>1.02</td>
<td>39.8</td>
<td>11.2</td>
<td>12.8</td>
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</table>

Sub-Area Average TTI = 1.00
GENESEE TRANSPORTATION COUNCIL
Travel Time Data Collection Program
Figure 5: Southern Segments
The average TTI for all principal arterials in the study area is 1.08 with an average TTI of 1.07 for the AM peak period and 1.09 for the PM peak period. The Phase 2 data documents congested segments with TTIs ranging from 1.25 to 1.80 with the exception of Segment 2, I-590 South between Exit 11, State Route 104 (E. Ridge Rd) to Exit 6, Blossom Rd in the AM with a TTI of 2.72. These TTIs are generally consistent with the TTIs in Phase 1 as shown in the following table. A detailed comparison of Phases 1 and 2 is provided in Section 5.

Table 5: Average TTI Comparison

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>AM peak</th>
<th>PM peak</th>
<th>Typical Range</th>
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<td>1.25-1.92</td>
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<td>Phase 2</td>
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<td>1.07</td>
<td>1.09</td>
<td>1.25-1.80</td>
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</table>

The following is a list of congested segments (rounded TTI of 1.3 or greater). These segments are also depicted in Figure 6:

AM Peak Period (Segment Number and Direction)

Northeast Segments
- (34W) I-490: Exit 25, State Route 31F (Fairport Rd) to I-590 Split – TTI = 1.70
- (39W) State Route 441 (Linden Ave / Penfield Rd): State Route 250 (Fairport Nine Mile Point Road) to I-490 – TTI = 1.29

North-central Segments
- (2S) I-590: Exit 11, State Route 104 (E. Ridge Rd) to Exit 6, Blossom Rd – TTI = 2.72
- (4W) I-490: I-590 Split to Exit 17, S. Goodman St – TTI = 1.80
- (7S) Lake Ave: State Route 104 (W. Ridge Rd) to Lyell Ave – TTI = 1.41
- (28S) Mt. Read Blvd: State Route 104 (W. Ridge Rd) to I-490 – TTI = 1.45
- (30S) I-390: Exit 22, Lexington Ave to Exit 17, State Route 383 (Scottsville Rd) – TTI = 1.30

Northwest Segments
- (11E) State Route 204 (Chili Ave / Brooks Ave): I-490 to I-390 – TTI = 1.41

PM Peak Period (Segment Number and Direction)

Northeast Segments
- (36E/W) State Route 31 (Pittsford Palmyra Rd): I-490 to State Route 250 (Moseley Rd)
  Eastbound TTI = 1.29
  Westbound TTI = 1.26
- (39E) State Route 441 (Linden Ave / Penfield Rd): I-490 to State Route 250 (Fairport Nine Mile Point Road) – TTI = 1.28
• (40S) State Route 250 (Moseley Rd / Main St / Fairport Nine Mile Point Rd): State Route 441 (Penfield Rd) to State Route 31 (Pittsford Palmyra Rd) – TTI = 1.25

North-central Segments
• (4E/W) I-490: Exit 17, S. Goodman St to I-590 Split
  Eastbound TTI = 1.31
  Westbound TTI = 1.41
• (7N/S) Lake Ave: Lyell Ave to State Route 104 (W. Ridge Rd)
  Northbound TTI = 1.28
  Southbound TTI = 1.27
• (8N) State St / Exchange Blvd: Plymouth Ave / Ford St to Lyell Ave – TTI = 1.41
• (13W) State Route 104 (W. Ridge Rd): Lake Ave, Rochester to I-390 – TTI = 1.37
• (24N/S) State Route 15 (W. Henrietta Rd): State Route 252 (Jefferson Rd) to Westfall Rd
  Northbound TTI = 1.68
  Southbound TTI = 1.26

All of the congested links are located in the northeast and north-central parts of the study area with the exception of Segment 11, State Route 204 (Chili Ave/Brooks Ave) from I-490 to I-390 in the eastbound direction during the AM peak hour.

In general, the direction associated with the high TTI values are related to the location of the segments in relation to Rochester’s central business district. During the AM peak period, the high TTI values are typically associated with those traveling towards downtown while those during the PM period are heading away from the area.

The following segments were congested in both directions during the PM peak period:

• (4E/W) I-490: Exit 17, S. Goodman St to I-590 Split
• (7N/S) Lake Ave: Lyell Ave to State Route 104 (W. Ridge Rd)
• (24N/S) State Route 15 (W. Henrietta Rd): State Route 252 (Jefferson Rd) to Westfall Rd
• (36E/W) State Route 31 (Pittsford Palmyra Rd): I-490 to State Route 250 (Moseley Rd)
GENESEE TRANSPORTATION COUNCIL
Travel Time Data Collection Program
Figure 6: Congested Segments Overview
There were a number of segments that had two or more runs with an individual TTI of at least 1.3 but the average of all the data collected for the peak period of that segment was under 1.3. This would indicate that these segments experience short congestion times during the peak period. These segments include:

AM Peak Period (Segment Number and Direction)

*North-central Segments*
- (2N) I-590: Exit 6, Blossom Rd to Exit 11, State Route 104 (E. Ridge Rd)
  - Run 2 TTI = 1.34
  - Run 5 TTI = 1.32
  - Run 4 TTI = 1.26
  - Average TTI = 1.22
- (7N) Lake Ave: Lyell Ave to State Route 104 (W. Ridge Rd)
  - Run 4 TTI = 1.27
  - Run 5 TTI = 1.32
  - Average TTI = 1.21

PM Peak Period (Segment Number and Direction)

*Northeast Segments*
- (34W) I-490: Exit 25, State Route 31F (Fairport Rd) to I-590 Split
  - Run 2 TTI = 1.69
  - Run 4 TTI = 1.37
  - Average TTI = 1.12
- (37E) State Route 31 (Pittsford Palmyra Rd): State Route 250 (Moseley Rd) to Victor Rd
  - Run 3 TTI = 1.37
  - Run 4 TTI = 1.30
  - Average TTI = 1.19

*North-central Segments*
- (2N) I-590: Exit 6, Blossom Rd to Exit 11, State Route 104 (E. Ridge Rd)
  - Run 4 TTI = 1.33
  - Run 6 TTI = 1.25
  - Run 7 TTI = 1.36
  - Average TTI = 1.14
- (23N) State Route 15 (Mt. Hope Ave): Westfall Rd to Ford St
  - Run 1 TTI = 1.25
  - Run 2 TTI = 1.35
  - Average TTI = 1.15
- (25E) State Route 252 (Jefferson Rd): State Route 383 (Scottsville Rd) to Hylan Dr
  - Run 1 TTI = 1.42
  - Run 4 TTI = 1.44
  - Average TTI = 1.22
(25W) State Route 252 (Jefferson Rd): Hylan Dr to State Route 383 (Scottsville Rd)
  Run 1 TTI = 1.29
  Run 3 TTI = 1.29
  Average TTI = 1.15

(26E) State Route 252 (Jefferson Rd): Hylan Dr to S. Winton Rd
  Run 1 TTI = 1.25
  Run 4 TTI = 1.30
  Run 5 TTI = 1.28
  Average TTI = 1.21

(27N) S. Winton Rd: State Route 252 (Jefferson Rd) to I-590
  Run 3 TTI = 1.37
  Run 4 TTI = 1.80
  Run 6 TTI = 2.54
  Average TTI = 1.21

Northwest Segments

(11E) State Route 204 (Chili Ave / Brooks Ave): I-490 to I-390
  Run 3 TTI = 1.58
  Run 6 TTI = 1.79
  Average TTI = 1.22

(14W) State Route 104 (W. Ridge Rd): I-390 to State Route 261 (Manitou Rd)
  Run 1 TTI = 1.28
  Run 3 TTI = 1.26
  Run 4 TTI = 1.25
  Average TTI = 1.21

The following is a list of segments where the average TTI is less than 0.9. This result indicates that a roadway segment is typically more congested during the mid-day than the AM or PM peak period. This may occur on corridors that contain land uses that generate more trips outside the peak period than during the typical AM and PM peaks such as commercial or health care uses. It also may occur on a segment in the opposite direction of typical commuter traffic (e.g., travelling towards the central business district during a PM peak period).

Segments 25, 26 and 27 may have been affected by construction lane closures in the mid-day hours.

AM Peak Period

North-east Segments

(39E) State Route 441 (Linden Ave / Penfield Rd): I-490 to State Route 250 (Fairport Nine Mile Point Road) – TTI = 0.89
North-central Segments
- (13E) State Route 104 (W. Ridge Rd): I-390 to Lake Ave, Rochester – TTI = 0.81
- (26W) State Route 252 (Jefferson Rd): S. Winton Rd to Hylan Dr – TTI = 0.88
- (27N/S) S. Winton Rd: State Route 252 (Jefferson Rd) to I-590
  Northbound TTI = 0.85
  Southbound TTI = 0.80

PM Peak Period
North-central Segments
- (26W) State Route 252 (Jefferson Rd): S. Winton Rd to Hylan Dr – TTI = 0.73
- (27S) S. Winton Rd: I-590 to State Route 252 (Jefferson Rd) – TTI = 0.82
- (28S) Mt. Read Blvd: Mt. Read Blvd: State Route 104 (W. Ridge Rd) to I-490 – TTI = 0.80
5. Comparison of Principal Arterials Phases 1 and 2

A comparison table showing the following parameters between Phases 1 and 2 is provided in Table 6 on Page 35:

- Mid-day Average Travel Time
- AM Peak Average Travel Time
- AM TTI
- PM Peak Average Travel Time
- PM TTI

The northeast and north-central areas saw an increase in overall TTI during the AM peak period (+0.04 and +0.03, respectively) and a decrease during the PM peak period (-0.07) from Phase 1 to Phase 2. The overall AM peak period TTI decreased (-0.07) for the northwest area with no change during the PM peak period. The Phase 2 TTI in the south area was comparable to Phase 1 with only a slight decrease (-0.02) during the PM peak period.

The decrease in overall TTI for the area may be attributed to lower traffic volumes which, in turn, may be due to an increase in unemployment rates between the two phases. Based on historic traffic volume data for the City of Rochester and Monroe County, volumes have decreased 1.3% each year between 2000 and 2009. At the same time, unemployment rates increased from 4.0% in 2007 to 7.3% in 2010.³

All TTIs greater than or equal to 1.25 are highlighted in yellow in Table 6. The following segments are congested in both phases:

**AM Peak Period (Segment Number)**
- (2S) I-590: Exit 11, State Route 104 (E. Ridge Rd) to Exit 6, Blossom Rd
- (4W) I-490: I-590 Split to Exit 17, S. Goodman St
- (7S) Lake Ave: State Route 104 (W. Ridge Rd) to Lyell Ave
- (11E) State Route 204 (Chili Ave / Brooks Ave): I-490 to I-390
- (30S) I-390: Exit 22, Lexington Ave to Exit 17, State Route 383 (Scottsville Rd)
- (39W) State Route 441 (Linden Ave / Penfield Rd): State Route 250 (Fairport Nine Mile Point Road) to I-490

**PM Peak Period (Segment Number)**
- (7N) Lake Ave: Lyell Ave to State Route 104 (W. Ridge Rd)
- (13W) State Route 104 (W. Ridge Rd): Lake Ave, Rochester to I-390
- (24S) State Route 15 (W. Henrietta Rd): Westfall Rd to State Route 252 (Jefferson Rd)

Table 6 outlines those segments which are congested in one phase but not the other using bold lines around the TTI values. Some of the potential reasons for the differences in TTIs between the two phases (beyond general area changes in volumes) are noted below:

- **Construction** – mid-day construction activity and associated lane closures may have resulted in the significantly higher mid-day travel times and therefore lower TTIs in the peak periods:

  **Jefferson Road Construction**
  - (26W) State Route 252 (Jefferson Rd): S. Winton Rd to Hylan Dr
  - (27S) S. Winton Rd: I-590 to State Route 252 (Jefferson Rd)

  **Mt. Hope Ave Utility Work**
  - (23S) State Route 15 (Mt. Hope Ave): Ford St to Westfall Rd

- **Short peak periods** – some segments experience short congested periods. Since the data collection is conducted over a two-hour period, there may be locations where the short congested period was observed more in one phase than the other:

  **AM Peak Period**
  - (11W) State Route 204 (Chili Ave / Brooks Ave): I-390 to I-490
  - (13E) State Route 104 (W. Ridge Rd): I-390 to Lake Ave, Rochester
  - (18E) I-490: Exit 7, Buffalo Rd to Exit 10, Mt. Read Blvd
  - (34W) I-490: Exit 25, State Route 31F (Fairport Rd) to I-590 Split

  **PM Peak Period**
  - (3N) I-590: I-390 Split to Exit 6, Blossom Rd
  - (4E) I-490: Exit 17, S. Goodman St to I-590 Split
  - (8N) State St / Exchange Blvd: Plymouth Ave / Ford St to Lyell Ave
  - (11W) State Route 204 (Chili Ave / Brooks Ave): I-390 to I-490
  - (22N) I-390: Exit 14, State Route 15A (E. Henrietta Rd) to Exit 17, State Route 383 (Scottsville Rd)
  - (25W) State Route 252 (Jefferson Rd): Hylan Dr to State Route 383 (Scottsville Rd)
  - (27N) S. Winton Rd: State Route 252 (Jefferson Rd) to I-590
  - (40S) State Route 250 (Moseley Rd / Main St / Fairport Nine Mile Point Rd): State Route 441 (Penfield Rd) to State Route 31 (Pittsford Palmyra Rd)
Marginal congestion - some segments which are marginally congested (rounded to 1.3) may show up as being congested in one phase but not another due to slight differences in the average TTI. These segments include:

- (7S) Lake Ave: State Route 104 (W. Ridge Rd) to Lyell Ave
- (39E) State Route 441 (Linden Ave / Penfield Rd): I-490 to State Route 250 (Fairport Nine Mile Point Road)

There were two segments that showed a general increase or decrease in the TTI between phases.

- (36E/W) State Route 31 (Pittsford Palmyra Rd): I-490 to State Route 250 (Moseley Rd) – Both the east and westbound directions of this segment experienced an increase in average travel time during the PM peak period.
- (48N) I-490: I-490 Exit 24 to I-590 Exit 6, Blossom Rd – This segment exhibited significantly higher delay in Phase 1 than Phase 2. In Phase 2, data was collected on two different days (October 28, 2010 and February 9, 2011) with comparable results. The data collected for this segment during Phase 1 was collected on June 10, 2008. There is the potential that seasonal variation in traffic volumes may explain this difference in travel time since the data being compared is from different times of the year but this has not been confirmed.
## Table 6: Principal Arterials - Phases 1 and 2 Comparison

<table>
<thead>
<tr>
<th>Segment Number</th>
<th>Route Description</th>
<th>Map Area</th>
<th>Distance (miles)</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>PM Peak AM Peak</th>
<th>PM Peak AM Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>State Route 104 (W. Ridge Rd) to State Route 104 (Hogback Rd) - Wayne County</td>
<td>NC</td>
<td>6.75</td>
<td>4.44</td>
<td>0.34</td>
<td>5.70</td>
<td>1.81</td>
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<tr>
<td>2N</td>
<td>State Route 15 (Redman Rd) to State Route 259 (S. Union St)</td>
<td>NC</td>
<td>3.18</td>
<td>3.27</td>
<td>0.00</td>
<td>3.70</td>
<td>1.21</td>
</tr>
<tr>
<td>24S</td>
<td>State Route 10 (E. Township Rd) to State Route 25 (N. Lacing Rd)</td>
<td>NE</td>
<td>9.75</td>
<td>1.02</td>
<td>0.02</td>
<td>1.04</td>
<td>0.98</td>
</tr>
<tr>
<td>26S</td>
<td>Inner Loop: Outer Loop to I-650 East 62-15</td>
<td>NE</td>
<td>8.21</td>
<td>2.72</td>
<td>0.00</td>
<td>2.94</td>
<td>3.41</td>
</tr>
<tr>
<td>38W</td>
<td>State Route 31 (Pittsford Palmyra Rd): State Route 250 (Moseley Rd) to Victor Rd</td>
<td>NE</td>
<td>6.47</td>
<td>4.73</td>
<td>0.30</td>
<td>4.85</td>
<td>1.06</td>
</tr>
<tr>
<td>39E</td>
<td>State Route 41 (Penfield Rd) to I-390 Exit 26</td>
<td>NE</td>
<td>6.00</td>
<td>5.79</td>
<td>0.48</td>
<td>5.98</td>
<td>1.12</td>
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<td>47W</td>
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<td>0.02</td>
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<tr>
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<td>State Route 10 (E. Township Rd) to State Route 25 (N. Lacing Rd)</td>
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<td>2.97</td>
<td>3.41</td>
<td>0.00</td>
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<tr>
<td>30S</td>
<td>I-650 Exit 7 to US 21S, Batsto Rd to US 21S</td>
<td>NC</td>
<td>7.04</td>
<td>2.09</td>
<td>0.02</td>
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<td>0.98</td>
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<td>32S</td>
<td>State Route 31 (Pittsford Palmyra Rd): State Route 250 (Moseley Rd) to Victor Rd</td>
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<td>6.47</td>
<td>4.73</td>
<td>0.30</td>
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<td>4.73</td>
<td>0.30</td>
<td>4.85</td>
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<tr>
<td>39E</td>
<td>State Route 41 (Penfield Rd) to I-390 Exit 26</td>
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<td>5.79</td>
<td>0.48</td>
<td>5.98</td>
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### Table 5: Average Travel Times

<table>
<thead>
<tr>
<th>Area</th>
<th>Average AM TTI</th>
<th>Average PM TTI</th>
<th>Average AM TTI</th>
<th>Average PM TTI</th>
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</thead>
<tbody>
<tr>
<td>Buffalo</td>
<td>1.41</td>
<td>1.96</td>
<td>1.31</td>
<td>1.67</td>
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<tr>
<td>Rochester</td>
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<td>1.70</td>
<td>1.27</td>
<td>1.41</td>
</tr>
<tr>
<td>Scottsville</td>
<td>1.41</td>
<td>1.96</td>
<td>1.31</td>
<td>1.67</td>
</tr>
<tr>
<td>Lake Ontario</td>
<td>1.41</td>
<td>1.96</td>
<td>1.31</td>
<td>1.67</td>
</tr>
<tr>
<td>Finger Lakes</td>
<td>1.41</td>
<td>1.96</td>
<td>1.31</td>
<td>1.67</td>
</tr>
</tbody>
</table>

* *Phase 1: The PM travel time was compared to Segment 24’s PM peak travel time. In Phase 2, Segment 48 runs in all time periods.*

** *1.33 greater than 1.25 in one phase but less than 1.25 in the other phase.*
6. Conclusion

Using the combination of GIS/GPS technologies and traditional data collection procedures (floating car method), the Travel Time Index for Principal Arterials – Phase 2 in the Rochester TMA was determined to be 1.08 which is slightly lower but comparable to the TTI calculated for Phase 1 – 1.10.

A summary of the Phase 2 findings is listed below:

- The most congested segment overall is Segment 2, I-590 from Exit 11, State Route 104 (E. Ridge Rd) to Exit 6, Blossom Rd – Southbound, AM TTI = 2.72
- The most congested non-expressway segment is Segment 24, State Route 15 (W. Henrietta Rd) from State Route 252 (Jefferson Rd) to Westfall Rd – Northbound, PM TTI = 1.68
- The most congested segment operated entirely by Monroe County is Segment 7, Lake Ave from State Route 104 (W. Ridge Rd) to Lyell Ave – Southbound, AM TTI = 1.41
- The following segments are congested during both peak periods:
  - (4W) I-490: I-590 Split to Exit 17, S. Goodman St
  - (7S) Lake Ave: State Route 104 (W. Ridge Rd) to Lyell Ave
- The following segments are congested in both directions during the PM peak period:
  - (4E/W) I-490: Exit 17, S. Goodman St to I-590 Split
  - (7N/S) Lake Ave: Lyell Ave to State Route 104 (W. Ridge Rd)
  - (24N/S) State Route 15 (W. Henrietta Rd): State Route 252 (Jefferson Rd) to Westfall Rd
  - (36E/W) State Route 31 (Pittsford Palmyra Rd): I-490 to State Route 250 (Moseley Rd)

The data collected as part of this program provides the GTC with reliable travel time data throughout the management area to advance its CMP as well as provide the information necessary to calibrate its travel demand model. This database provides a baseline of travel time information which should be maintained in order to support congestion management related decision making in the future.