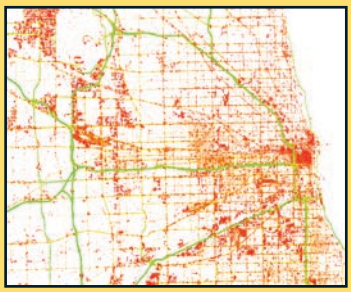
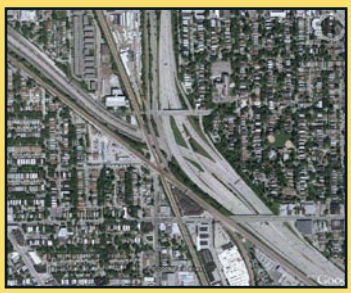
# Freight Performance Measures Analysis of 30 Freight Bottlenecks

March 2009





Prepared by the American Transportation Research Institute

ATRI American Transportation Research Institute

# Freight Performance Measures Analysis of 30 Freight Bottlenecks

**Prepared by**

The American Transportation Research Institute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## INTRODUCTION

In 2008 the American Transportation Research Institute (ATRI) conducted an analysis of 30 U.S. freight bottlenecks using a unique truck position database and Freight Performance Measures (FPM) analysis techniques and tools.

The 30 bottlenecks analyzed, which are shown in the original rank order in Table 1, were provided to ATRI from an external freight bottleneck research effort, and represent one of several lists that have been produced in the current freight bottleneck research environment[1].

Through this analysis, ATRI has developed new approaches for identifying and assessing bottlenecks that affect commercial motor vehicles, the details of which are described in this report.

[1] The following research report is an example of such research activities.

Federal Highway Administration. *Estimated Cost of Freight Involved in Highway Bottlenecks: Final Report*. Prepared by Cambridge Systematics, Inc., for Federal Highway Administration Office of Transportation Policy Studies, November 12, 2008.

| No. | Bottleneck Name | County/State |
|---|---|---|
| 1 | I-710 @I-105 Interchange | Los Angeles, CA |
| 2 | I-17/ I-10 Interchange (the "Stack") | Maricopa, AZ |
| 3 | I - 285 @ I - 85 Interchange ("Spaghetti Junction") | Dekalb, GA |
| 4 | I-20 @ I-75/I-85 Interchange | Fulton, GA |
| 5 | I-80 @ I-94 split in Chicago, IL | Cook, IL |
| 6 | SR-60 @ SR-57 Interchange | Los Angeles, CA |
| 7 | I-80 @ I-580/I-880 in Oakland, CA | Alameda, CA |
| 8 | I-405 (San Diego Fwy) @ I-605 Interchange | Orange, CA |
| 9 | I-90 @I-94 Interchange ("Edens Interchange") | Cook, IL |
| 10 | I-40 @ I-65 Interchange (east) | Davidson, TN |
| 11 | I-290 @ I-355 Interchange | DuPage, IL |
| 12 | I - 75 @ I - 85 Interchange | Fulton, GA |
| 13 | I-95 @SR-9A (Westside Hwy) | New York, NY |
| 14 | I-71 @ I-70 Interchange | Franklin, OH |
| 15 | I-880 @ I-238 | Alameda, CA |
| 16 | SR-91 @ SR-55 Interchange | Orange, CA |
| 17 | I - 285 @ I - 75 Interchange | Cobb, GA |
| 18 | I-695/I-70 and I-95 exit 11 (note: I-70 N. of here) | Baltimore, MD |
| 19 | I-95 @ SR-4 | Bergen, NJ |
| 20 | I-10 @ I-110/US-54 Interchange | El Paso, TX |
| 21 | I-45 (Gulf Freeway) @ US-59 Interchange | Harris, TX |
| 22 | SR-134 @ SR-2 Interchange | Los Angeles, CA |
| 23 | I-10 @ SR-51/SR-202 Interchange ("Mini-Stack") | Maricopa, AZ |
| 24 | I-10 @ I-15 Interchange | San Bernardino, CA |
| 25 | I-95/I-495 | Prince Georges, MD |
| 26 | I-45 @ I-610 Interchange | Harris, TX |
| 27 | I-10 @ I-410 Loop North Interchange | Bexar, TX |
| 28 | I-110 @ I-105 Interchange | Los Angeles, CA |
| 29 | I-95 @ I-595 Interchange | Broward, FL |
| 30 | I-25 @ I-76 Interchange | Adams, CO |

Table 1: Original List of Worst U.S. Freight Bottlenecks (Ranked by Severity)
Source: Generated during the development of *Estimated Cost of Freight Involved in Highway Bottlenecks* (2008).

## RESEARCH METHODOLOGY

ATRI conducted an in-depth analysis of each of the 30 bottlenecks listed in Table 1 using truck position and speed data that were derived from wireless onboard communications systems used by the trucking industry. The four basic steps in this analysis are as follows:

1. Identification of Study Population (i.e. extraction of data for commercial vehicles within a specific time period and at a specific location from a larger "fused" database);
2. Application of Data Quality Tools and Techniques;
3. Application of a Four-Step Analysis Process that Utilizes Vehicle Time, Date and Speed information; and
4. Final Production of Total Freight Congestion Values and Ranking.

The results of the first three steps in the analysis are described and displayed in Appendix One. For this Appendix, the ATRI Research Team produced analysis for each of the 30 bottlenecks, including a description of the selected study area and population, a chart describing mean and median speeds by hour of day for data that is included in the study population, and a map that visualizes the study area. The process for producing total freight congestion values and rankings is described in the next section of this report.

## RESEARCH OUTCOME

The final result of this analysis was a new ranking of the original 30 bottleneck list. Each bottleneck was given a "total freight congestion value" using a calculation that factors in the impact of congestion on average commercial vehicle speeds in each study area, includes analysis for 24 one-hour blocks of time, and addresses freight demand for road segments that are located within the study area during each hour-long block of time. The "total freight congestion value" does not represent hours lost, or financial costs due to this delay, but is simply a means by which the researchers could compare the level of severity of each individual bottleneck.

Table 2 displays the calculations used to produce a "total freight congestion value" for an individual bottleneck; the methods are also described below.

The first step in the process is to set a free flow speed. In this research, 55 mph is used for free flow on all 30 bottlenecks. In future exercises of this nature the free flow speed may be set lower or higher based on the posted speed limit at a given location, which may vary from bottleneck to bottleneck.

The second step is a calculation of the miles per hour below free flow; this number is then multiplied on an hour-by-hour basis by the number of commercial vehicles that were part of the corresponding hour block. Thus, commercial vehicles that are not affected by delay produce a delay value of 0. Essentially, for each of the 24 one-hour blocks of time, "vehicle population by hour" is multiplied by "(Free Flow – Average MPH)" to produce an "hourly freight congestion value."

Finally, the sum of 24 hourly freight congestion values is calculated to produce the "total freight congestion value," which is the number used to rank the severity of the 30 bottlenecks.

The final result of this exercise is a re-ranking of the original 30 bottleneck list, which is shown in Table 3. It should be noted that this list only describes the relationship of each of the 30 bottlenecks with other bottlenecks in the list using the method of analysis described above; it does not offer information pertaining to bottlenecks that are not on the list. Bottlenecks that are <u>not</u> shown on the Table 1 and 2 lists may be more severe than those analyzed in this study.

As a final note, the study period (i.e. the timeframe from which data was extracted) included one year of weekday truck position data between June 1, 2006 and May 31, 2007. During those time periods (and for specific bottlenecks) certain external factors may have played a role in the final total freight congestion value. This is especially true for those areas that were influenced by ongoing, long-term construction projects.

| Hour of Day | Vehicle Population by Hour | Average MPH by Hour | MPH Below Free Flow =(Free Flow [55]- Average MPH) | Hourly Freight Congestion Value = (MPH Below Free Flow) * (Vehicle Population by Hour) |
|---|---|---|---|---|
| 00:00-01:00 | 687 | 55.00 | 0.00 | 0 |
| 01:00-02:00 | 711 | 55.00 | 0.00 | 0 |
| 02:00-03:00 | 744 | 55.00 | 0.00 | 0 |
| 03:00-04:00 | 700 | 55.00 | 0.00 | 0 |
| 04:00-05:00 | 784 | 55.00 | 0.00 | 0 |
| 05:00-06:00 | 979 | 55.00 | 0.00 | 0 |
| 06:00-07:00 | 1015 | 53.98 | 1.02 | 1,032 |
| 07:00-08:00 | 1473 | 38.48 | 16.52 | 24,333 |
| 08:00-09:00 | 1536 | 38.59 | 16.41 | 25,203 |
| 09:00-10:00 | 1585 | 49.06 | 5.94 | 9,418 |
| 10:00-11:00 | 1456 | 54.27 | 0.73 | 1,070 |
| 11:00-12:00 | 1537 | 55.00 | 0.00 | 0 |
| 12:00-13:00 | 1358 | 55.00 | 0.00 | 0 |
| 13:00-14:00 | 1420 | 53.44 | 1.56 | 2,209 |
| 14:00-15:00 | 1521 | 46.80 | 8.20 | 12,467 |
| 15:00-16:00 | 1654 | 39.85 | 15.15 | 25,057 |
| 16:00-17:00 | 1465 | 39.68 | 15.32 | 22,446 |
| 17:00-18:00 | 1609 | 39.36 | 15.64 | 25,164 |
| 18:00-19:00 | 1186 | 47.76 | 7.24 | 8,588 |
| 19:00-20:00 | 998 | 55.00 | 0.00 | 0 |
| 20:00-21:00 | 835 | 55.00 | 0.00 | 0 |
| 21:00-22:00 | 862 | 55.00 | 0.00 | 0 |
| 22:00-23:00 | 753 | 55.00 | 0.00 | 0 |
| 23:00-00:00 | 751 | 55.00 | 0.00 | 0 |
| | | | | |
| | | | | Total Freight Congestion Value = 156,987 |
| | | | | (Sum of Hourly Freight Congestion Values) |

Table 2: Example of Total Freight Congestion Value Calculation for a Single Freight Bottleneck

| Total Freight Congestion Value | Ranking Using ATRI Analysis | Bottleneck Name/ Location | County/State |
|---|---|---|---|
| 2722629 | **1** | I-80 @ I-94 split in Chicago, IL | Cook, IL |
| 1435661 | **2** | I-95 @ SR-4 | Bergen, NJ |
| 921688 | **3** | I-90 @I-94 Interchange ("Edens Interchange") | Cook, IL |
| 899899 | **4** | I - 285 @ I - 85 Interchange ("Spaghetti Junction") | Dekalb, GA |
| 656190 | **5** | I-95 @SR-9A (Westside Hwy) | New York, NY |
| 446933 | **6** | I-40 @ I-65 Interchange (east) | Davidson, TN |
| 426569 | **7** | SR-60 @ SR-57 Interchange | Los Angeles, CA |
| 382200 | **8** | I-10 @ I-15 Interchange | San Bernardino, CA |
| 318853 | **9** | I-45 (Gulf Freeway) @ US-59 Interchange | Harris, TX |
| 259704 | **10** | I-45 @ I-610 Interchange | Harris, TX |
| 234258 | **11** | I-20 @ I-75/I-85 Interchange | Fulton, GA |
| 225892 | **12** | I-17 (Black Canyon Fwy): I-10 Interchange (the "Stack") | Maricopa, AZ |
| 183772 | **13** | I-95/I-495 | Prince Georges, MD |
| 156987 | **14** | I-710 @I-105 Interchange | Los Angeles, CA |
| 144772 | **15** | I-71 @ I-70 Interchange | Franklin, OH |
| 144009 | **16** | I-80 @ I-580/I-880 in Oakland, CA | Alameda, CA |
| 138824 | **17** | I - 75 @ I - 85 Interchange | Fulton, GA |
| 129421 | **18** | I-880 @ I-238 | Alameda, CA |
| 119629 | **19** | I-695/I-70 and I-95 exit 11 (note: I-70 N. of here) | Baltimore, MD |
| 115516 | **20** | I-10 @ I-110/US-54 Interchange | El Paso, TX |
| 107116 | **21** | I-25 @ I-76 Interchange | Adams, CO |
| 93066 | **22** | I-10 @ I-410 Loop North Interchange | Bexar, TX |
| 58784 | **23** | I - 285 @ I - 75 Interchange | Cobb, GA |
| 56591 | **24** | I-290 @ I-355 Interchange | DuPage, IL |
| 51486 | **25** | I-10 @ SR-51/SR-202 Interchange ("Mini-Stack") | Maricopa, AZ |
| 40647 | **26** | I-110 @ I-105 Interchange | Los Angeles, CA |
| 36746 | **27** | SR-91 @ SR-55 Interchange | Orange, CA |
| 28291 | **28** | I-95 @ I-595 Interchange | Broward, FL |
| 16732 | **29** | I-405 (San Diego Fwy) @ I-605 Interchange | Orange, CA |
| 3200 | **30** | SR-134 @ SR-2 Interchange | Los Angeles, CA |

Table 3: Ranking of Freight Bottleneck Severity Based on ATRI Analysis

## CONCLUSIONS

The analysis contained within this report offers an initial glimpse at the use of FPM data, customized software and FPM processing methods to identify and determine the severity of freight bottlenecks. Future research should focus on the identification and analysis of additional bottlenecks that were not among the 30 bottlenecks analyzed in this report, including those that derive from sources other than urban congestion. In future research efforts, it is possible that several hundred major U.S. freight bottlenecks could be identified, assigned total freight congestion values and ranked by severity.

As a follow-up activity to this report, ATRI intends to host a Freight Bottleneck Analysis Workshop in May 2009, which will allow those involved in this type of research the ability to collaborate on research methods.

# APPENDIX ONE

## ANALYSIS OF 30 FREIGHT BOTTLENECKS

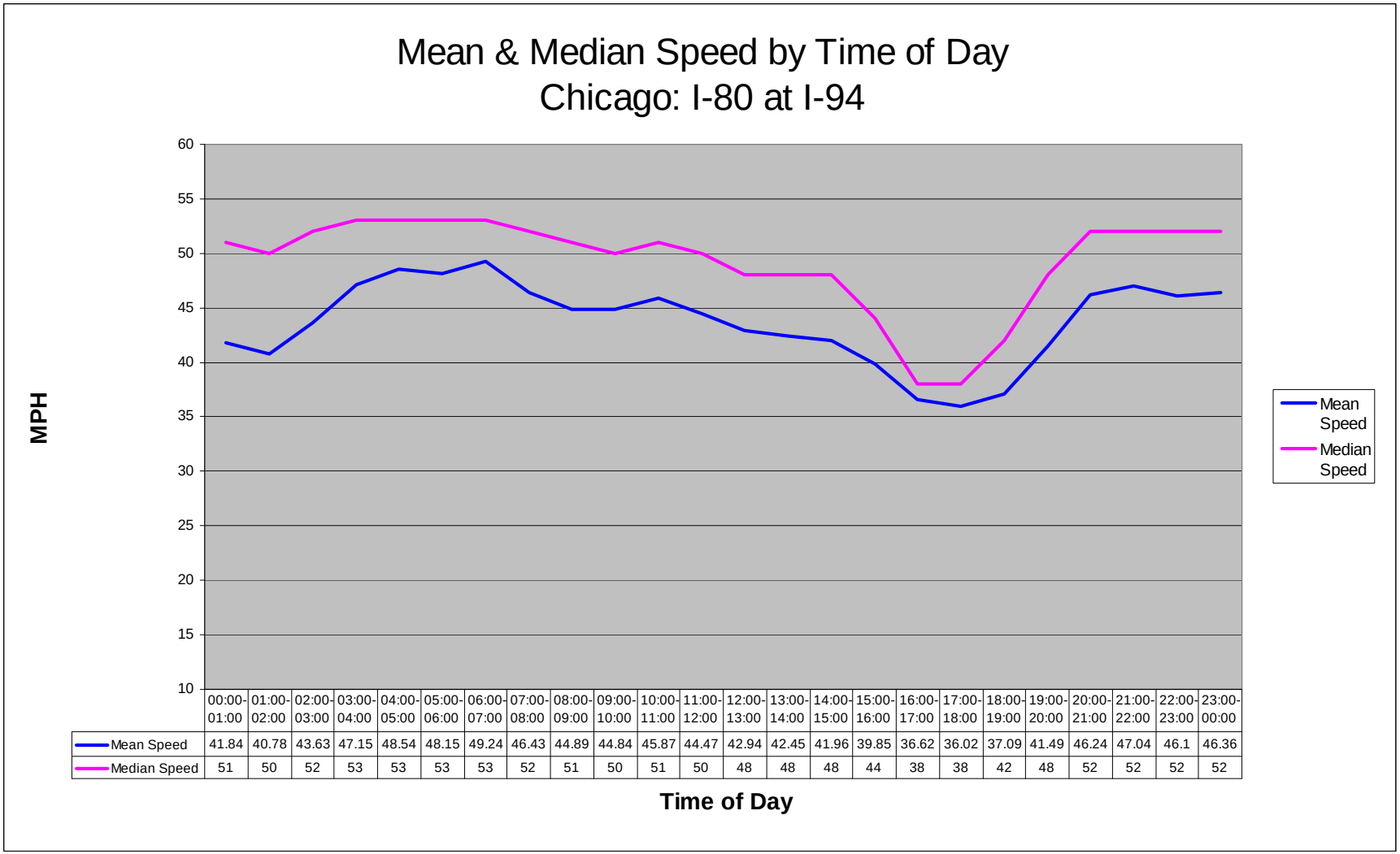
## Bottleneck 01: Chicago, Illinois

**Bottleneck Location:** Chicago, Illinois, Interstate 80 at Interstate 94.

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 8 miles in the study area.

**Positions:** There were approximately 227,478 truck position reads used in this analysis.

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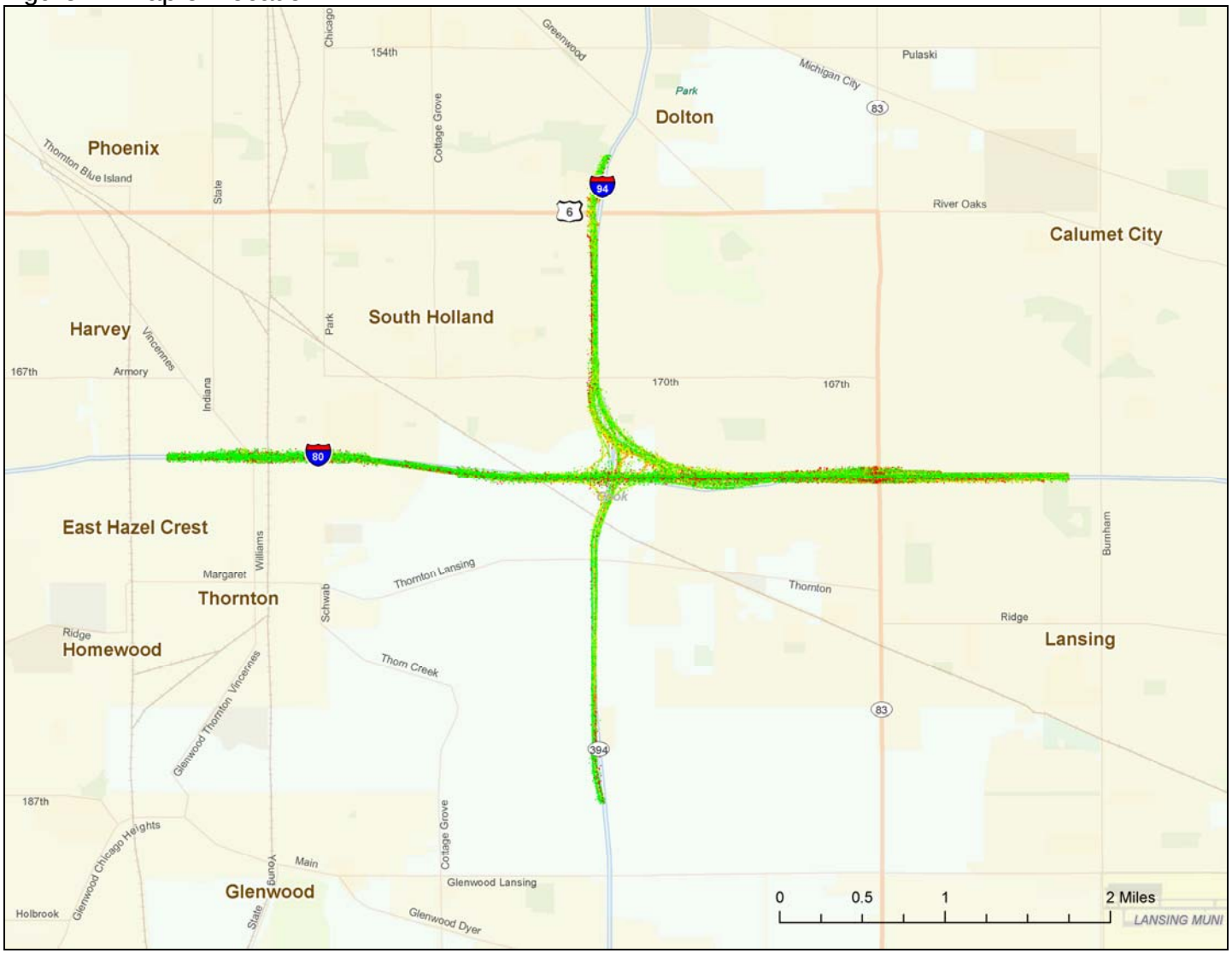
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 41.84 | 40.78 | 43.63 | 47.15 | 48.54 | 48.15 | 49.24 | 46.43 | 44.89 | 44.84 | 45.87 | 44.47 | 42.94 | 42.45 | 41.96 | 39.85 | 36.62 | 36.02 | 37.09 | 41.49 | 46.24 | 47.04 | 46.1 | 46.36 |
| Median Speed | 51 | 50 | 52 | 53 | 53 | 53 | 53 | 52 | 51 | 50 | 51 | 50 | 48 | 48 | 48 | 44 | 38 | 38 | 42 | 48 | 52 | 52 | 52 | 52 |

Chart 1: Weekday Speed by Time of Day

Figure 1:  Map of Location



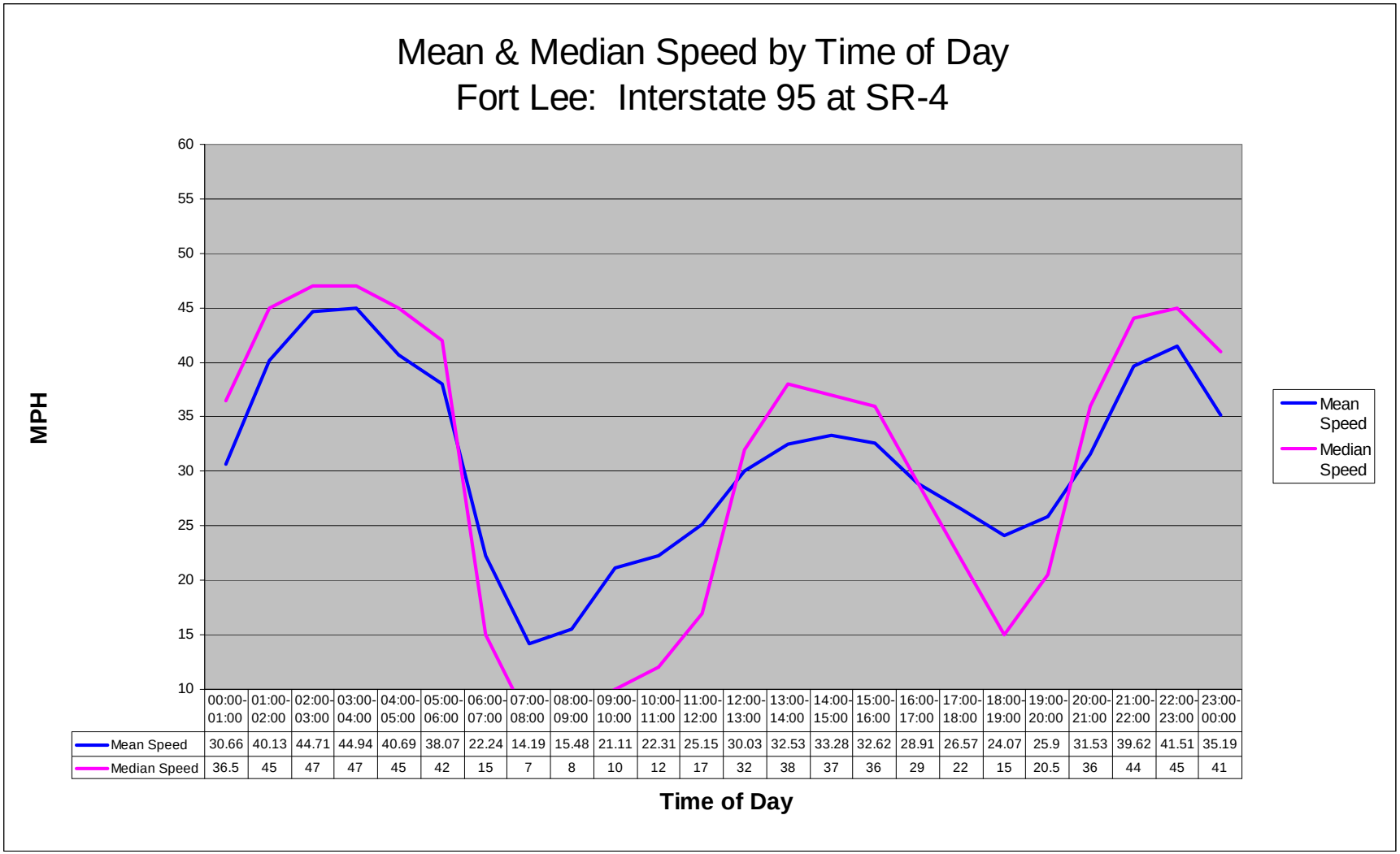
## Bottleneck 02: Fort Lee, New Jersey

**Bottleneck Location:** Fort Lee, New Jersey, Interstate 95 at SR-4

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 4 miles of roadway were included in the study area.

**Positions:** There were approximately 51,257 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 30.66 | 40.13 | 44.71 | 44.94 | 40.69 | 38.07 | 22.24 | 14.19 | 15.48 | 21.11 | 22.31 | 25.15 | 30.03 | 32.53 | 33.28 | 32.62 | 28.91 | 26.57 | 24.07 | 25.9 | 31.53 | 39.62 | 41.51 | 35.19 |
| Median Speed | 36.5 | 45 | 47 | 47 | 45 | 42 | 15 | 7 | 8 | 10 | 12 | 17 | 32 | 38 | 37 | 36 | 29 | 22 | 15 | 20.5 | 36 | 44 | 45 | 41 |

Chart 2: Weekday Speed by Time of Day

Figure 2:  Map of Location

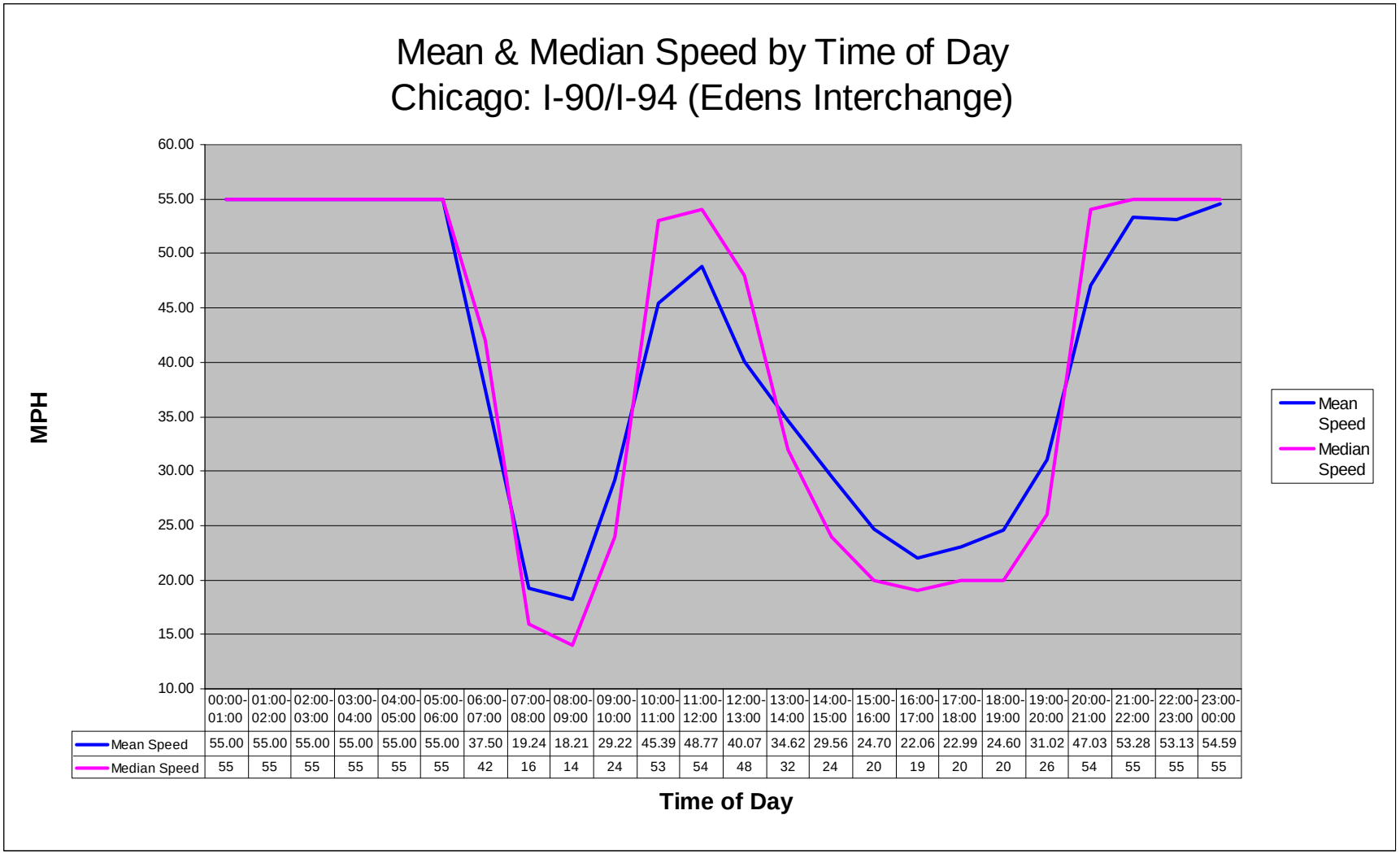
## Bottleneck 03: Chicago, Illinois

**Bottleneck Location:** Chicago, Illinois , Interstate 94/90 Interchange (Edens)

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 6 miles.

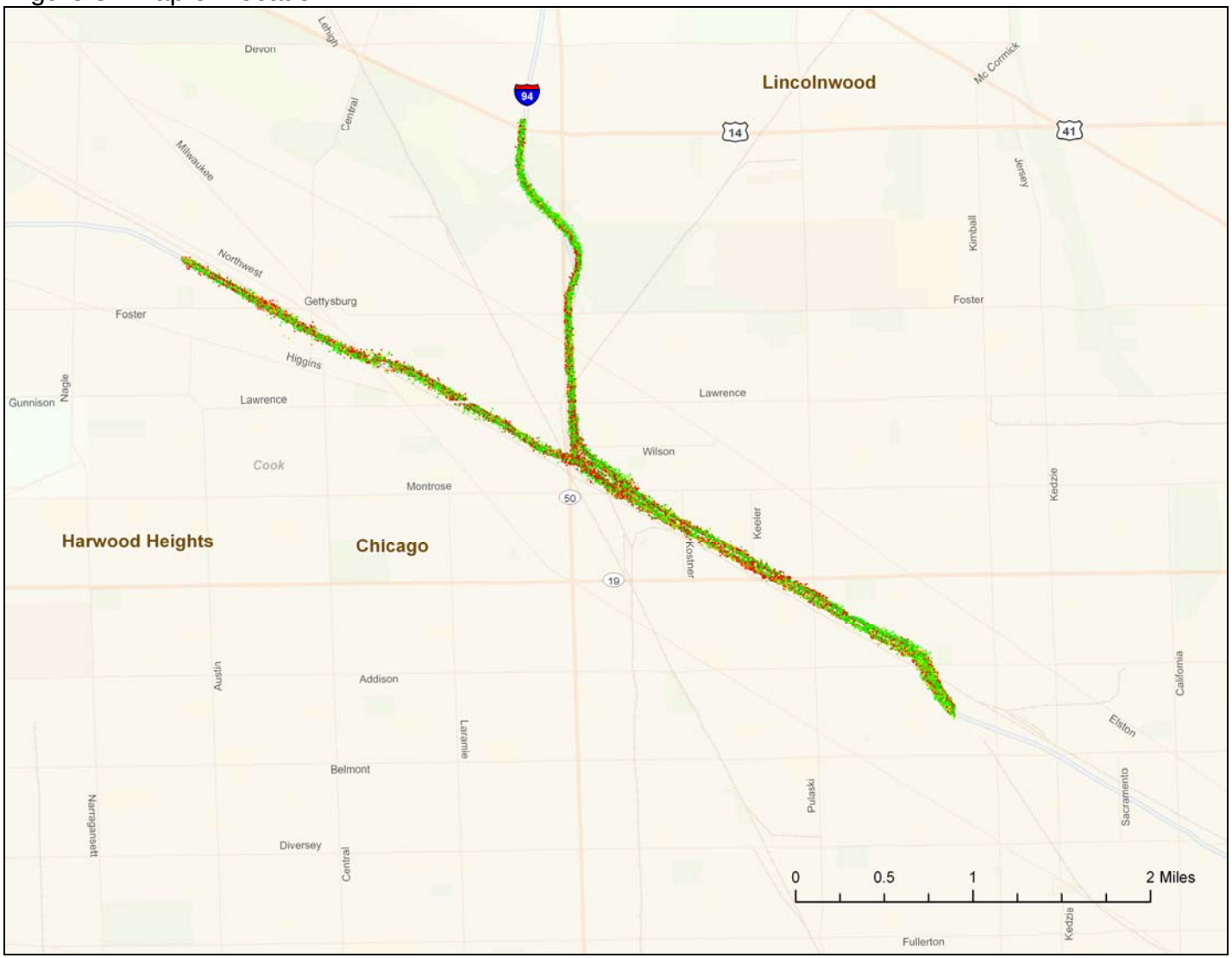
**Positions:** There were approximately 49,923 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 37.50 | 19.24 | 18.21 | 29.22 | 45.39 | 48.77 | 40.07 | 34.62 | 29.56 | 24.70 | 22.06 | 22.99 | 24.60 | 31.02 | 47.03 | 53.28 | 53.13 | 54.59 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 42 | 16 | 14 | 24 | 53 | 54 | 48 | 32 | 24 | 20 | 19 | 20 | 20 | 26 | 54 | 55 | 55 | 55 |

Chart 3: Weekday Speed by Time of Day

Figure 3:  Map of Location



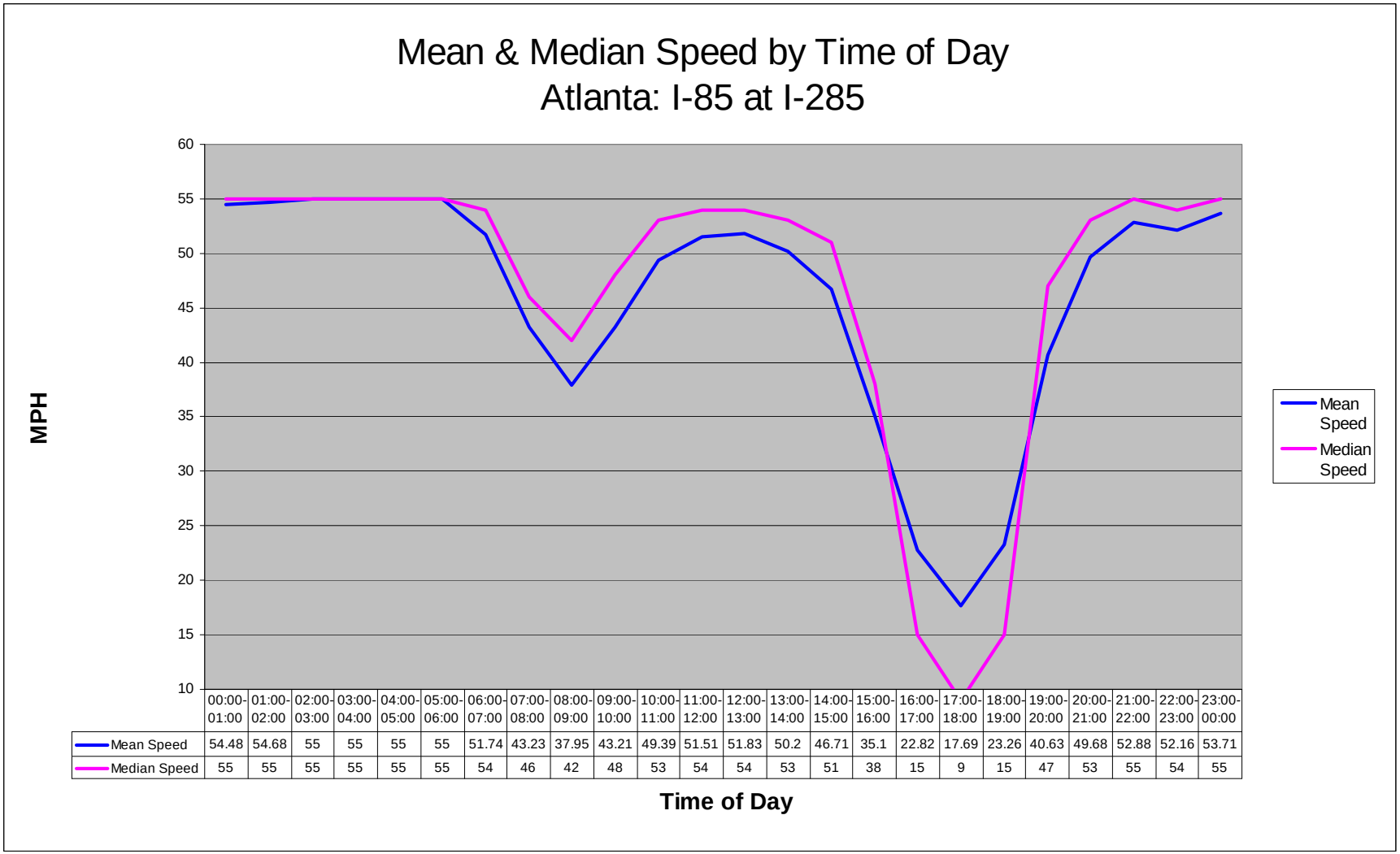
## Bottleneck 04: Atlanta, Georgia

**Bottleneck Location:** Atlanta, Georgia; Interstates 85 and 285; “Spaghetti Junction”

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 1 mile in each direction for a total of approximately 3 miles.

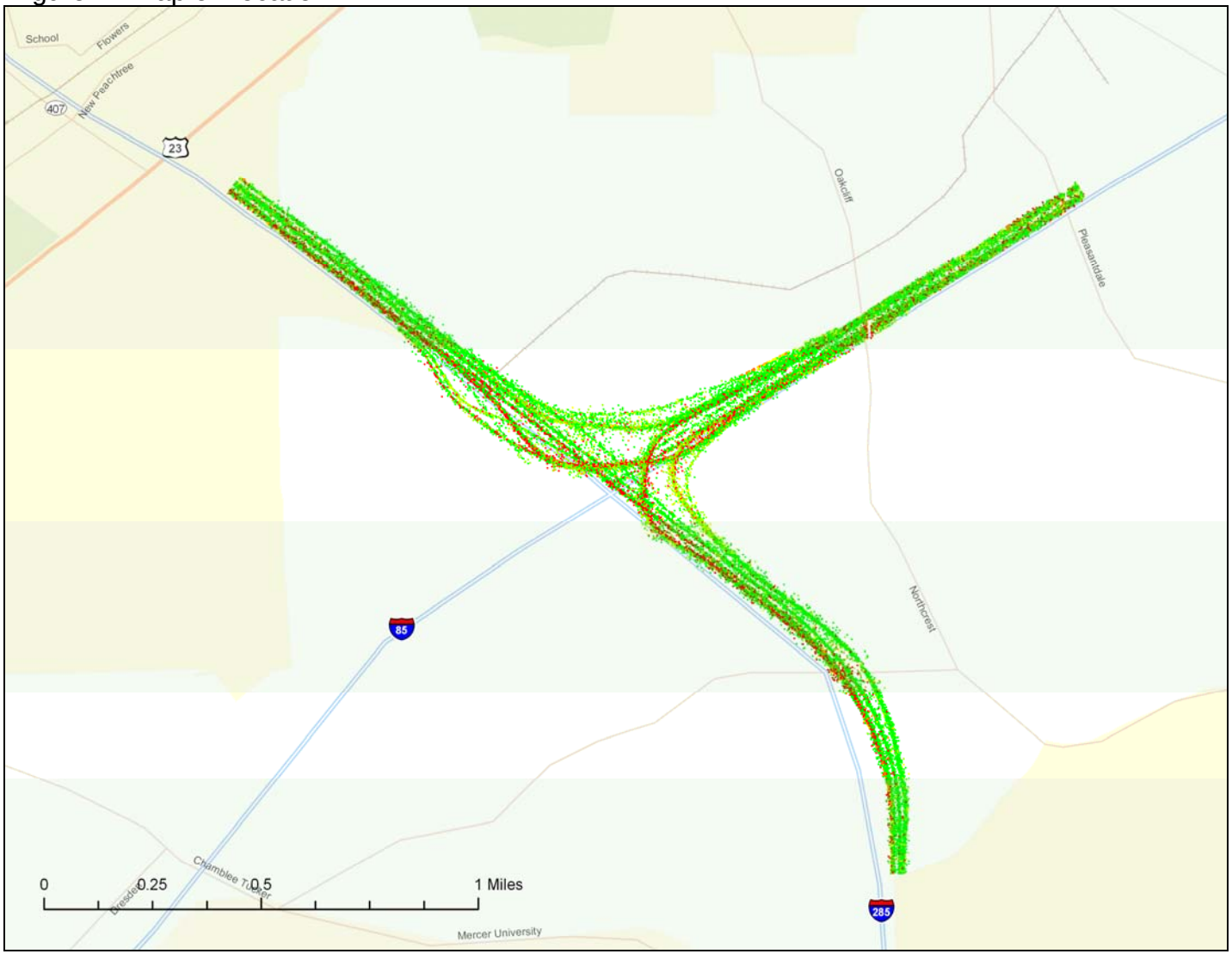
**Positions:** There were approximately 71,865 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 54.48 | 54.68 | 55 | 55 | 55 | 55 | 51.74 | 43.23 | 37.95 | 43.21 | 49.39 | 51.51 | 51.83 | 50.2 | 46.71 | 35.1 | 22.82 | 17.69 | 23.26 | 40.63 | 49.68 | 52.88 | 52.16 | 53.71 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 46 | 42 | 48 | 53 | 54 | 54 | 53 | 51 | 38 | 15 | 9 | 15 | 47 | 53 | 55 | 54 | 55 |

Chart 4: Weekday Speed by Time of Day

Figure 4:  Map of Location



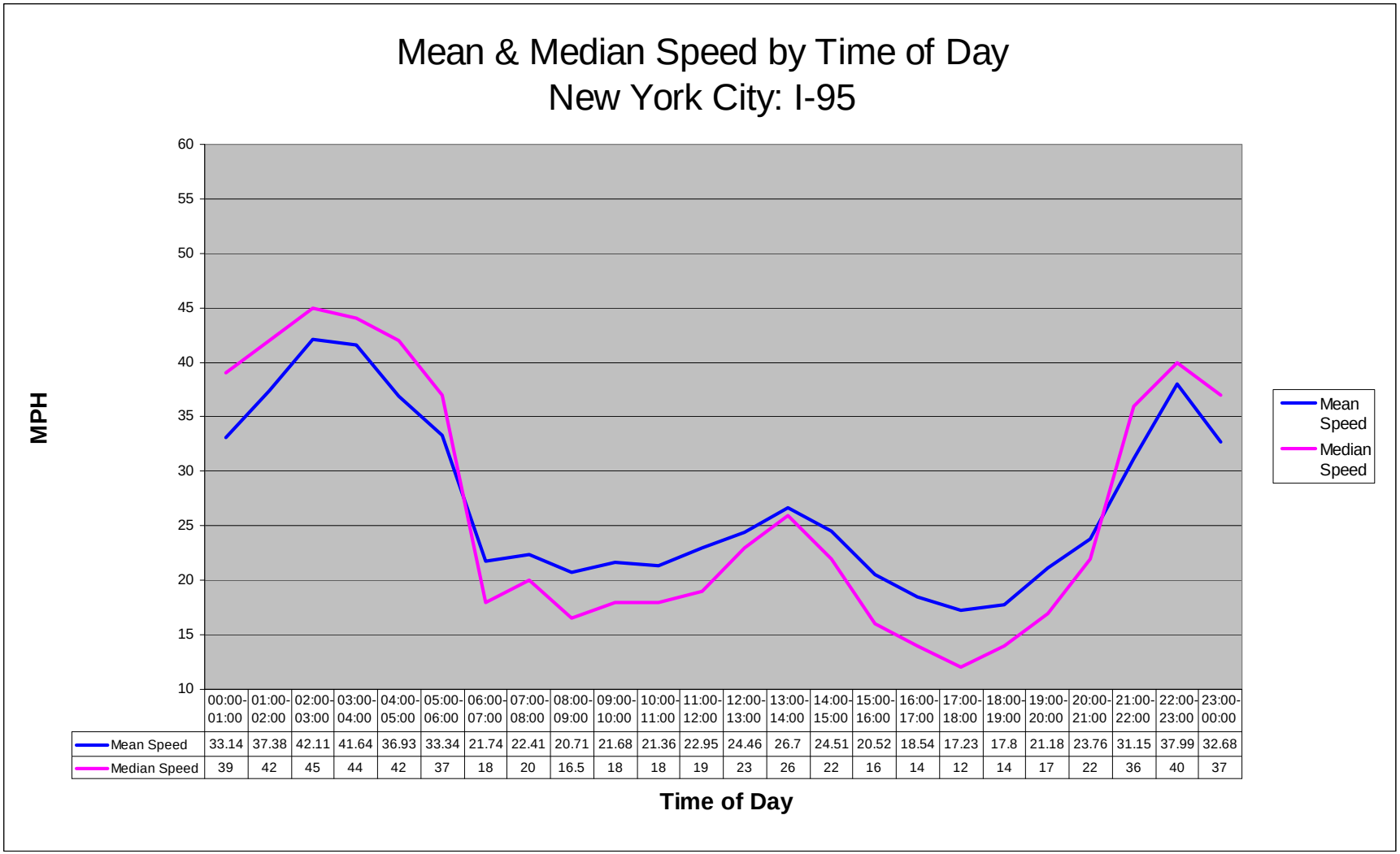
## Bottleneck 05: New York, New York

**Bottleneck Location:** New York, New York, Interstate 95 near SR-9A (Westside Highway)

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** The study area is approximately 2 miles.

**Positions:** There were approximately 21,896 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 33.14 | 37.38 | 42.11 | 41.64 | 36.93 | 33.34 | 21.74 | 22.41 | 20.71 | 21.68 | 21.36 | 22.95 | 24.46 | 26.7 | 24.51 | 20.52 | 18.54 | 17.23 | 17.8 | 21.18 | 23.76 | 31.15 | 37.99 | 32.68 |
| Median Speed | 39 | 42 | 45 | 44 | 42 | 37 | 18 | 20 | 16.5 | 18 | 18 | 19 | 23 | 26 | 22 | 16 | 14 | 12 | 14 | 17 | 22 | 36 | 40 | 37 |

Chart 5: Weekday Speed by Time of Day

Figure 5:  Map of Location

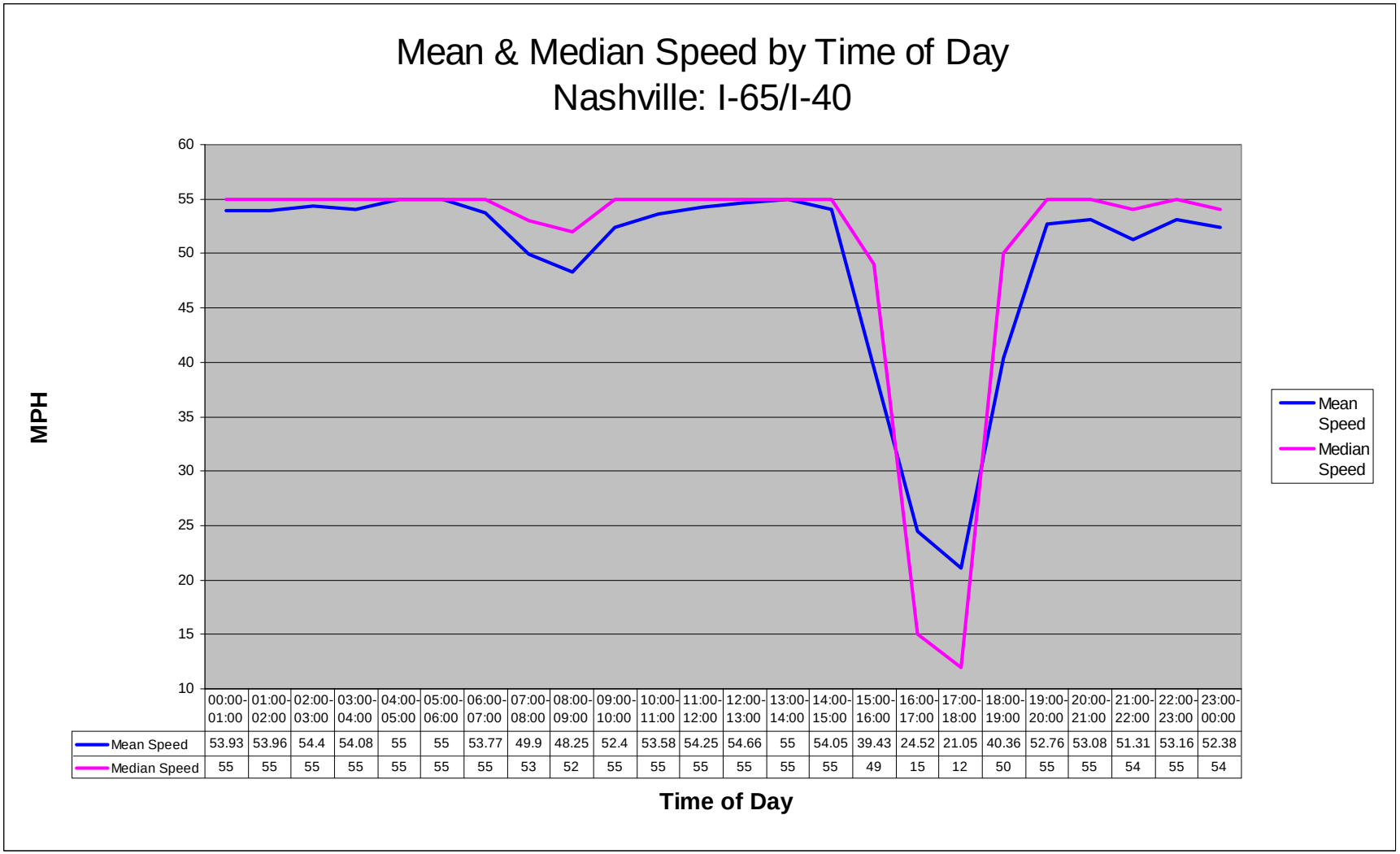
## Bottleneck 06: Nashville, Tennessee

**Bottleneck Location:** Nashville, Tennessee, Interstates 65 and 40

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

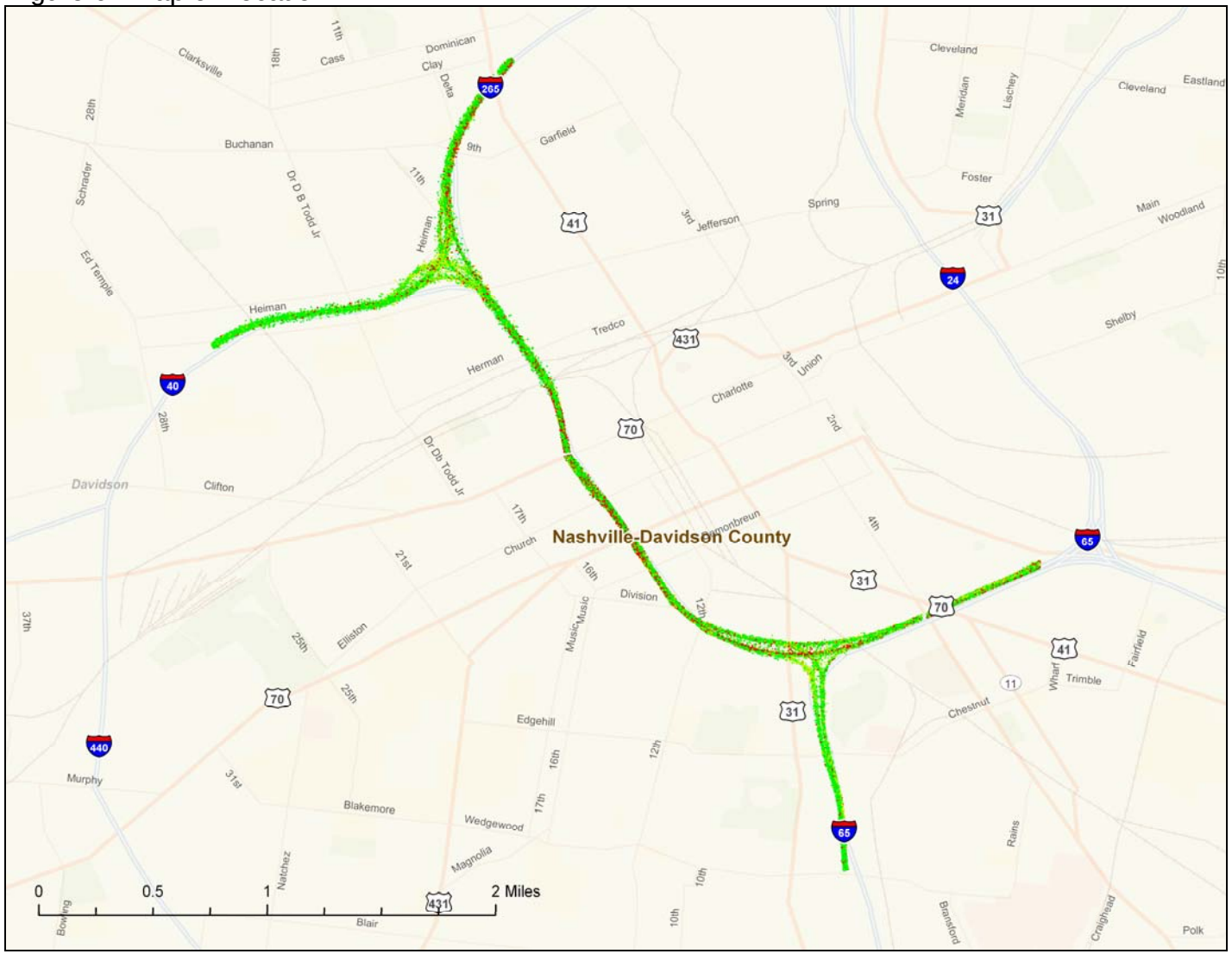
**Positions:** There were approximately 51,313 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 53.93 | 53.96 | 54.4 | 54.08 | 55 | 55 | 53.77 | 49.9 | 48.25 | 52.4 | 53.58 | 54.25 | 54.66 | 55 | 54.05 | 39.43 | 24.52 | 21.05 | 40.36 | 52.76 | 53.08 | 51.31 | 53.16 | 52.38 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 52 | 55 | 55 | 55 | 55 | 55 | 55 | 49 | 15 | 12 | 50 | 55 | 55 | 54 | 55 | 54 |

Chart 6 Weekday Speed by Time of Day

Figure 6:  Map of Location



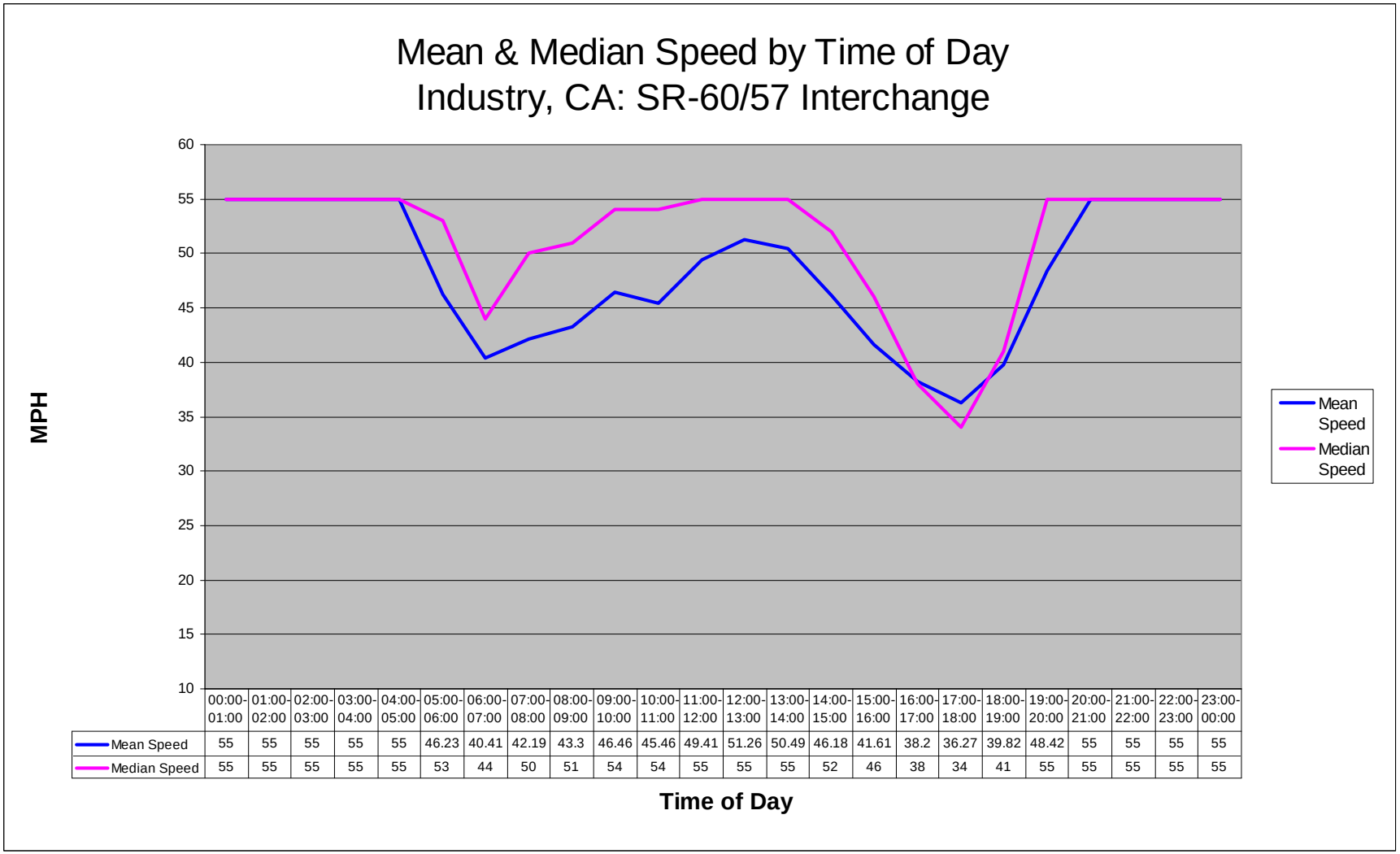
## Bottleneck 07: Industry, California

**Bottleneck Location:** Industry, California, Highways 60 and 57 (near Los Angeles)

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** The study area covers approximately 10 miles.

**Positions:** There were approximately 52,140 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 46.23 | 40.41 | 42.19 | 43.3 | 46.46 | 45.46 | 49.41 | 51.26 | 50.49 | 46.18 | 41.61 | 38.2 | 36.27 | 39.82 | 48.42 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 53 | 44 | 50 | 51 | 54 | 54 | 55 | 55 | 55 | 52 | 46 | 38 | 34 | 41 | 55 | 55 | 55 | 55 | 55 |

Chart 7: Weekday Speed by Time of Day

Figure 7:  Map of Location

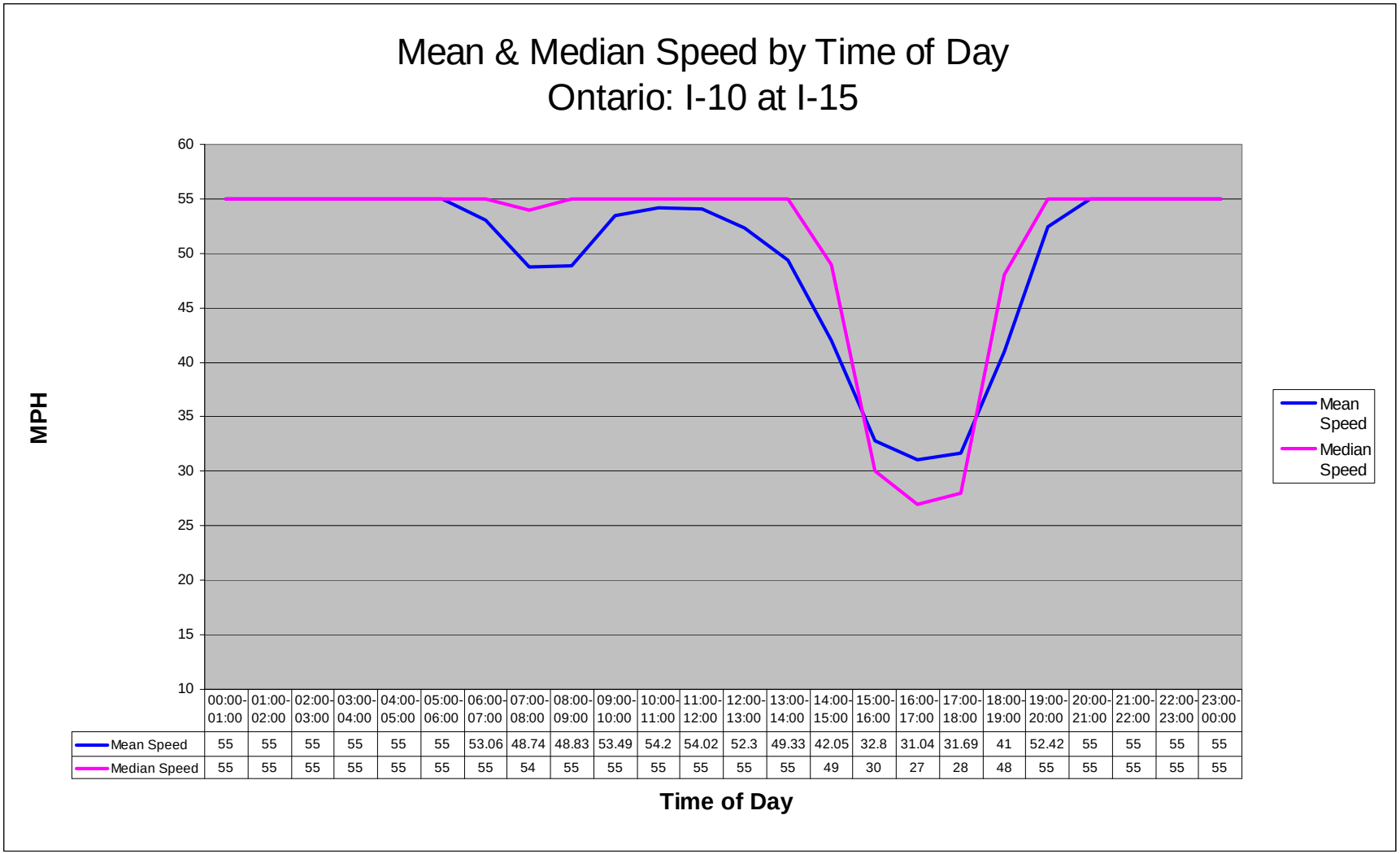
## Bottleneck 08: Ontario, California

**Bottleneck Location:** Ontario, California, Interstate 10 at 15

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

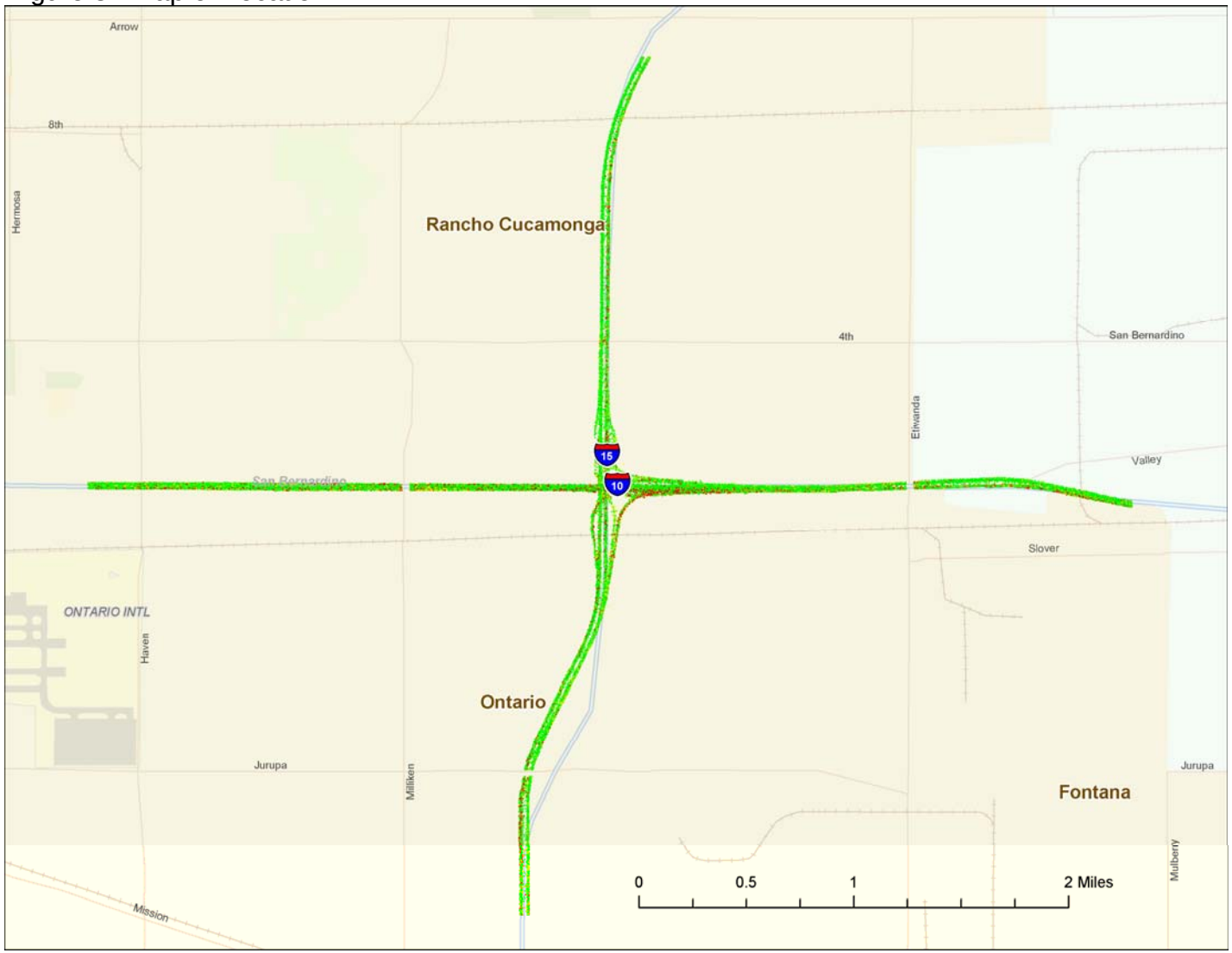
**Positions:** There were 56,102 approximately truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 53.06 | 48.74 | 48.83 | 53.49 | 54.2 | 54.02 | 52.3 | 49.33 | 42.05 | 32.8 | 31.04 | 31.69 | 41 | 52.42 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 55 | 55 | 55 | 55 | 55 | 55 | 49 | 30 | 27 | 28 | 48 | 55 | 55 | 55 | 55 | 55 |

Chart 8: Weekday Speed by Time of Day

Figure 8:  Map of Location



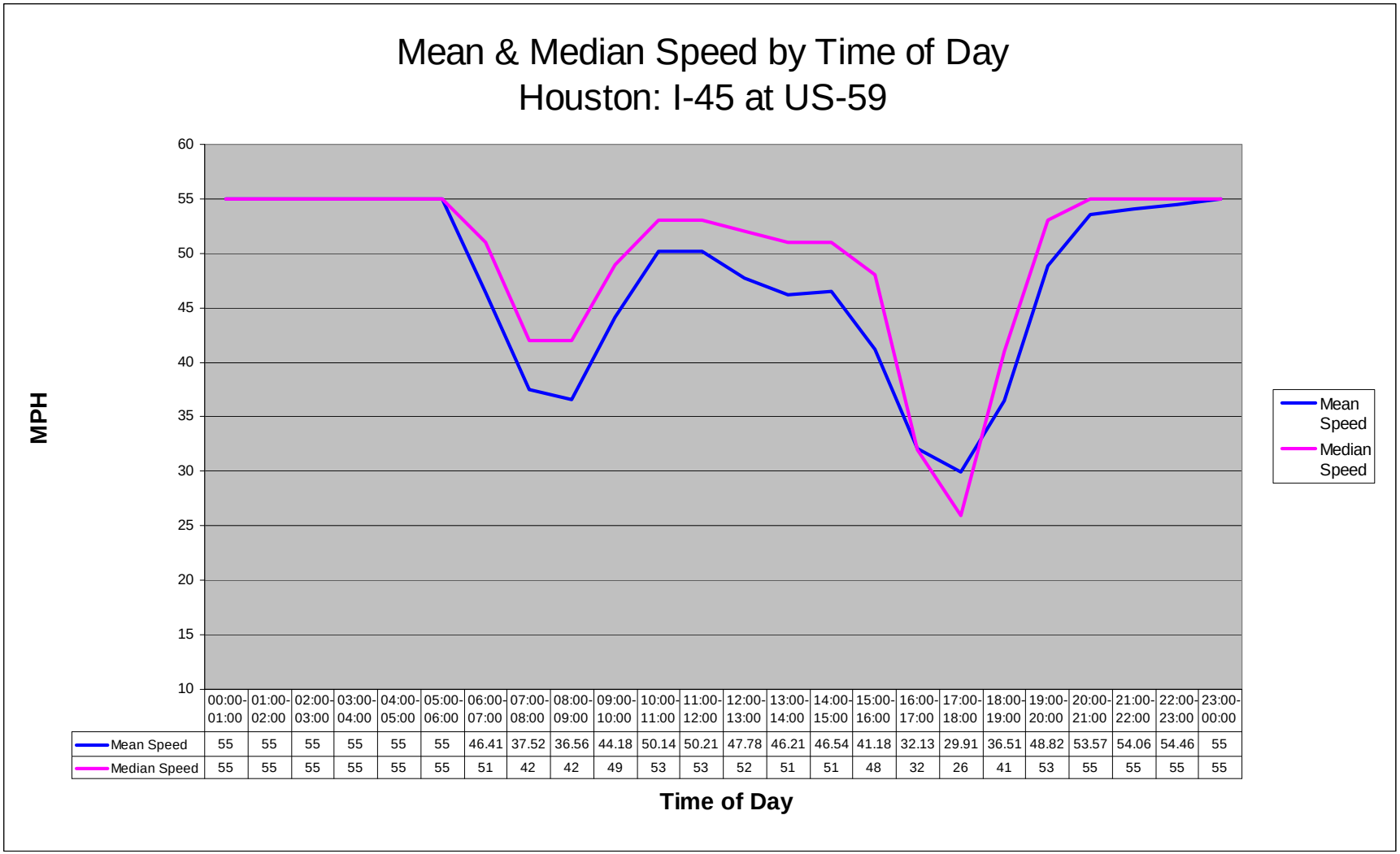
## Bottleneck 09: Houston, Texas

**Bottleneck Location:** Houston, Texas, Interstate 45 at US-59

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

**Positions:** There were approximately 32,627 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 46.41 | 37.52 | 36.56 | 44.18 | 50.14 | 50.21 | 47.78 | 46.21 | 46.54 | 41.18 | 32.13 | 29.91 | 36.51 | 48.82 | 53.57 | 54.06 | 54.46 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 51 | 42 | 42 | 49 | 53 | 53 | 52 | 51 | 51 | 48 | 32 | 26 | 41 | 53 | 55 | 55 | 55 | 55 |

Chart 9: Weekday Speed by Time of Day

Figure 9:  Map of Location

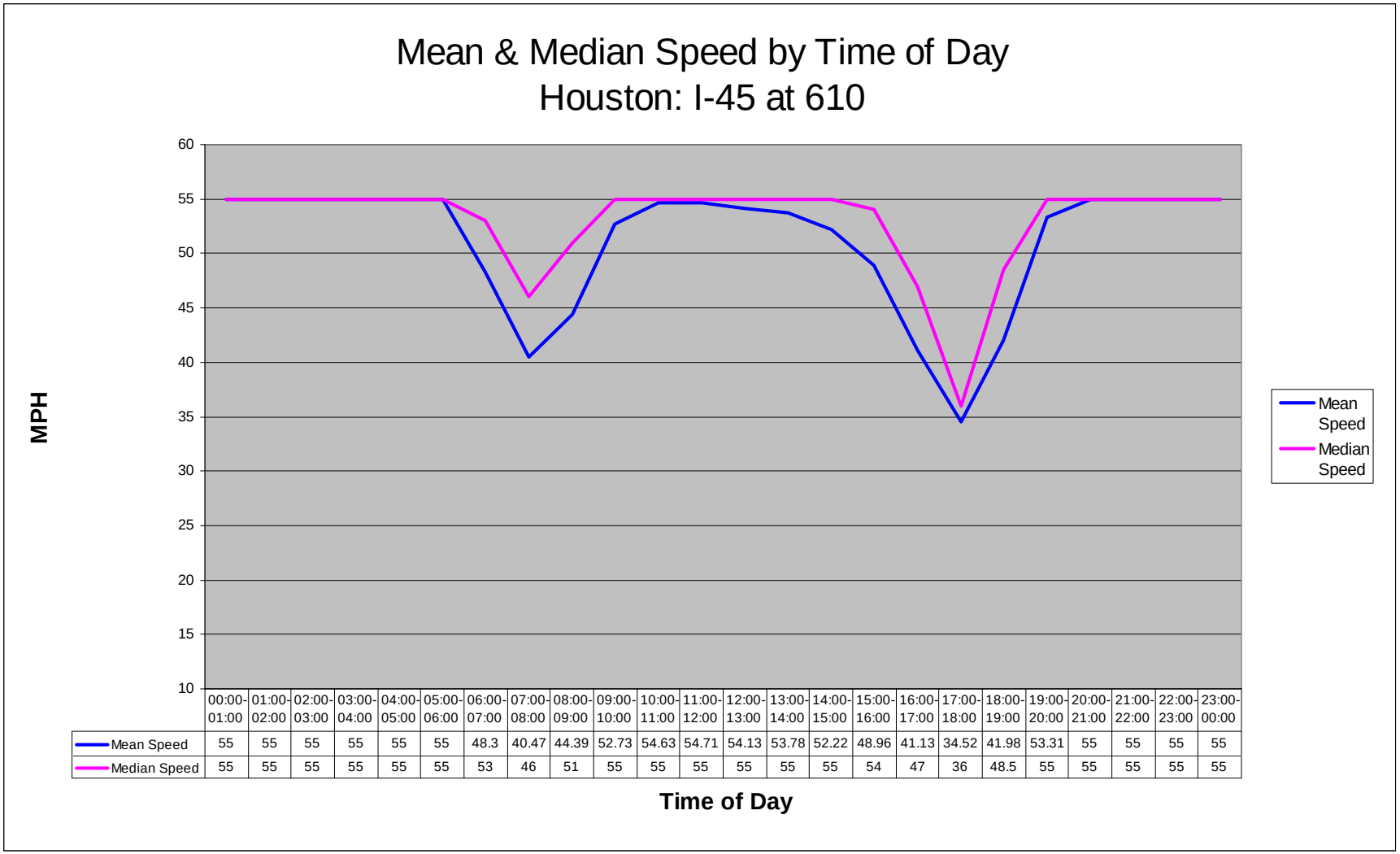
## Bottleneck 10: Houston, Texas

**Bottleneck Location:** Houston, Texas, Interstate 45 at Highway 610

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 1.5 miles in each direction for a total of approximately 6 miles.

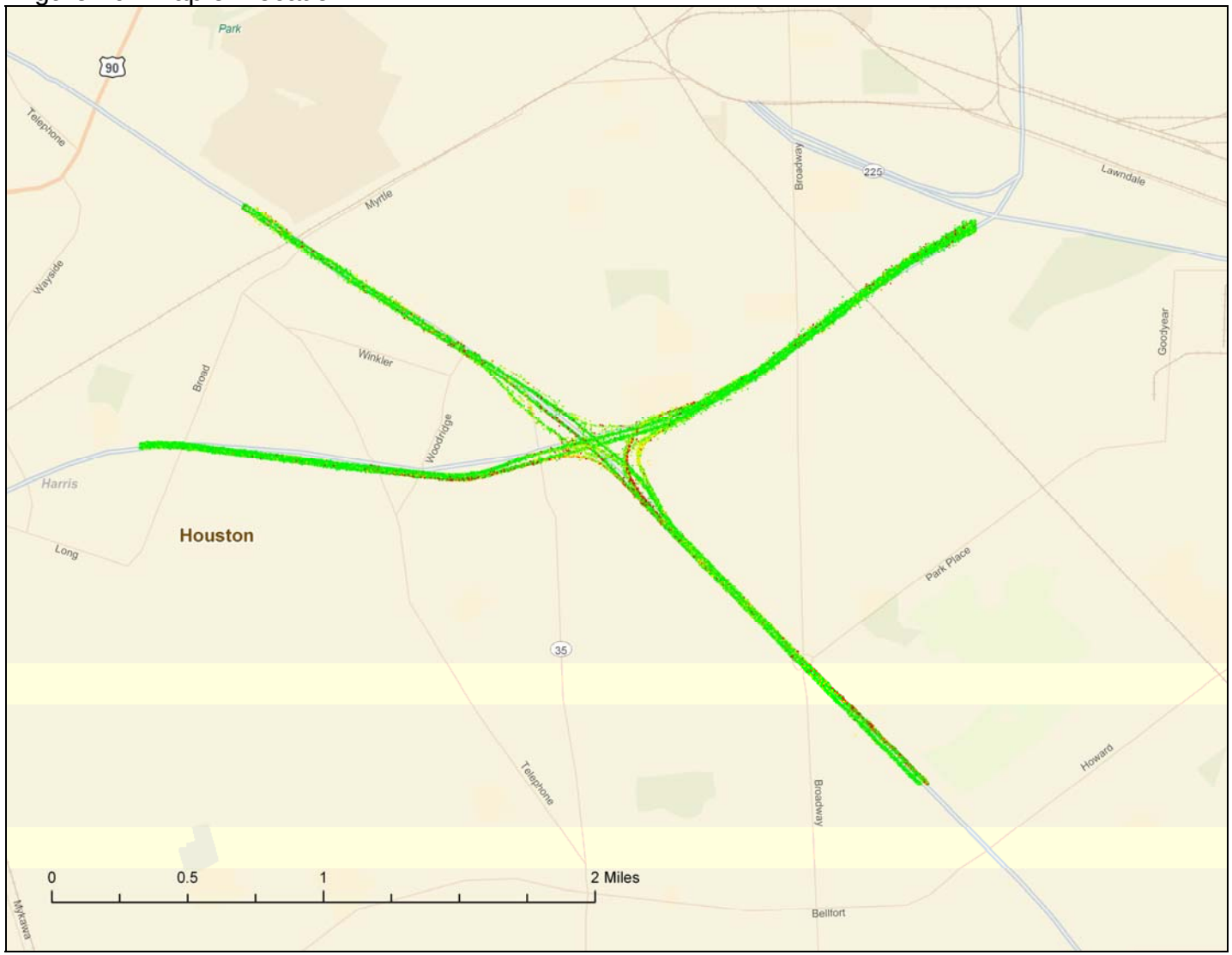
**Positions:** There were approximately 46,856 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 48.3 | 40.47 | 44.39 | 52.73 | 54.63 | 54.71 | 54.13 | 53.78 | 52.22 | 48.96 | 41.13 | 34.52 | 41.98 | 53.31 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 46 | 51 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 47 | 36 | 48.5 | 55 | 55 | 55 | 55 | 55 |

Chart 10: Weekday Speed by Time of Day

Figure 10:  Map of Location



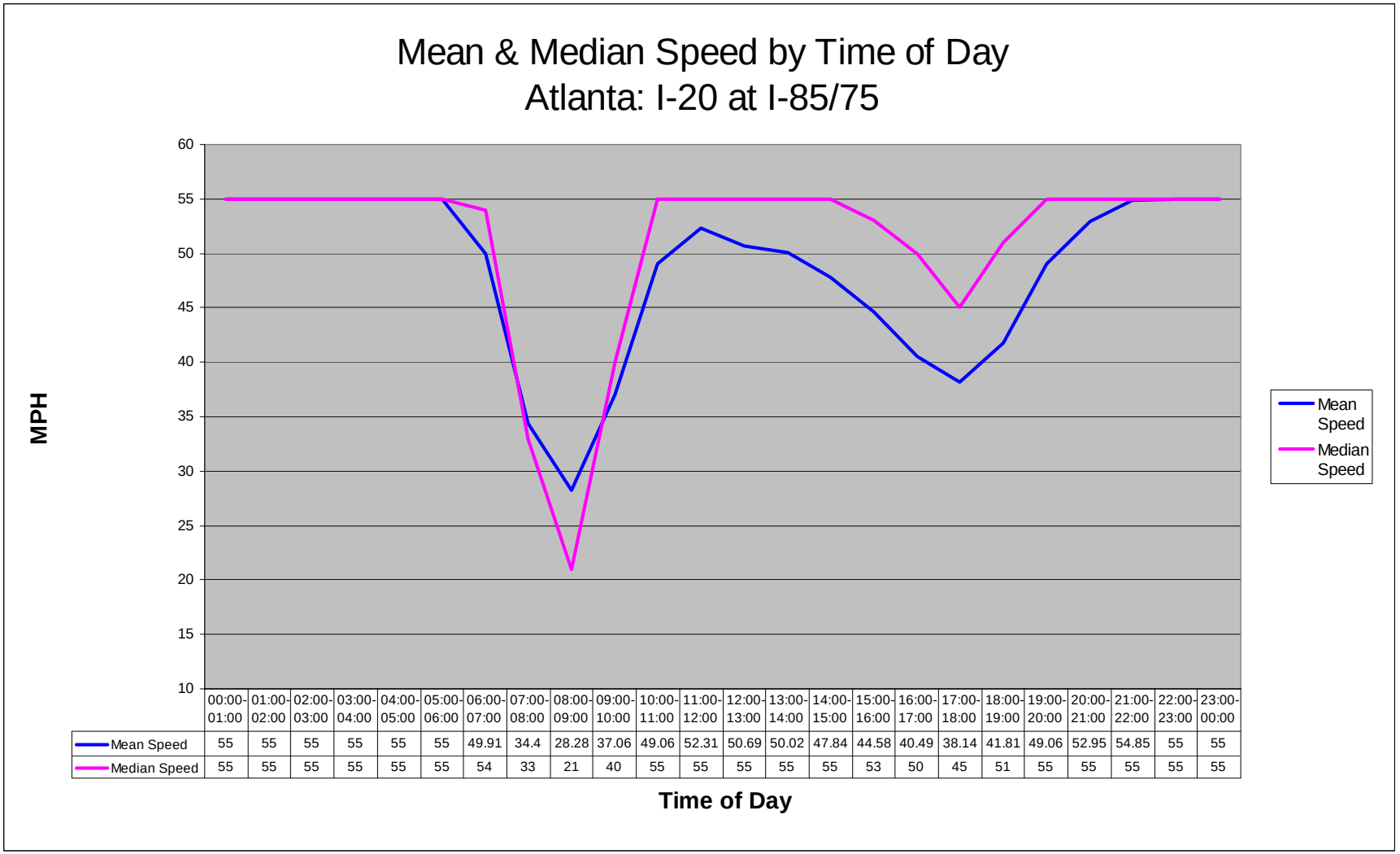
## Bottleneck 11: Atlanta, Georgia

**Bottleneck Location:** Atlanta, Georgia, Interstate 20 at Interstate 85/75

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 8 miles.

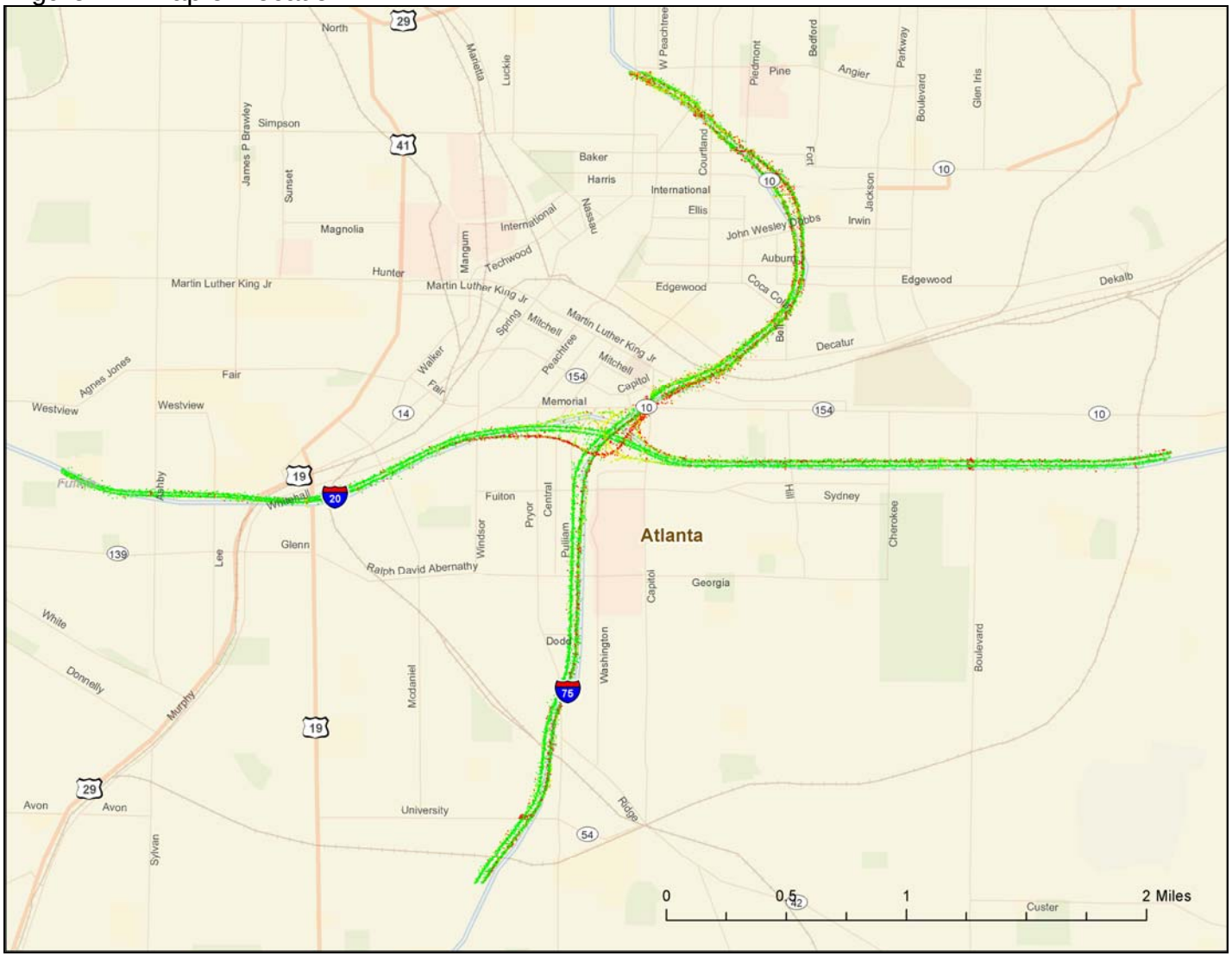
**Positions:** There were approximately 27,537 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 49.91 | 34.4 | 28.28 | 37.06 | 49.06 | 52.31 | 50.69 | 50.02 | 47.84 | 44.58 | 40.49 | 38.14 | 41.81 | 49.06 | 52.95 | 54.85 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 33 | 21 | 40 | 55 | 55 | 55 | 55 | 55 | 53 | 50 | 45 | 51 | 55 | 55 | 55 | 55 | 55 |

Chart 11: Weekday Speed by Time of Day

Figure 11: Map of Location



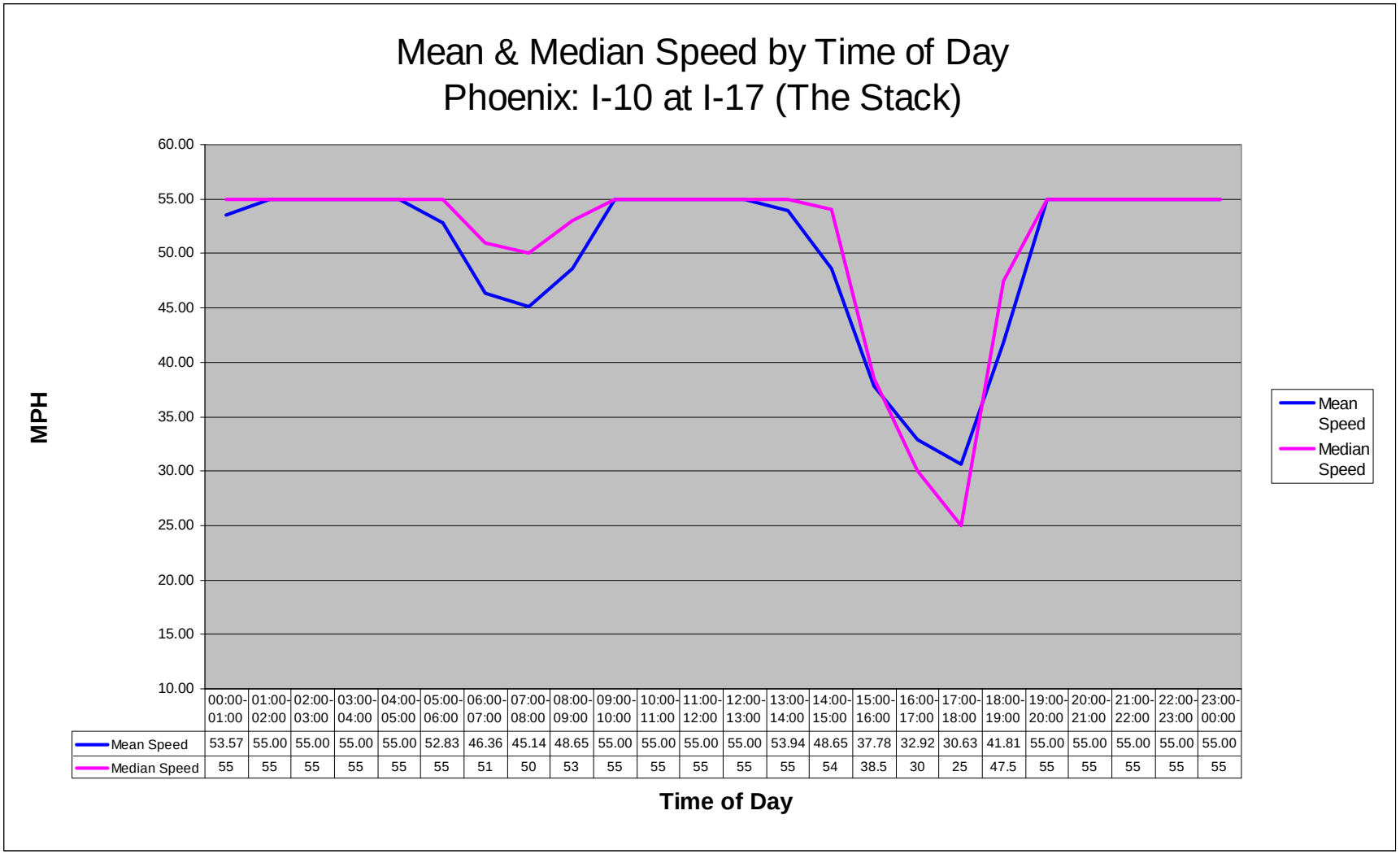
## Bottleneck 12: Phoenix, Arizona

**Bottleneck Location:** Phoenix, Arizona, Interstate 10 and 17, “The Stack”

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 8 miles.

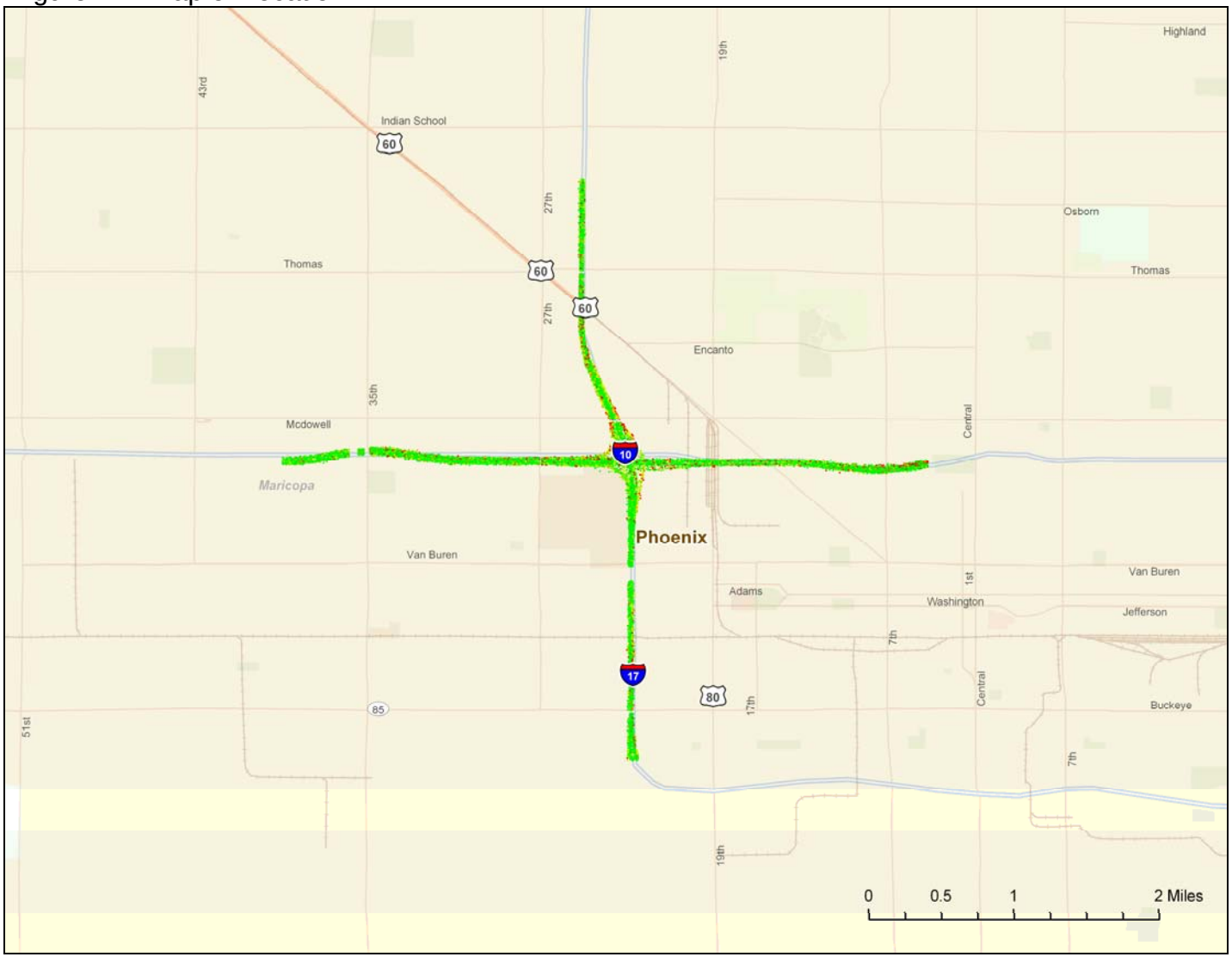
**Positions:** There were approximately 42,395 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 53.57 | 55.00 | 55.00 | 55.00 | 55.00 | 52.83 | 46.36 | 45.14 | 48.65 | 55.00 | 55.00 | 55.00 | 55.00 | 53.94 | 48.65 | 37.78 | 32.92 | 30.63 | 41.81 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 51 | 50 | 53 | 55 | 55 | 55 | 55 | 55 | 54 | 38.5 | 30 | 25 | 47.5 | 55 | 55 | 55 | 55 | 55 |

Chart 12: Weekday Speed by Time of Day

Figure 12:  Map of Location



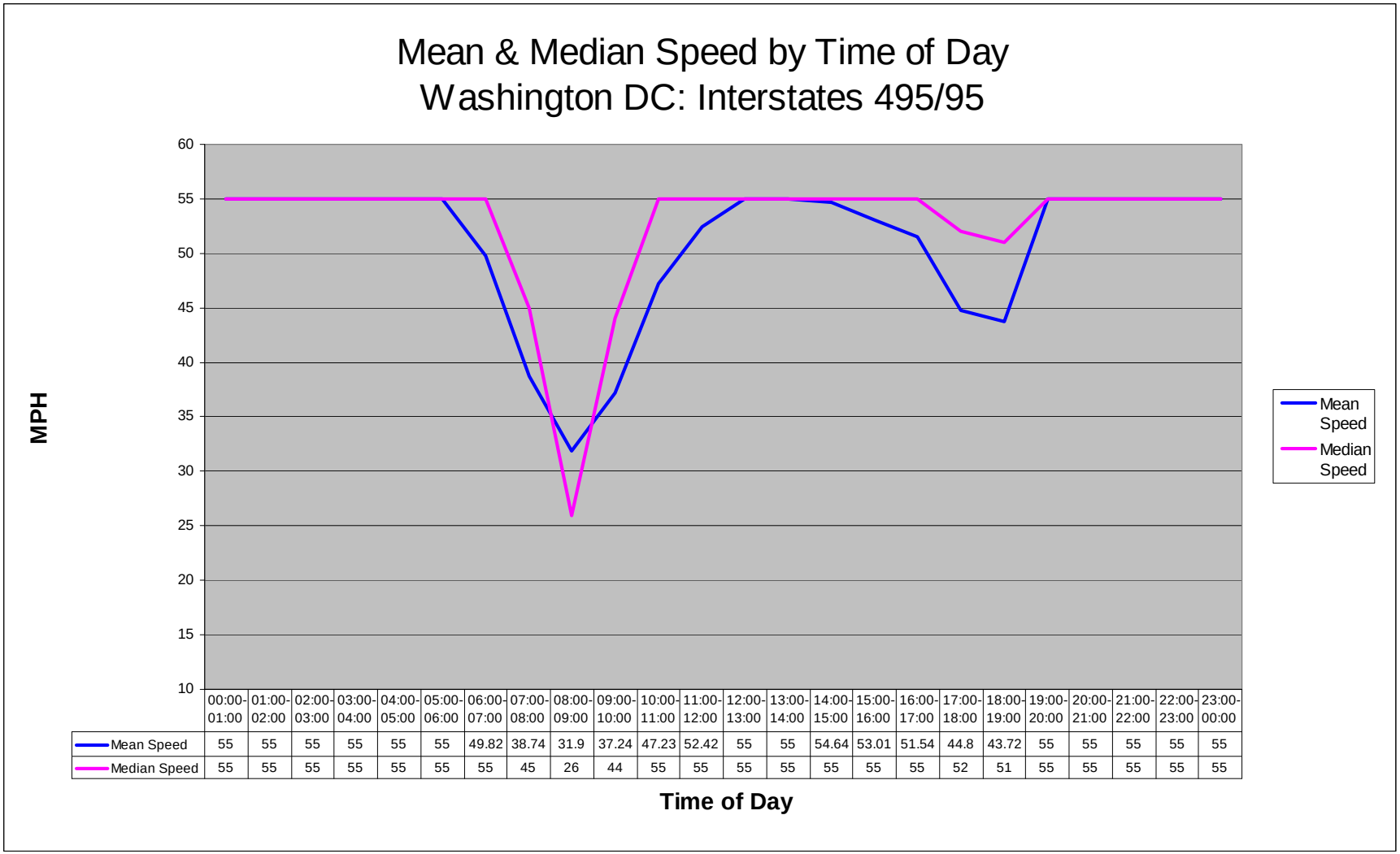
## Bottleneck 13: Washington, DC

**Bottleneck Location:** Near Washington D.C., Interstates 495/95

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

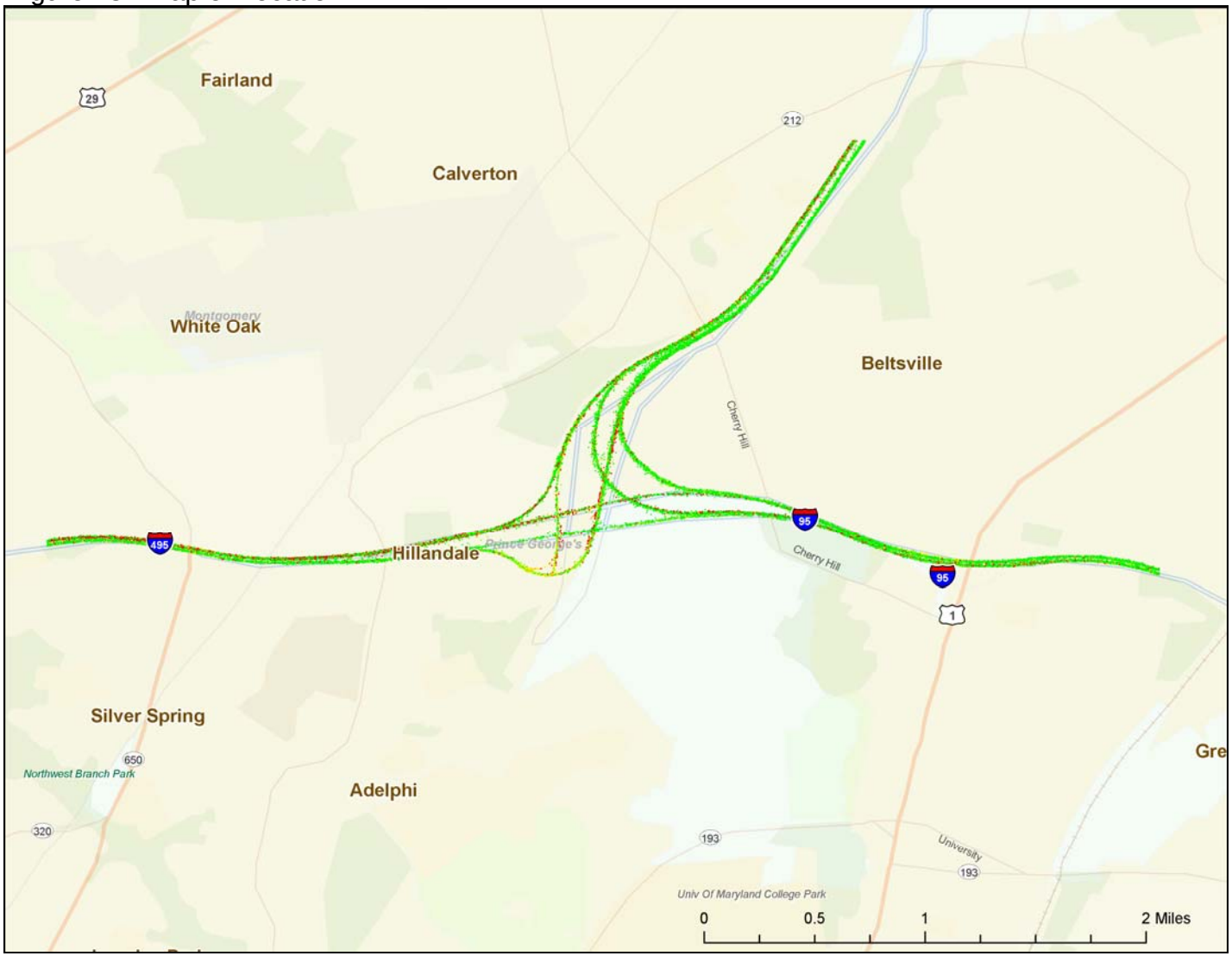
**Positions:** There were approximately 36,540 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 49.82 | 38.74 | 31.9 | 37.24 | 47.23 | 52.42 | 55 | 55 | 54.64 | 53.01 | 51.54 | 44.8 | 43.72 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 45 | 26 | 44 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 52 | 51 | 55 | 55 | 55 | 55 | 55 |

Chart 13: Weekday Speed by Time of Day

Figure 13: Map of Location



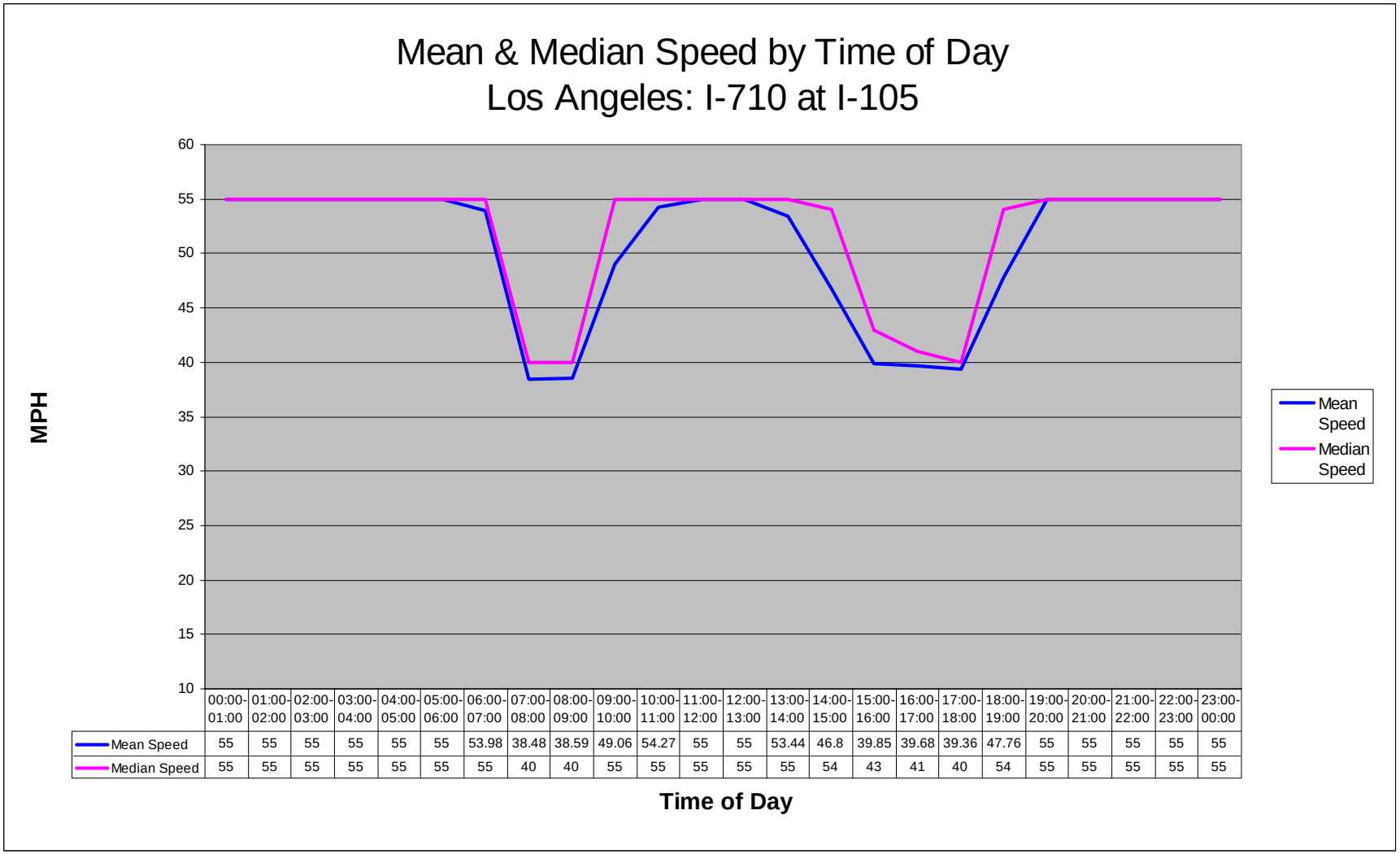
## Bottleneck 14: Los Angeles, California

**Bottleneck Location:** Los Angeles, California, Interstate 710 and Interstate 105

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 8 miles.

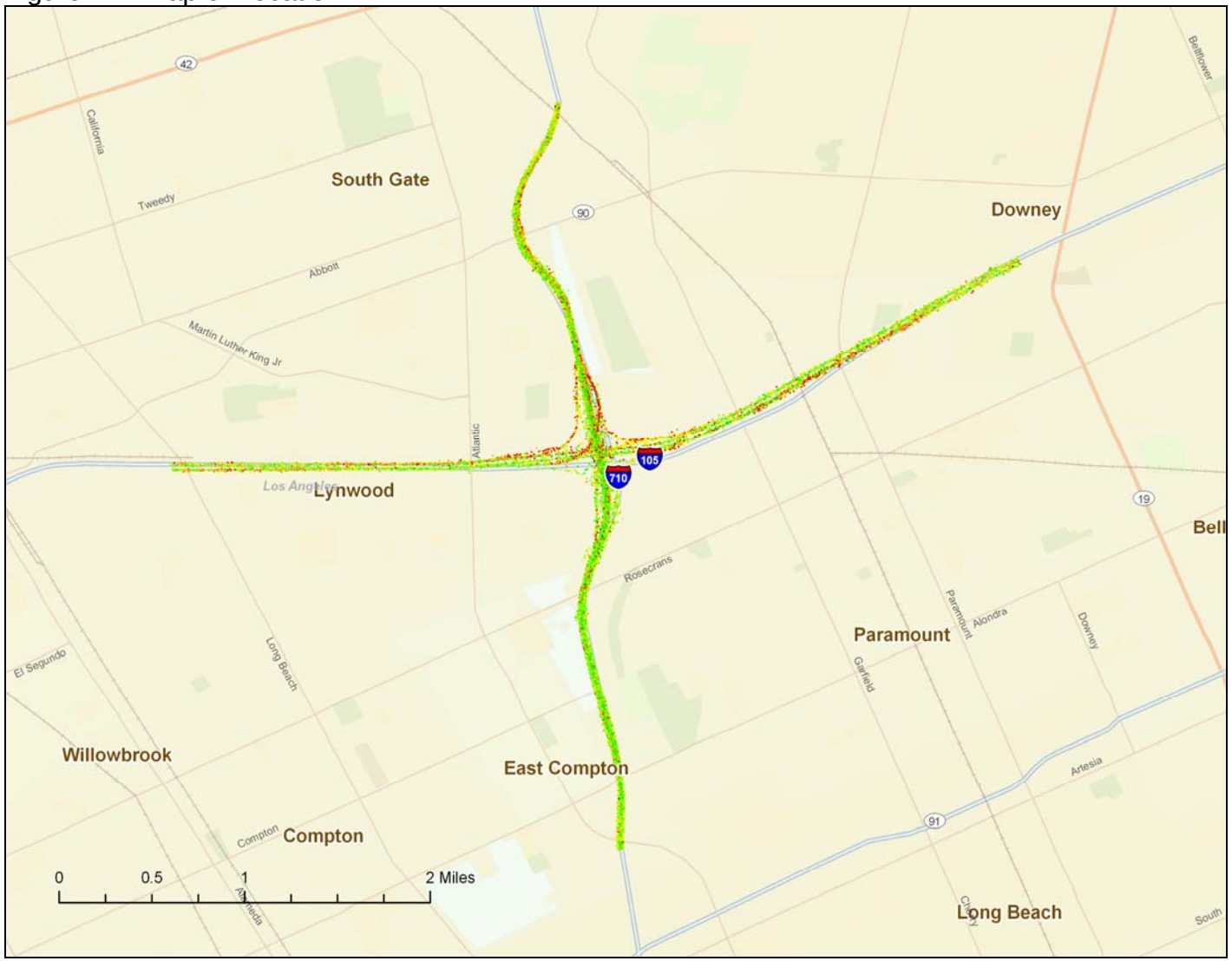
**Positions:** There were approximately 27,488 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 53.98 | 38.48 | 38.59 | 49.06 | 54.27 | 55 | 55 | 53.44 | 46.8 | 39.85 | 39.68 | 39.36 | 47.76 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 40 | 40 | 55 | 55 | 55 | 55 | 55 | 54 | 43 | 41 | 40 | 54 | 55 | 55 | 55 | 55 | 55 |

Chart 14: Weekday Speed by Time of Day

Figure 14:  Map of Location



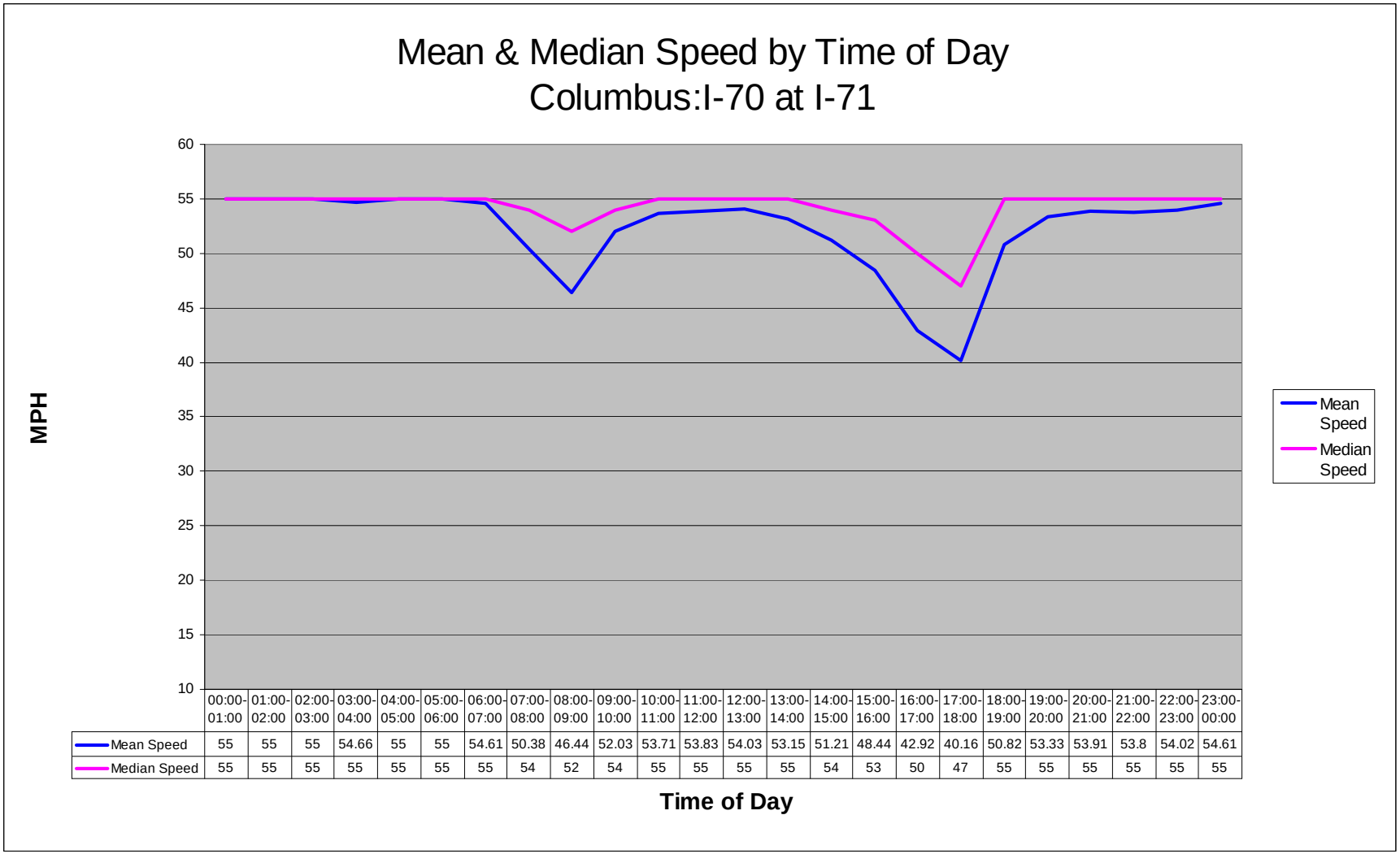
## Bottleneck 15: Columbus, Ohio

**Bottleneck Location:** Columbus, Ohio, Interstate 70 at Interstate 71

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

**Positions:** There were approximately 40,718 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 54.66 | 55 | 55 | 54.61 | 50.38 | 46.44 | 52.03 | 53.71 | 53.83 | 54.03 | 53.15 | 51.21 | 48.44 | 42.92 | 40.16 | 50.82 | 53.33 | 53.91 | 53.8 | 54.02 | 54.61 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 52 | 54 | 55 | 55 | 55 | 55 | 54 | 53 | 50 | 47 | 55 | 55 | 55 | 55 | 55 | 55 |

Chart 15: Weekday Speed by Time of Day

Figure 15: Map of Location

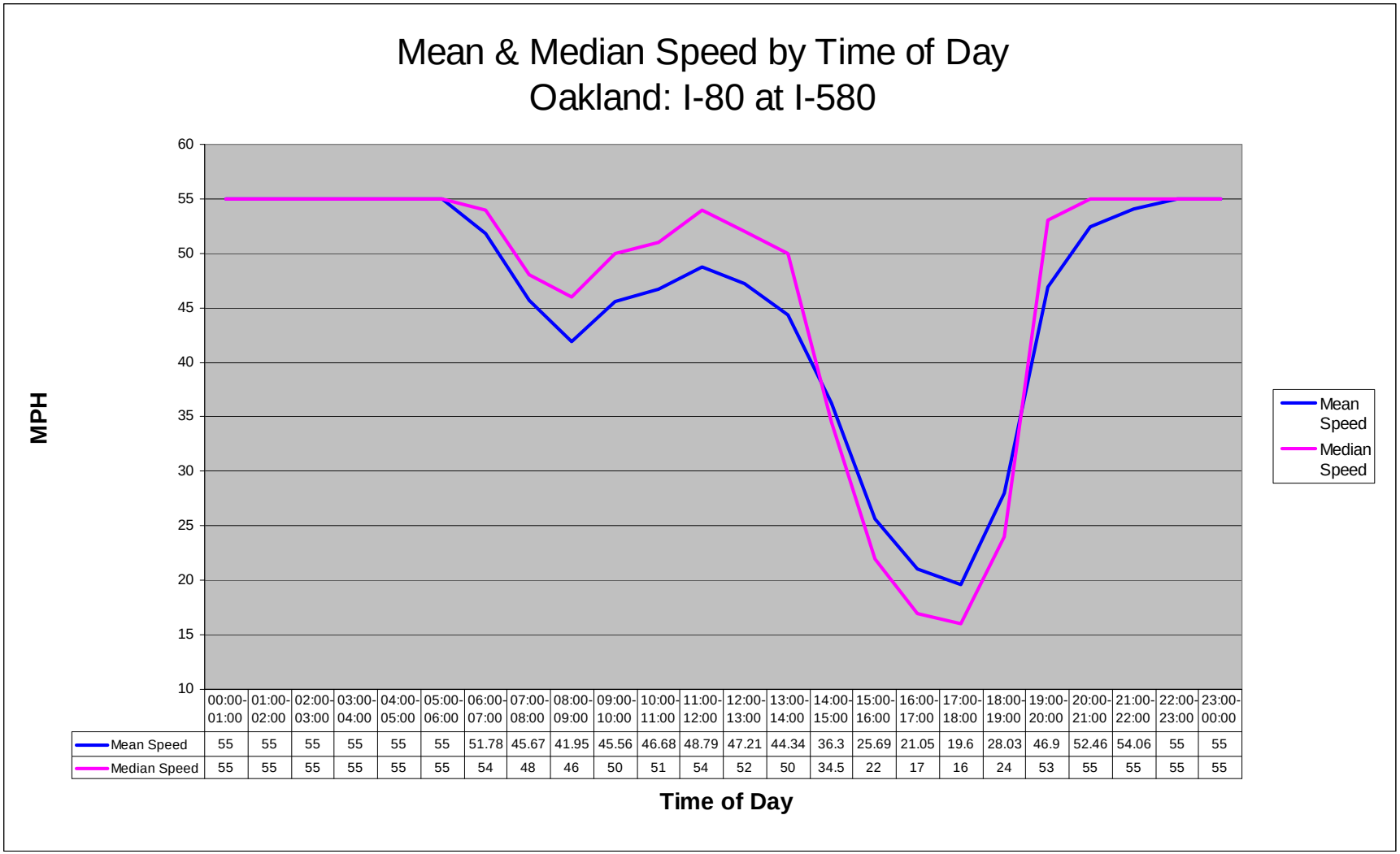
## Bottleneck 16: Oakland, California

**Bottleneck Location:** Oakland, California, Interstate 80 at Interstate 580

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 4 miles.

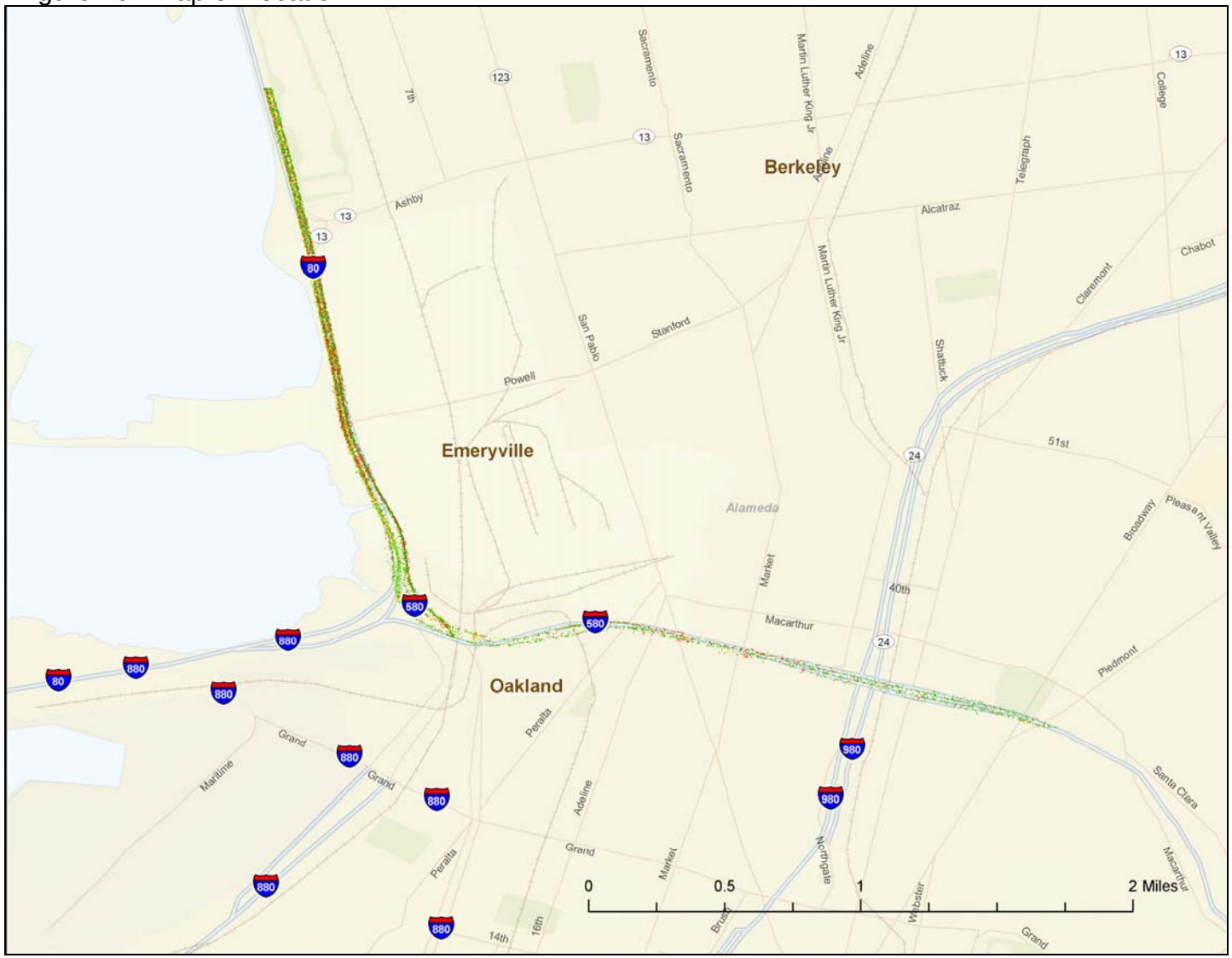
**Positions:** There were approximately 10,347 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 51.78 | 45.67 | 41.95 | 45.56 | 46.68 | 48.79 | 47.21 | 44.34 | 36.3 | 25.69 | 21.05 | 19.6 | 28.03 | 46.9 | 52.46 | 54.06 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 48 | 46 | 50 | 51 | 54 | 52 | 50 | 34.5 | 22 | 17 | 16 | 24 | 53 | 55 | 55 | 55 | 55 |

Chart 16: Weekday Speed by Time of Day

Figure 16: Map of Location



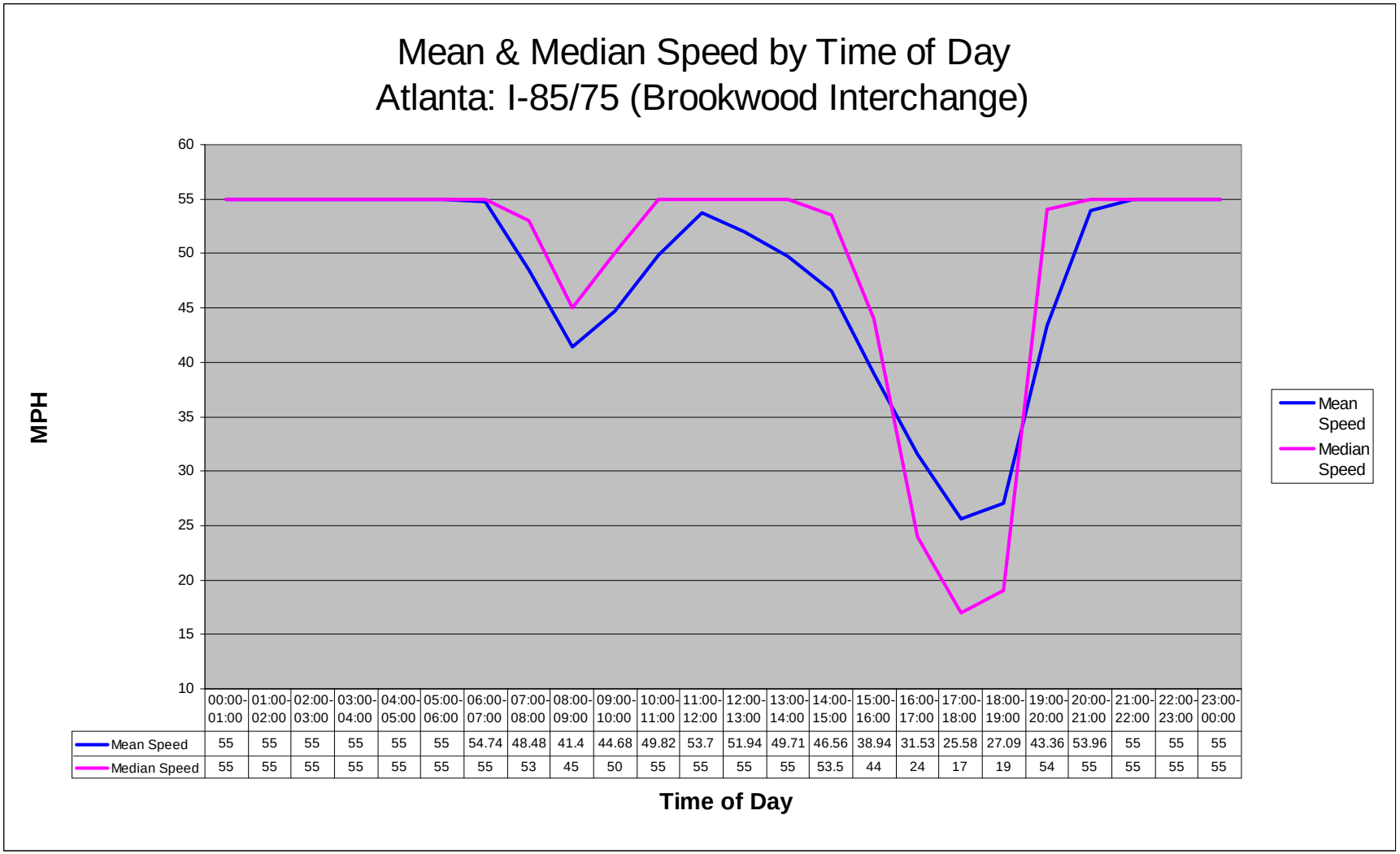
## Bottleneck 17: Atlanta, Georgia

**Bottleneck Location:** Atlanta, Georgia, Interstate 75 and 85 Interchange (Brookwood) in Fulton County

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 6 miles.

**Positions:** There were approximately 18,270 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 54.74 | 48.48 | 41.4 | 44.68 | 49.82 | 53.7 | 51.94 | 49.71 | 46.56 | 38.94 | 31.53 | 25.58 | 27.09 | 43.36 | 53.96 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 45 | 50 | 55 | 55 | 55 | 55 | 53.5 | 44 | 24 | 17 | 19 | 54 | 55 | 55 | 55 | 55 |

Chart 17: Weekday Speed by Time of Day

Figure 17:  Map of Location

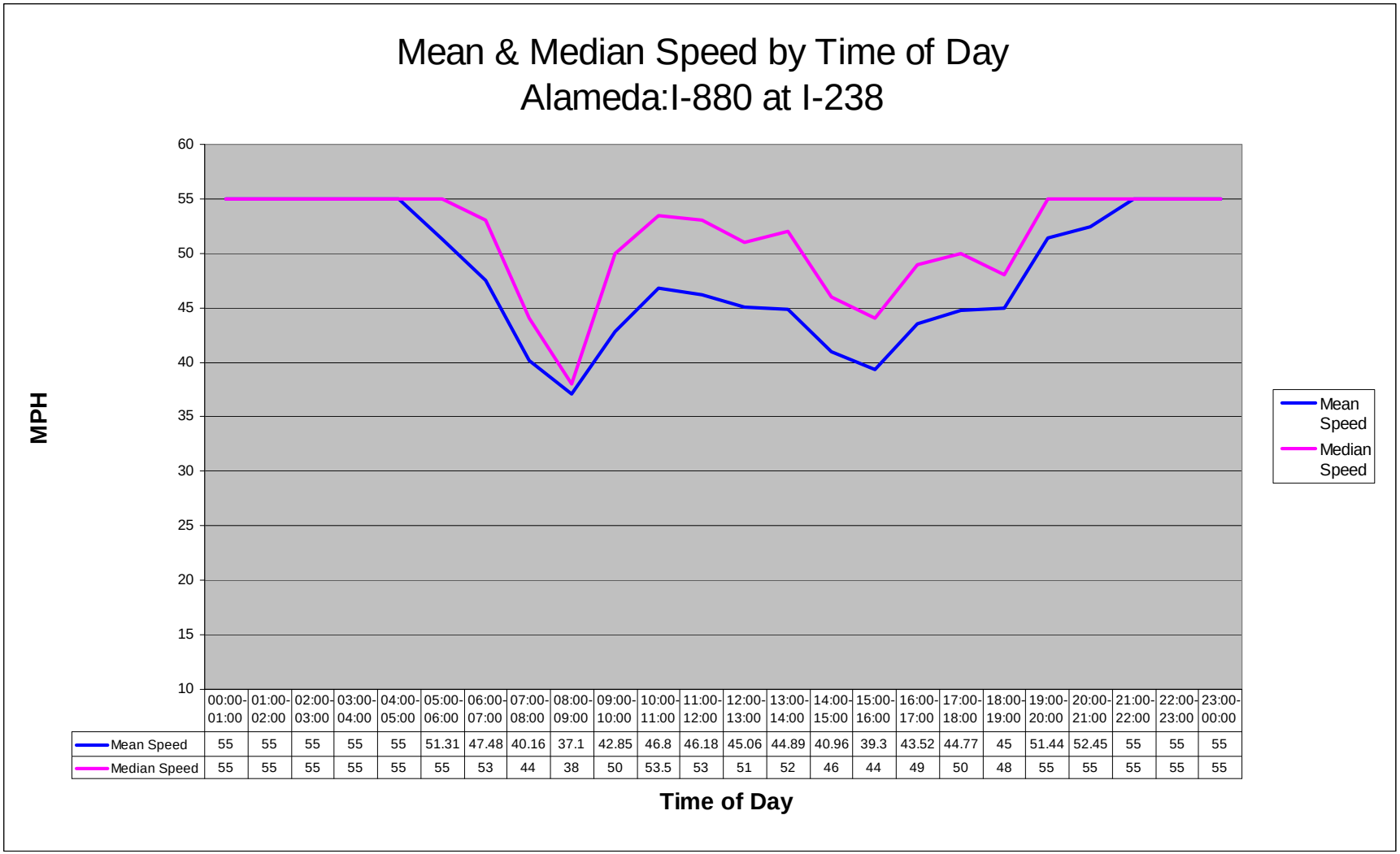
## Bottleneck 18: Alameda, California

**Bottleneck Location:** Alameda, California, Interstate 880 at 238

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

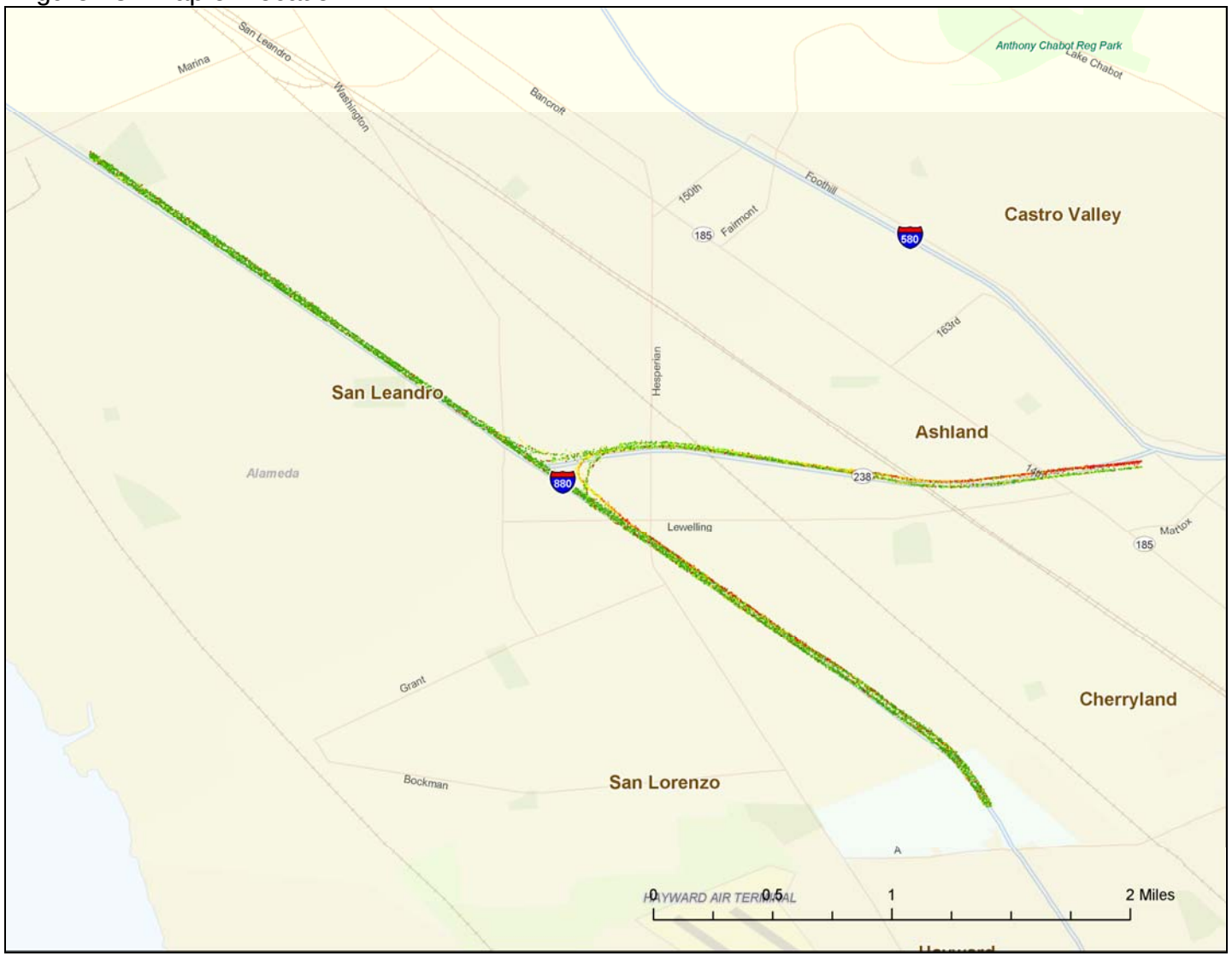
**Positions:** There were approximately 13,550 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 51.31 | 47.48 | 40.16 | 37.1 | 42.85 | 46.8 | 46.18 | 45.06 | 44.89 | 40.96 | 39.3 | 43.52 | 44.77 | 45 | 51.44 | 52.45 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 44 | 38 | 50 | 53.5 | 53 | 51 | 52 | 46 | 44 | 49 | 50 | 48 | 55 | 55 | 55 | 55 | 55 |

Chart 18: Weekday Speed by Time of Day

Figure 18: Map of Location



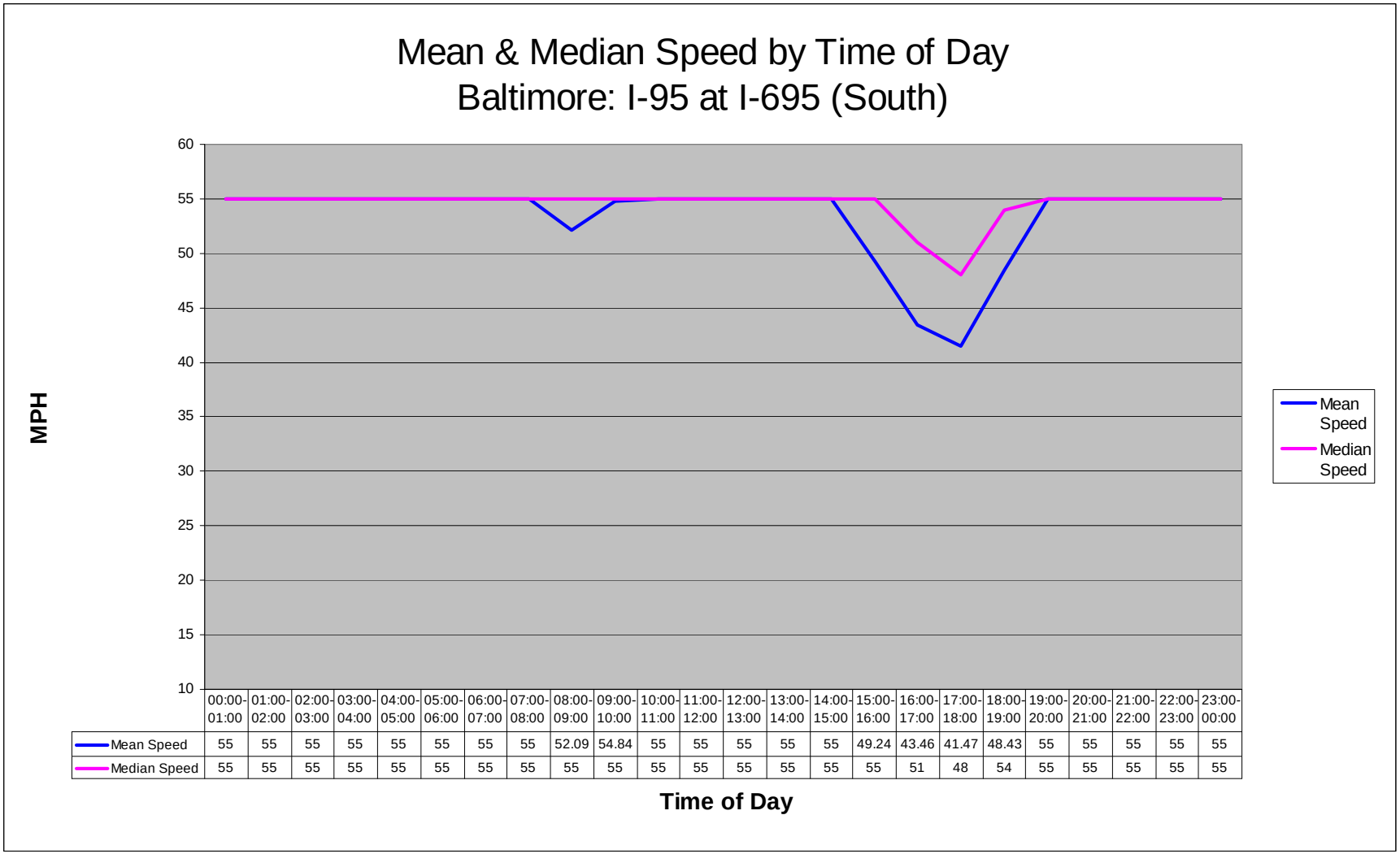
## Bottleneck 19: Baltimore, Maryland

**Bottleneck Location:** Baltimore, Maryland, I-95 at I-695

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

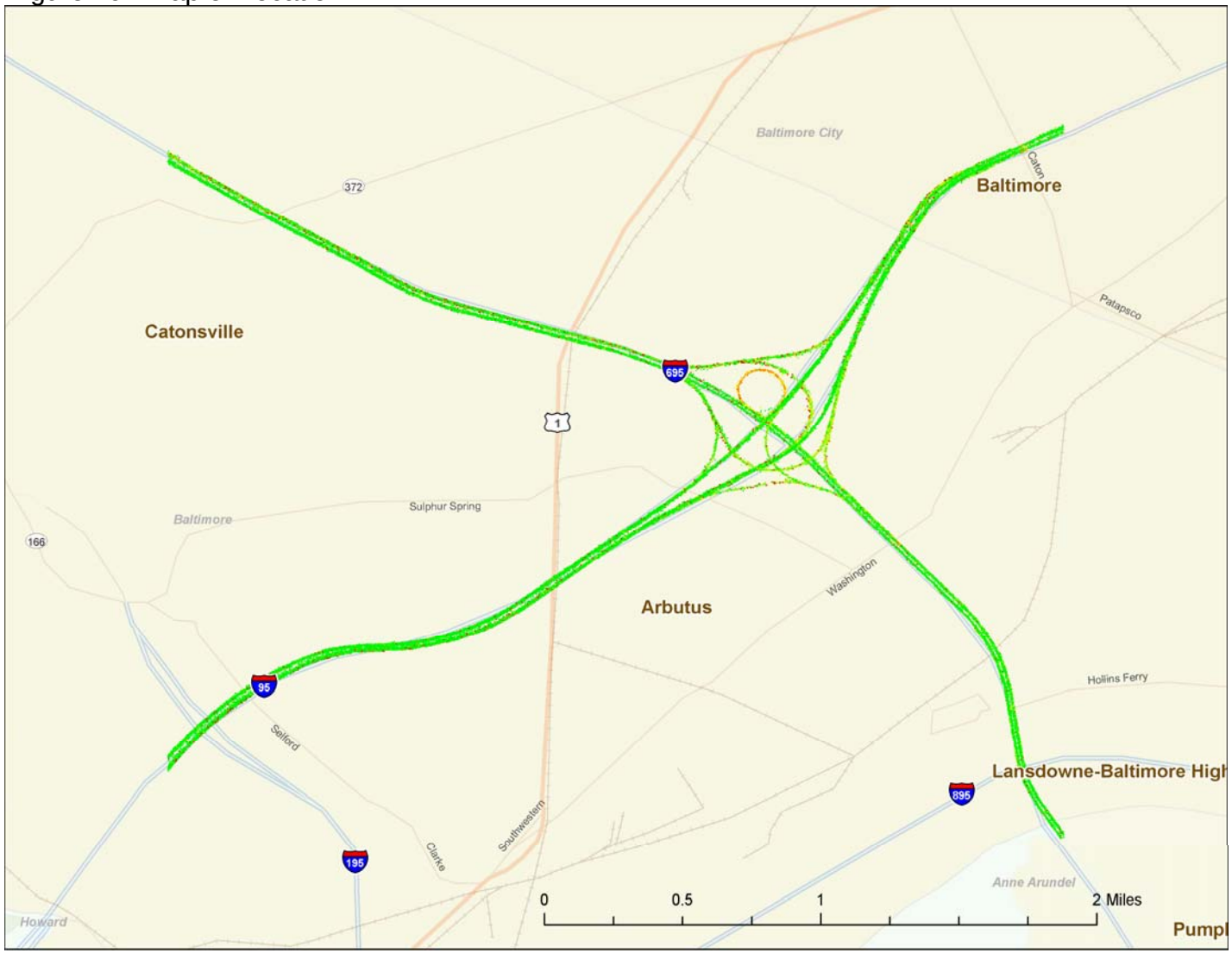
**Positions:** There were approximately 59,523 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 52.09 | 54.84 | 55 | 55 | 55 | 55 | 55 | 49.24 | 43.46 | 41.47 | 48.43 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 51 | 48 | 54 | 55 | 55 | 55 | 55 | 55 |

Chart 19: Weekday Speed by Time of Day

Figure 19:  Map of Location



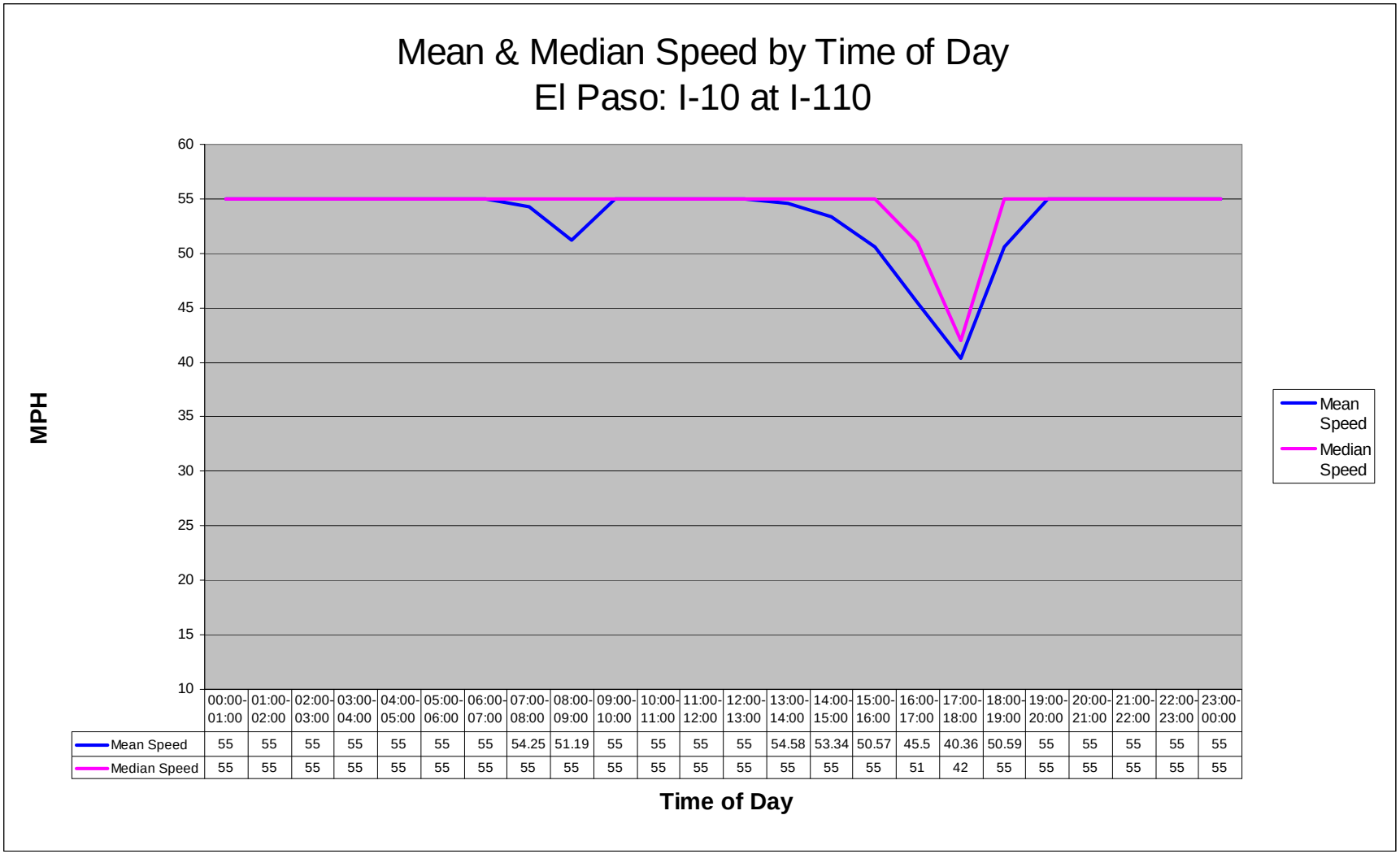
## Bottleneck 20: El Paso, Texas

**Bottleneck Location:** El Paso, Texas, Interstate 10 at Interstate 110

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

**Positions:** There were approximately 49,672 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54.25 | 51.19 | 55 | 55 | 55 | 55 | 54.58 | 53.34 | 50.57 | 45.5 | 40.36 | 50.59 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 51 | 42 | 55 | 55 | 55 | 55 | 55 | 55 |

Chart 20: Weekday Speed by Time of Day

Figure 20: Map of Location

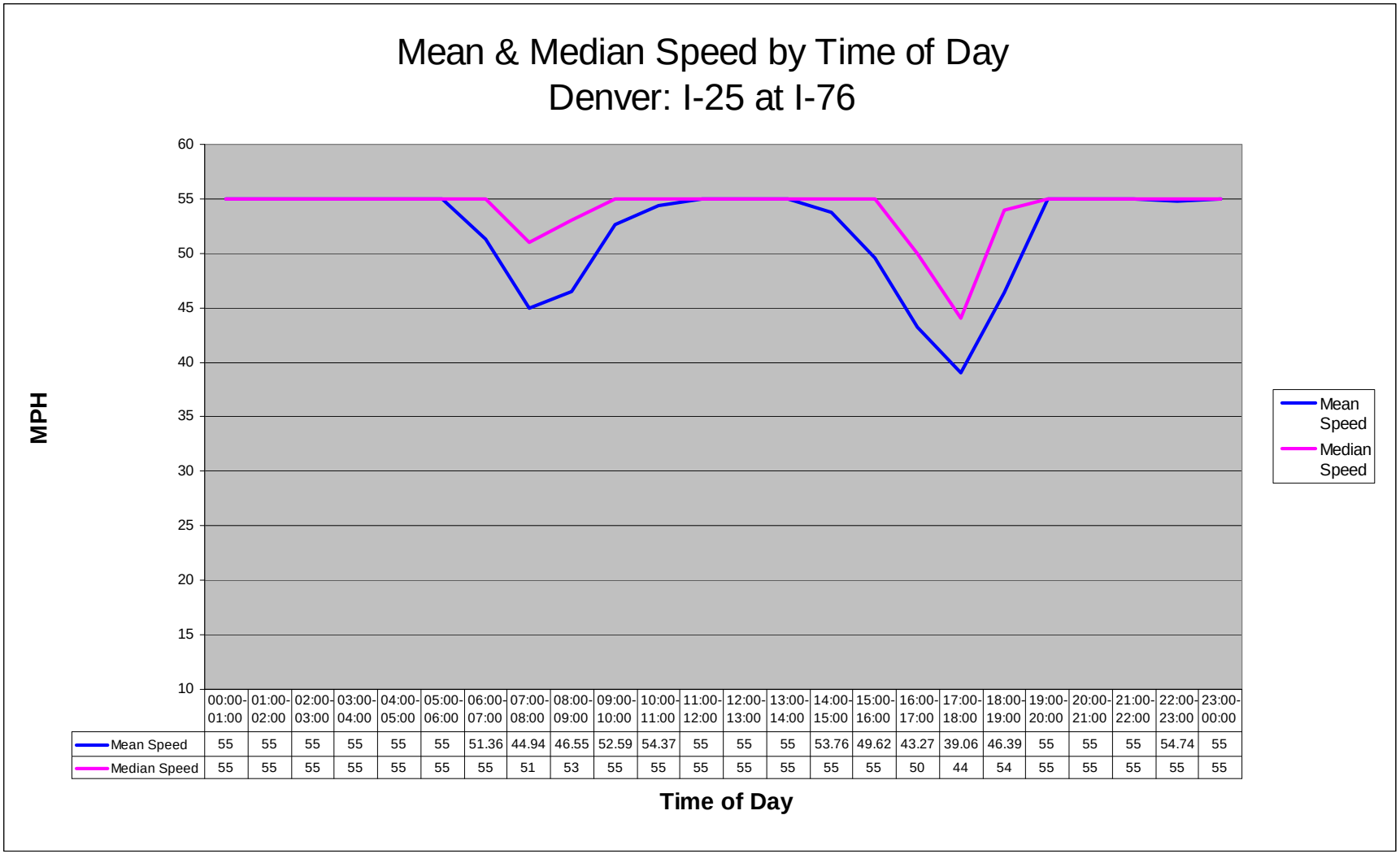
## Bottleneck 21: Denver, Colorado

**Bottleneck Location:** Denver, Colorado, Interstate 25 at Interstate 76

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

**Positions:** There were approximately 30,826 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 51.36 | 44.94 | 46.55 | 52.59 | 54.37 | 55 | 55 | 55 | 53.76 | 49.62 | 43.27 | 39.06 | 46.39 | 55 | 55 | 55 | 54.74 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 51 | 53 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 50 | 44 | 54 | 55 | 55 | 55 | 55 | 55 |

Chart 21: Weekday Speed by Time of Day

Figure 21: Map of Location

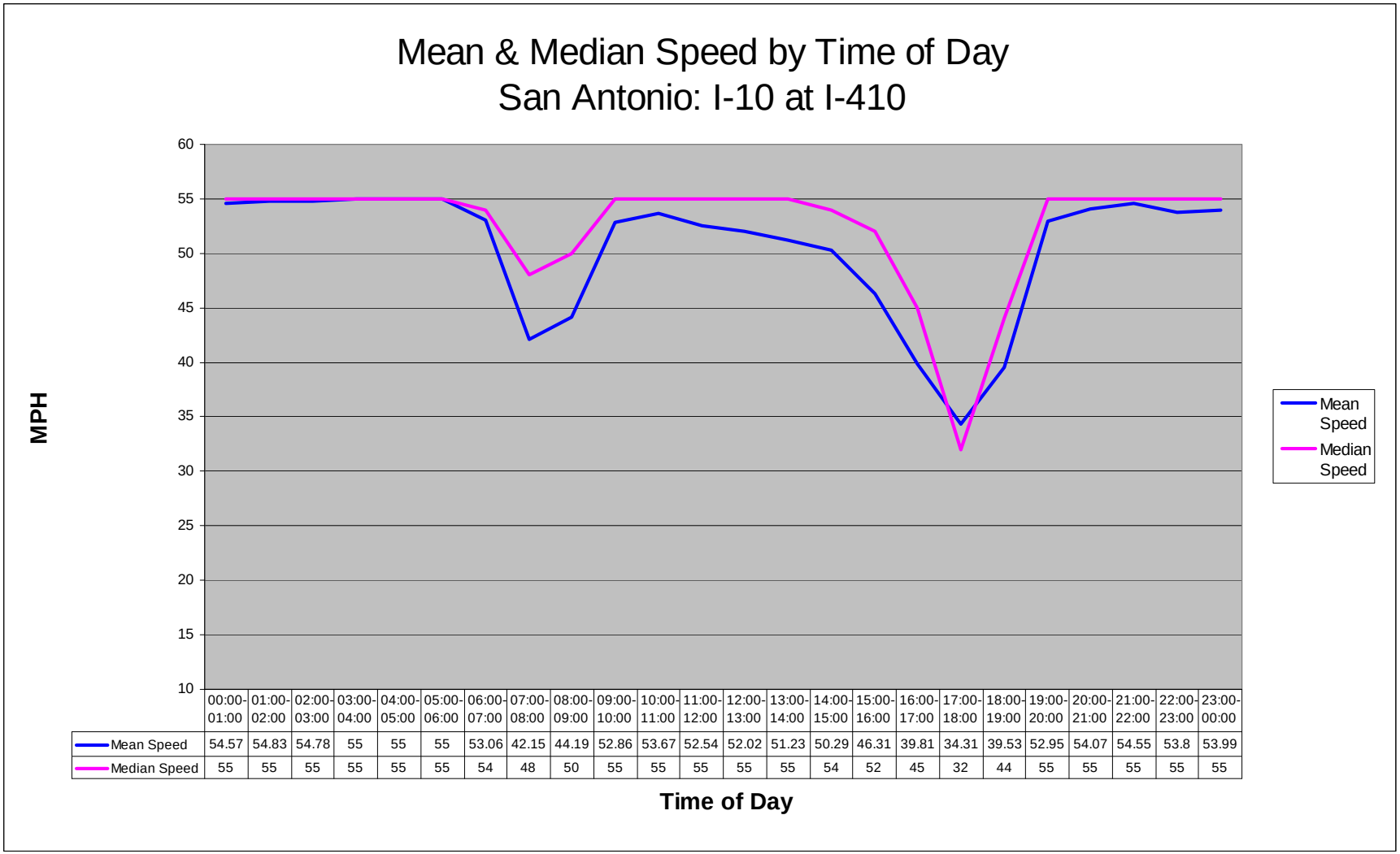
## Bottleneck 22: San Antonio, Texas

**Bottleneck Location:** San Antonio, Texas, Interstate 10 at Interstate 410

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

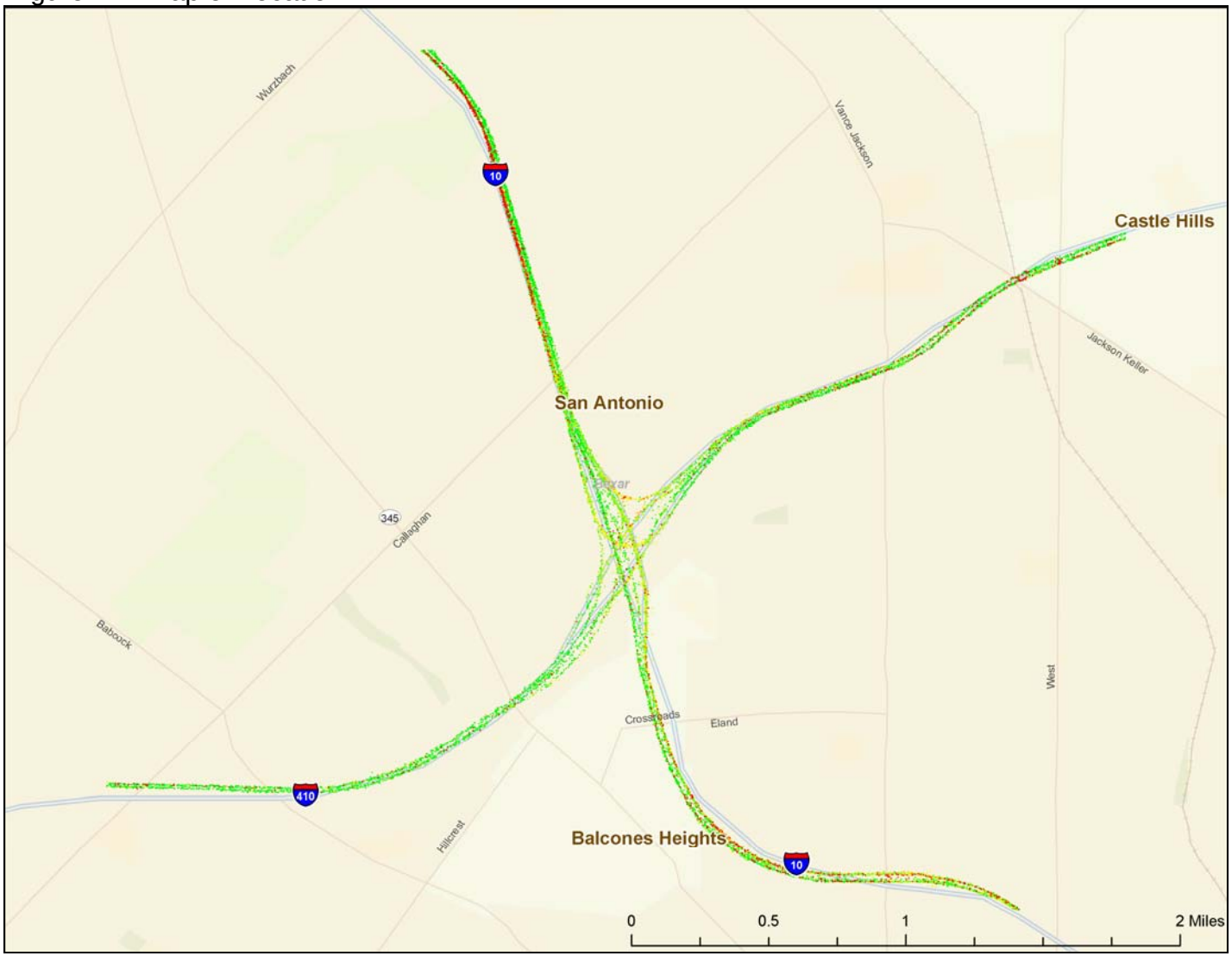
**Positions:** There were approximately 15,243 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 54.57 | 54.83 | 54.78 | 55 | 55 | 55 | 53.06 | 42.15 | 44.19 | 52.86 | 53.67 | 52.54 | 52.02 | 51.23 | 50.29 | 46.31 | 39.81 | 34.31 | 39.53 | 52.95 | 54.07 | 54.55 | 53.8 | 53.99 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 48 | 50 | 55 | 55 | 55 | 55 | 55 | 54 | 52 | 45 | 32 | 44 | 55 | 55 | 55 | 55 | 55 |

Chart 22: Weekday Speed by Time of Day

Figure 22:  Map of Location



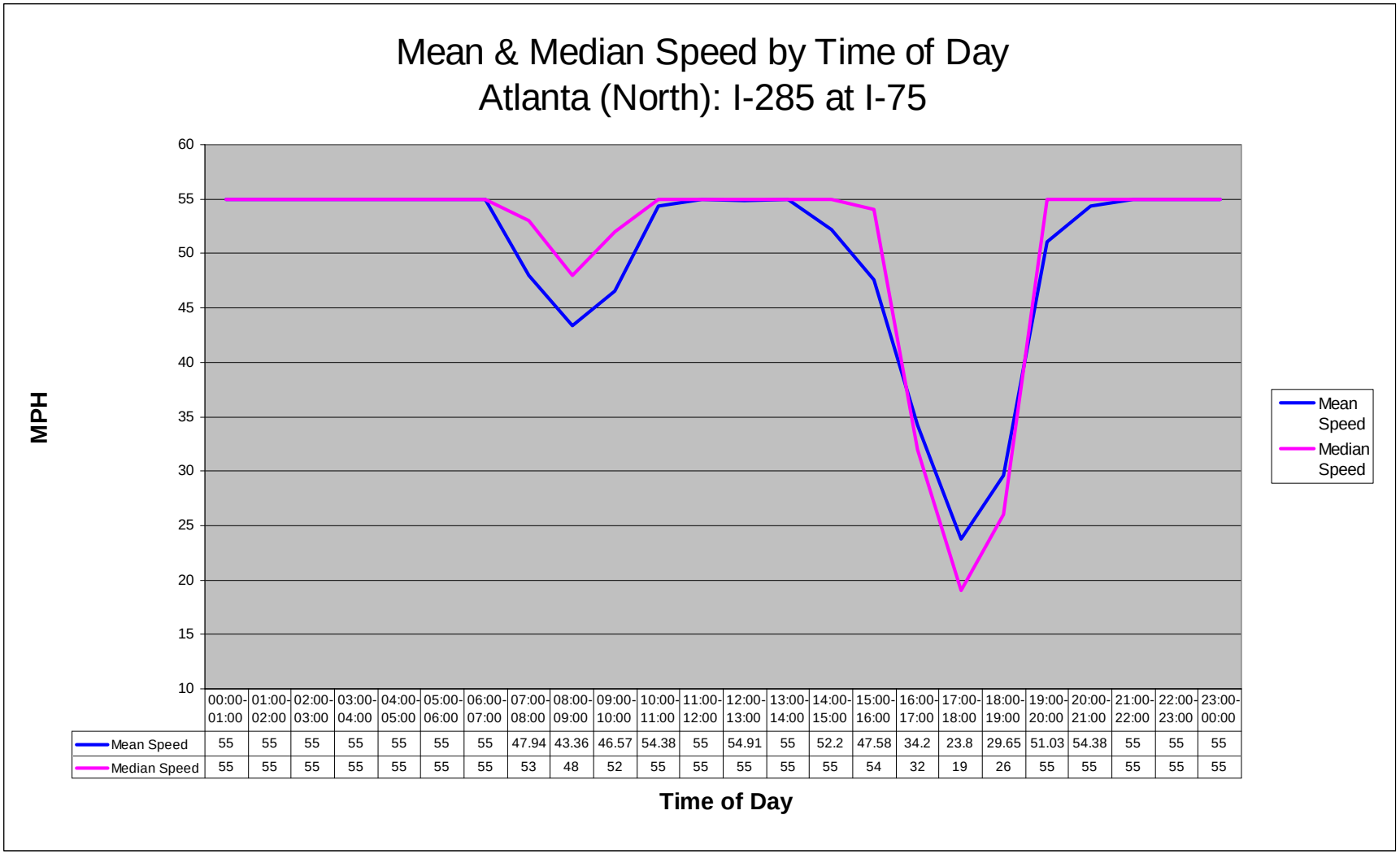
## Bottleneck 23: Atlanta, Georgia (North)

**Bottleneck Location:** Atlanta, Georgia, Interstate 285 at 75 Interchange in Cobb County

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 8 miles.

**Positions:** There were approximately 8,532 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 47.94 | 43.36 | 46.57 | 54.38 | 55 | 54.91 | 55 | 52.2 | 47.58 | 34.2 | 23.8 | 29.65 | 51.03 | 54.38 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 48 | 52 | 55 | 55 | 55 | 55 | 55 | 54 | 32 | 19 | 26 | 55 | 55 | 55 | 55 | 55 |

Chart 23: Weekday Speed by Time of Day

Figure 23: Map of Location

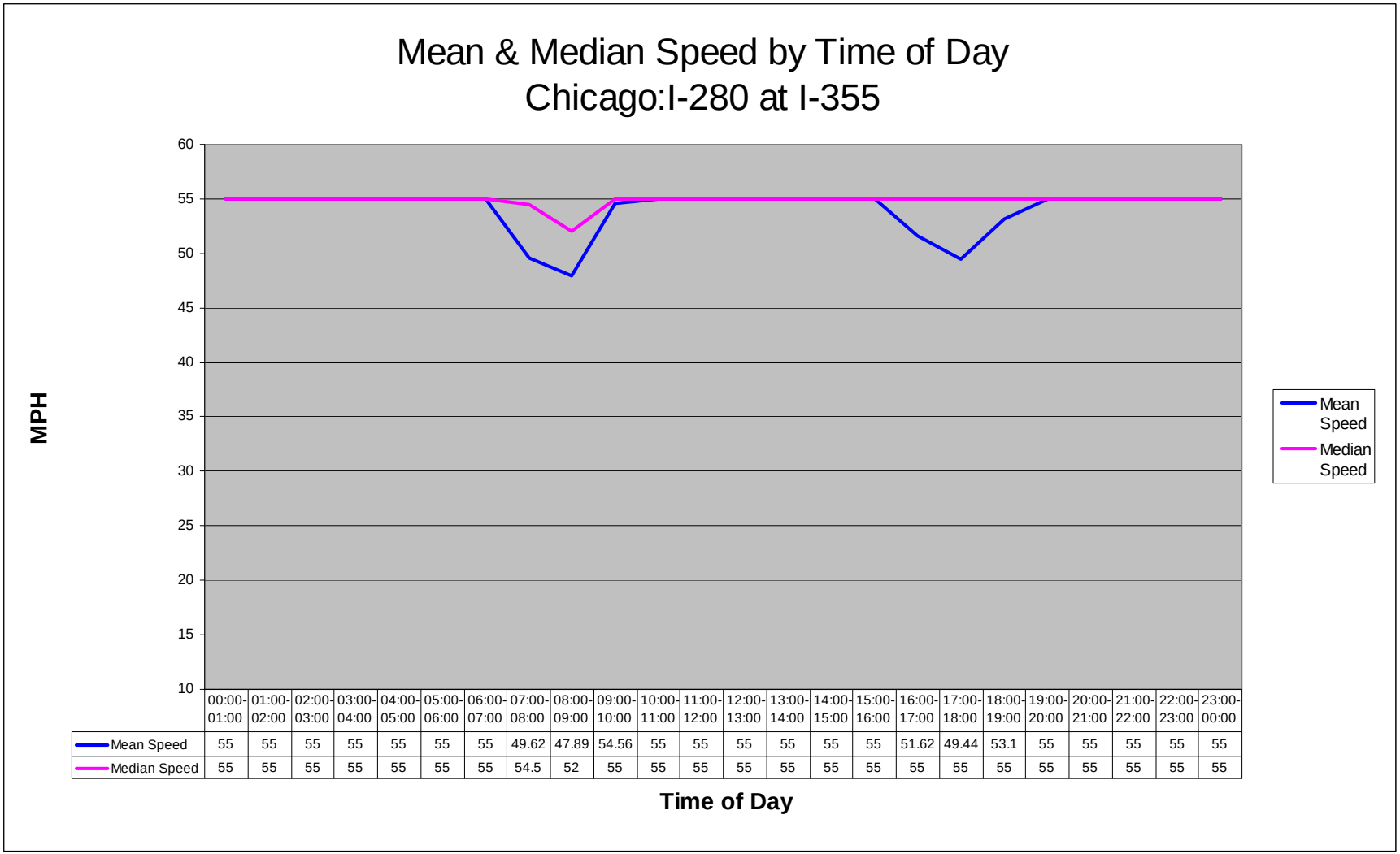
## Bottleneck 24: Chicago, Illinois

**Bottleneck Location:** Chicago, Illinois, Interstate 280 at Interstate 355

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 2 miles in each direction for a total of approximately 6 miles.

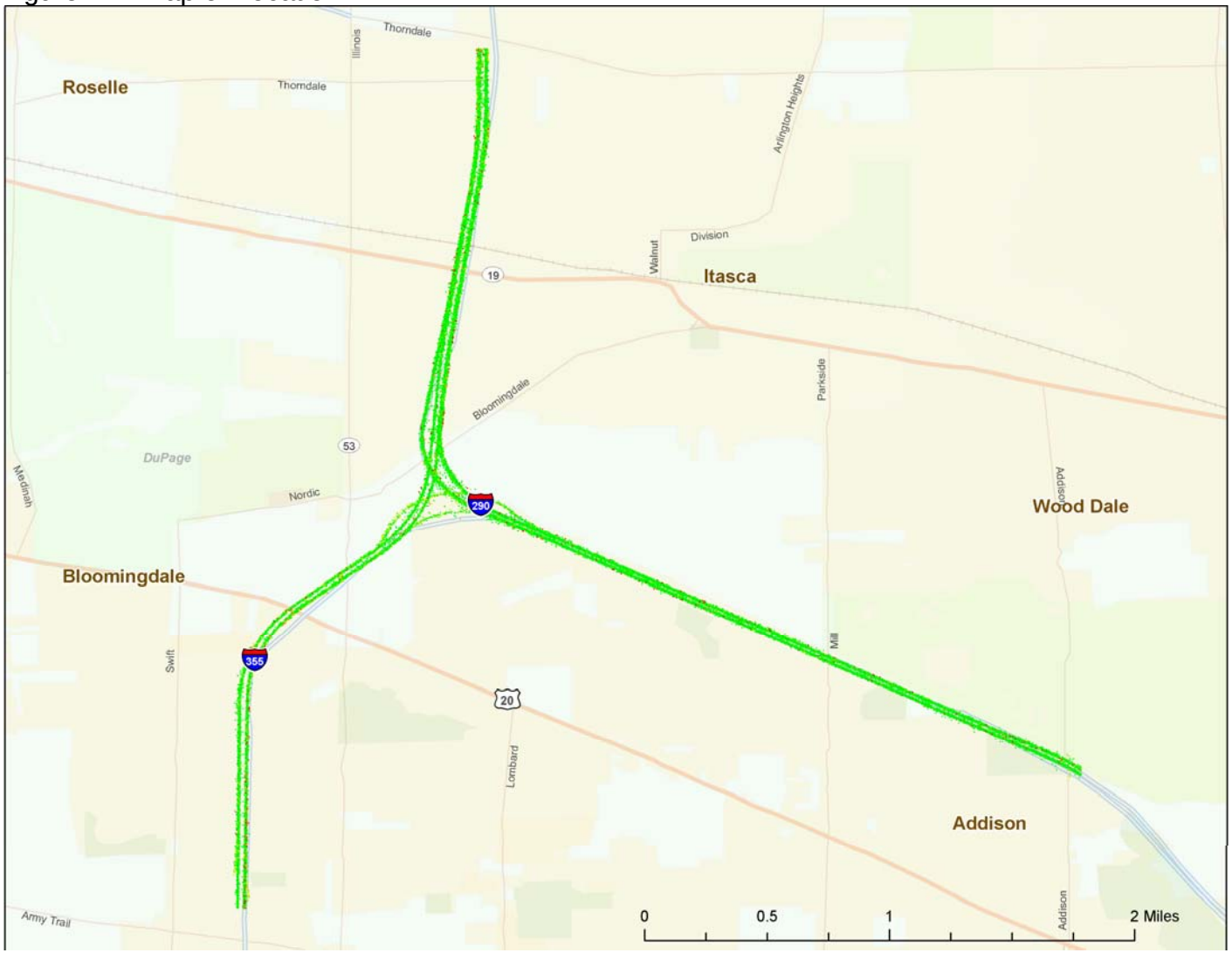
**Positions:** There were approximately 49,546 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 49.62 | 47.89 | 54.56 | 55 | 55 | 55 | 55 | 55 | 55 | 51.62 | 49.44 | 53.1 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54.5 | 52 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |

Chart 24: Weekday Speed by Time of Day

Figure 24:  Map of Location



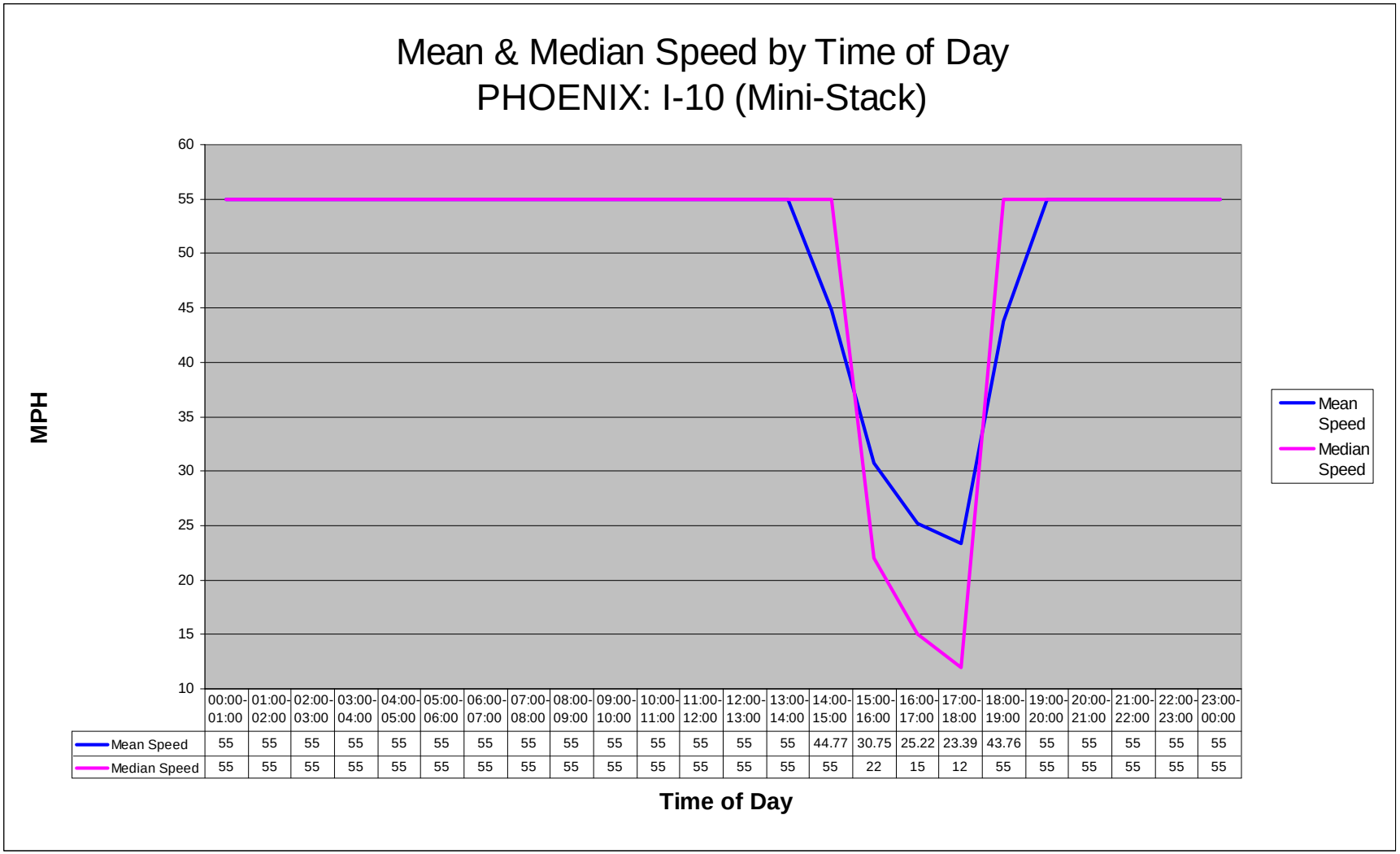
## Bottleneck 25: Phoenix, Arizona

**Bottleneck Location:** Phoenix, Arizona, Interstate 10, Mini Stack

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** From the bottleneck (the interchange) the study area extends 1 mile in each direction for a total of approximately 2 miles.

**Positions:** There were approximately 8,322 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 44.77 | 30.75 | 25.22 | 23.39 | 43.76 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 22 | 15 | 12 | 55 | 55 | 55 | 55 | 55 | 55 |

Chart 25: Weekday Speed by Time of Day

Figure 25:  Map of Location

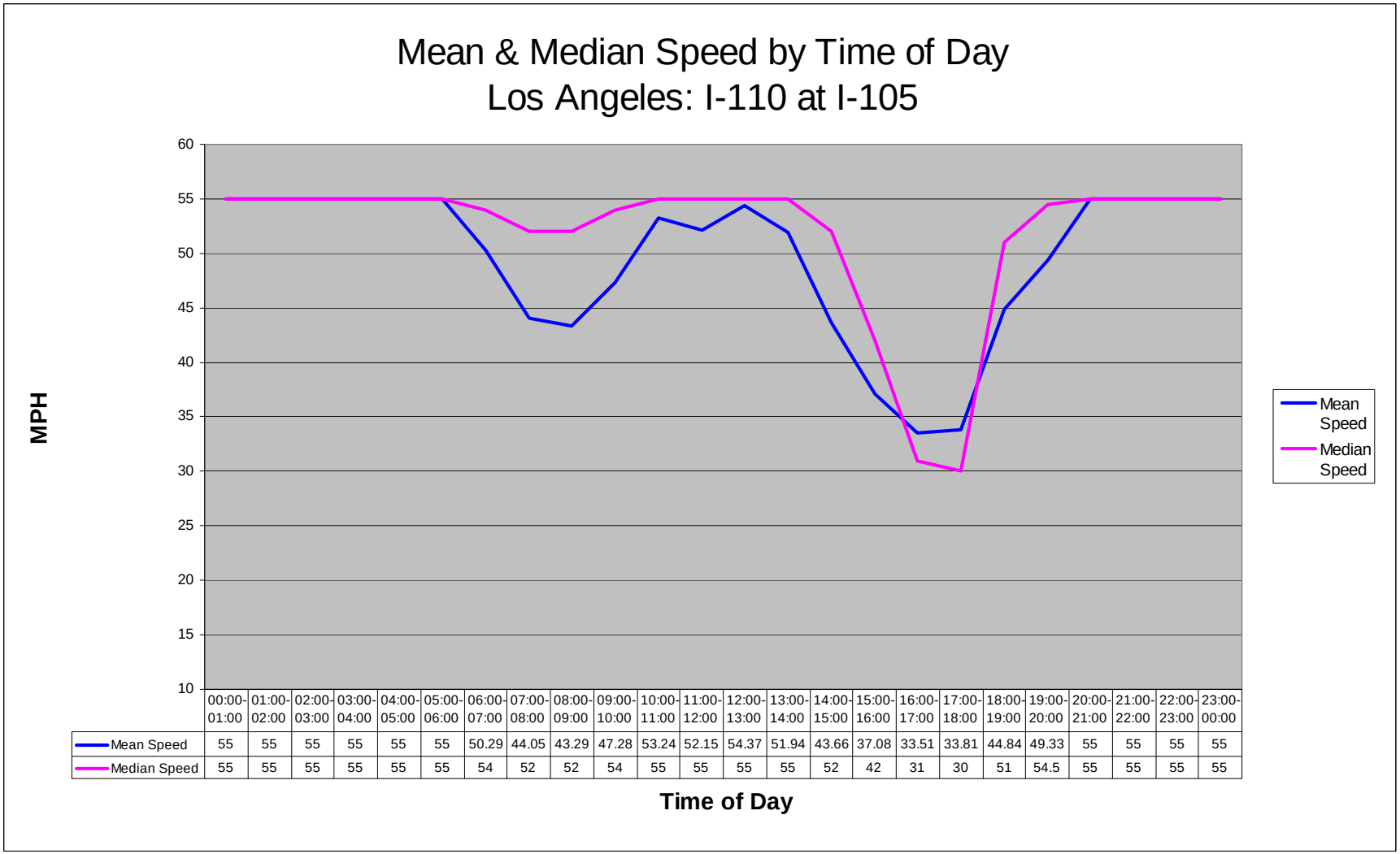
## Bottleneck 26: Los Angeles, California

**Bottleneck Location:** Los Angeles, California, Interstate 110 at Interstate 105

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

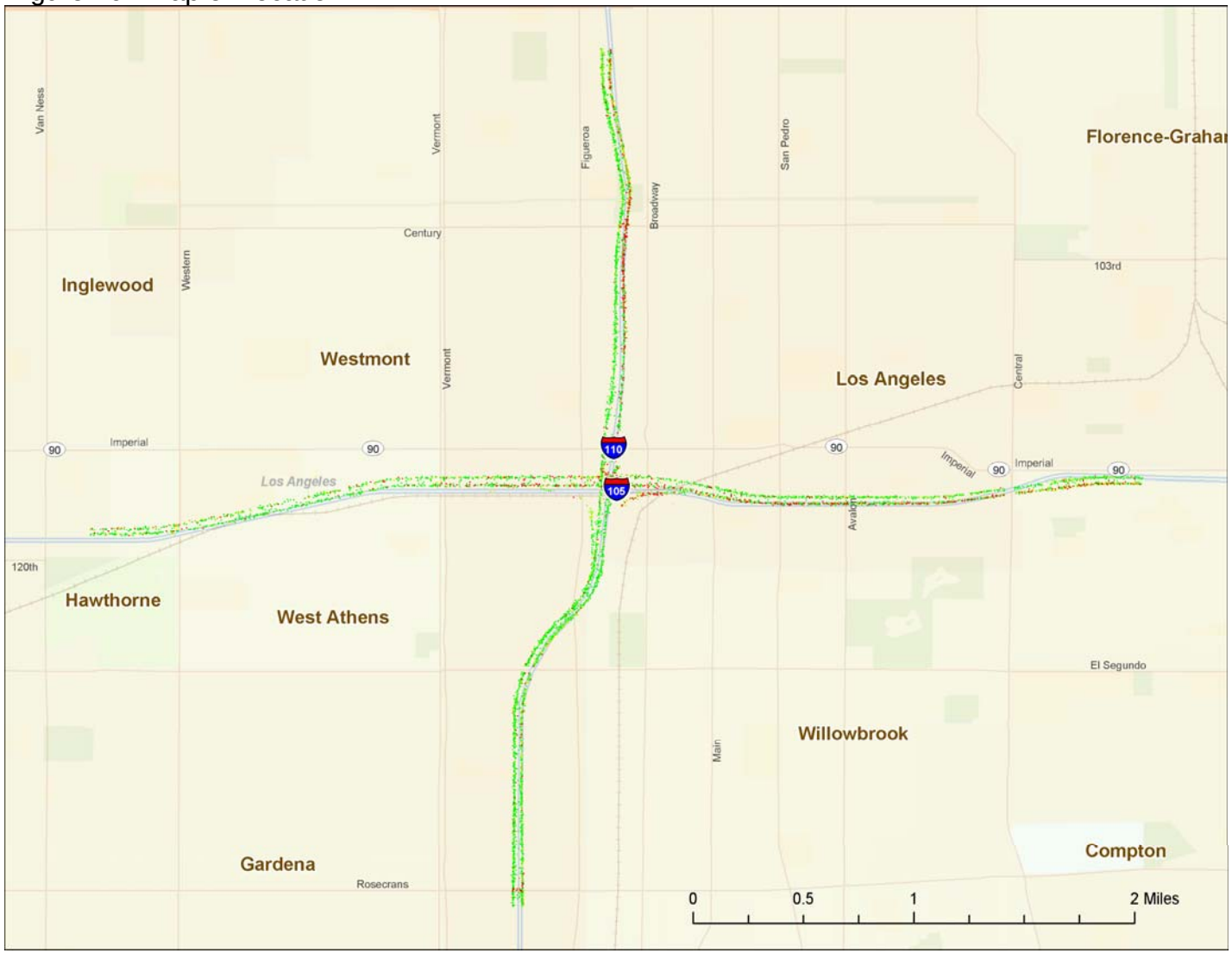
**Positions:** There were approximately 6,370 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 50.29 | 44.05 | 43.29 | 47.28 | 53.24 | 52.15 | 54.37 | 51.94 | 43.66 | 37.08 | 33.51 | 33.81 | 44.84 | 49.33 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 52 | 52 | 54 | 55 | 55 | 55 | 55 | 52 | 42 | 31 | 30 | 51 | 54.5 | 55 | 55 | 55 | 55 |

Chart 26: Weekday Speed by Time of Day

Figure 26: Map of Location



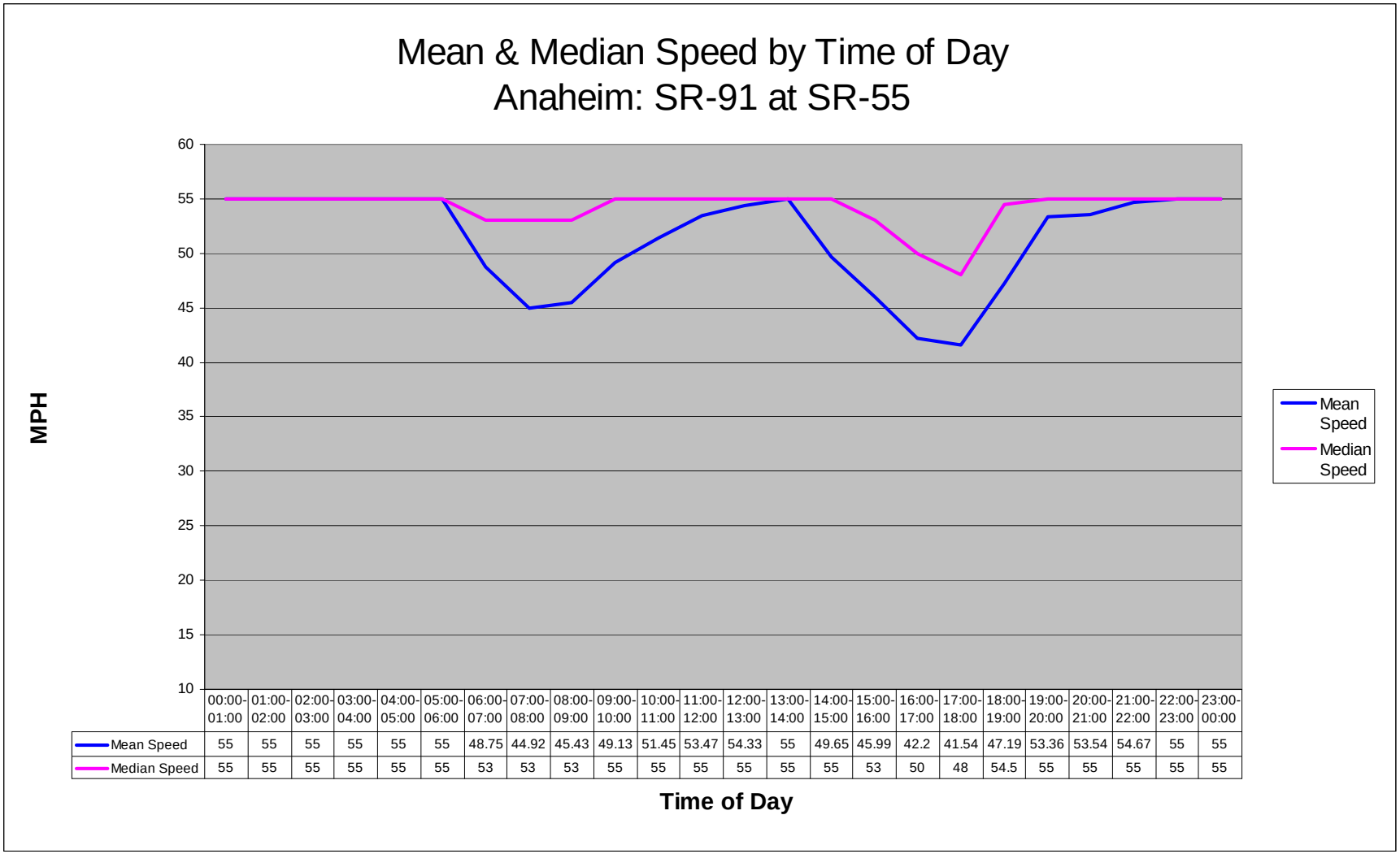
## Bottleneck 27: Anaheim, California

**Bottleneck Location:** Anaheim, California, SR-91 at SR-55

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

**Positions:** There were approximately 8,163 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 48.75 | 44.92 | 45.43 | 49.13 | 51.45 | 53.47 | 54.33 | 55 | 49.65 | 45.99 | 42.2 | 41.54 | 47.19 | 53.36 | 53.54 | 54.67 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 53 | 53 | 55 | 55 | 55 | 55 | 55 | 55 | 53 | 50 | 48 | 54.5 | 55 | 55 | 55 | 55 | 55 |

Chart 27: Weekday Speed by Time of Day

Figure 27:  Map of Location

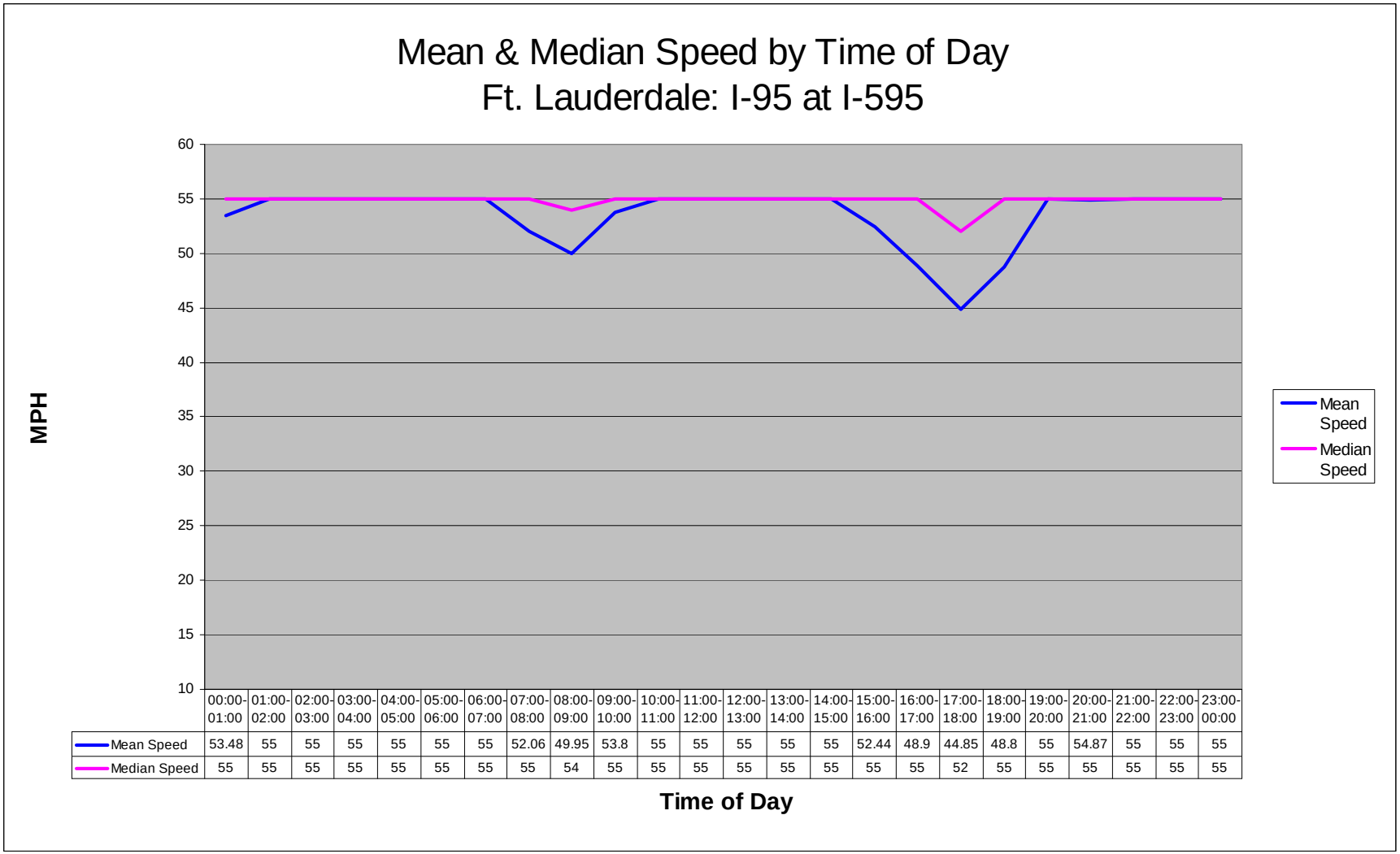
## Bottleneck 28: Ft. Lauderdale, Florida

**Bottleneck Location:** Ft. Lauderdale, Florida, Interstate 95 at Interstate 595

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

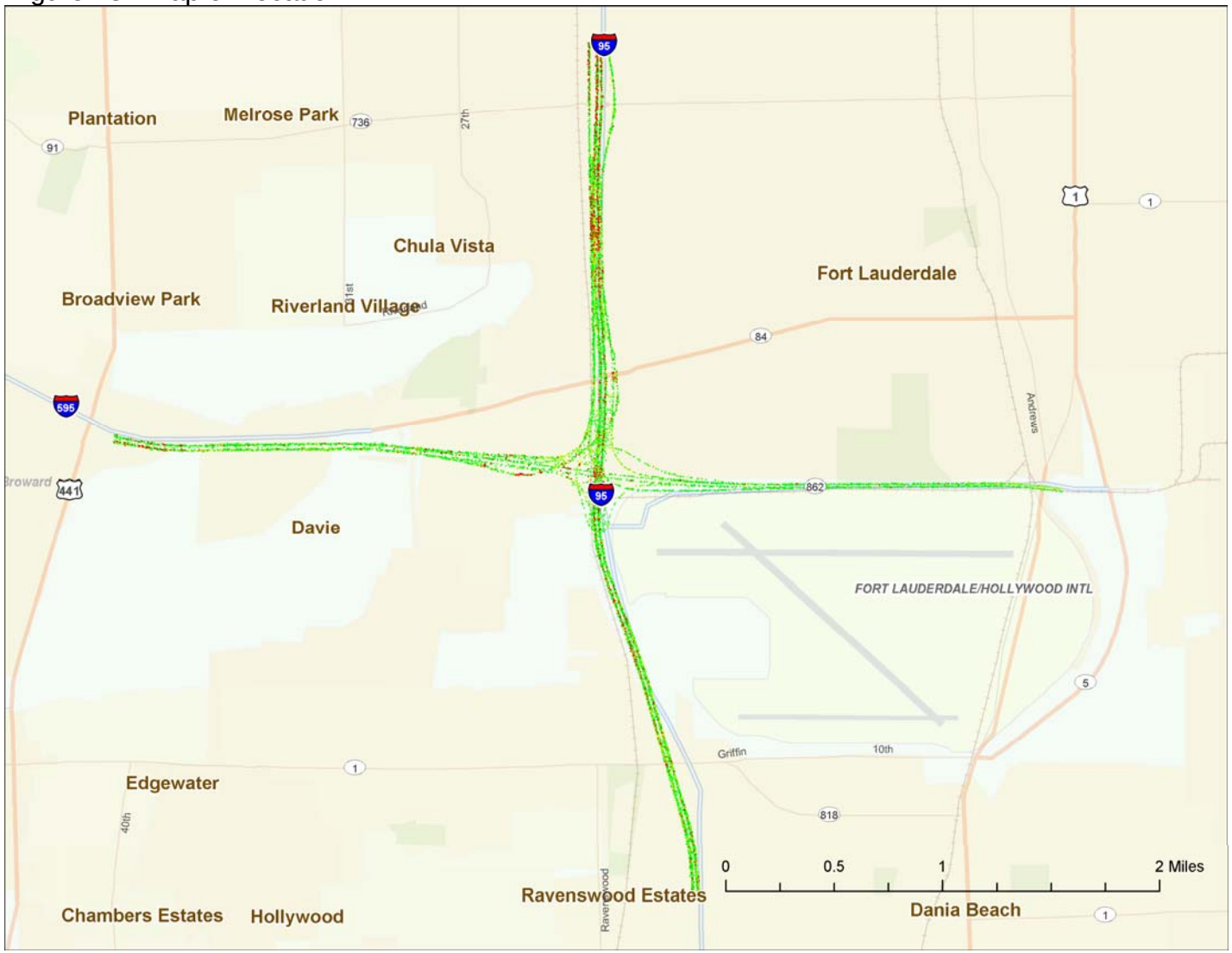
**Positions:** There were approximately 16,635 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 53.48 | 55 | 55 | 55 | 55 | 55 | 55 | 52.06 | 49.95 | 53.8 | 55 | 55 | 55 | 55 | 55 | 52.44 | 48.9 | 44.85 | 48.8 | 55 | 54.87 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 52 | 55 | 55 | 55 | 55 | 55 | 55 |

Chart 28: Weekday Speed by Time of Day

Figure 28: Map of Location



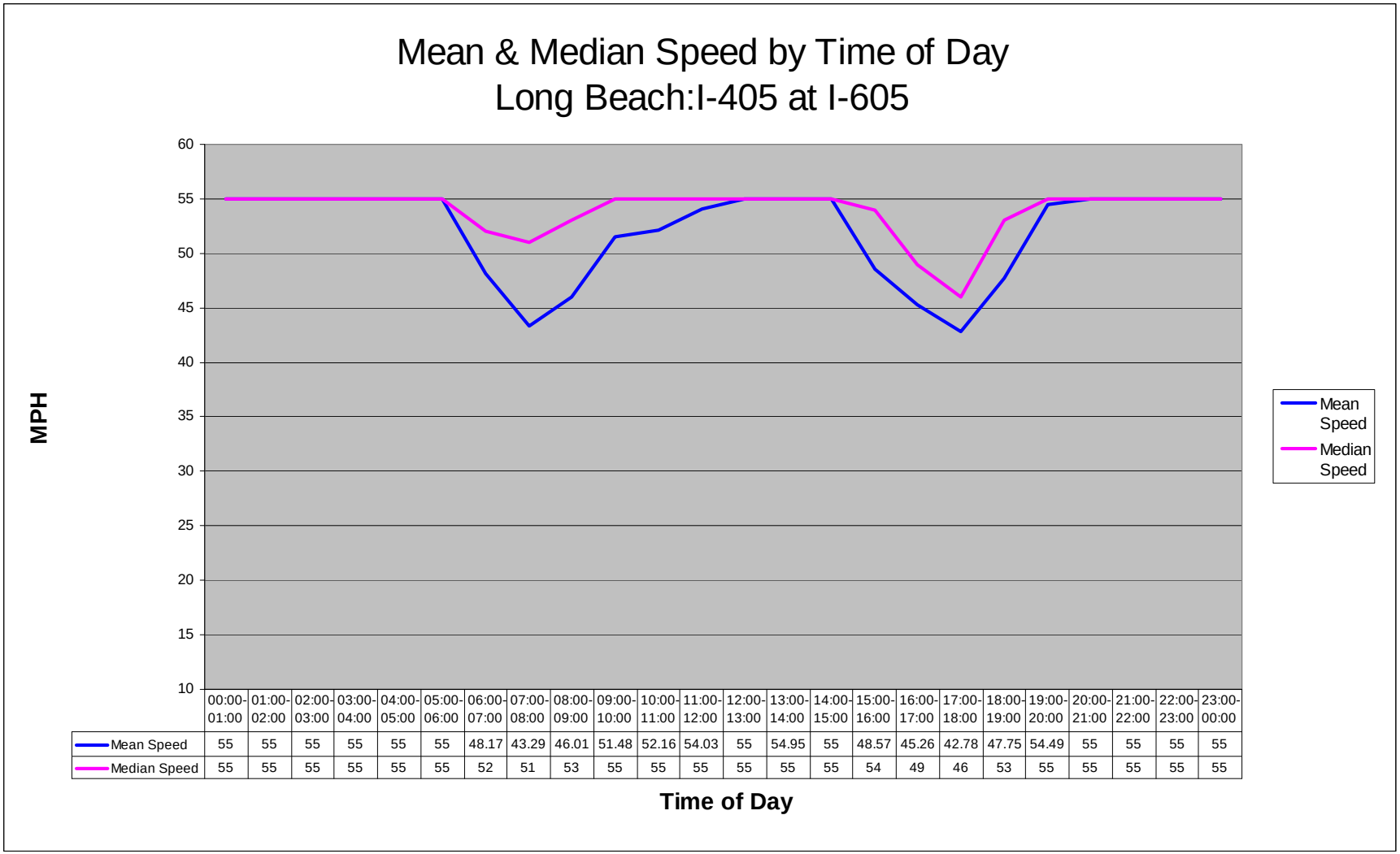
## Bottleneck 29: Long Beach, California

**Bottleneck Location:** Long Beach, California, Interstate 405 at Interstate 605

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 6 miles of roadway were included in the study area.

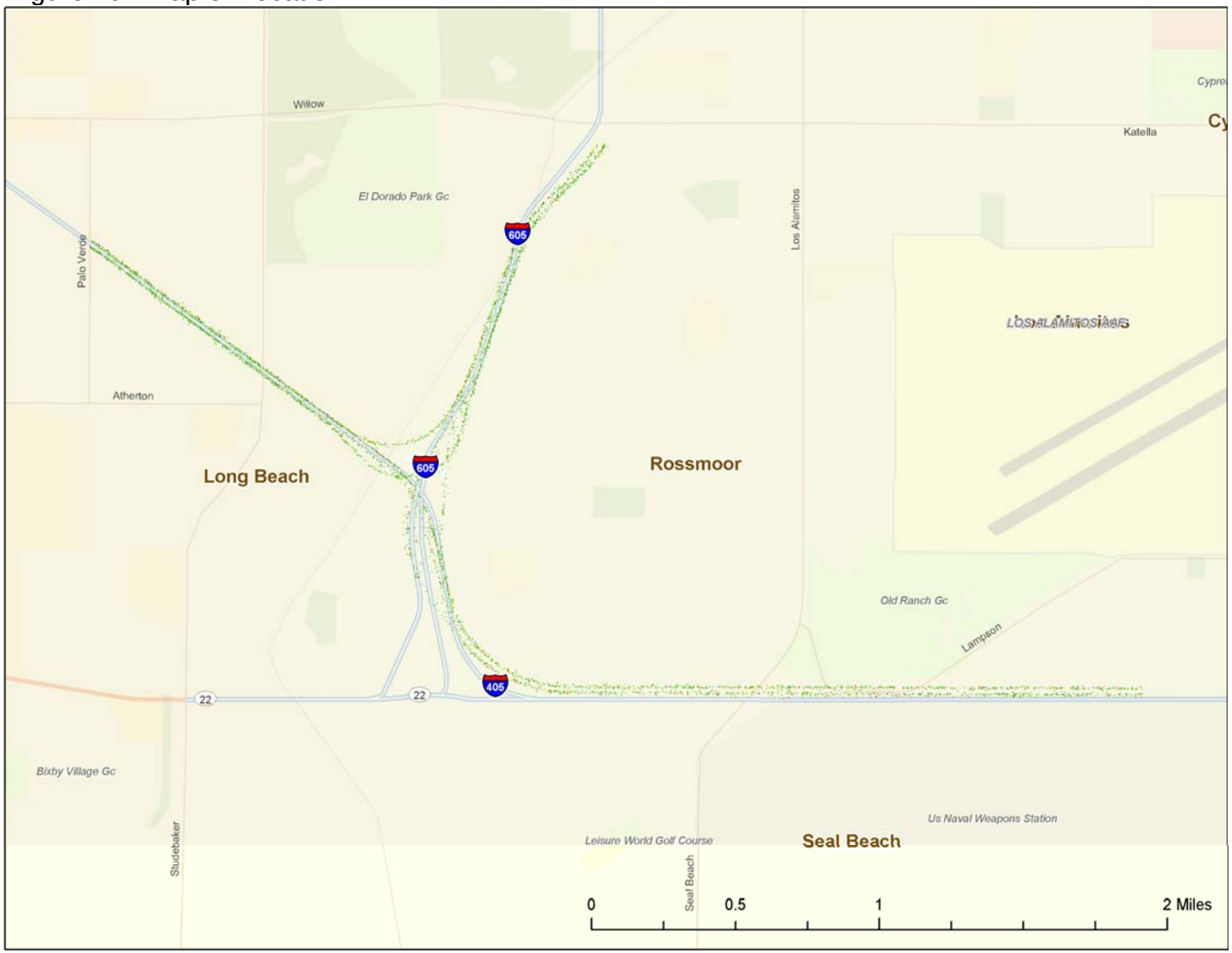
**Positions:** There were approximately 4,426 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 48.17 | 43.29 | 46.01 | 51.48 | 52.16 | 54.03 | 55 | 54.95 | 55 | 48.57 | 45.26 | 42.78 | 47.75 | 54.49 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 52 | 51 | 53 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 49 | 46 | 53 | 55 | 55 | 55 | 55 | 55 |

Chart 29: Weekday Speed by Time of Day

Figure 29:  Map of Location



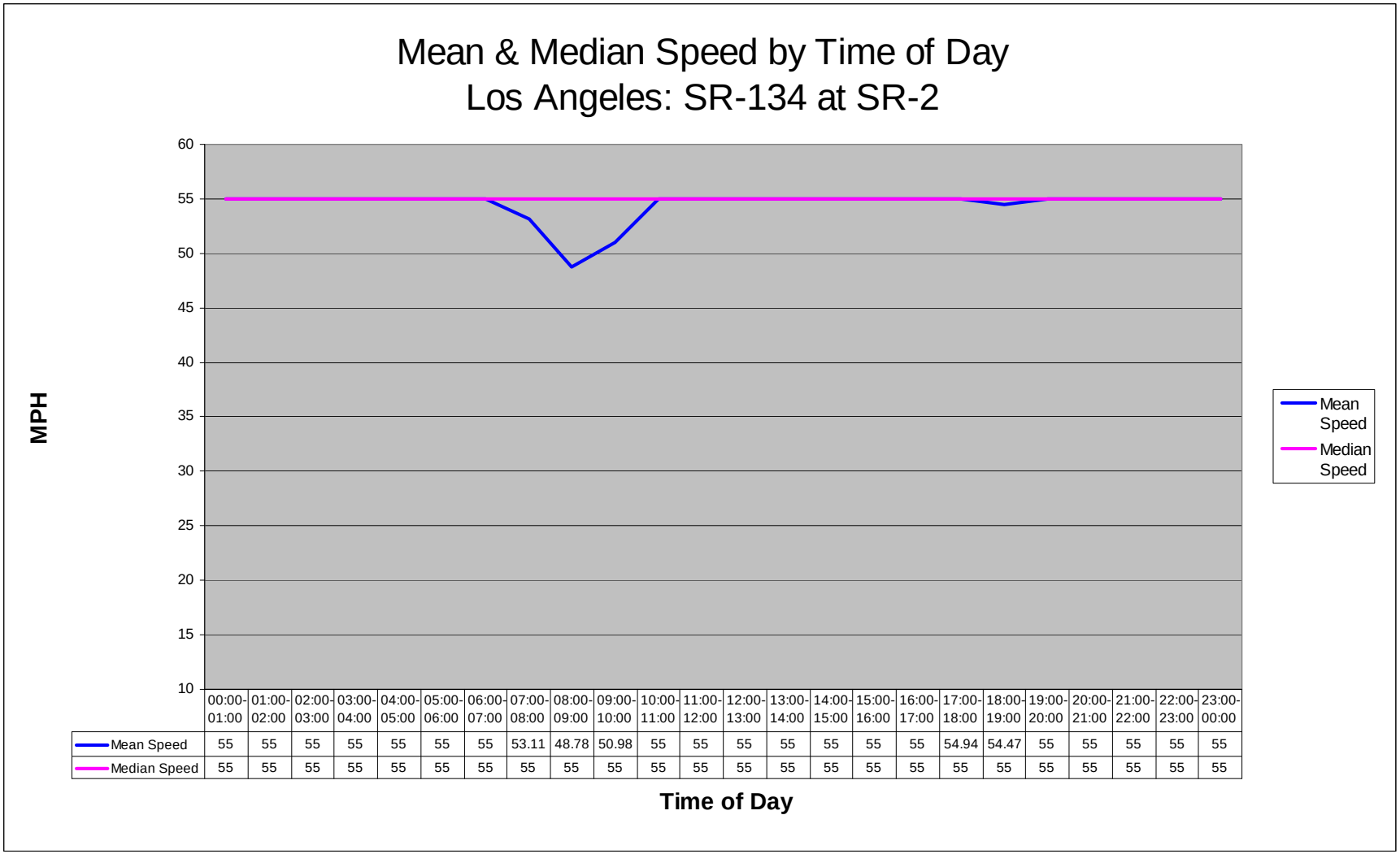
## Bottleneck 30: Los Angeles, California

**Bottleneck Location:** Los Angeles, California, SR-134 at SR-2

**Dates:** Weekdays; June 1, 2006 - May 31, 2007; 1 year time period

**Distances:** Approximately 8 miles of roadway were included in the study area.

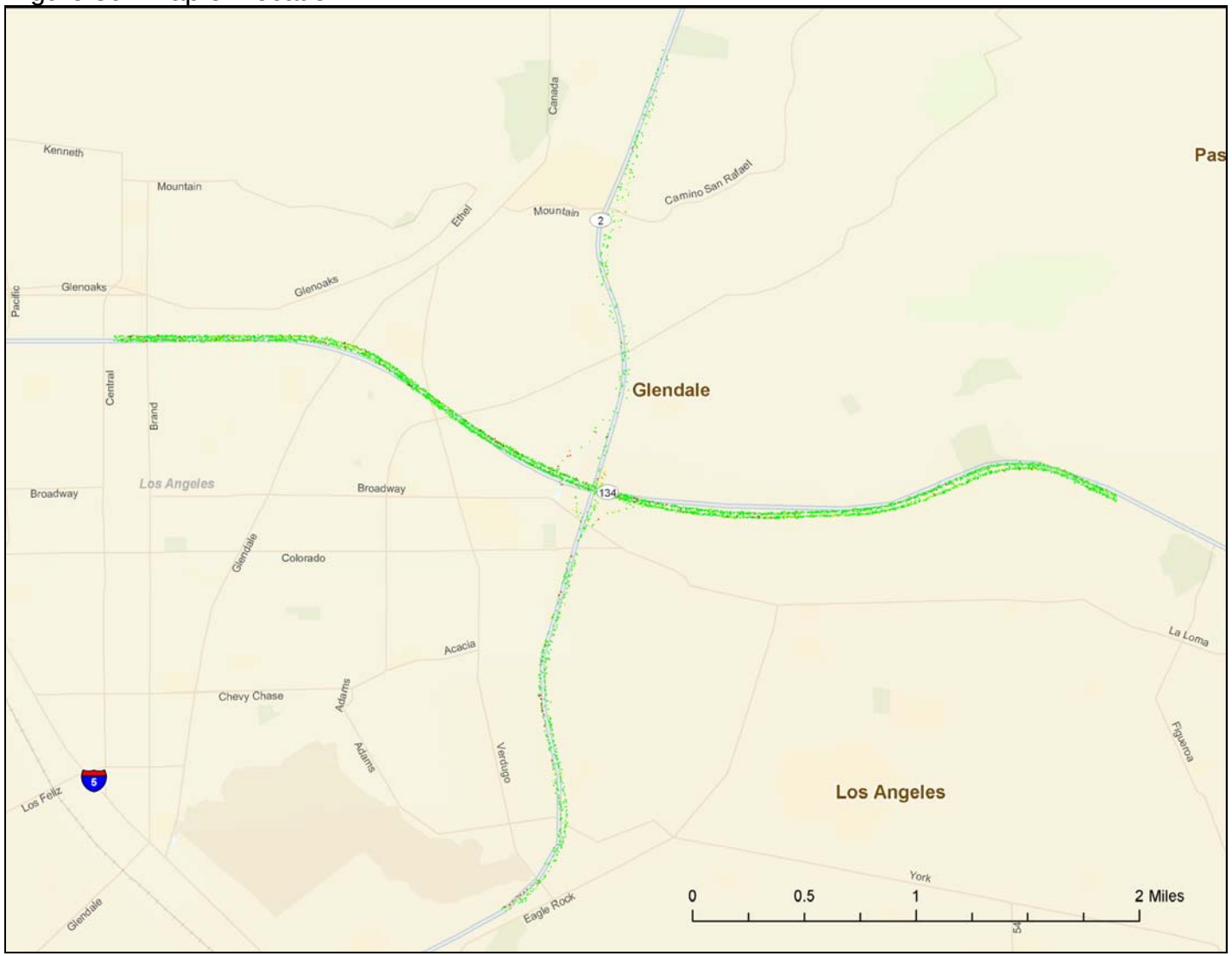
**Positions:** There were approximately 4,603 truck position reads used in this analysis.




| | 00:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | 04:00-05:00 | 05:00-06:00 | 06:00-07:00 | 07:00-08:00 | 08:00-09:00 | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-13:00 | 13:00-14:00 | 14:00-15:00 | 15:00-16:00 | 16:00-17:00 | 17:00-18:00 | 18:00-19:00 | 19:00-20:00 | 20:00-21:00 | 21:00-22:00 | 22:00-23:00 | 23:00-00:00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 53.11 | 48.78 | 50.98 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54.94 | 54.47 | 55 | 55 | 55 | 55 | 55 |
| Median Speed | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |

Chart 30: Weekday Speed by Time of Day

Figure 30:  Map of Location

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