



# TravTime™ in Action

## Case Study: Chattanooga CMS Study

**GeoStats**  
Technology for a  
Mobile World

GeoStats was hired in 2005 by the Chattanooga Hamilton County North Georgia Authority (CHCNGA) to assist with a travel time study along predefined Congestion Management System (CMS) routes. The study was conducted to support congestion-related planning, including air quality analysis, an annual congestion management agency (CMA) update, and travel demand modeling data needs.

The client purchased four GeoStats **GeoLoggers™** and one license of GeoStats **TravTime™** software for this study and future travel time and delay studies. As partners on the project, GeoStats defined a GPS sampling strategy and data collection process, performed data analysis using the company's state-of-the-art GPS analysis software, **TravTime**, created a data integration and maintenance plan, and a guidance document for future data collection.

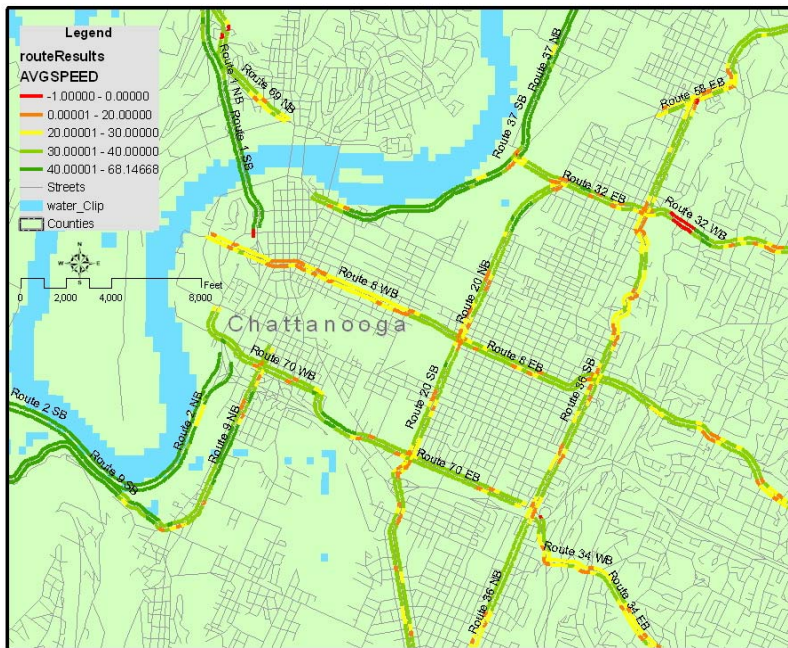


Figure 1. Chattanooga area with observed CMS speeds determined using GeoStats' TravTime software

### Data Collection

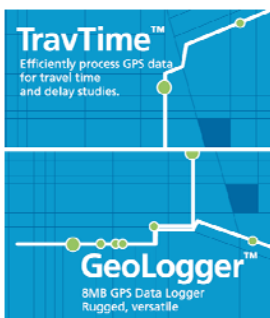
In addition to annual travel time measurement for major roads, this study was used to evaluate the VDF curves used in the travel demand forecasting model. The sampling plan identified specific routes, starting points, ending points, times of day, days of week, and an estimated number of runs. The client collected GPS-based travel time data from November 2005 to January 2006 along predefined CMS routes.

### Data Processing

GeoStats processed the GPS data in **TravTime** using the client's travel demand forecasting model network to generate route and link level travel time, speed, and delay statistics from the observed data. In all, 71 GPS files were processed with over 600,000 seconds of GPS data. The processed data were then used to create a data report and database design for both CMS and Speed Study projects.

### Creating Routes

The software's GIS-based environment made it easy to use the links from the travel demand forecast model network to build bidirectional routes. Using the map interface, road segments (model links) and key intersections were identified and used as the basis for summarized performance calculations of delay, average speed, and stopped time.



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## Segmenting GPS Data into Runs

With routes defined, **TravTime** automatically segmented the raw GPS data into runs and assigned them to directional routes. This step also trimmed off extraneous GPS data, a great **TravTime** feature that eliminates the need for costly route and GPS calibration in the field. Figure 2 shows one processed “segment” or “run” for a westbound route.

## Reviewing GPS for QA and Quality Control

In addition to viewing the data, **TravTime** allows the client to “replay” the collected GPS data days or even years later. This functionality made it easy to verify that turnaround locations were appropriate and that drivers did not deviate from assigned routes.

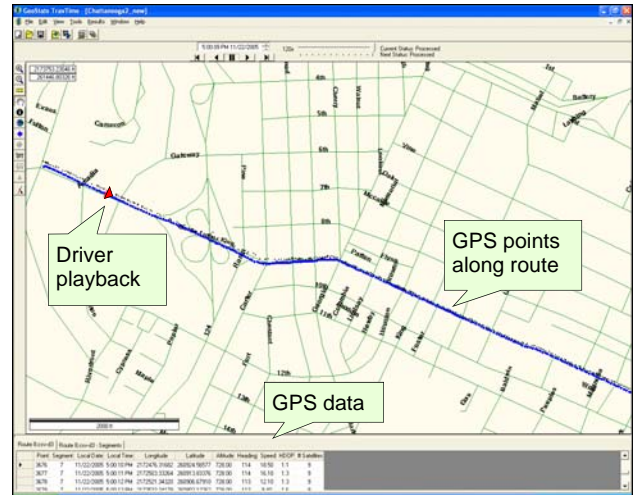


Figure 2. Playing back a run along a route in GeoStats' TravTime software

**TravTime** produces a range of dynamic graphs. Figure 3 shows a space-time diagram for all of the eastbound runs on a single route. Distance traveled is shown on the Y axis and time traveled on the X axis. Frequently congested locations along the route are easy to locate.

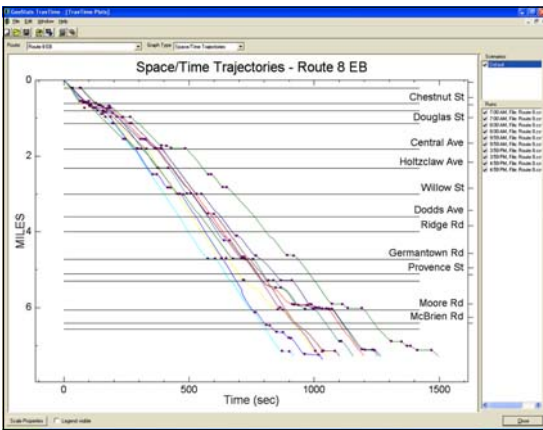


Figure 3. TravTime showing a space-time trajectory graph for a given route

and ArcGIS to meet the client’s planning and reporting needs. One result is shown in Figure 1 (on page 1), a map of the Chattanooga area with observed CMS speeds.

Using **TravTime**, sets of run were grouped into scenarios to allow for separate summarization and comparison. The 2004 data was loaded into **TravTime** as the “2004 scenario” and subsequently compared to the “2005 scenario” to see performance change across routes and links. At the completion of the study, GeoStats delivered the entire database, results, and a **TravTime** project file. This allowed the client to use **TravTime** to process future GPS data along the same routes for multi-year comparisons. ✦

## Data Analysis

Once all of the GPS data were loaded and processed, **TravTime** created summary statistics for each route by direction, run, key intersection, and link in a route. Average speed by time period, development density, and type of roadway were also produced. Figure 4 shows the top ten routes with the greatest amount of stopped time in the morning period. The range of speed values were then used to generate estimates of congested and free flow speeds. The data were exported for use in Microsoft Excel

### HIGHLIGHTS

- Processing of over 60,000 GPS data points
- Re-playing of driver routes in a GIS environment
- Automatic generation of statistics
- Exporting maps, data and GIS shape files

| Time Period | Route               | #Runs | Avg Speed | Avg Travel Time | Ave # Stops | Avg Stopped Time | Avg Congested Time |
|-------------|---------------------|-------|-----------|-----------------|-------------|------------------|--------------------|
| AM Peak     | Route 33 Northbound | 5     | 23.60     | 12:46           | 3.6         | 4:36             | 5:13               |
| AM Peak     | Route 20 Northbound | 5     | 25.00     | 22:19           | 8.8         | 3:34             | 6:22               |
| AM Peak     | Route 32 Eastbound  | 4     | 28.10     | 19:37           | 8.5         | 3:22             | 5:06               |
| AM Peak     | Route 65 Westbound  | 5     | 27.50     | 15:28           | 6.6         | 2:47             | 4:38               |
| AM Peak     | Route 42 Northbound | 3     | 23.10     | 13:50           | 7.7         | 2:46             | 5:08               |
| AM Peak     | Route 8 Eastbound   | 4     | 25.30     | 17:20           | 8.8         | 2:44             | 5:15               |
| AM Peak     | Route 8 Westbound   | 5     | 26.70     | 16:26           | 5.4         | 2:33             | 4:12               |
| AM Peak     | Route 9 Southbound  | 4     | 34.50     | 13:12           | 4.8         | 2:27             | 2:53               |
| AM Peak     | Route 20 Southbound | 6     | 27.20     | 20:28           | 8.5         | 2:25             | 4:39               |
| AM Peak     | Route 36 Southbound | 4     | 23.00     | 15:28           | 6.8         | 2:21             | 4:38               |

Figure 4. Top ten CMS routes with the longest AM stopped time (Excel table)

