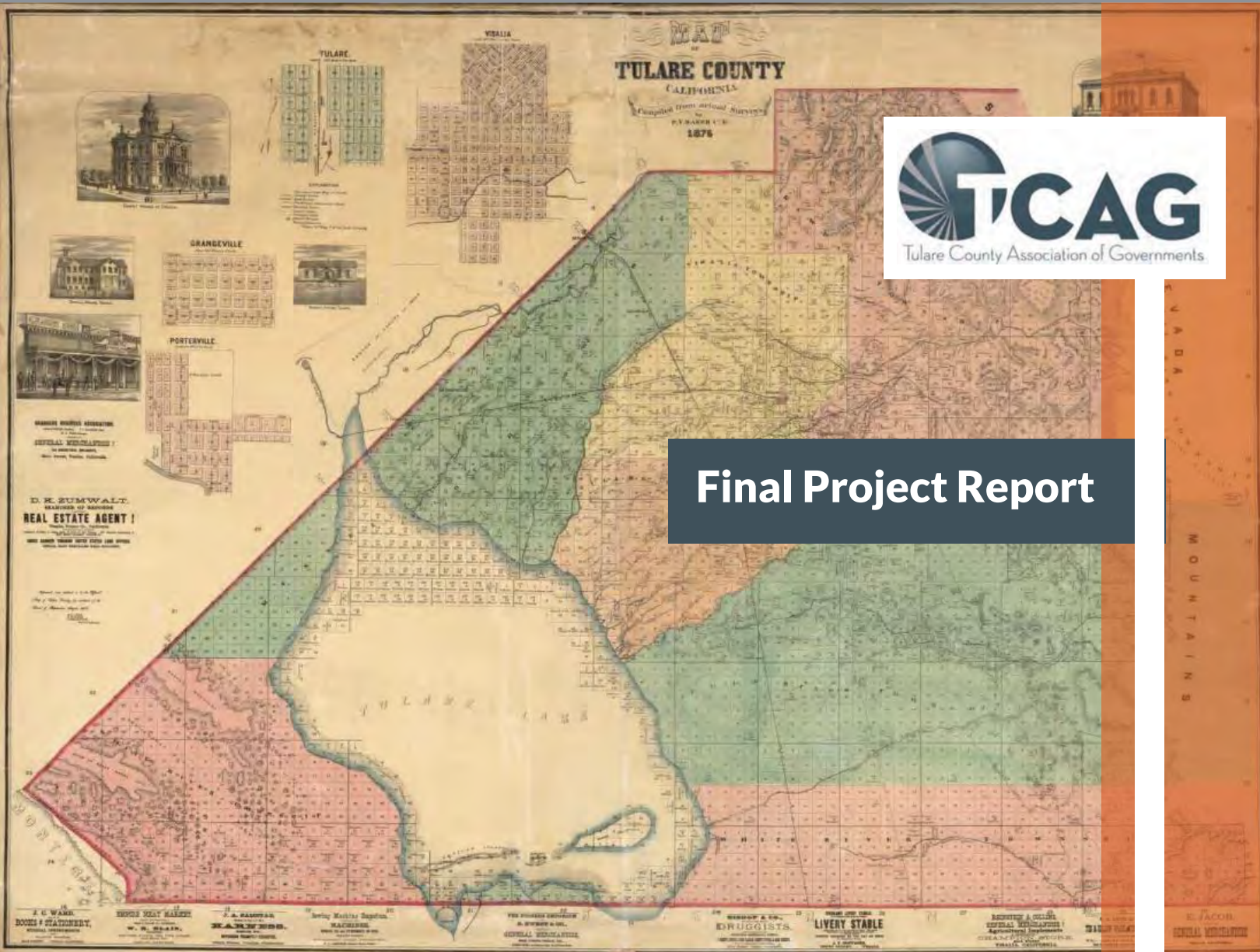


# SR 198 & SR 190 Travel Time Study

February 22, 2016



Final Project Report



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- Appendix C – SR 190 Checkpoint Summary Maps
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## 1.0 INTRODUCTION

Tulare County Association of Governments (TCAG) contracted TJKM to conduct a Travel Time Study for State Route 198 (SR 198) and State Route 190 (SR 190). The objective of the Travel Time Study is to collect travel time data that will aid TCAG and its member agencies in prioritizing and developing projects to improve congestion within Tulare County.

Travel time data are collected for a variety of applications and analyses. Travel time-based measures can be used in transportation planning, design and operations, and evaluation. Some applications of travel time study results include:

- ⇒ Develop transportation policies and programs
- ⇒ Perform needs studies or assessments
- ⇒ Rank and prioritize transportation improvements
- ⇒ Evaluate transportation improvement strategies
- ⇒ Input/calibration of planning models
- ⇒ Calculate road user costs for economic analyses
- ⇒ Develop historical database of traffic conditions
- ⇒ Input/calibration of traffic models
- ⇒ Traveler information
- ⇒ Establish/monitor congestion trends
- ⇒ Congestion management/performance measurement
- ⇒ Identify congestion locations or bottlenecks
- ⇒ Measure effectiveness and benefits of improvements
- ⇒ Communicate information to the public
- ⇒ Research and development

SR 198 is an east–west state highway that begins at US Route 101 (US 101) south of King City and ends in Sequoia National Park. It connects the California Central Coast to the mid–Central Valley through Hanford and Visalia. SR 198 intersects the major north–south routes in the Central Valley, including Interstate 5 (I-5), SR 33, and SR 99. The SR 198 study limits are from the SR 99 interchange on the west to County Road 152 on the east.

SR 190 begins at SR 99 just south of downtown Tipton in Tulare County and heads straight east along the flat San Joaquin Valley on Avenue 144. There is a short expressway segment in Porterville, including a cloverleaf interchange at SR 65 and a partial interchange at Main Street, after which the highway begins to curve alongside the Tule River. The SR 190 study limits are from S Westwood Street on the west to County Road 284 on the east.

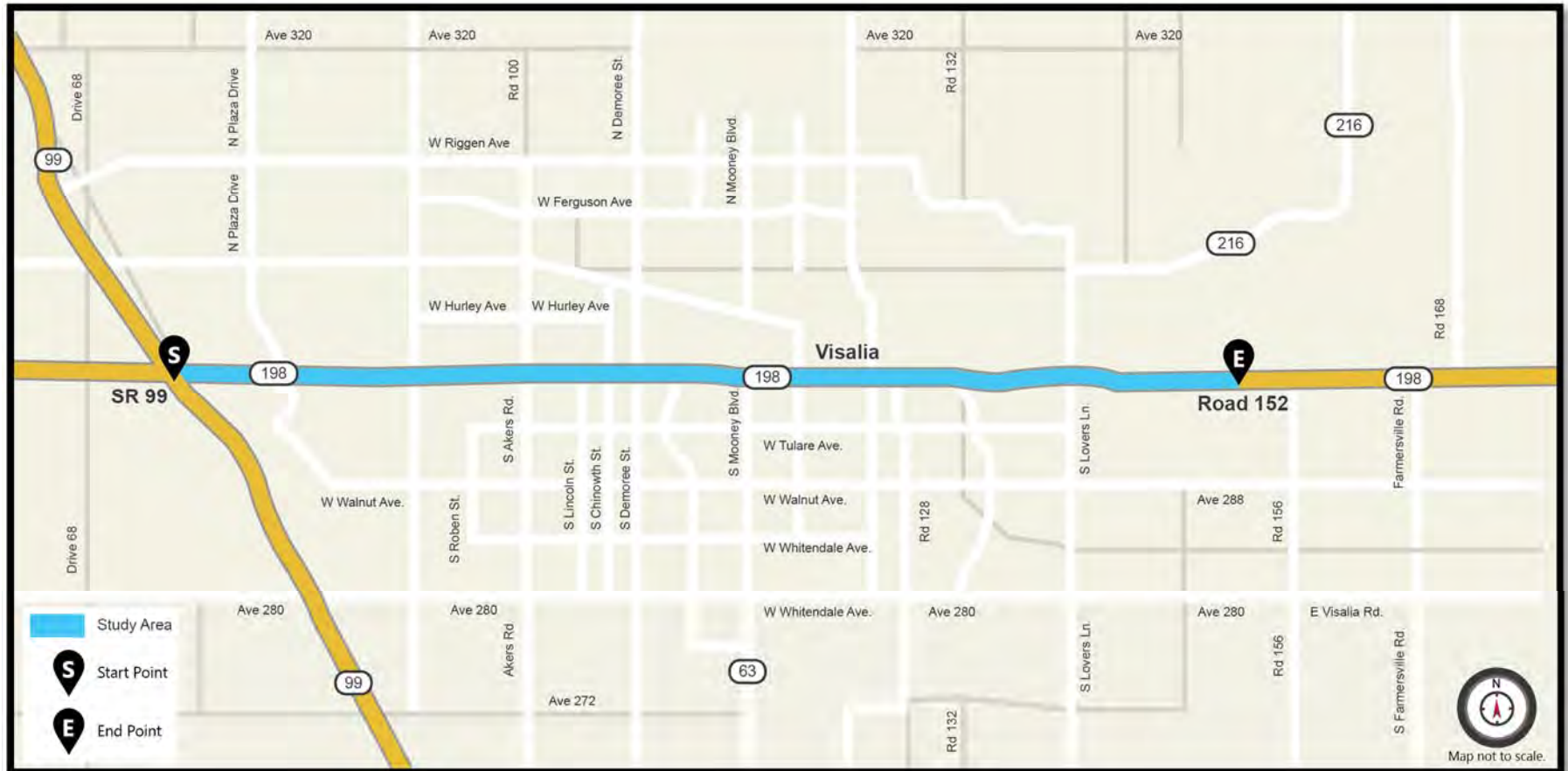
The study limits and their vicinity for the SR 198 and SR 190 corridors are shown in **Figures 1 & 2**. The study limits for the travel time runs along both corridors are shown in **Table 1** below:

**Table 1: Study Corridor Limits**

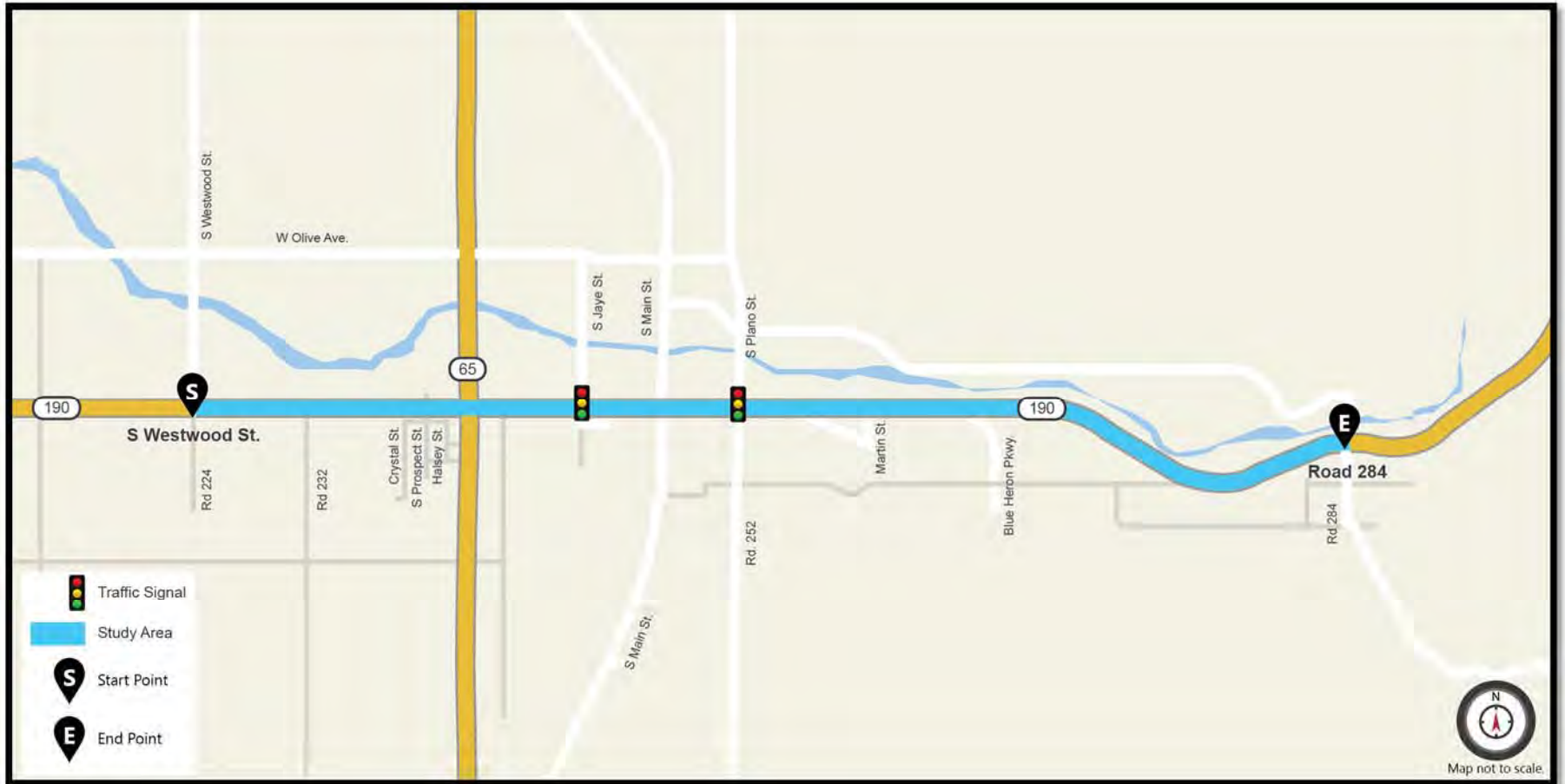
Route	From	To	Approximate Distance
SR 198	SR 99 Interchange	County Road 152	9.8 miles
SR 190	S Westwood Street	County Road 284	7.7 miles



Figure 1: Study Limits for SR 198 (SR 99 to County Road 152)



**Figure 2: Study Limits for SR 190 (S Westwood Street to County Road 284)**



**Table 2** below shows the cross streets along SR 190 within the study limits. These cross streets were also used as checkpoints for travel time runs.

**Table 2: SR 190 Cross Streets (Listed West to East)**

#	Cross Street	Type of Crossing	Control Type
0	S Westwood	at grade	4-way Stop
1	Road 232	at grade	Stop Control (Side Street)
2	S Prospect St.	at grade	Stop Control (Side Street)
3	SR 65 SB On/Off Ramps	not at grade	n/a
4	SR 65 NB On/Off Ramps	not at grade	n/a
5	S Jaye St.	at grade	Traffic Signal
6	S Main St. On/Off Ramps	not at grade	n/a
7	S Plano St./Road 252	at grade	Traffic Signal
8	Martin St.	at grade	Stop Control (Side Street)
9	Blue Heron Pkwy	at grade	Stop Control (Side Street)
10	Road 284	at grade	Stop Control (Side Street)

The following abbreviations have been used in this report:

NB = Northbound

SB = Southbound

EB = Eastbound

WB = Westbound

AM Peak Period = 6 AM to 9 AM

Mid-day (MD) = 9 AM to 3 PM

PM Peak Period = 4 PM to 7 PM

mph = Miles per hour

min = minutes

SR = State Route

TTI = Travel Time Index

HCM = Highway Capacity Manual



## 2.0 METHODOLOGY

The travel time data for this study were collected on a typical weekday (Tuesday, Wednesday, and/or Thursday) and weekend (Sunday) in mid-September 2015, during a week where there were no public or school holidays. In order to conform earlier results, additional data was collected for the SR 190 corridor, for the mid-day period and PM peak periods in early December 2015. The following three time periods were studied for weekdays and weekends for both the study corridors in both directions:

- ⇒ Morning (AM) peak period, defined as 6:00 AM to 9:00 AM
- ⇒ Mid-day (MD) period, defined as 9:00 AM to 3:00 PM
- ⇒ Evening (PM) peak period, defined as 4:00 PM to 7:00 PM

Construction activity, special events, weather, and other factors were monitored to avoid collecting unreliable data. The travel time surveys were not conducted at any particular location under any of the following circumstances: Adverse weather conditions; public holidays or major local events; weeks with any public holidays; major incidents on a nearby freeway or major arterial; and school closures and minimum days.

For the weekday AM and PM peak periods, five (5) bidirectional travel time runs were conducted. For the weekday and weekend mid-day periods, and the weekend AM and PM peak periods, three (3) travel time runs were conducted. The travel time runs conducted ensure statistically significant results consistent with the Travel Time Data Collection Handbook (Report No. FHWA-PL-98-035) issued by the Federal Highway Administration. An electronic version of the Handbook can be accessed/downloaded using this web link: <https://www.fhwa.dot.gov/ohim/tvtw/natmec/00020.pdf>.

The number of runs conducted for SR 198 and SR 190 corridors within the study limits are shown in **Table 3** below:

**Table 3: Number of Travel Time Runs Conducted in the Study**

Day	Time Period	Number of Travel Time Runs			
		SR 198		SR 190	
		Eastbound	Westbound	Eastbound	Westbound
Weekday	AM Peak Period	5	5	5	5
	Mid-day Period	3	3	6	5
	PM Peak Period	5	5	11	10
Weekend	AM Peak Period	3	3	3	3
	Mid-day Period	3	3	3	3
	PM Peak Period	3	3	3	3

The travel time data were collected using a hybrid of both the floating car and average speed methods. With this approach, the driver maintained the average speed of traffic for the segment of roadway being sampled, but if there were many passing cars then the driver also passed some cars. This approach provides more realistic results than using either the floating car or average speed methods exclusively.

## 2.1 DEFINITIONS

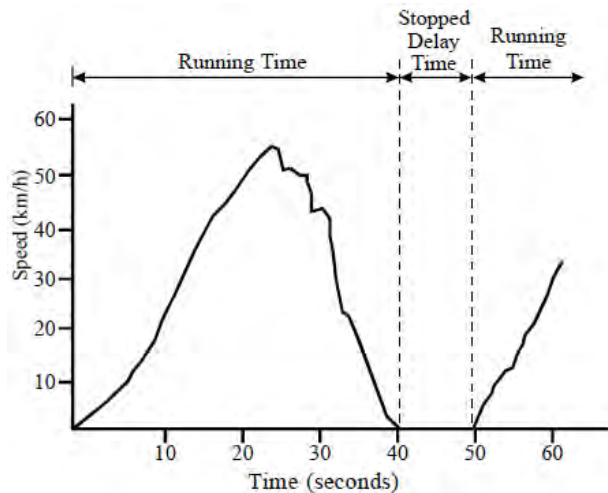
**Average Distance** is the average run distance of the route in miles.

**Posted Speed Limit** is the posted legal speed limit along the route in miles per hour.

**Travel Time** is broadly defined as “the time necessary to traverse a route between any two points of interest.” The formula to calculate the Travel Time using distance and speed is:

$$\text{Estimated Travel Time (seconds)} = \frac{\text{Segment Length (miles)}}{\text{Time-Mean Speed (mph)}} \times (3,600 \text{ sec/hour})$$

Travel time is measured by traversing the route that connects any two or more points of interest. Travel time is composed of running time, or time in which the vehicle is in motion, and stopped delay time, or time in which the vehicle is stopped (or moving sufficiently slow as to be stopped, i.e., typically less than 5 mph). The relationship between travel time and speed is illustrated in the chart below:



Source: Travel Time Data Collection Handbook

**Average Speed** is the average of speed recorded for all the travel time runs combined in mph.

**Number of Stops** is the number of times the vehicle speed dropped below 5 mph. Everytime the vehicle drops below 5 mph will be recorded as a stop.

**Average Number of Stops** is the average of the number of stops recorded for all the travel time runs combined.

**Stopped Time** is the total amount of time the vehicle speed dropped below 5 mph or the vehicle came to a complete stop.

**Congested Time** is the total amount of time the vehicle speed dropped below 20 mph.

**Travel Time Index (TTI)\*** is defined as the ratio between travel time during peak period and the free-flow travel time. For example, a TTI value of 1.2 means travel time during peak period is 20% longer than the free-flow travel time between the same origin and destination. This report uses this definition for calculating the TTI as specified in the Travel Time Data Collection Handbook.

**Annual Average Daily Traffic (AADT)** are traffic volumes estimates representing the average value of daily traffic over the course of a year.

\*Source: <http://www.fhwa.dot.gov/ohim/start.pdf>

### 3.0 OVERALL STUDY RESULTS

This chapter includes the aggregated run summary data for several travel time runs along the same route, such as average number of stops, average stopped time, average congested time, average speed, average travel time and Travel Time Index. Aggregated run summaries are helpful to compare the travel times and speed for several runs that have been performed at different times or different days of the week. The aggregate summary results are discussed in this chapter:

#### 3.1 SR 198 – TRAVEL TIME RESULTS SUMMARY

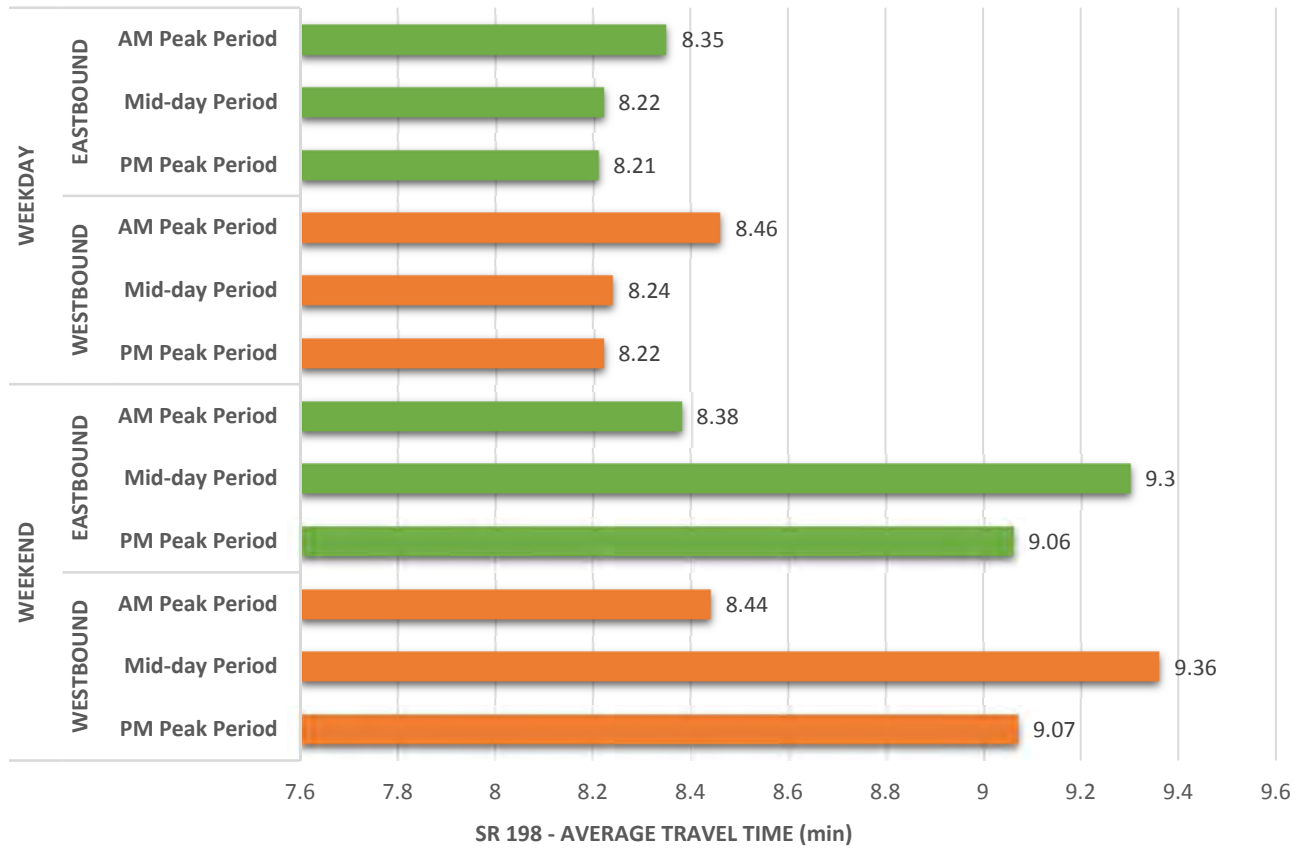
**Table 4** and the **Figures 3, 4 & 5** below summarize the results (averaged from multiple runs) for the travel time study along the SR 198 corridor in both directions. The average distance between the eastbound and westbound directions slightly differs by approximately 0.14 miles (740 ft) due to variations in the horizontal curvatures of the road. The results show that the travel times are consistent across various peak periods but are slightly higher on the weekends. The TTI indicates that the travel times are slightly higher when compared to free-flow conditions during the weekend mid-day period and PM peak period, in both the eastbound and westbound directions. The maximum travel times for both directions are during the weekend mid-day period. The driver noticed that there were heavy traffic during weekends possibly resulting in slower speeds and longer travel times.

The results show that the average speed ranges approximately from 61 mph to 70 mph in the eastbound direction, and approximately 62 mph to 71 mph in the westbound direction. In general, slower speeds are observed during weekends than weekdays. In the eastbound direction, the minimum travel time is 8.21 minutes in the PM peak period and maximum travel time is 9.3 minutes during mid-day period, both on a weekday. In the westbound direction, the minimum travel time is 8.22 minutes during weekday PM peak and maximum travel time is 9.36 minutes during the weekend mid-day period.

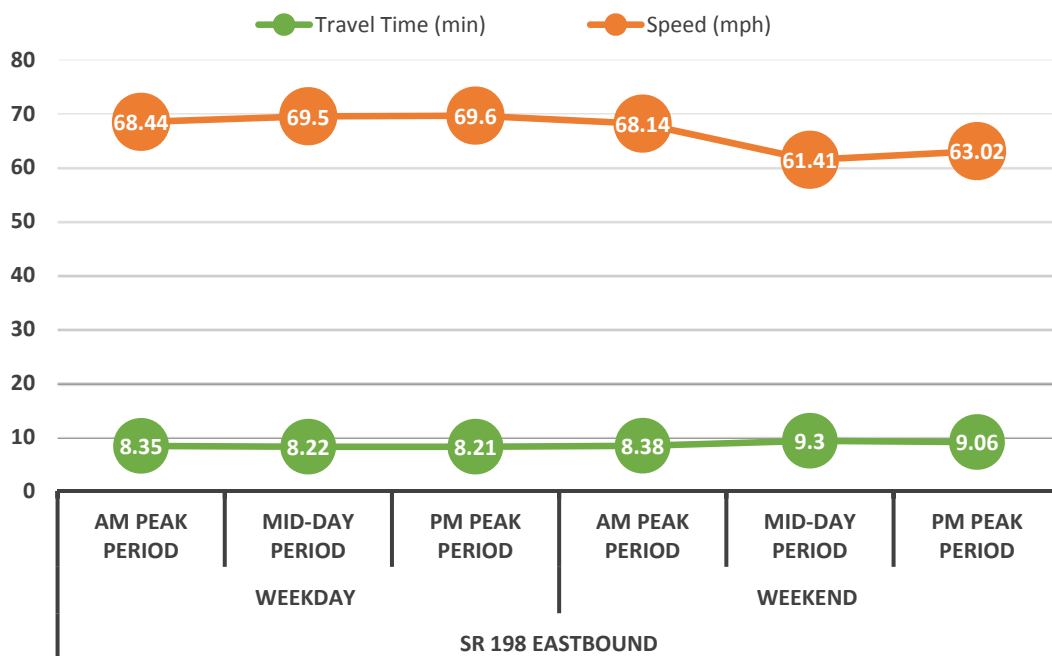
**Table 4: SR 198 Travel Time Results Summary**

Day	Route	Time Period	Average Distance (miles)	Posted Speed Limit (mph)	Average # Stops	Average Stopped Time (minutes)	Average Congested Time (minutes)	Average Speed (mph)	Average Travel Time (minutes)	Travel Time Index (TTI)
WEEKDAY	EB	AM	9.52	65	0	0	0	68.44	8.35	0.95
		MD	9.52	65	0	0	0	69.5	8.22	0.94
		PM	9.52	65	0	0	0	69.6	8.21	0.93
	WB	AM	9.66	65	0	0	0	68.54	8.46	0.95
		MD	9.66	65	0	0	0	70.35	8.24	0.92
		PM	9.66	65	0	0	0	70.54	8.22	0.92
WEEKEND	EB	AM	9.52	65	0	0	0	68.14	8.38	0.95
		MD	9.52	65	0	0	0	61.41	9.3	1.06
		PM	9.52	65	0	0	0	63.02	9.06	1.03
	WB	AM	9.66	65	0	0	0	68.66	8.44	0.95
		MD	9.66	65	0	0	0	61.95	9.36	1.05
		PM	9.66	65	0	0	0	63.93	9.07	1.02

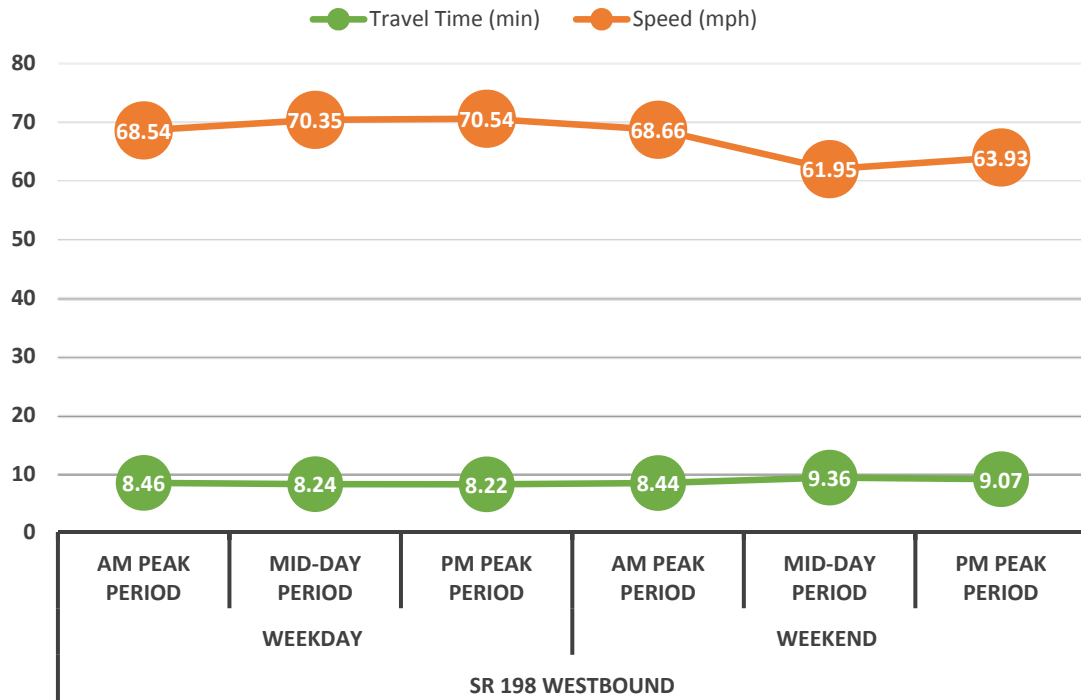
**Figure 3: SR 198 Travel Time Results Comparison**



**Figure 4: SR 198 Eastbound Travel Time Results Comparison**



**Figure 5: SR 198 Westbound Travel Time Results Comparison**



The following GIS maps for the SR 198 study corridor are included in **Appendix A**:

- ⇒ Figure A-1: SR 198 Eastbound Weekday AM Peak Period
- ⇒ Figure A-2: SR 198 Eastbound Weekday Mid-day Period
- ⇒ Figure A-3: SR 198 Eastbound Weekday PM Peak Period
- ⇒ Figure A-4: SR 198 Eastbound Weekend AM Peak Period
- ⇒ Figure A-5: SR 198 Eastbound Weekend Mid-day Period
- ⇒ Figure A-6: SR 198 Eastbound Weekend PM Peak Period
- ⇒ Figure A-7: SR 198 Westbound Weekday AM Peak Period
- ⇒ Figure A-8: SR 198 Westbound Weekday Mid-day Period
- ⇒ Figure A-9: SR 198 Westbound Weekday PM Peak Period
- ⇒ Figure A-10: SR 198 Westbound Weekend AM Peak Period
- ⇒ Figure A-11: SR 198 Westbound Weekend Mid-day Period
- ⇒ Figure A-12: SR 198 Westbound Weekend PM Peak Period



### 3.2 SR 190 – TRAVEL TIME RESULTS SUMMARY

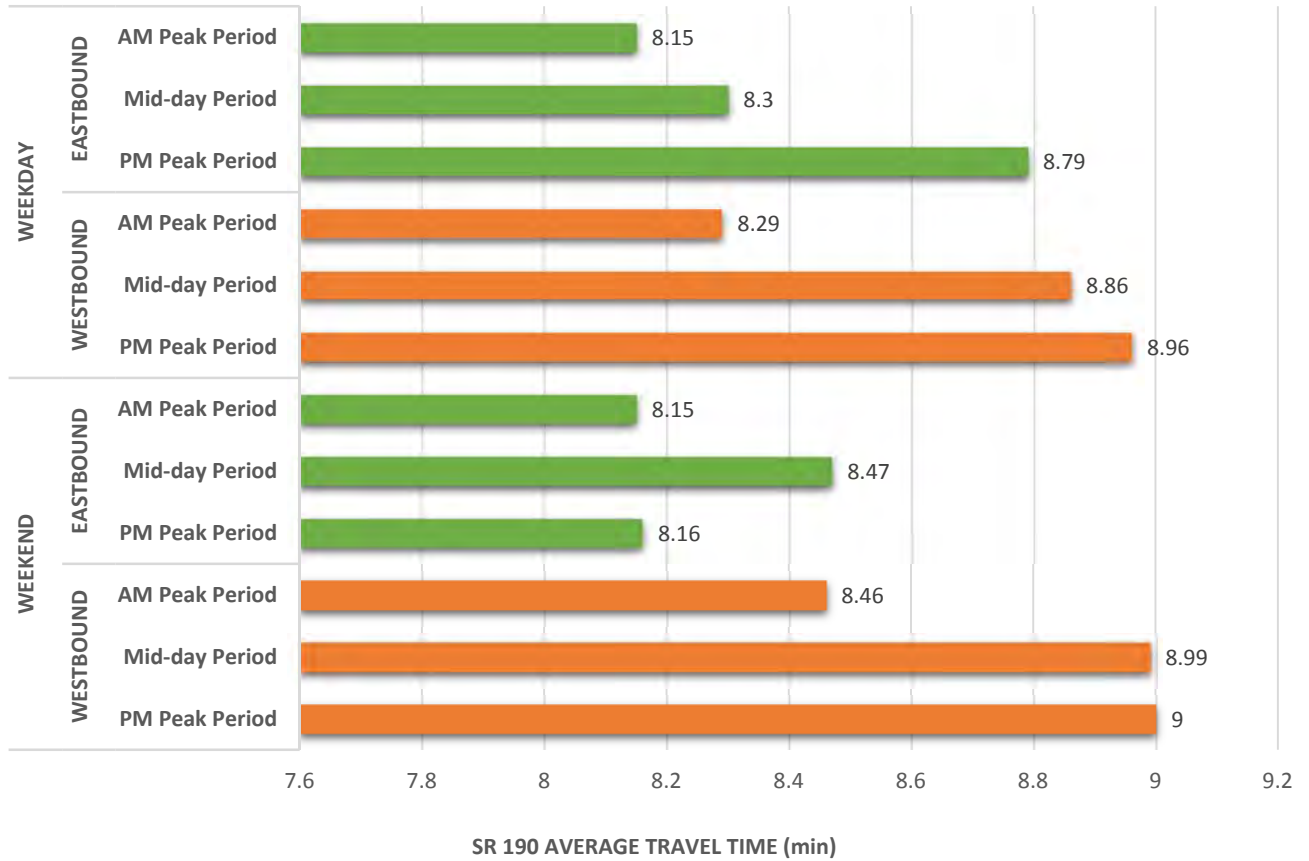
**Table 5** and the **Figures 6, 7 & 8** below summarize the results (averaged from multiple runs) for the travel time study along the SR 190 corridor in both directions. The average distance between the eastbound and westbound directions slightly differs by approximately 0.03 miles (160 ft) due to variations in the horizontal curvatures of the road. The results show that the travel times and speeds are consistent for various peak periods during weekdays and weekends. However, the TTI being over one indicates that the travel times are higher during the peak periods when compared to free-flow conditions.

The results show that the average speed ranges approximately from 51 mph to 56 mph in the eastbound direction, and approximately 50 mph to 55 mph in the westbound direction. The maximum travel times for both directions are during the PM peak periods. In the eastbound direction, the minimum travel time is 8.15 minutes during the AM peak period and the maximum travel time is 8.79 minutes during the weekday PM peak period. In the westbound direction, the minimum travel time is 8.29 minutes during the weekday AM peak period and the maximum travel time is 9 minutes during the weekend PM peak period.

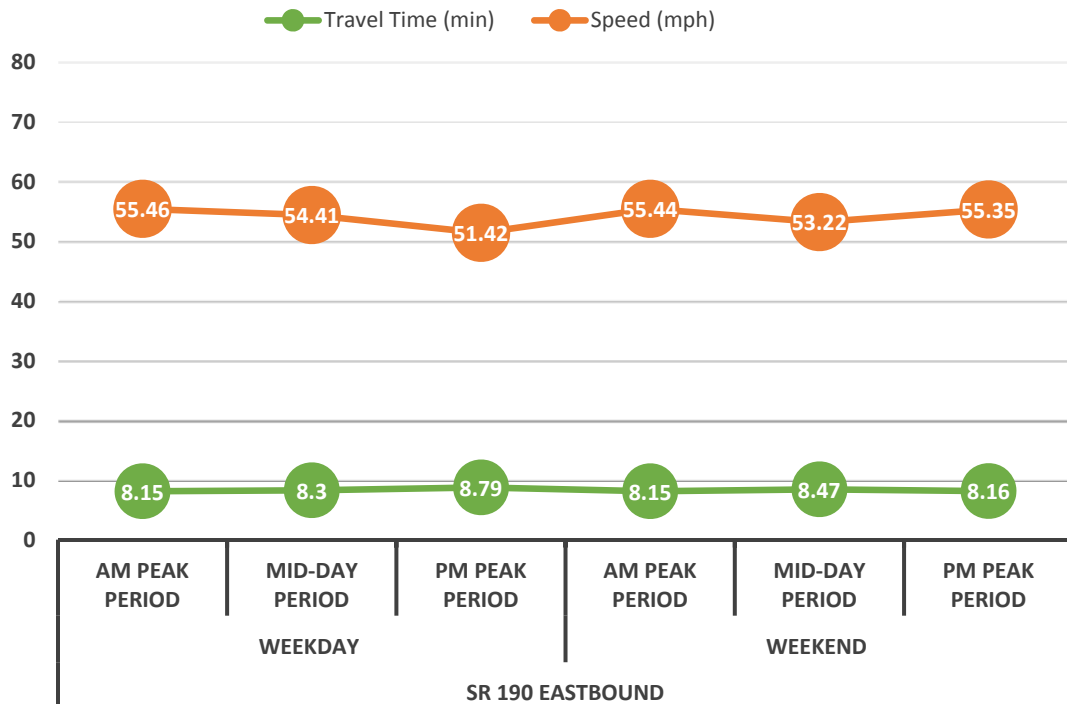
**Table 5: SR 190 Travel Time Results Summary**

Day	Route	Time Period	Average Distance (miles)	# of Traffic Signals	Posted Speed Limit (mph)	Average # Stops	Average Stopped Time (minutes)	Average Congested Time (minutes)	Average Speed (mph)	Average Travel Time (minutes)	Travel Time Index (TTI)
WEEKDAY	EB	AM	7.53	2	60	1.2	0.38	0.53	55.46	8.15	1.08
		MD	7.53	2	60	0.8	0.28	0.42	54.41	8.3	1.10
		PM	7.53	2	60	1.27	0.64	0.84	51.42	8.79	1.17
	WB	AM	7.56	2	60	2	0.44	0.67	54.74	8.29	1.10
		MD	7.56	2	60	1.83	0.66	0.96	51.11	8.86	1.17
		PM	7.56	2	60	2.6	0.82	1.12	50.65	8.96	1.18
WEEKEND	EB	AM	7.53	2	60	0.67	0.18	0.26	55.44	8.15	1.08
		MD	7.53	2	60	1.33	0.51	0.62	53.22	8.47	1.13
		PM	7.53	2	60	1	0.26	0.37	55.35	8.16	1.08
	WB	AM	7.56	2	60	1.67	0.31	0.44	53.45	8.46	1.12
		MD	7.56	2	60	2.67	0.76	0.98	50.37	8.99	1.19
		PM	7.56	2	60	3.33	0.73	1.07	50.27	9	1.19

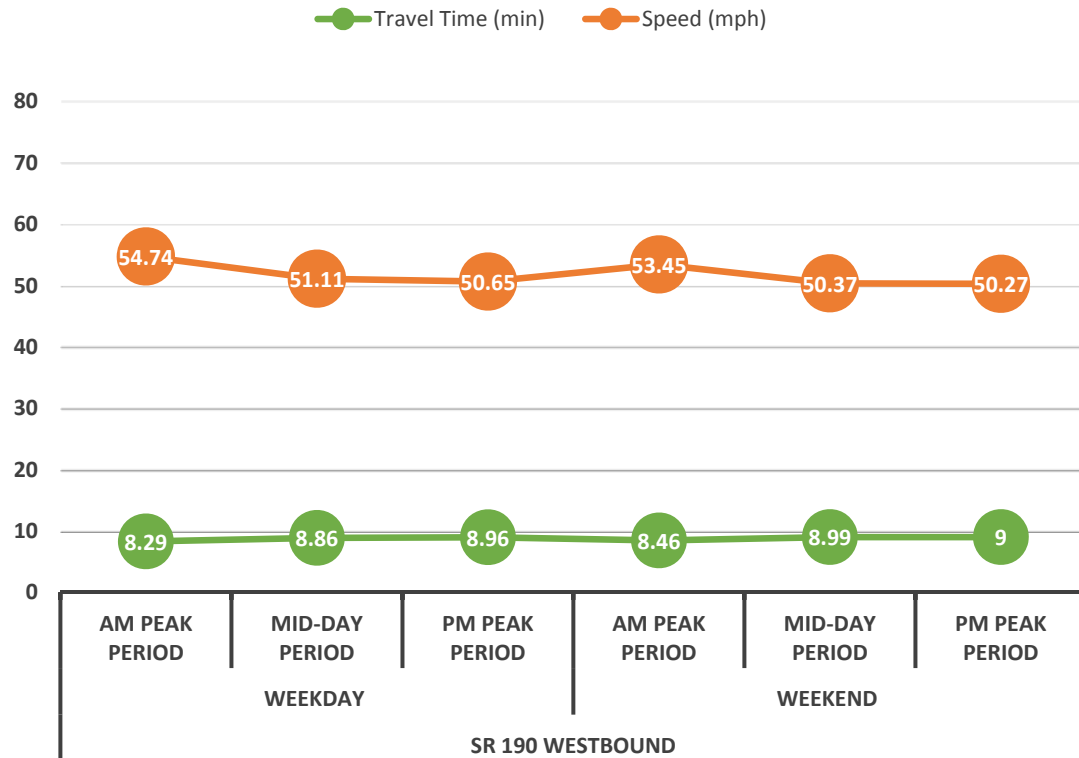
**Figure 6: SR 190 Travel Time Results Comparison**



**Figure 7: SR 190 Eastbound Travel Time Results Comparison**



**Figure 8: SR 190 Westbound Travel Time Results Comparison**



The following GIS maps for the SR 190 study corridor are included in **Appendix B**:

- ⇒ Figure B-1: SR 190 Eastbound Weekday AM Peak Period
- ⇒ Figure B-2: SR 190 Eastbound Weekday Mid-day Period
- ⇒ Figure B-3: SR 190 Eastbound Weekday PM Peak Period
- ⇒ Figure B-4: SR 190 Eastbound Weekend AM Peak Period
- ⇒ Figure B-5: SR 190 Eastbound Weekend Mid-day Period
- ⇒ Figure B-6: SR 190 Eastbound Weekend PM Peak Period
- ⇒ Figure B-7: SR 190 Westbound Weekday AM Peak Period
- ⇒ Figure B-8: SR 190 Westbound Weekday Mid-day Period
- ⇒ Figure B-9: SR 190 Westbound Weekday PM Peak Period
- ⇒ Figure B-10: SR 190 Westbound Weekend AM Peak Period
- ⇒ Figure B-11: SR 190 Westbound Weekend Mid-day Period
- ⇒ Figure B-12: SR 190 Westbound Weekend PM Peak Period

## 4.0 INDIVIDUAL RUNS SUMMARY

### 4.1 SR 198 – EASTBOUND INDIVIDUAL TRAVEL TIME RUNS

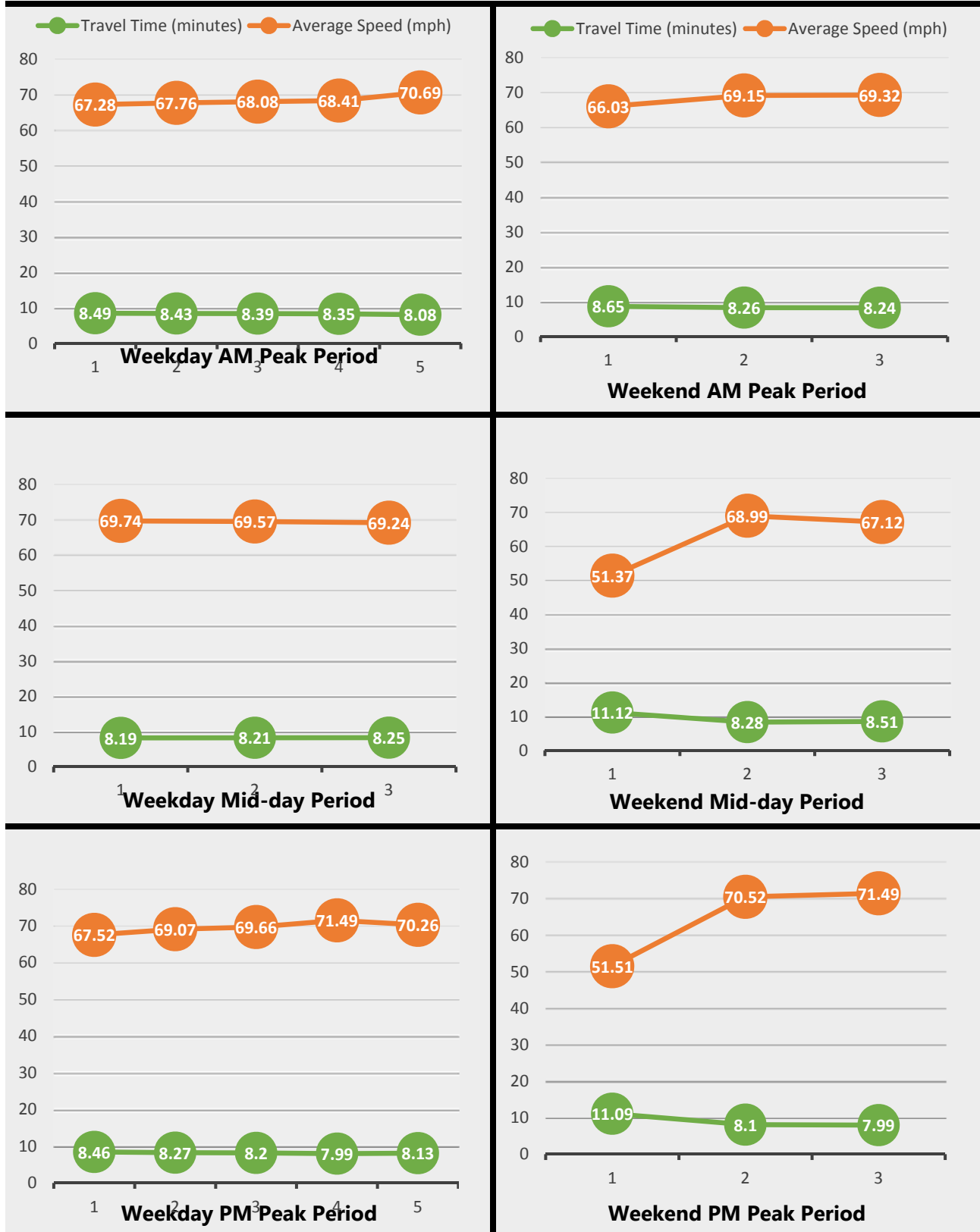
**Table 6** and **Figure 9** below shows the summary of the individual runs conducted during various peak periods along SR 198 study area in the eastbound direction. While most of the runs are consistent, there are two travel time runs that have TTI higher than 1, indicating higher travel-times when compared to free-flow conditions. The travel time run #1 on the weekend, during both the mid-day period and the PM peak period show lower speeds due to heavy traffic volumes observed along the corridor.

**Table 6: SR 198 Eastbound Individual Travel Time Runs**

Day	Run #	Start Date/Time	Posted Speed Limit (mph)	# of Stops	Stopped Time (minutes)	Congested Time (minutes)	Average Speed (mph)	Travel Time (minutes)	Travel Time Index (TTI)
WEEKDAY	<b>AM Peak Period</b>								
	1	9/16/2015 7:03	65	0	0	0	67.28	8.49	0.97
	2	9/16/2015 7:24	65	0	0	0	67.76	8.43	0.96
	3	9/16/2015 7:47	65	0	0	0	68.08	8.39	0.95
	4	9/16/2015 8:08	65	0	0	0	68.41	8.35	0.95
	5	9/16/2015 8:30	65	0	0	0	70.69	8.08	0.92
	<b>Mid-day Period</b>								
	1	9/16/2015 12:02	65	0	0	0	69.74	8.19	0.93
	2	9/16/2015 12:23	65	0	0	0	69.57	8.21	0.93
	3	9/16/2015 12:45	65	0	0	0	69.24	8.25	0.94
	<b>PM Peak Period</b>								
	1	9/16/2015 16:01	65	0	0	0	67.52	8.46	0.96
	2	9/16/2015 16:24	65	0	0	0	69.07	8.27	0.94
	3	9/16/2015 16:45	65	0	0	0	69.66	8.2	0.93
	4	9/16/2015 17:07	65	0	0	0	71.49	7.99	0.91
5	9/16/2015 17:28	65	0	0	0	70.26	8.13	0.93	
WEEKEND	<b>AM Peak Period</b>								
	1	9/13/2015 7:02	65	0	0	0	66.03	8.65	0.98
	2	9/13/2015 7:25	65	0	0	0	69.15	8.26	0.94
	3	9/13/2015 7:46	65	0	0	0	69.32	8.24	0.94
	<b>Mid-day Period</b>								
	1	9/13/2015 12:10	65	0	0	0	51.37	11.12	1.27
	2	9/13/2015 12:24	65	0	0	0	68.99	8.28	0.94
	3	9/13/2015 12:46	65	0	0	0	67.12	8.51	0.97
	<b>PM Peak Period</b>								
	1	9/13/2015 16:10	65	0	0	0	51.51	11.09	1.26
2	9/13/2015 16:24	65	0	0	0	70.52	8.1	0.92	
3	9/13/2015 16:45	65	0	0	0	71.49	7.99	0.91	

**Figure 9: SR 198 Eastbound – Individual Travel Time Runs Comparison**

X-Axis represents the Number of the Travel Time Run & Y-Axis represents Travel Time in minutes or Average Speed in mph.





## 4.2 SR 198 – WESTBOUND INDIVIDUAL TRAVEL TIME RUNS

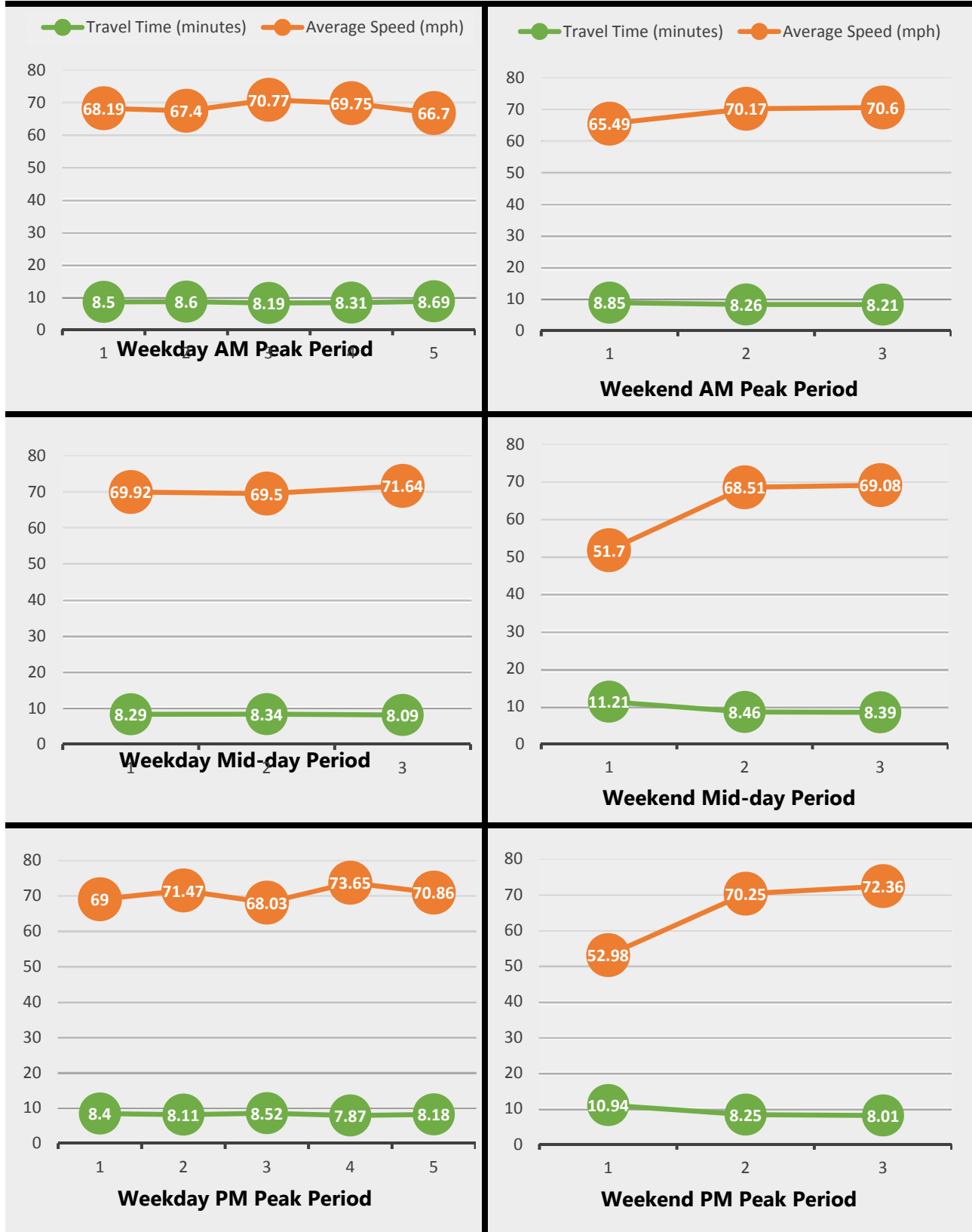
The **Table 7** and **Figure 10** below shows the summary of the individual runs conducted during various peak periods along the SR 198 study area in the eastbound direction. While most of the runs are consistent, two travel time runs have TTI higher than one indicating higher travel-time when compared to free-flow conditions. The travel time run #1 on the weekend, during both the mid-day period and the PM peak period show lower speeds due to heavy traffic volumes observed along the corridor.

**Table 7: SR 198 Westbound Individual Travel Time Runs**

Day	Run #	Start Date/Time	Posted Speed Limit (mph)	# of Stops	Stopped Time (minutes)	Congested Time (minutes)	Average Speed (mph)	Travel Time (minutes)	Travel Time Index (TTI)
WEEKDAY	<b>AM Peak Period</b>								
	1	9/16/2015 7:13	65	0	0	0	68.19	8.5	0.95
	2	9/16/2015 7:36	65	0	0	0	67.4	8.6	0.96
	3	9/16/2015 7:58	65	0	0	0	70.77	8.19	0.92
	4	9/16/2015 8:19	65	0	0	0	69.75	8.31	0.93
	5	9/16/2015 8:41	65	0	0	0	66.7	8.69	0.97
	<b>Mid-day Period</b>								
	1	9/16/2015 12:12	65	0	0	0	69.92	8.29	0.93
	2	9/16/2015 12:34	65	0	0	0	69.5	8.34	0.94
	3	9/16/2015 12:55	65	0	0	0	71.64	8.09	0.91
	<b>PM Peak Period</b>								
	1	9/16/2015 16:13	65	0	0	0	69	8.4	0.94
	2	9/16/2015 16:35	65	0	0	0	71.47	8.11	0.91
	3	9/16/2015 16:56	65	0	0	0	68.03	8.52	0.96
	4	9/16/2015 17:18	65	0	0	0	73.65	7.87	0.88
5	9/16/2015 17:39	65	0	0	0	70.86	8.18	0.92	
WEEKEND	<b>AM Peak Period</b>								
	1	9/13/2015 7:14	65	0	0	0	65.49	8.85	0.99
	2	9/13/2015 7:35	65	0	0	0	70.17	8.26	0.93
	3	9/13/2015 7:57	65	0	0	0	70.6	8.21	0.92
	<b>Mid-day Period</b>								
	1	9/13/2015 11:59	65	0	0	0	51.7	11.21	1.26
	2	9/13/2015 12:35	65	0	0	0	68.51	8.46	0.95
	3	9/13/2015 12:56	65	0	0	0	69.08	8.39	0.94
	<b>PM Peak Period</b>								
1	9/13/2015 16:00	65	0	0	0	52.98	10.94	1.23	
2	9/13/2015 16:34	65	0	0	0	70.25	8.25	0.93	
3	9/13/2015 16:55	65	0	0	0	72.36	8.01	0.90	

**Figure 10: SR 198 Westbound – Individual Travel Time Runs Comparison**

X-Axis represents the Number of the Travel Time Run & Y-Axis represents Travel Time in minutes or Average Speed in mph.



### 4.3 SR 190 – EASTBOUND INDIVIDUAL TRAVEL TIME RUNS

The **Table 8** and **Figure 11** below shows the summary of the individual runs conducted during various peak periods along the SR 190 study area in the eastbound direction.

**Table 8: SR 190 Eastbound Individual Travel Time Runs**

Day	Run #	Start Date/Time	Posted Speed Limit (mph)	# of Stops	Stopped Time (minutes)	Congested Time (minutes)	Average Speed (mph)	Travel Time (minutes)	Travel Time Index (TTI)	
WEEKDAY	<b>AM Peak Period</b>									
	1	9/15/2015 7:05	60	0	0	0	59.04	7.65	1.02	
	2	9/15/2015 7:21	60	1	0.17	0.3	56.14	8.05	1.07	
	3	9/15/2015 7:38	60	0	0	0.17	59.98	7.53	1.00	
	4	9/15/2015 7:55	60	2	1.02	1.25	50.32	8.98	1.19	
	5	9/15/2015 8:14	60	3	0.72	0.95	53.05	8.52	1.13	
	<b>Mid-day Period</b>									
	1	9/15/2015 12:20	60	0	0	0	61.03	7.4	0.98	
	2	9/15/2015 12:36	60	1	0.13	0.3	56.85	7.95	1.06	
	3	12/3/2015 14:03	60	1	0.47	0.72	50.67	8.92	1.18	
	4	12/3/2015 14:22	60	0	0	0	56.24	8.03	1.07	
	5	12/3/2015 14:40	60	2	0.8	1.08	49.06	9.22	1.22	
	<b>PM Peak Period</b>									
	1	9/15/2015 16:02	60	1	0.12	0.3	58.28	7.75	1.03	
	2	9/15/2015 16:19	60	1	0.88	1.18	53.36	8.47	1.12	
	3	9/15/2015 16:36	60	2	0.18	0.47	57.33	7.88	1.05	
	4	9/15/2015 16:54	60	2	1.5	1.72	48.32	9.35	1.24	
	5	9/15/2015 17:13	60	2	1.25	1.45	49.67	9.1	1.21	
	6	12/3/2015 16:33	60	0	0	0	55.59	8.12	1.08	
	7	12/3/2015 16:52	60	0	0	0	55.08	8.2	1.09	
	8	12/3/2015 17:13	60	2	0.85	1.13	48.19	9.38	1.25	
9	12/3/2015 17:34	60	1	0.12	0.35	53.91	8.38	1.11		
10	12/3/2015 17:53	60	2	1.65	1.97	42.68	10.6	1.41		
11	12/3/2015 18:16	60	1	0.52	0.67	47.99	9.42	1.25		
WEEKEND	<b>AM Peak Period</b>									
	1	9/13/2015 7:00	60	0	0	0	58.12	7.77	1.03	
	2	9/13/2015 7:18	60	1	0.28	0.4	54.8	8.25	1.09	
	3	9/13/2015 7:36	60	1	0.27	0.37	53.59	8.43	1.12	
	<b>Mid-day Period</b>									
	1	9/13/2015 12:07	60	1	0.22	0.32	53.32	8.42	1.13	
	2	9/13/2015 12:27	60	2	0.77	0.93	52.25	8.65	1.15	
	3	9/13/2015 12:45	60	1	0.55	0.6	54.23	8.33	1.11	
	<b>PM Peak Period</b>									
	1	9/13/2015 16:00	60	0	0	0.02	56.98	7.93	1.05	
2	9/13/2015 16:19	60	1	0.33	0.42	55.22	8.18	1.09		
3	9/13/2015 16:37	60	2	0.43	0.68	53.97	8.38	1.11		

There are two traffic signals in the study corridor at S Jaye St and S Plano St/Road 252. As per the methodology described in *Section 2.0*, if the vehicle speed drop below 5 mph, it would be recorded as a stop. This methodology is consistent with the Travel Time Data Collection Handbook. In the above results, during the weekday AM peak period, the travel time run #5 recorded three stops even though there are only two signal lights along the corridor. The checkpoint summary for the run indicates that it took two cycles of the signal at Jaye Street for the vehicle to get through the signal.

The following SR 190 Eastbound Checkpoint Summary GIS Maps are included in **Appendix C**:

- ⇒ Figure C-1: SR 190 Eastbound Weekday
- ⇒ Figure C-2: SR 190 Eastbound Weekend

The following SR 190 Checkpoint Summary Tables are included in **Appendix D**:

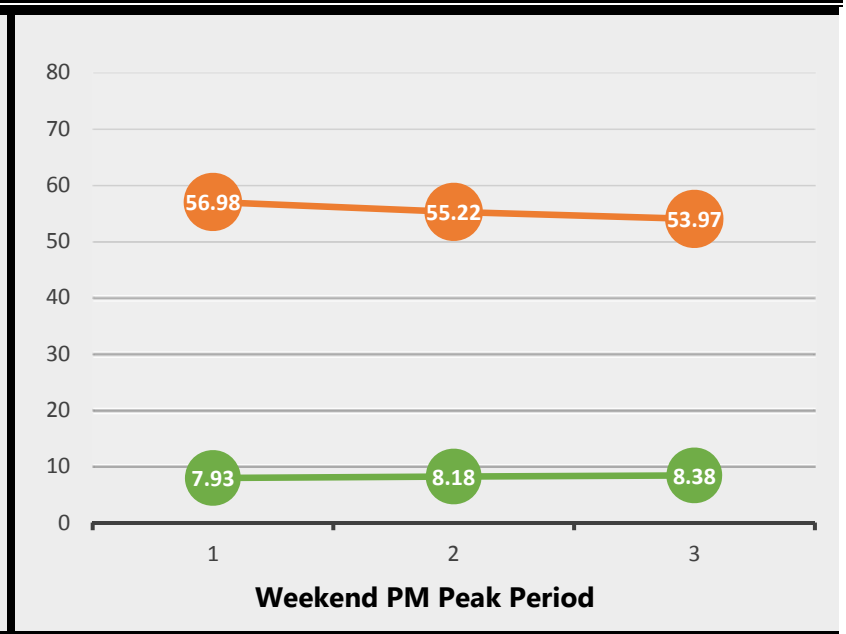
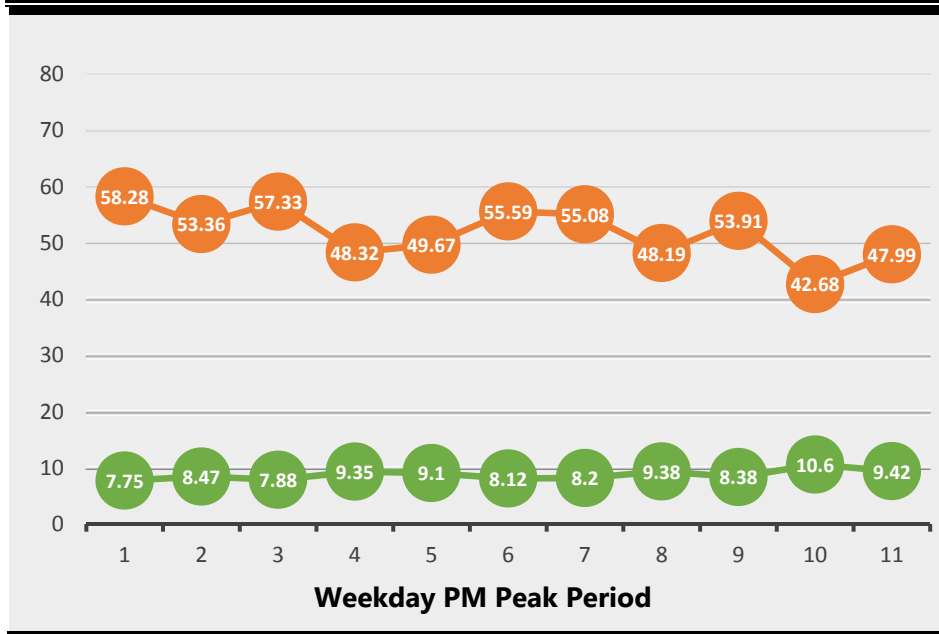
- ⇒ Table D-1: SR 190 Eastbound Weekday
- ⇒ Table D-2: SR 190 Eastbound Weekend

**Figure 11: SR 190 Eastbound – Individual Travel Time Runs Comparison**

X-Axis represents the Number of the Travel Time Run & Y-Axis represents Travel Time in minutes or Average Speed in mph.







#### 4.4 SR 190 – WESTBOUND INDIVIDUAL TRAVEL TIME RUNS

The **Table 9** and **Figure 12** below shows the summary of the individual runs conducted during various peak periods along SR 190 study area in the eastbound direction.

**Table 9: SR 190 Westbound Individual Travel Time Runs**

Day	Run #	Start Date/Time	Posted Speed Limit (mph)	# of Stops	Stopped Time (minutes)	Congested Time (minutes)	Average Speed (mph)	Travel Time (minutes)	Travel Time Index (TTI)	
WEEKDAY	<b>AM Peak Period</b>									
	1	9/15/2015 7:13	60	2	0.07	0.3	58.27	7.77	1.03	
	2	9/15/2015 7:29	60	2	0.37	0.65	54.93	8.33	1.09	
	3	9/15/2015 7:46	60	1	0.72	0.88	53.73	8.43	1.12	
	4	9/15/2015 8:05	60	2	0.57	0.77	54.54	8.3	1.10	
	5	9/15/2015 8:22	60	3	0.47	0.75	52.66	8.6	1.14	
	<b>Mid-day Period</b>									
	1	9/15/2015 12:10	60	2	0.78	1.13	50.71	8.93	1.18	
	2	9/15/2015 12:27	60	1	0.18	0.6	55.71	8.13	1.08	
	3	9/15/2015 12:44	60	1	0.85	1.03	52.35	8.65	1.15	
	4	12/3/2015 14:13	60	2	0.17	0.47	52.47	8.62	1.14	
	5	12/3/2015 14:30	60	2	0.77	1.02	49.36	9.17	1.22	
	6	12/3/2015 14:50	60	3	1.18	1.52	46.78	9.68	1.28	
	<b>PM Peak Period</b>									
	1	9/15/2015 16:10	60	2	0.77	0.92	54.11	8.37	1.11	
	2	9/15/2015 16:27	60	3	0.48	0.83	54.33	8.43	1.10	
	3	9/15/2015 16:44	60	3	0.65	0.83	54.03	8.38	1.11	
	4	9/15/2015 17:04	60	3	0.77	1.05	50.5	8.97	1.19	
	5	9/15/2015 17:22	60	3	0.6	0.98	52.67	8.7	1.14	
	6	12/3/2015 16:42	60	2	0.2	0.72	50.98	8.88	1.18	
7	12/3/2015 17:01	60	3	1.98	2.35	44.62	10.15	1.34		
8	12/3/2015 17:24	60	3	1.35	1.65	47.77	9.45	1.26		
9	12/3/2015 17:44	60	2	0.27	0.58	52.66	8.6	1.14		
10	12/3/2015 18:27	60	2	1.13	1.33	47.05	9.62	1.28		
WEEKEND	<b>AM Peak Period</b>									
	1	9/13/2015 7:08	60	2	0.75	0.93	50.74	8.92	1.18	
	2	9/13/2015 7:27	60	1	0.07	0.13	55.53	8.15	1.08	
	3	9/13/2015 7:46	60	2	0.1	0.27	54.39	8.32	1.10	
	<b>Mid-day Period</b>									
	1	9/13/2015 12:16	60	3	0.98	1.28	49.2	9.2	1.22	
	2	9/13/2015 12:36	60	3	0.72	0.95	51.21	8.85	1.17	
	3	9/13/2015 12:54	60	2	0.57	0.7	50.71	8.93	1.18	
	<b>PM Peak Period</b>									
	1	9/13/2015 16:09	60	4	0.8	1.25	48.67	9.3	1.23	
2	9/13/2015 16:28	60	3	0.93	1.18	49.36	9.17	1.22		
3	9/13/2015 16:46	60	3	0.45	0.77	53.04	8.53	1.13		

A majority of the runs recorded during the weekday PM peak period and the weekend peak periods show more than two stops. The driver observed heavy traffic during these periods, including brief slowdowns due to merging vehicles. While the posted speed limit is 60 mph, the average minimum speed recorded was approximately 44 mph and the average maximum speed recorded was approximately 58 mph. The heavy traffic volumes generally result the lower speeds.

There is heavy congestion at the on/off ramps at S Main St and SR 65 resulting in slower speeds for the thru traffic. There were several occasions when the study vehicle driver noticed trucks/cars abruptly changing lanes resulting in slowdowns. These results are considered to be acceptable as per the Travel Time Data Collection Handbook as they represent the inconsistent driver behavior which is a common factor in typical driving conditions.

The two traffic lights in the corridor have resulted in stops for a majority of the runs. The GIS maps included in **Appendix B** show the vehicle slowdowns at the two traffic lights. However, the minimum average speed along the corridor is over 44 mph, which is still considered acceptable as per Caltrans standards.

The following SR 190 Westbound Checkpoint Summary GIS Maps are included in **Appendix C**:

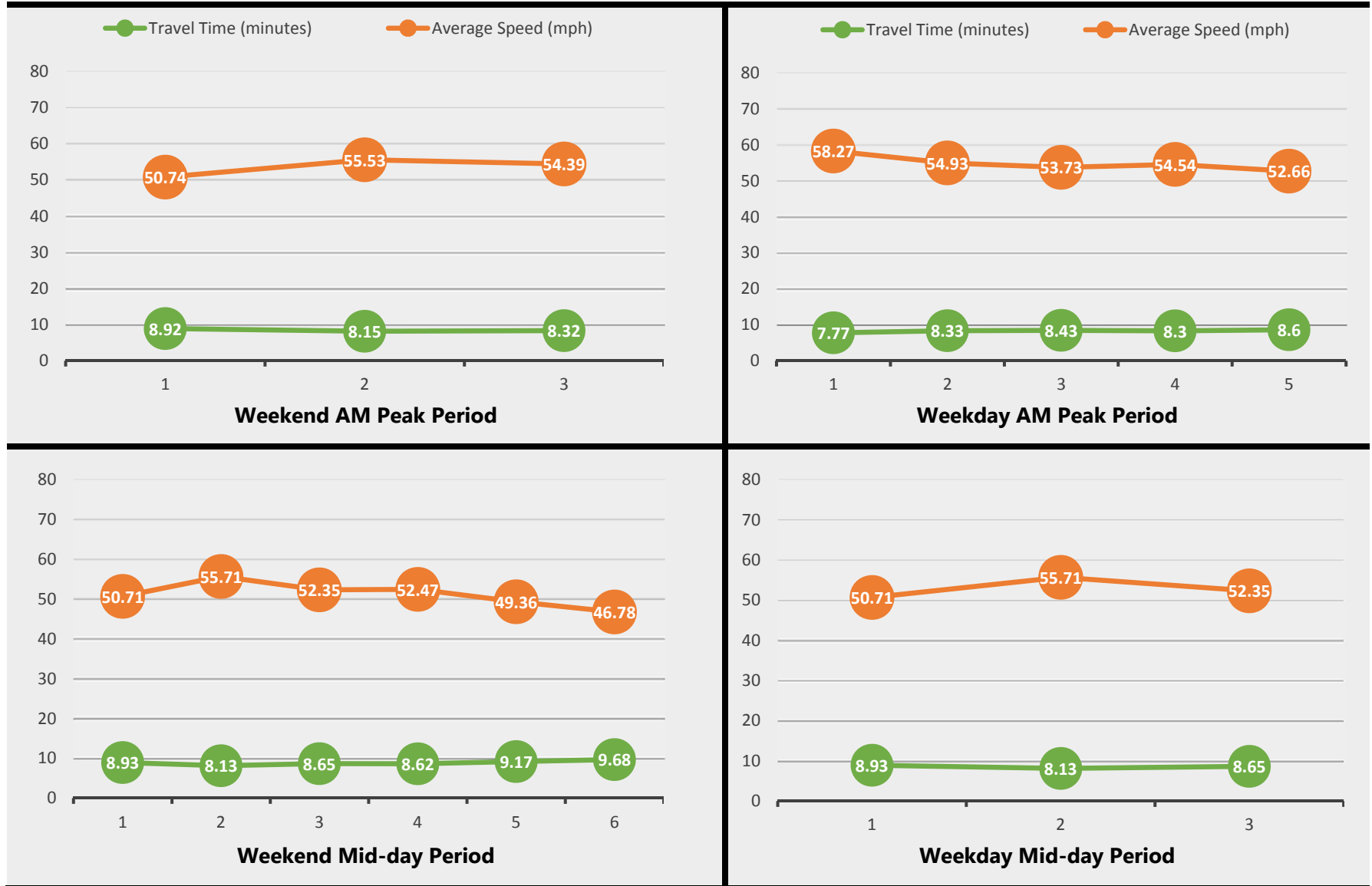
- ⇒ Figure C-3: SR 190 Westbound Weekday
- ⇒ Figure C-4: SR 190 Westbound Weekend

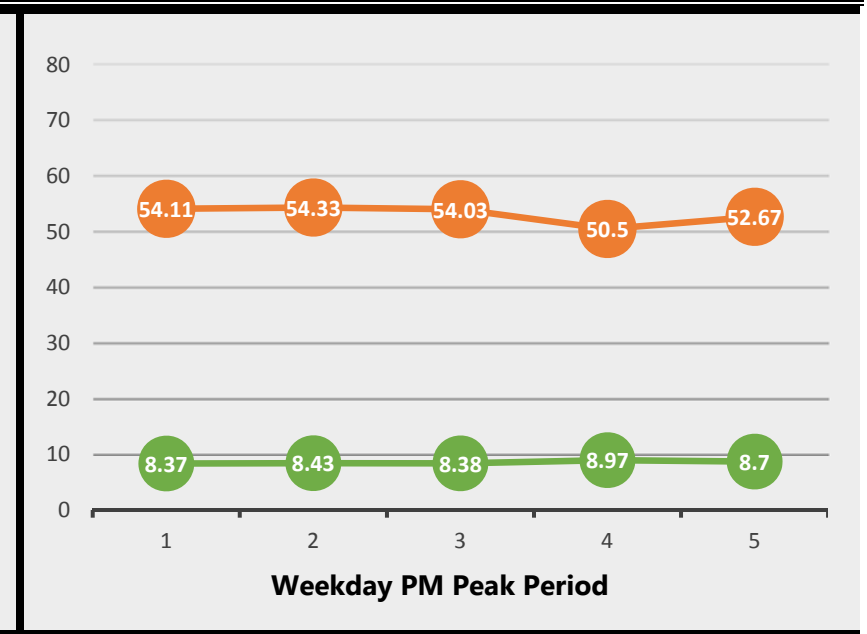
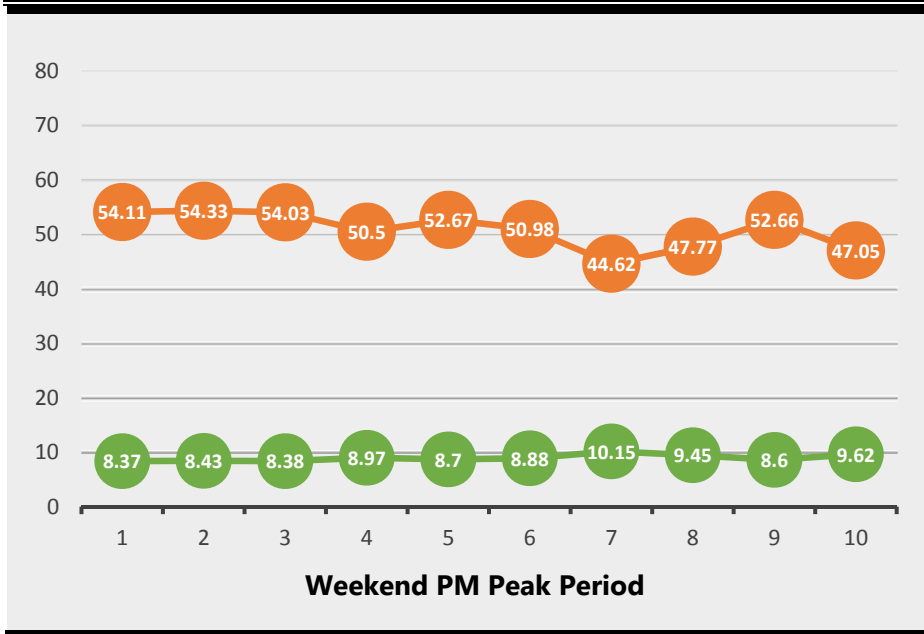
The following SR 190 Checkpoint Summary Tables are included in **Appendix D**:

- ⇒ Table D-3: SR 190 Westbound Weekday
- ⇒ Table D-4: SR 190 Westbound Weekend

**Figure 12: SR 190 Westbound – Individual Travel Time Runs Comparison**

X-Axis represents the Number of the Travel Time Run & Y-Axis represents Travel Time in minutes or Average Speed in mph.





## 5.0 TRAFFIC VOLUMES

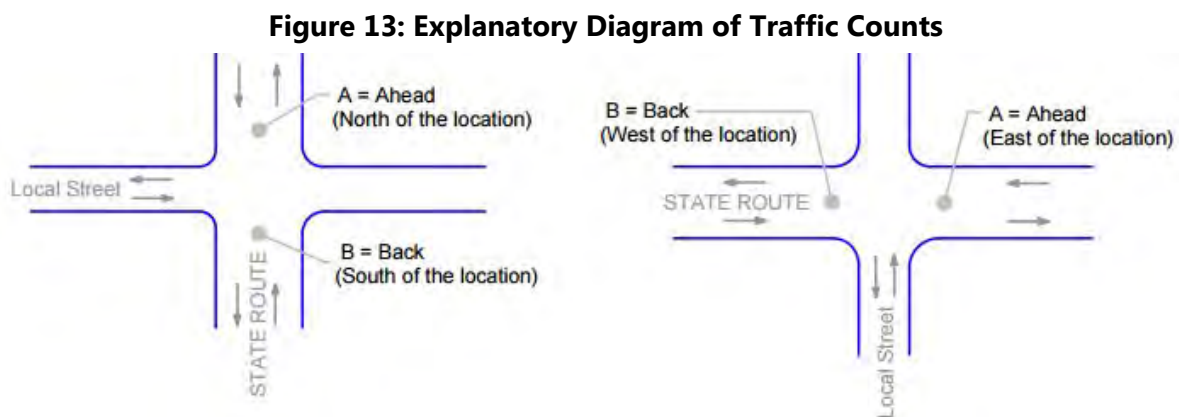
TJKM contacted several agencies, including Caltrans District 6, to collect any available historical travel time runs and/or traffic volumes. There were no travel time runs available with any of the agencies for the study corridors. Caltrans collects annual traffic counts for the State Highway System through its 'Traffic Census Program.' The latest available traffic volumes for the study corridors were collected in 2014. In general, the traffic volumes are inversely proportional to speed, i.e., the higher the traffic volumes the lower the speeds. There are not enough data collection points within the study limits to draw conclusions between traffic volumes and travel time data collected as a part of this study. There is no available historical travel time data making it difficult to draw any conclusions between change in traffic volumes, travel times and speed for the study corridor.

The 2014 AADT volumes and historical ahead traffic volumes for the SR 198 corridor and SR 190 corridor are provided in this Chapter for informational purposes only and no conclusions are drawn between these volumes and the travel time data collected in this study.

### Explanation of Traffic Counts\*

Generally, in California West to East routes are even numbered, while South to North routes are odd numbered. In addition, the postmile values increase from South to North or West to East with some minor exceptions.

Ahead AADT usually represents traffic North or East of the count location and is the total volume for the year divided by 365 days. Back Annual Average Daily Traffic (AADT) usually represents traffic South or West of the count location and is the total volume for the year divided by 365 days. **Figure 13** below shows the typical locations where the data is collected. AADTs represent both directions of travel, and summing them together will result in erroneous data.



Peak hour usually represents an estimate of the heaviest traffic flow, which usually occurs between 7 AM to 9 AM and 5 PM to 7 PM. Peak hour values indicate the volume in both directions. In urban and suburban areas, the peak hour normally occurs every weekday. On roads with large seasonal fluctuations in traffic, the peak hour is the hour near the maximum for the year but excluding a few (30 to 50 hours) that are exceedingly high and are not typical of the frequency of the high hours occurring during the season. Peak Month ADT is the average daily traffic for the month of heaviest traffic flow, usually July or August. This data are obtained because on many routes, high traffic volumes, which occur during a certain season of the year, are more representative of traffic conditions than the annual ADT.

\*Source: <http://traffic-counts.dot.ca.gov/>

## 5.1 SR 198 – 2014 AVERAGE ANNUAL DAILY TRAFFIC (AADT) VOLUMES

**Table 10** below summarizes the 2014 AADT volumes for SR 198 in Tulare County. Please note that this data is for informational purposes only and no conclusions are drawn between these traffic volumes and the travel time data collected in this study.

**Table 10: SR 198 – Year 2014 AADT Volumes**

Caltrans District	County	Postmile*	Location Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
6	Tulare	0	Kings/Tulare County Line				2,400	27,500	25,000
6	Tulare	R 3.835R	Jct. Rte. 99	870	11,200	19,000	1,450	15,900	24,250
6	Tulare	R 3.711L	Jct. Rte. 99	870	11,200	9,750	4,100	45,000	42,500
6	Tulare	R 4.796	Alta Avenue; County Road 80	4,550	49,500	47,000	5,000	54,000	51,000
6	Tulare	7.01	Visalia, County Road 102	5,300	56,000	53,000	5,700	60,000	57,000
6	Tulare	8.1	Visalia, West Main Street/Whitney Drive	5,700	60,000	57,000	6,100	64,000	60,000
6	Tulare	R 8.753	Visalia, Jct. Rte. 63 South	6,100	64,000	60,000	6,200	65,000	61,000
6	Tulare	R 9.967	Visalia, Jct. Rte. 63 North	6,200	65,000	61,000	5,100	53,000	50,000
6	Tulare	R 10.73	Ben Maddox Way	5,100	53,000	50,000	4,200	43,500	41,000
6	Tulare	R 11.72	Lovers Lane	4,200	43,000	41,000	2,900	32,500	31,000
6	Tulare	R 13.74	County Road 156	2,900	32,500	31,000	2,400	27,500	25,500
6	Tulare	R 14.65	County Road 164	2,400	27,500	25,500	2,000	21,300	20,300
6	Tulare	R 18.76	Jct. Rte. 65 South	2,000	21,300	20,300	1,350	15,900	15,000
6	Tulare	R 19.76	Jct. Rte. 245 North	1,350	15,900	15,000	670	7,900	6,700
6	Tulare	26.93	S Lim Lemon Cove	530	9,000	4,900	530	9,000	4,900
6	Tulare	27.96	Jct. Rte. 216 West	530	9,000	4,900	660	5,700	4,100
6	Tulare	30.75	Lake Kaweah Boat Launching Marina	660	5,700	4,100	690	6,000	4,200
6	Tulare	35.91	Moro Road (to Stivers Ranch)	660	5,900	4,000	700	6,000	4,100
6	Tulare	37.4	W Lim Three Rivers	700	6,000	4,100	710	6,000	4,200
6	Tulare	38.49	Three Rivers, N Fork Dr (County Rd to Kaweah)	710	6,000	4,200	780	6,300	4,450
6	Tulare	39.69	E Lim Three Rivers	670	4,550	3,700	670	4,550	3,700
6	Tulare	42.35	Three Rivers, Mineral King Road	670	4,550	3,700	310	2,950	1,550
6	Tulare	44.16	Sequoia National Park Boundary	310	2,950	1,550			

Source: <http://traffic-counts.dot.ca.gov/>

\* The postmile may have a prefix like R (First realignment), T (Temporary connection), L (Overlap post mile), M (Second realignment), etc. When a length of highway is changed due to construction or realignment, new postmile values are assigned. To distinguish the new values from the old, an alpha code is prefixed to the new postmile.

## 5.2 SR 198 – HISTORICAL AADT VOLUMES

**Table 11** below summarizes the historical traffic volumes for SR 198 in Tulare County. Please note that this data is for informational purposes only and no conclusions are drawn between these traffic volumes and the travel time data collected in this study.

**Table 11: SR 198 - Historical (Ahead) AADT Volumes**

Caltrans District	County	Postmile *	Location Description	2014	2013	2012	2011	2010
6	Tulare	0	Kings/Tulare County Line	25,000	19,000	19,000	19,000	19,000
6	Tulare	R 3.835R	Jct. Rte. 99	24,250	42,500	42,500	15,000	15,000
6	Tulare	R 3.711L	Jct. Rte. 99	42,500	42,500	42,500	42,500	15,000
6	Tulare	R 4.796	Alta Avenue; County Road 80	51,000	48,500	48,500	48,500	47,000
6	Tulare	7.01	Visalia, County Road 102	57,000	54,000	54,000	54,000	53,000
6	Tulare	8.1	Visalia, West Main Street/Whitney Drive	60,000	58,500	58,500	58,500	59,000
6	Tulare	R 8.753	Visalia, Jct. Rte. 63 South	61,000	58,000	58,000	58,000	61,000
6	Tulare	R 9.967	Visalia, Jct. Rte. 63 North	50,000	46,000	46,000	46,000	48,500
6	Tulare	R 10.73	Ben Maddox Way	41,000	36,000	36,000	36,000	38,000
6	Tulare	R 11.72	Lovers Lane	31,000	26,500	26,500	26,500	29,000
6	Tulare	R 13.74	County Road 156	25,500	23,500	23,500	23,500	26,000
6	Tulare	R 14.65	County Road 164	20,300	21,000	21,000	21,000	21,000
6	Tulare	R 18.76	Jct. Rte. 65 South	15,000	14,000	14,000	14,000	11,600
6	Tulare	R 19.76	Jct. Rte. 245 North	6,700	7,100	7,100	7,100	7,100
6	Tulare	26.93	S Lim Lemon Cove	4,900	5,200	5,200	5,200	4,500
6	Tulare	27.96	Jct. Rte. 216 West	4,100	3,900	3,900	3,900	4,100
6	Tulare	30.75	Lake Kaweah Boat Launching Marina	4,200	4,300	4,300	4,300	3,500
6	Tulare	35.91	Moro Road (to Stivers Ranch)	4,100	3,650	3,650	3,650	3,300
6	Tulare	37.4	W Lim Three Rivers	4,200	4,500	4,500	4,500	3,800
6	Tulare	38.49	Three Rivers, N Fork Dr (County Rd to Kaweah)	4,450	5,000	5,000	5,000	3,600
6	Tulare	39.69	E Lim Three Rivers	3,700	3,600	3,600	3,600	3,000
6	Tulare	42.35	Three Rivers, Mineral King Road	1,550	1,700	1,700	1,700	1,650

Source: <http://traffic-counts.dot.ca.gov/>

\* The postmile may have a prefix like R (First realignment), T (Temporary connection), L (Overlap post mile), M (Second realignment), etc. When a length of highway is changed due to construction or realignment, new postmile values are assigned. To distinguish the new values from the old, an alpha code is prefixed to the new postmile.



### 5.3 SR 190 – 2014 AADT VOLUMES

**Table 12** below summarizes the 2014 AADT volumes for SR 190 in Tulare County. Please note that this data is for informational purposes only and no conclusions are drawn between these traffic volumes and the travel time data collected in this study.

**Table 12: SR 190 2014 AADT Volumes**

Caltrans District	County	Postmile*	Location Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
6	Tulare	0	Tipton, Jct. Rte. 99				380	4,350	3,800
6	Tulare	9.474	Poplar, County Road 192	420	4,800	4,250	570	5,900	5,500
6	Tulare	R 15.24	Porterville, Jct. Rte. 65	930	10,000	9,400	2,350	28,500	3,700
6	Tulare	16.45	South Porterville	2,000	3,000	1,200	1,750	8,300	7,200
6	Tulare	16.97	Plano Street (County Road 252)	1,600	18,300	7,200	1,050	3,100	2,200
6	Tulare	18.45	Hospital Road	1,000	10,700	10,100	850	9,300	8,700
6	Tulare	21.1	Worth Road (County Road 284)	850	10,300	8,700	670	8,400	7,000
6	Tulare	22.55	Government Road to Success Dam	670	8,400	7,000	730	9,400	6,900
6	Tulare	24.45	Tule Indian Reservation Road (Avenue 160)	680	8,200	6,900	1,000	3,900	10,300
6	Tulare	27.3	River Island Road	450	5,500	4,600	420	5,100	4,350
6	Tulare	R 31.55	Springville, Cramer Drive	420	4,500	3,850	360	3,900	3,350
6	Tulare	31.7	Jct. Old Route 190	360	3,900	3,350	400	4,300	3,700
6	Tulare	R 32.7	Balch Park Drive	260	3,300	2,450	150	1,000	760
6	Tulare	47.98	Camp Nelson Road	140	1,000	680	70	430	350
6	Tulare	56.57	Quaking Aspen Camp	50	400	270			

Source: <http://traffic-counts.dot.ca.gov/>

\* The postmile may have a prefix like R (First realignment), T (Temporary connection), L (Overlap post mile), M (Second realignment), etc. When a length of highway is changed due to construction or realignment, new postmile values are assigned. To distinguish the new values from the old, an alpha code is prefixed to the new postmile.

## 5.4 SR 190 – HISTORICAL AADT VOLUMES

**Table 13** below summarizes the historical traffic volumes for SR 190 in Tulare County. Please note that this data is for informational purposes only and no conclusions are drawn between these traffic volumes and the travel time data collected in this study.

**Table 13: SR 190 Historical (Ahead) AADT Volumes**

Caltrans District	County	Postmile*	Location Description	2014	2013	2012	2011	2010
6	Tulare	0	Tipton, Jct. Rte. 99	3,800	4,000	4,000	4,000	3,700
6	Tulare	9.474	Poplar, County Road 192	5,500	5,650	5,650	5,650	5,650
6	Tulare	R 15.24	Porterville, Jct. Rte. 65	23,700	24,700	24,700	24,700	23,100
6	Tulare	16.45	South Porterville	17,200	17,300	17,300	17,300	18,300
6	Tulare	16.97	Plano Street (County Road 252)	12,200	13,100	13,100	13,100	17,400
6	Tulare	18.45	Hospital Road	8,700	11,200	11,200	11,200	10,100
6	Tulare	21.1	Worth Road (County Road 284)	7,000	6,200	6,200	6,200	7,400
6	Tulare	22.55	Government Road to Success Dam	6,900	6,000	6,000	6,000	5,600
6	Tulare	24.45	Tule Indian Reservation Road (Avenue 160)	10,300	6,000	6,000	6,000	6,400
6	Tulare	27.3	River Island Road	4,350	4,300	4,300	4,300	4,400
6	Tulare	R 31.55	Springville, Cramer Drive	3,350	3,650	3,650	3,650	3,900
6	Tulare	31.7	Jct. Old Route 190	3,700	3,900	3,900	3,900	3,900
6	Tulare	R 32.7	Balch Park Drive	760	850	850	850	790
6	Tulare	47.98	Camp Nelson Road	350	400	400	400	400

Source: <http://traffic-counts.dot.ca.gov/>

\* The postmile may have a prefix like R (First realignment), T (Temporary connection), L (Overlap post mile), M (Second realignment), etc. When a length of highway is changed due to construction or realignment, new postmile values are assigned. To distinguish the new values from the old, an alpha code is prefixed to the new postmile.

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## 6.0 CONCLUSIONS

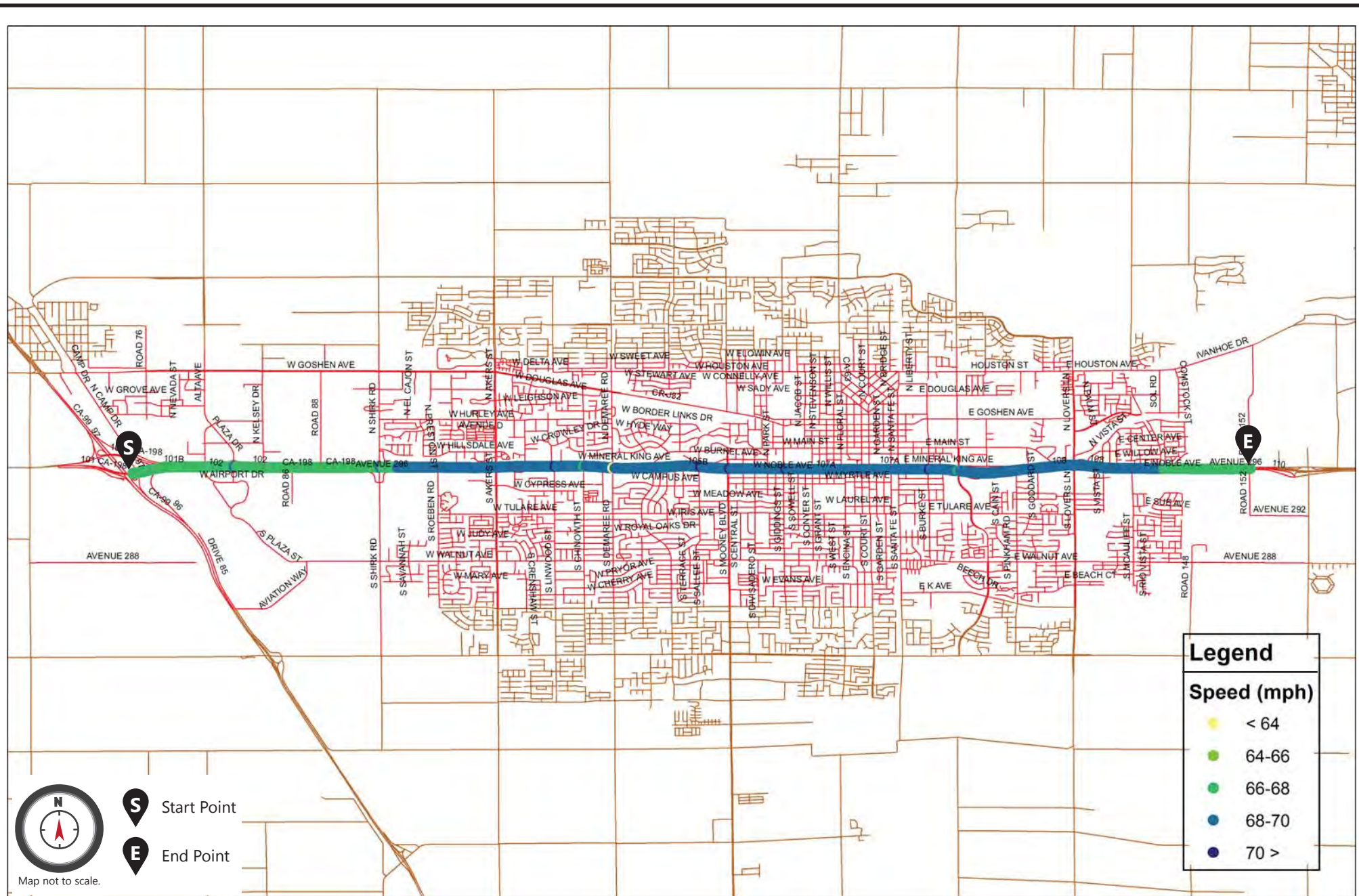
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As the above study results illustrate, SR 198, within the study limits has an average travel time of 8.61 minutes with an average speed of 67.01 mph. When compared to other state routes with similar characteristics (number of lanes, posted speed limits, etc.), the SR 190 is performing at an acceptable level with no congestion during most peak periods. For e.g., SR 4 (between SR 242 and Antioch) in the Bay Area has an average speed of 57.51 mph, and SR 29 between (American Canyon and Napa) has an average speed of 44.64 mph.

SR 190, within the study limits has an average travel time of 8.55 minutes with an average speed of 52.98 mph. When compared to other roadways with similar characteristics (number of lanes, posted speed limits, etc.), the SR 190 is performing at an acceptable level with minimal congestion. For e.g., SR 152 (between U.S. 101 and CA-156) has an average speed of 48.52 mph, SR 4 (between SR 242 and SR 160) in the Bay Area has an average speed of 41.14 mph, and Vasco Road (between I-580 and Brentwood Boulevard) has an average speed of 50.72 mph.

While the comparison with other similar corridors helps in understanding the performance of the SR 198 and SR190 within the study limits, it is beneficial to monitor them on an annual or biannual basis. Monitoring these corridors in the fall of every year or every other year helps in tracking the historical performance and would help in proactively initiating congestion relief measures, if needed, or prioritizing other improvements.

## Appendix A – SR 198 GIS Maps

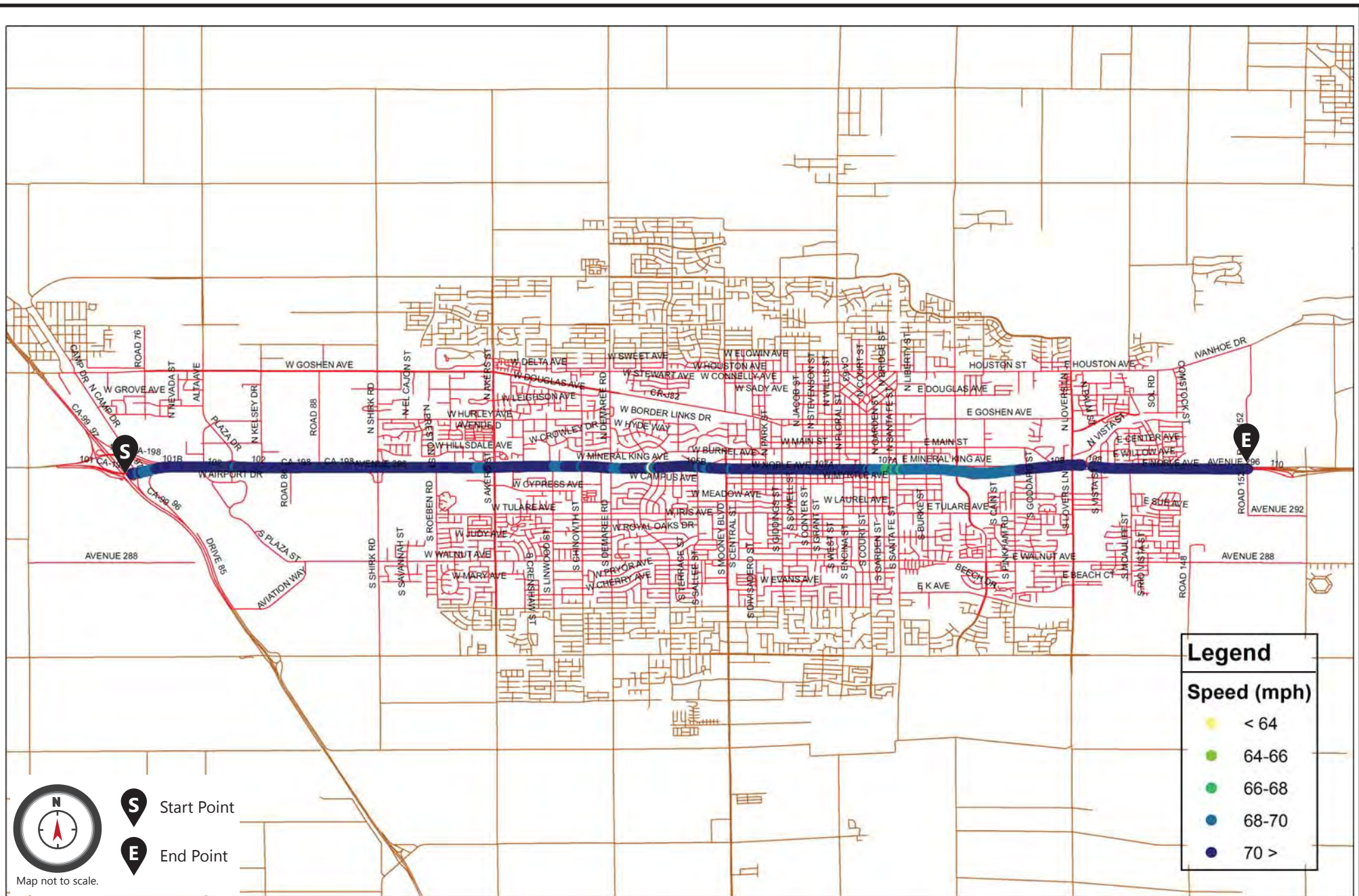


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-1: SR 198 Eastbound Weekday AM Peak Period**





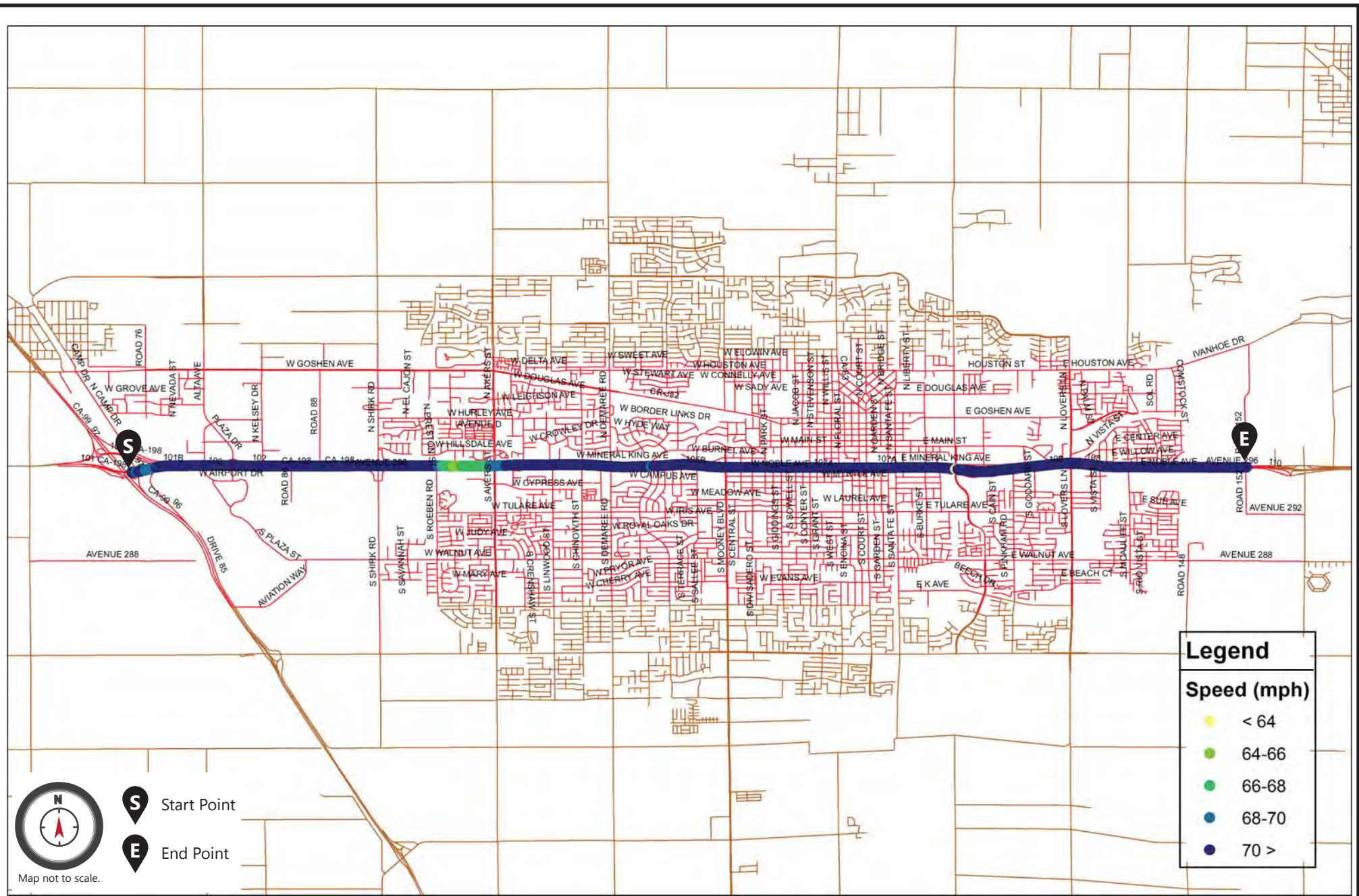


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-2: SR 198 Eastbound Weekday Midday Period**



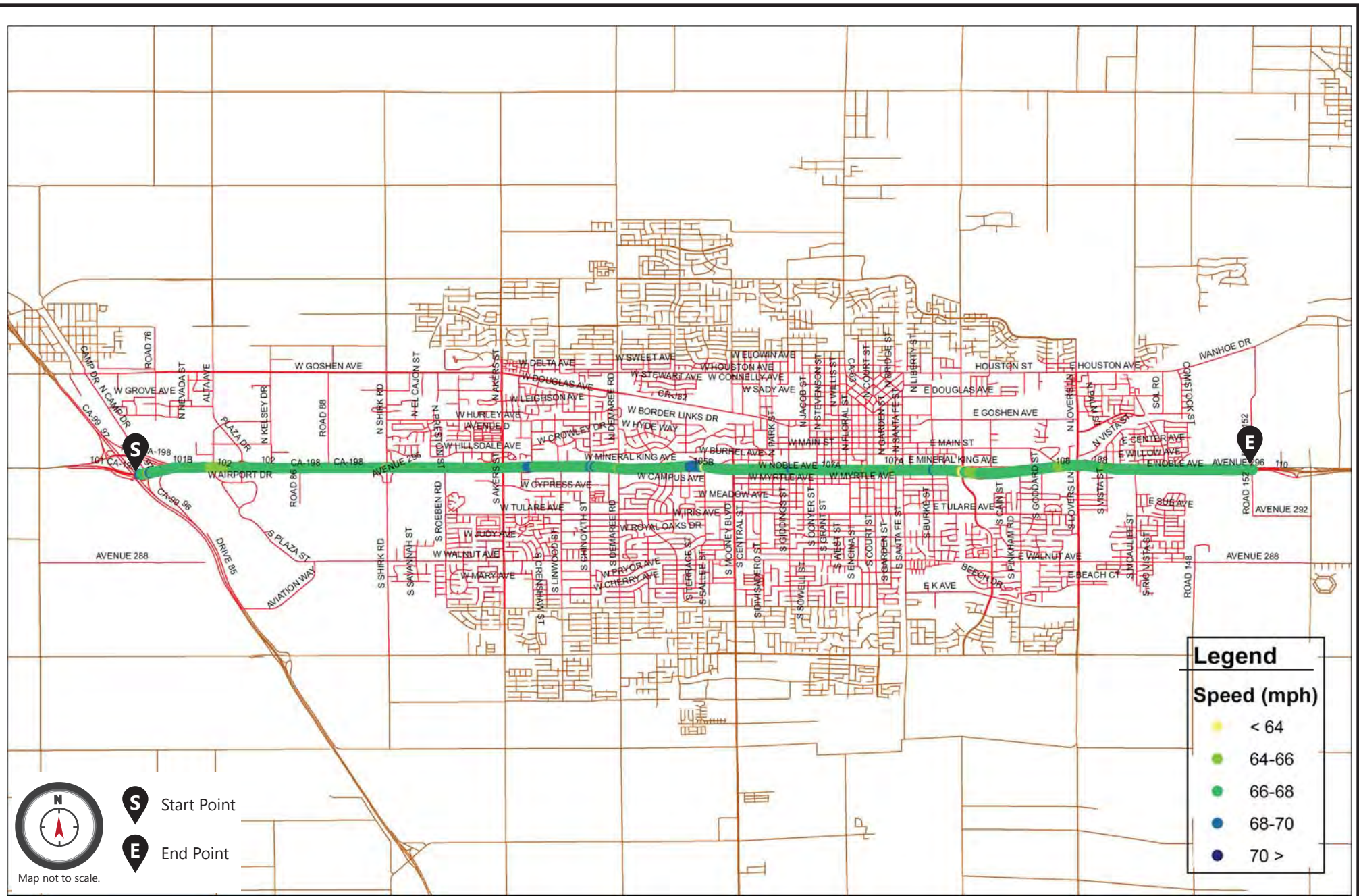




**FIGURE A-3: SR 198 Eastbound Weekday PM Peak Period**



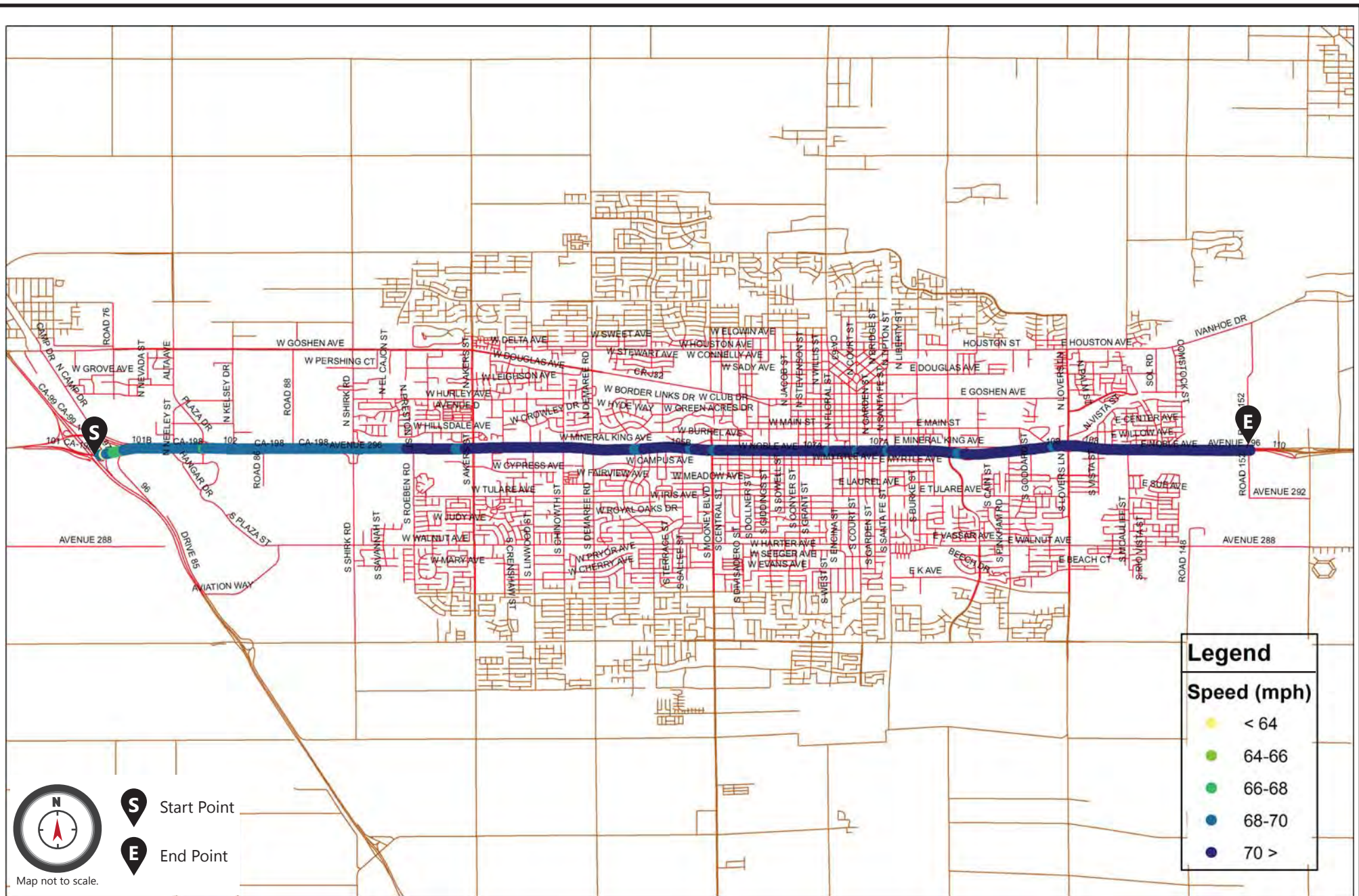




**FIGURE A-4: SR 198 Eastbound Weekend AM Peak Period**





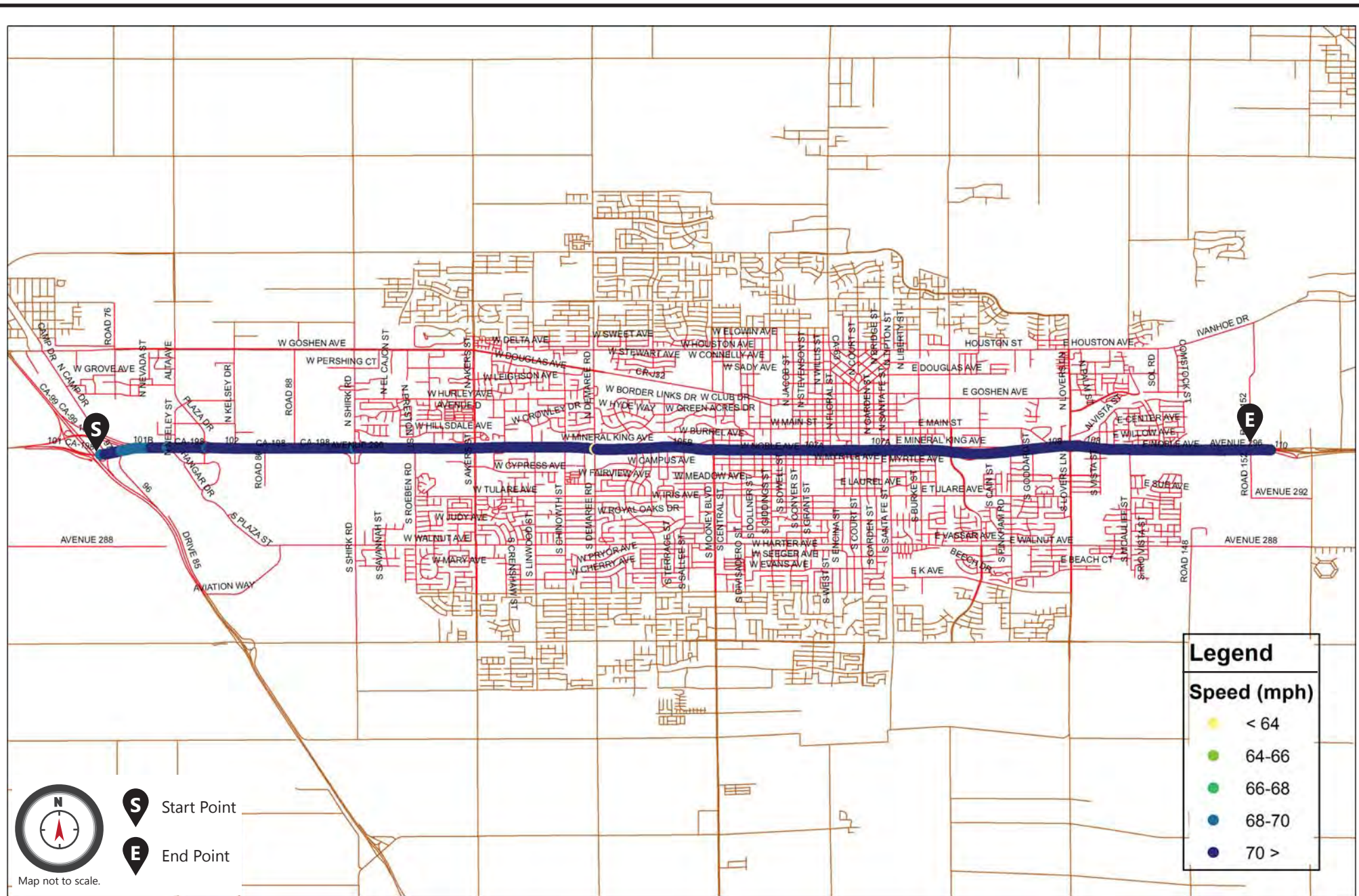


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-5: SR 198 Eastbound Weekend Midday Period**



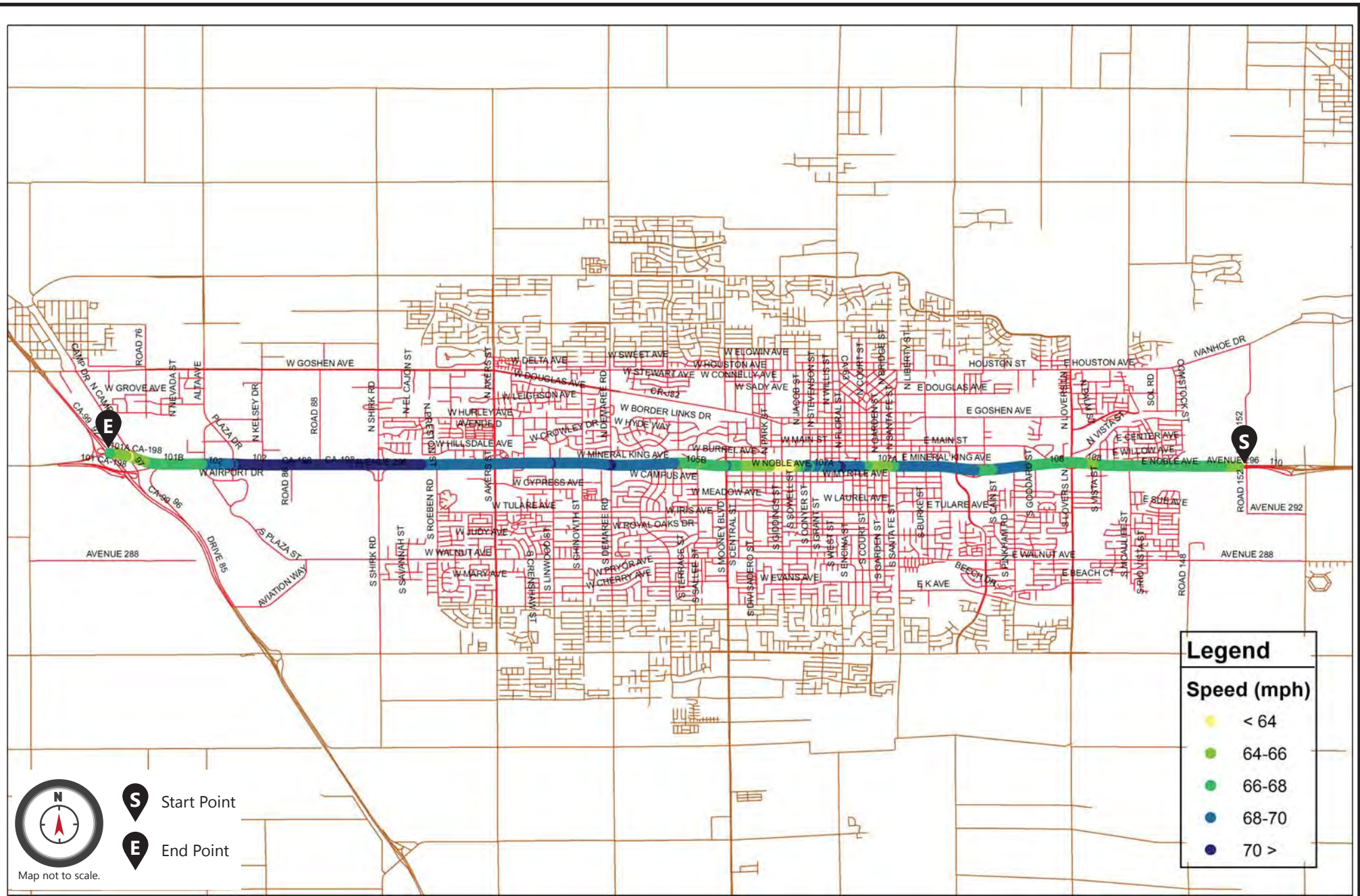




**FIGURE A-6: SR 198 Eastbound Weekend PM Peak Period**





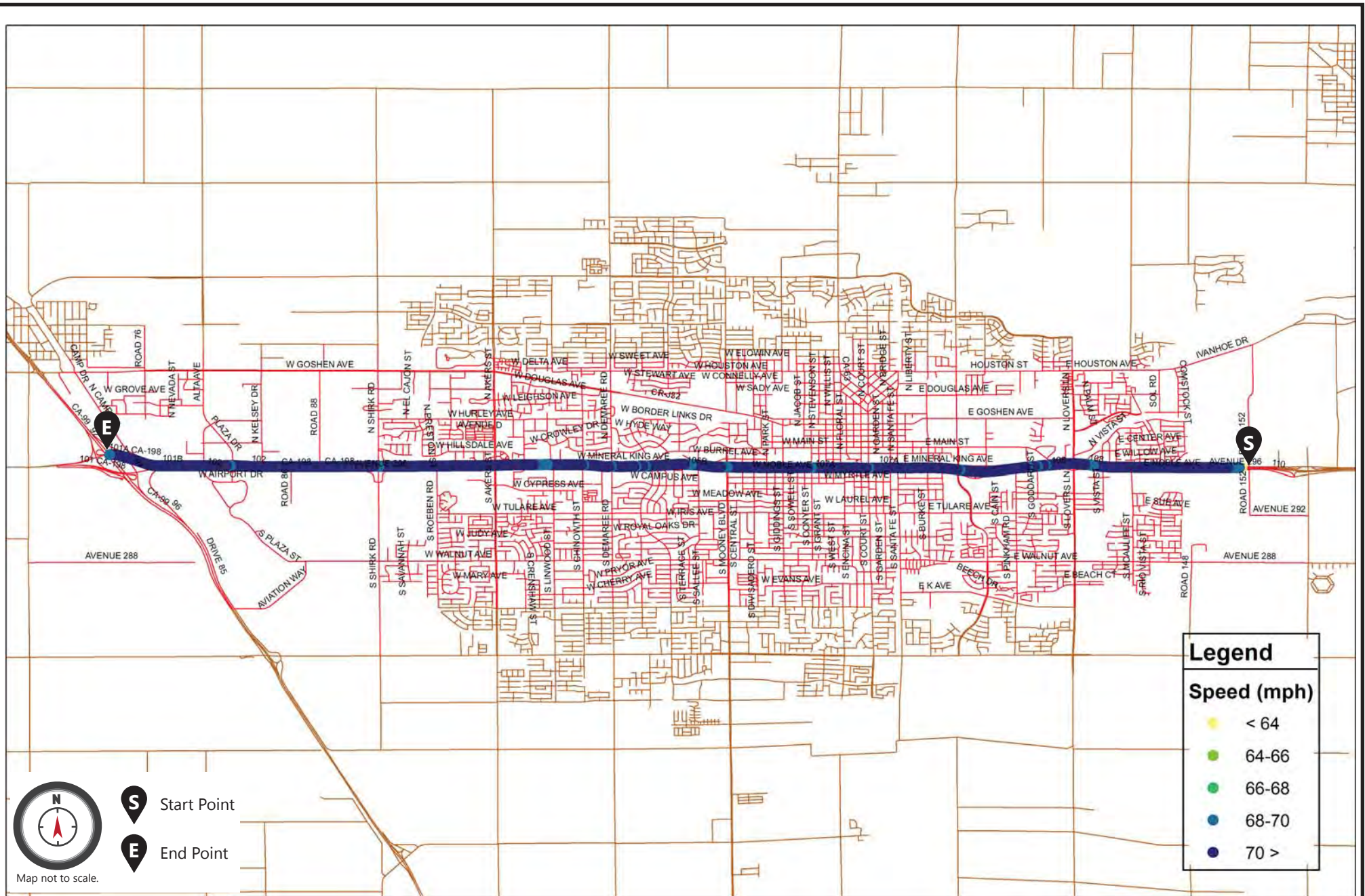


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-7: SR 198 Westbound Weekday AM Peak Period**





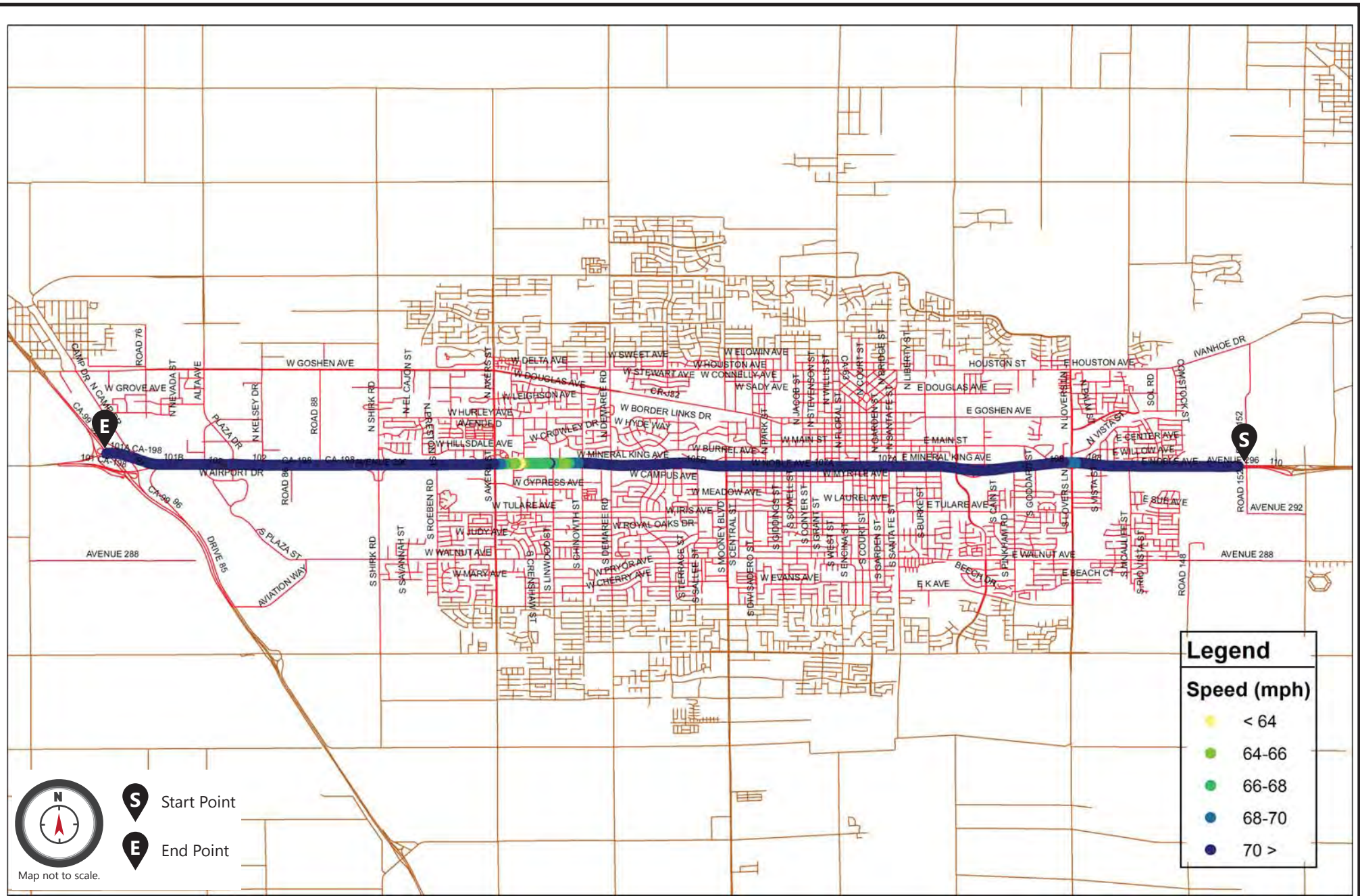


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-8: SR 198 Westbound Weekday Midday Period**





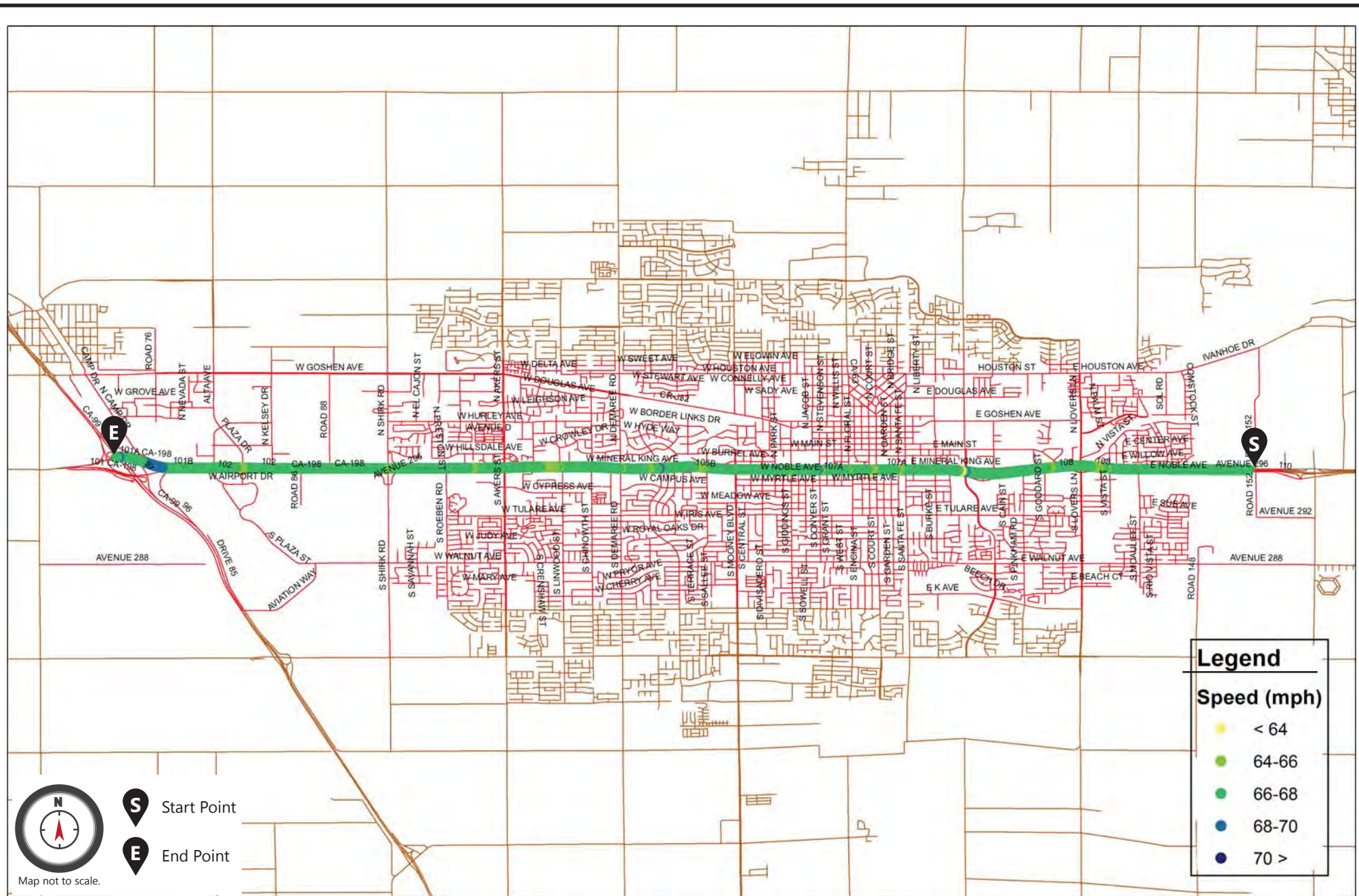


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-9: SR 198 Westbound Weekday PM Peak Period**





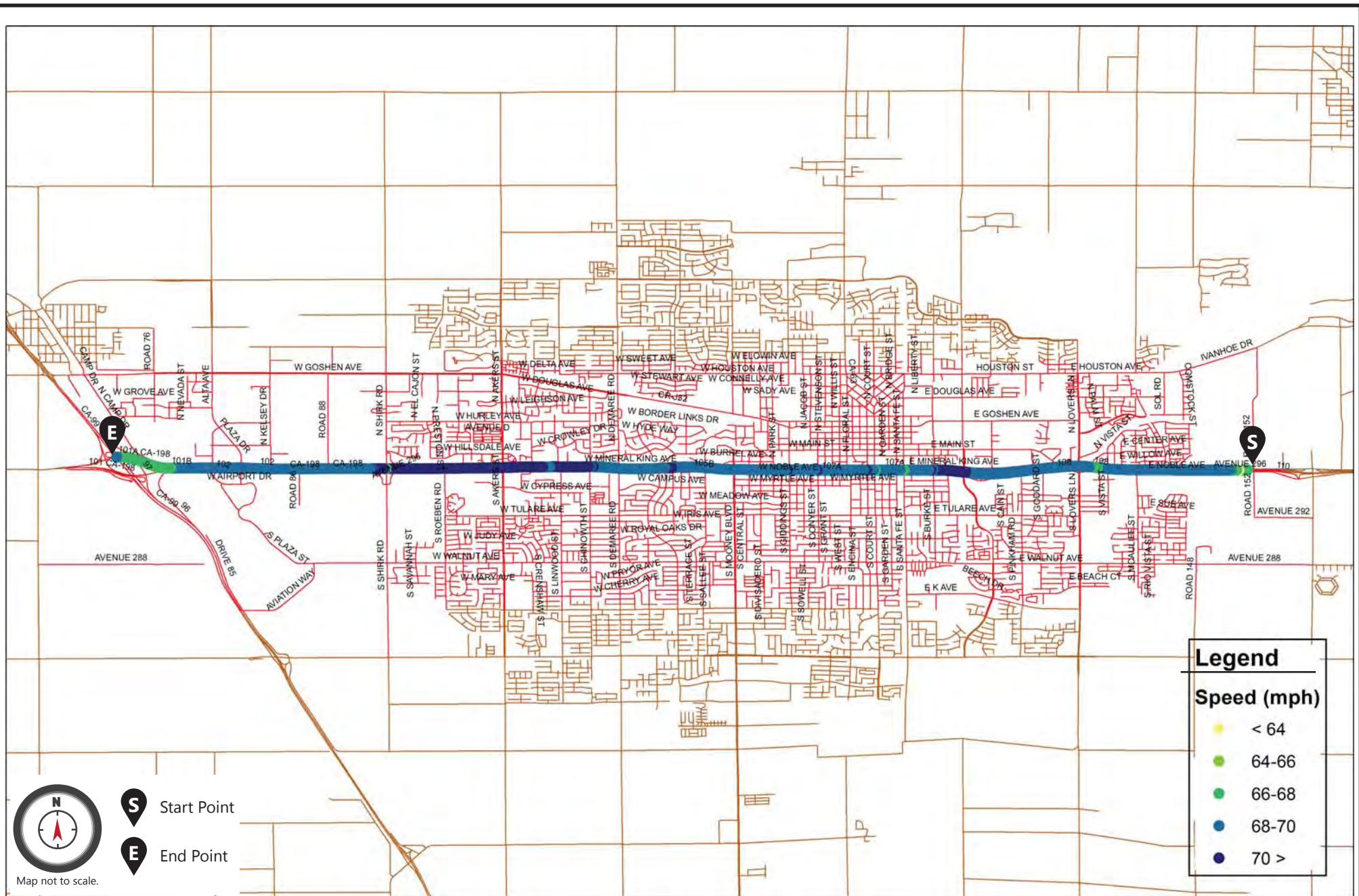


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-10: SR 198 Westbound Weekend AM Peak Period**







Note: Speed data used from an actual recorded typical travel time run.

**FIGURE A-11: SR 198 Westbound Weekend Midday Period**

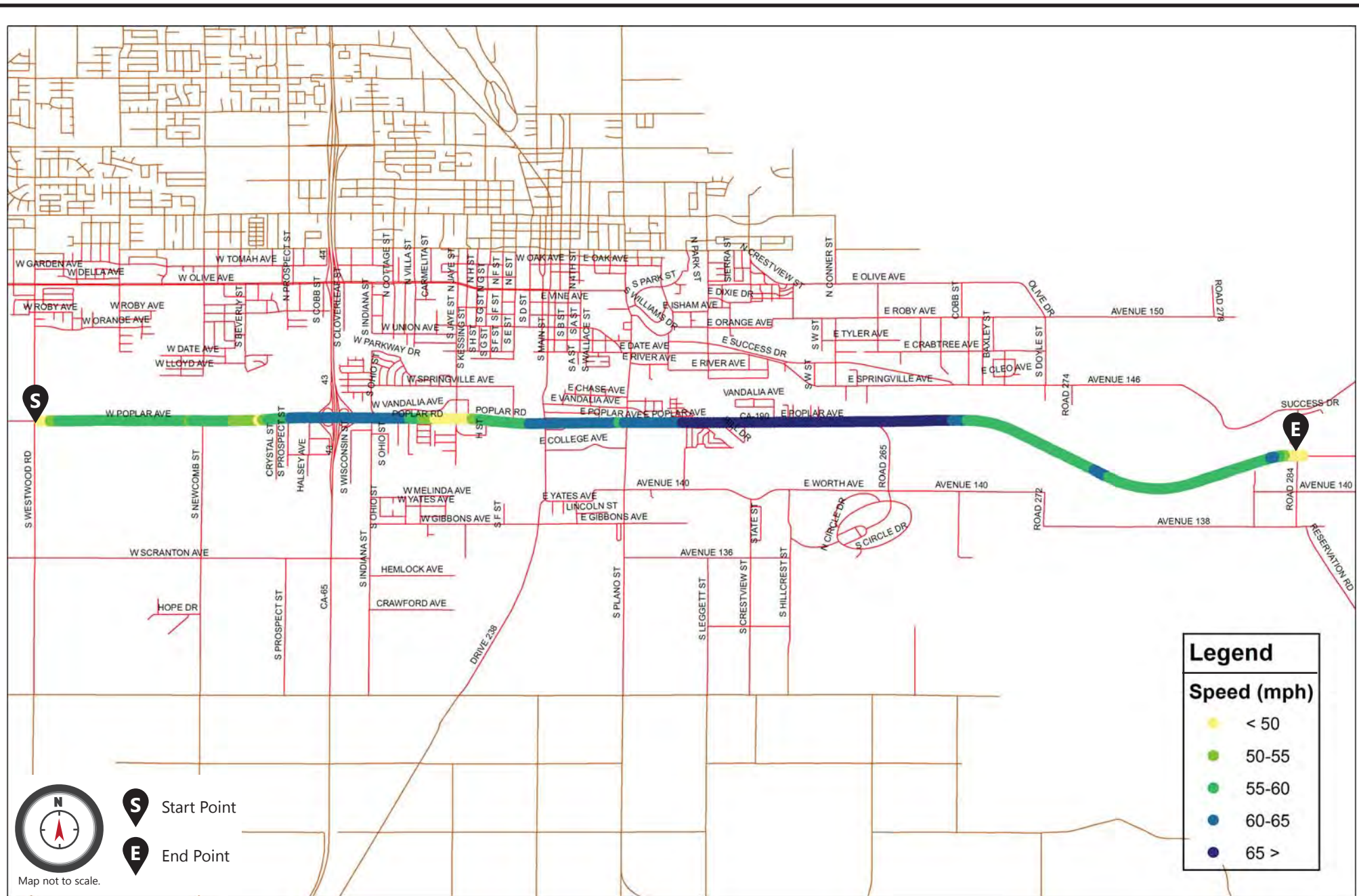






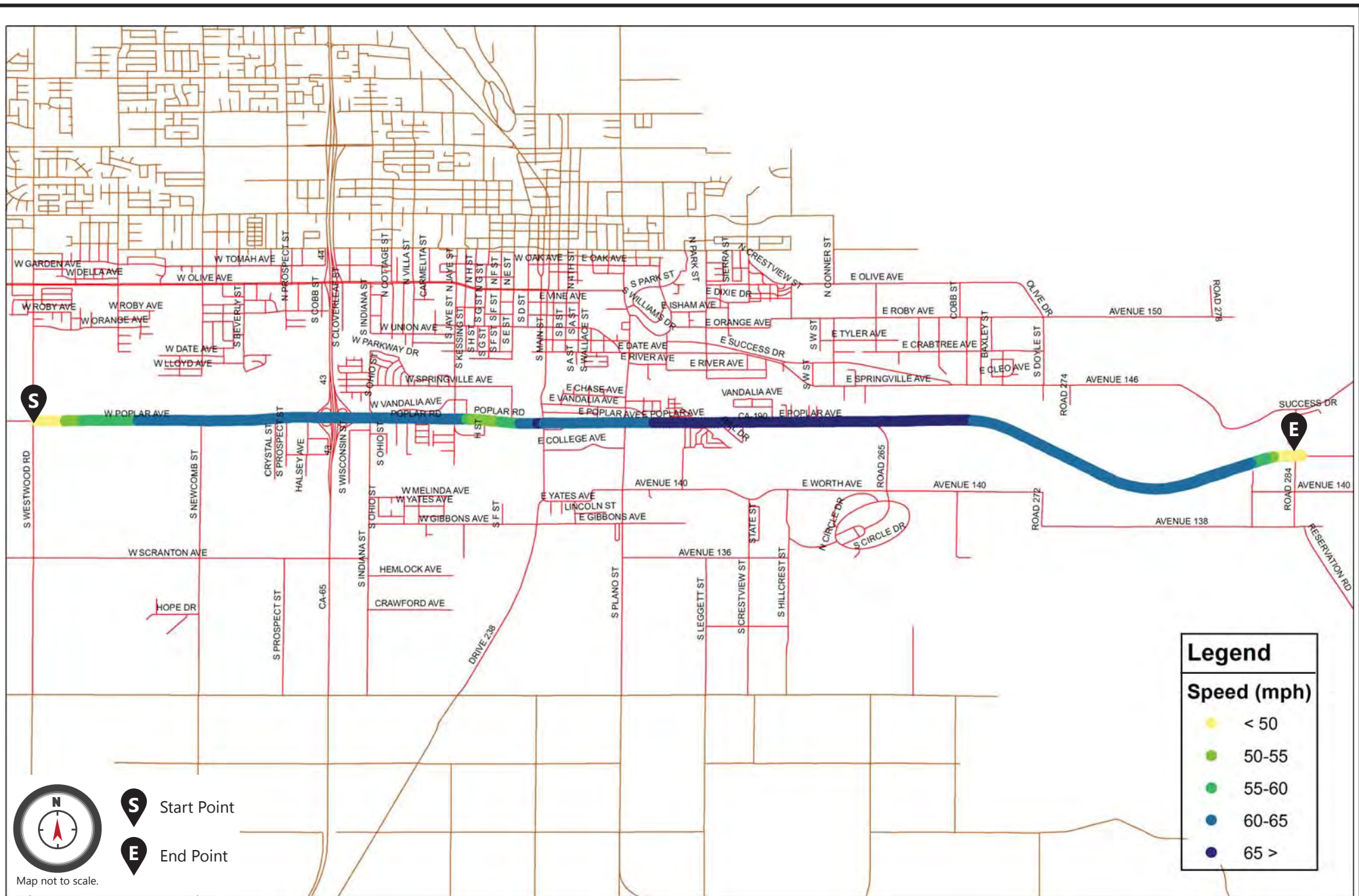


## Appendix B – SR 190 GIS Maps



**FIGURE B-1: SR 190 Eastbound Weekday AM Peak Period**



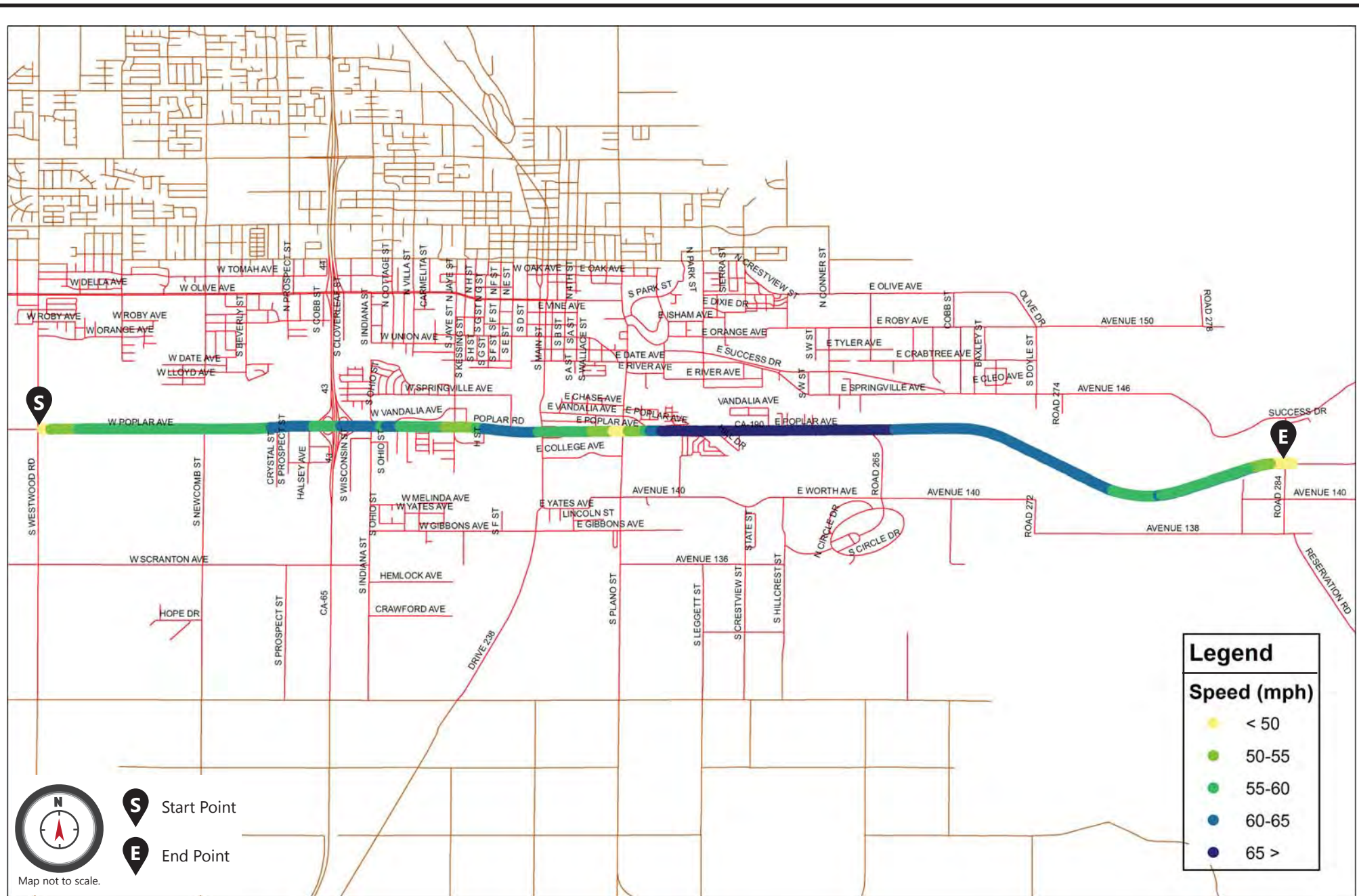


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-2: SR 190 Eastbound Weekday Midday Period**



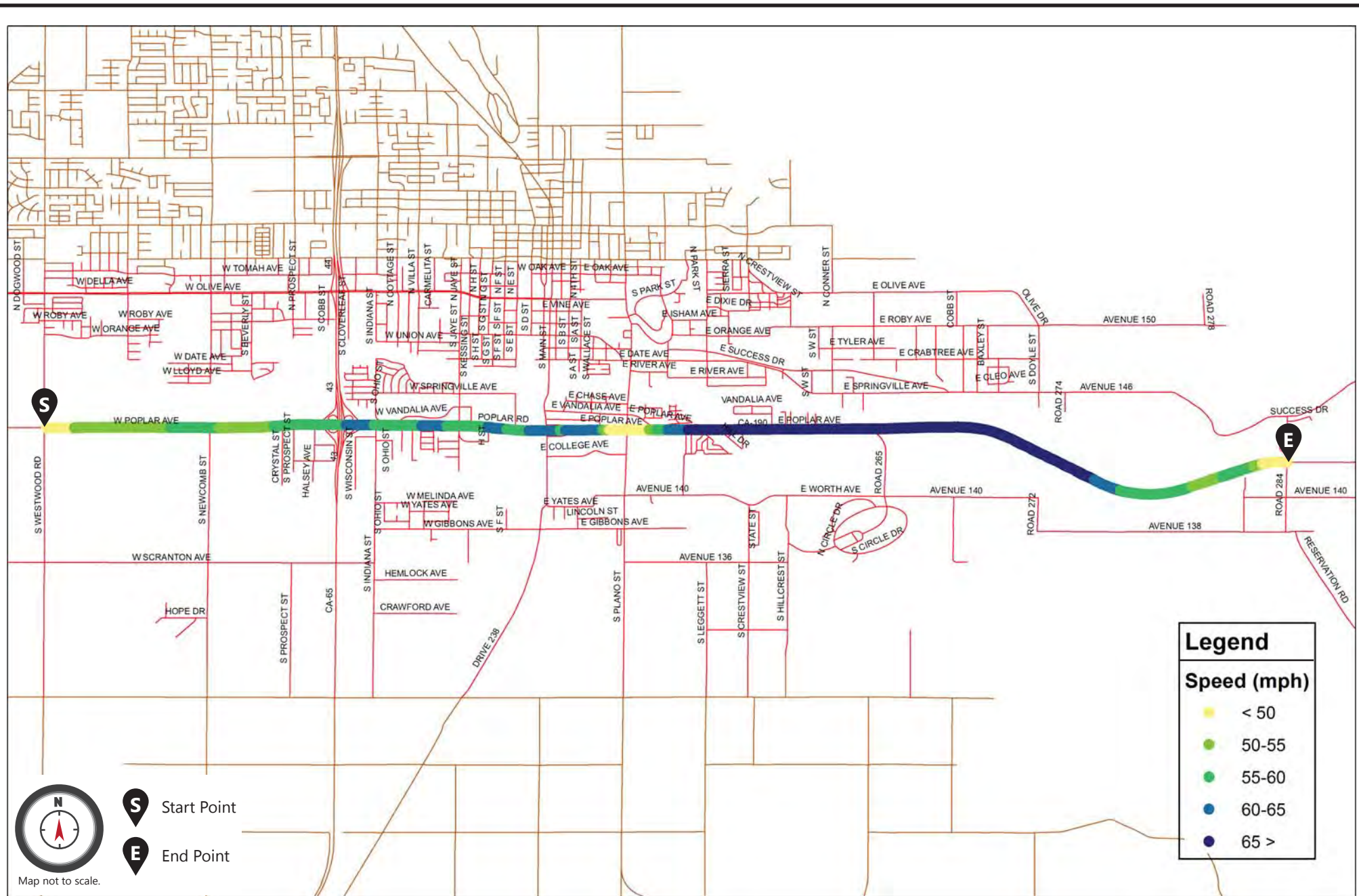




Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-3: SR 190 Eastbound Weekday PM Peak Period**



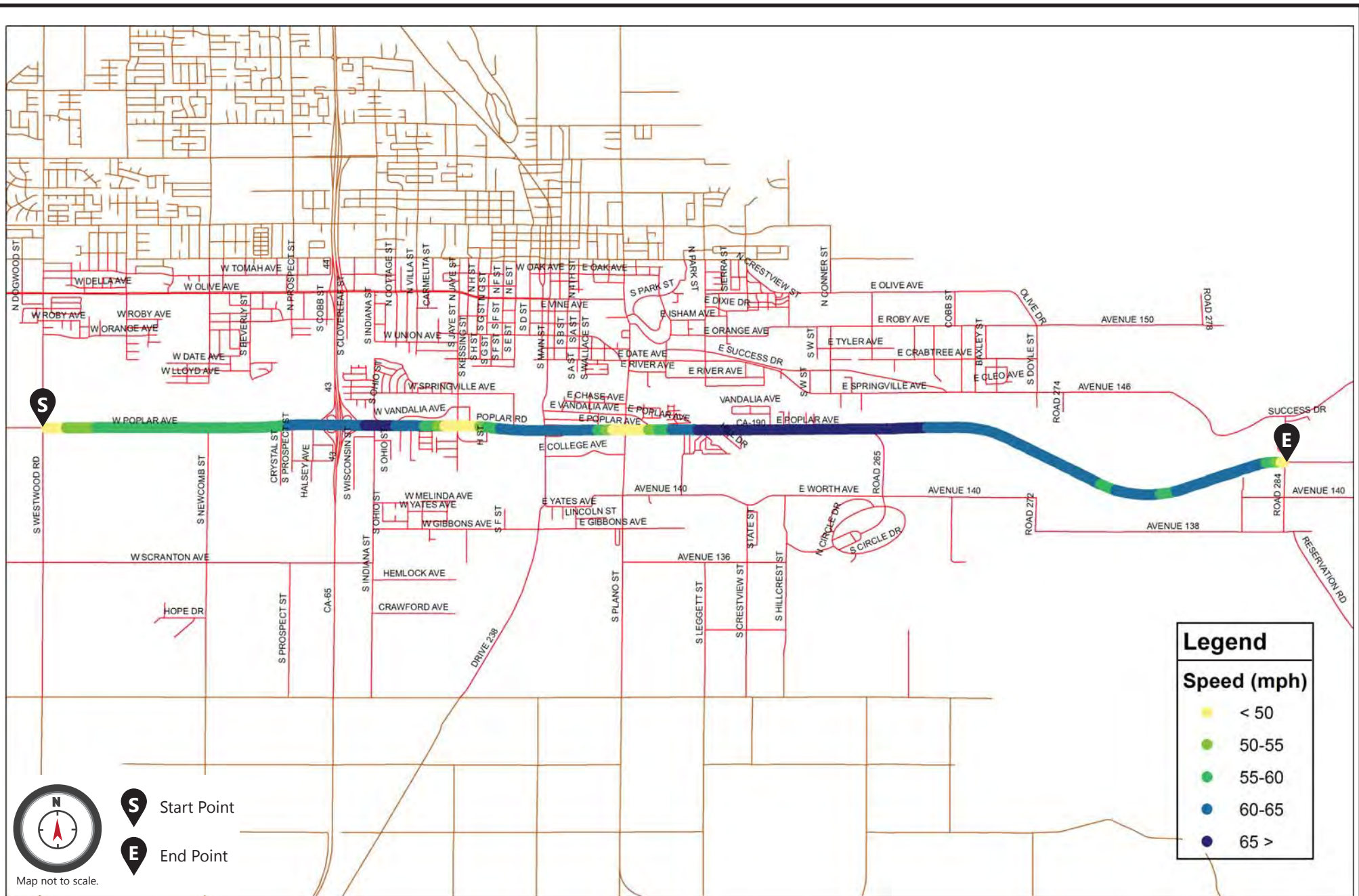


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-4: SR 190 Eastbound Weekend AM Peak Period**



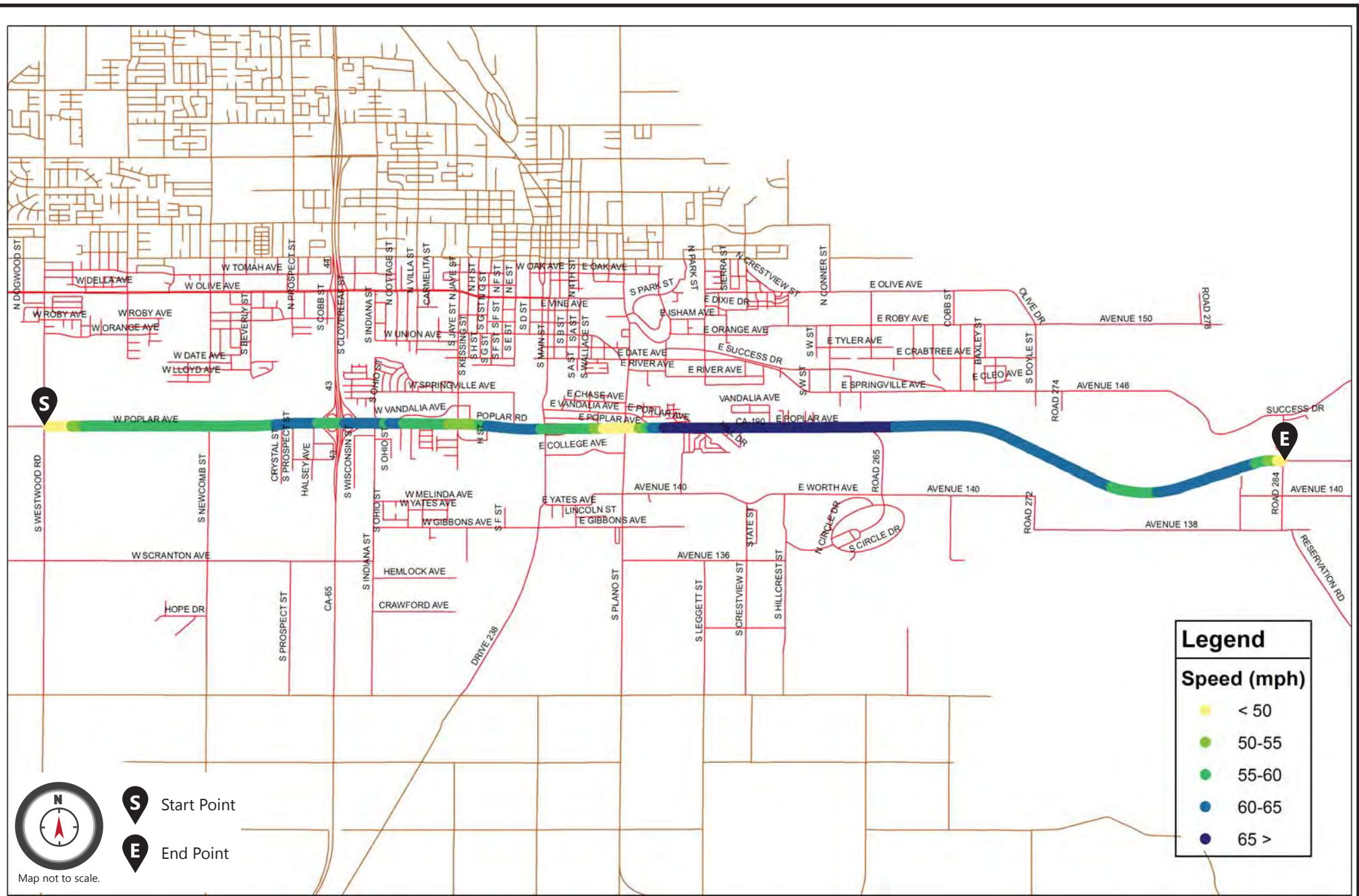




Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-5: SR 190 Eastbound Weekend Midday Period**



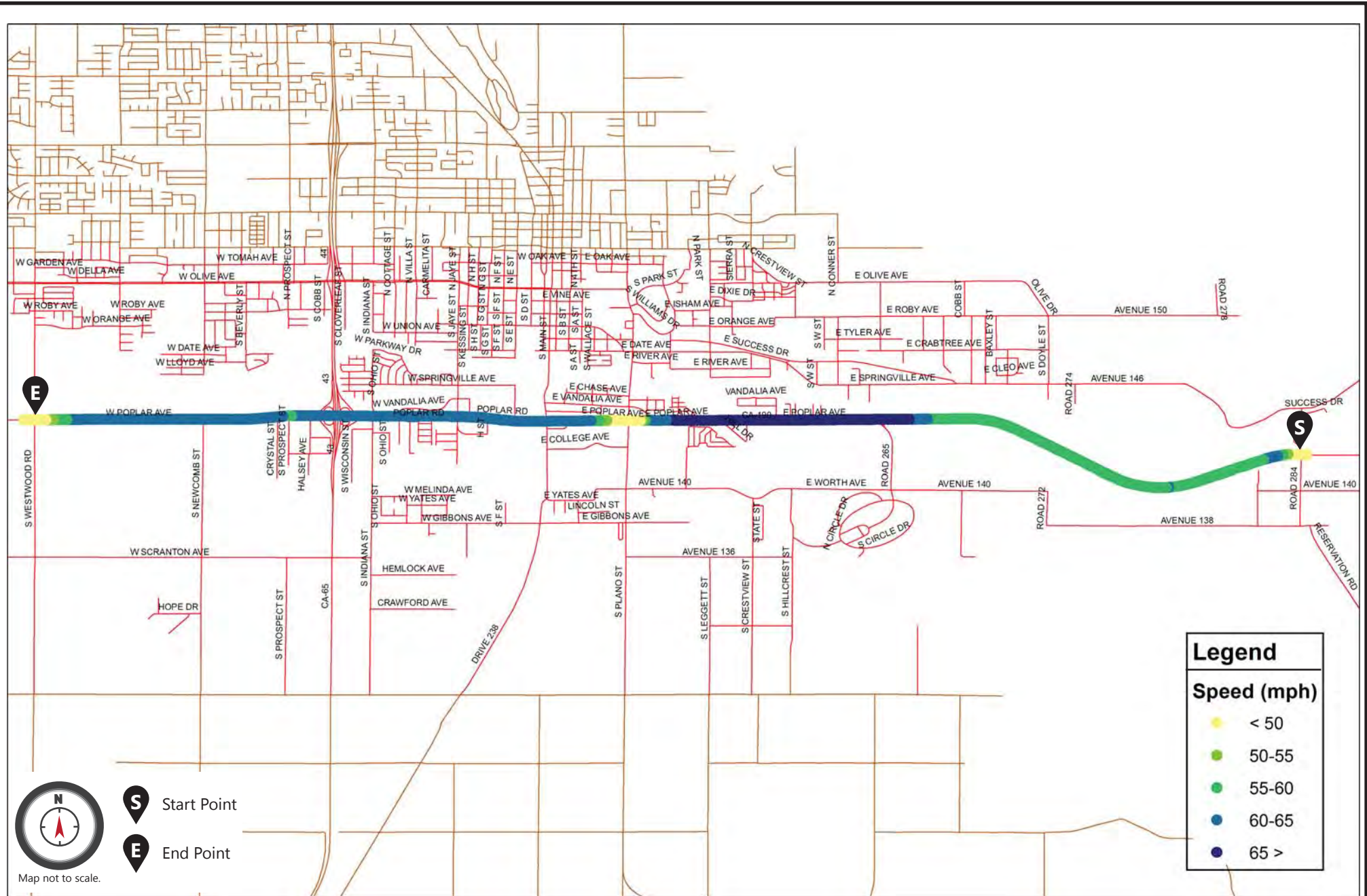


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-6: SR 190 Eastbound Weekend PM Peak Period**





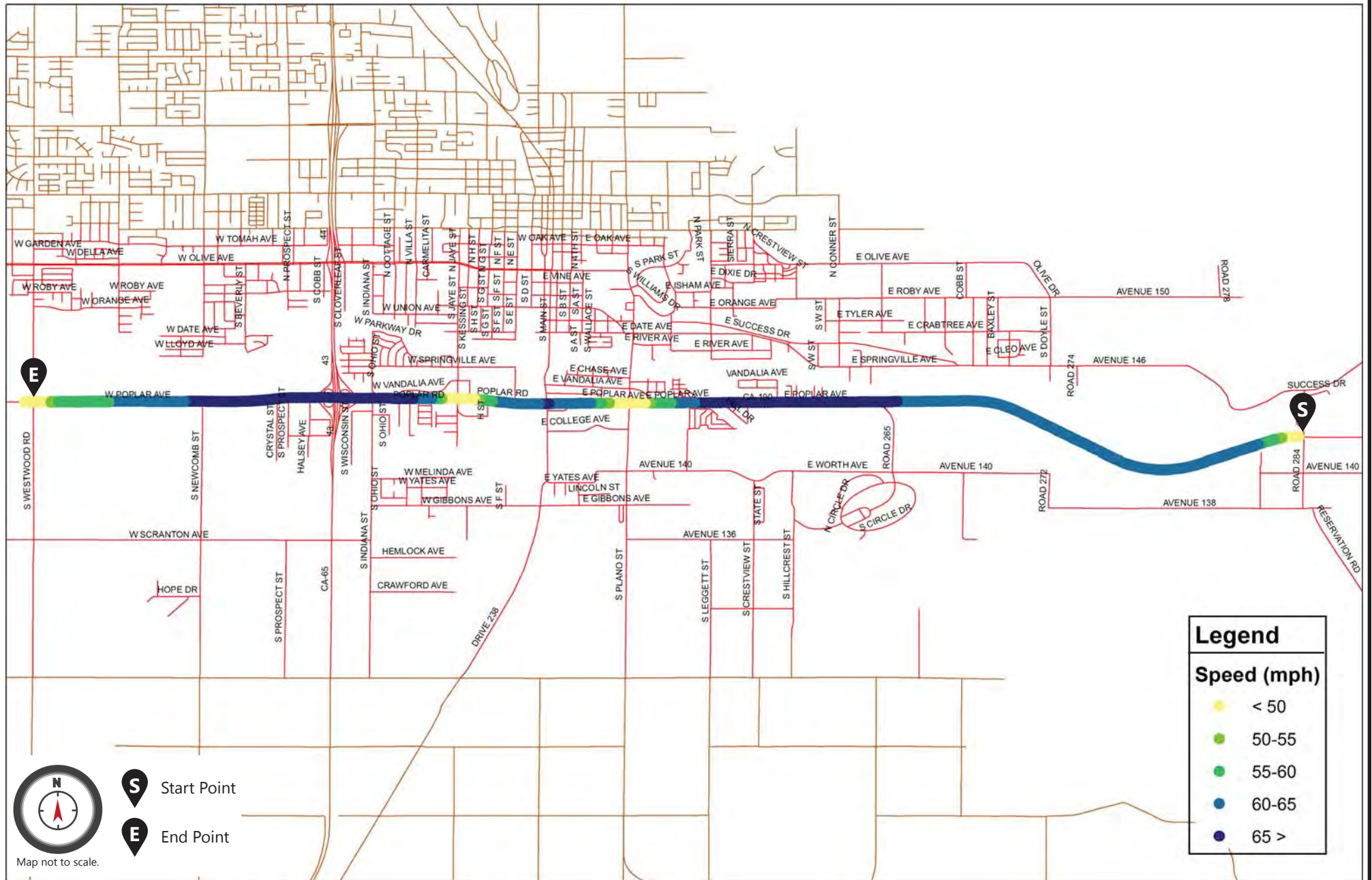


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-7: SR 190 Westbound Weekday AM Peak Period**

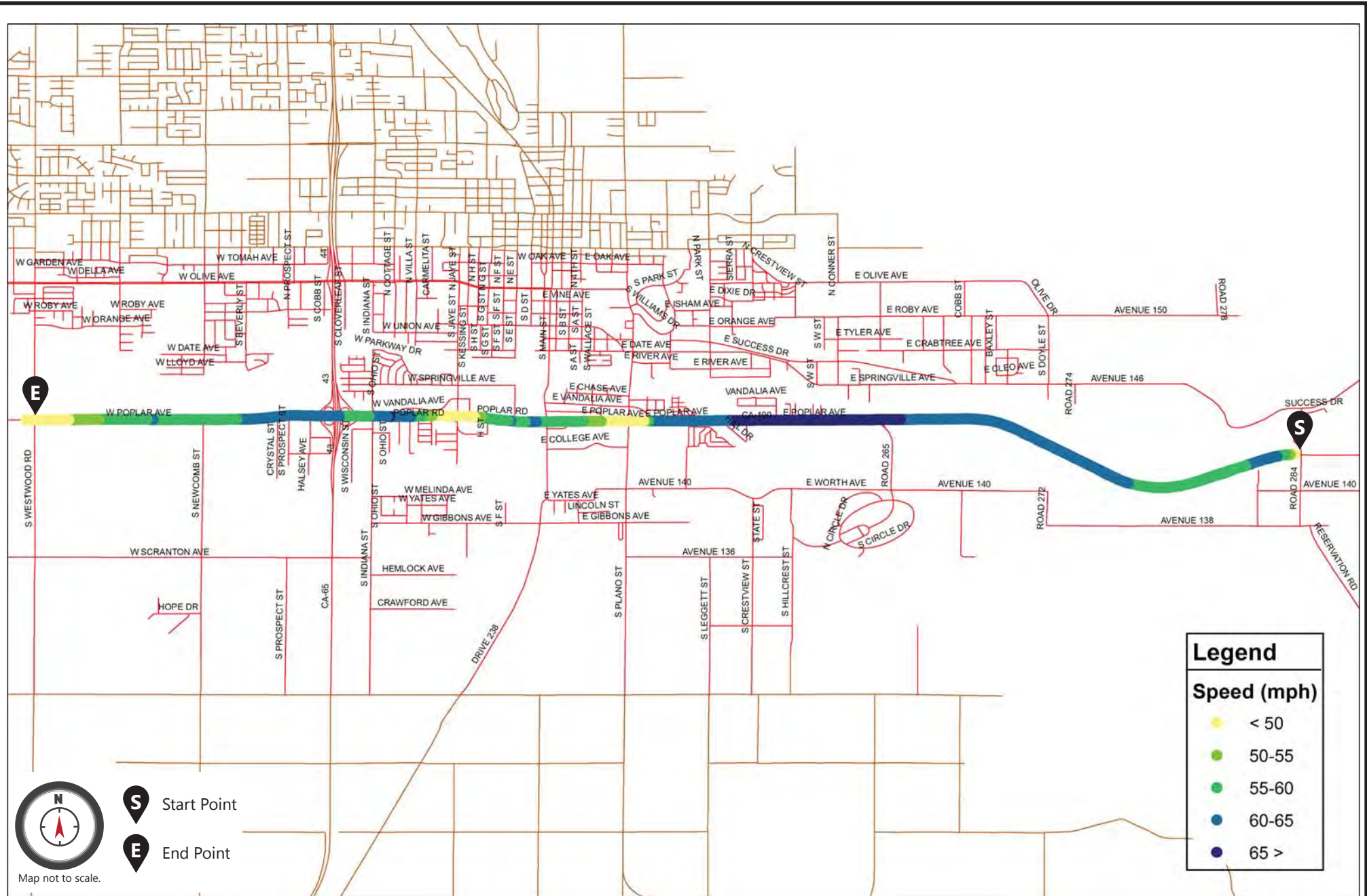






**FIGURE B-8: SR 190 Westbound Weekday Midday Period**



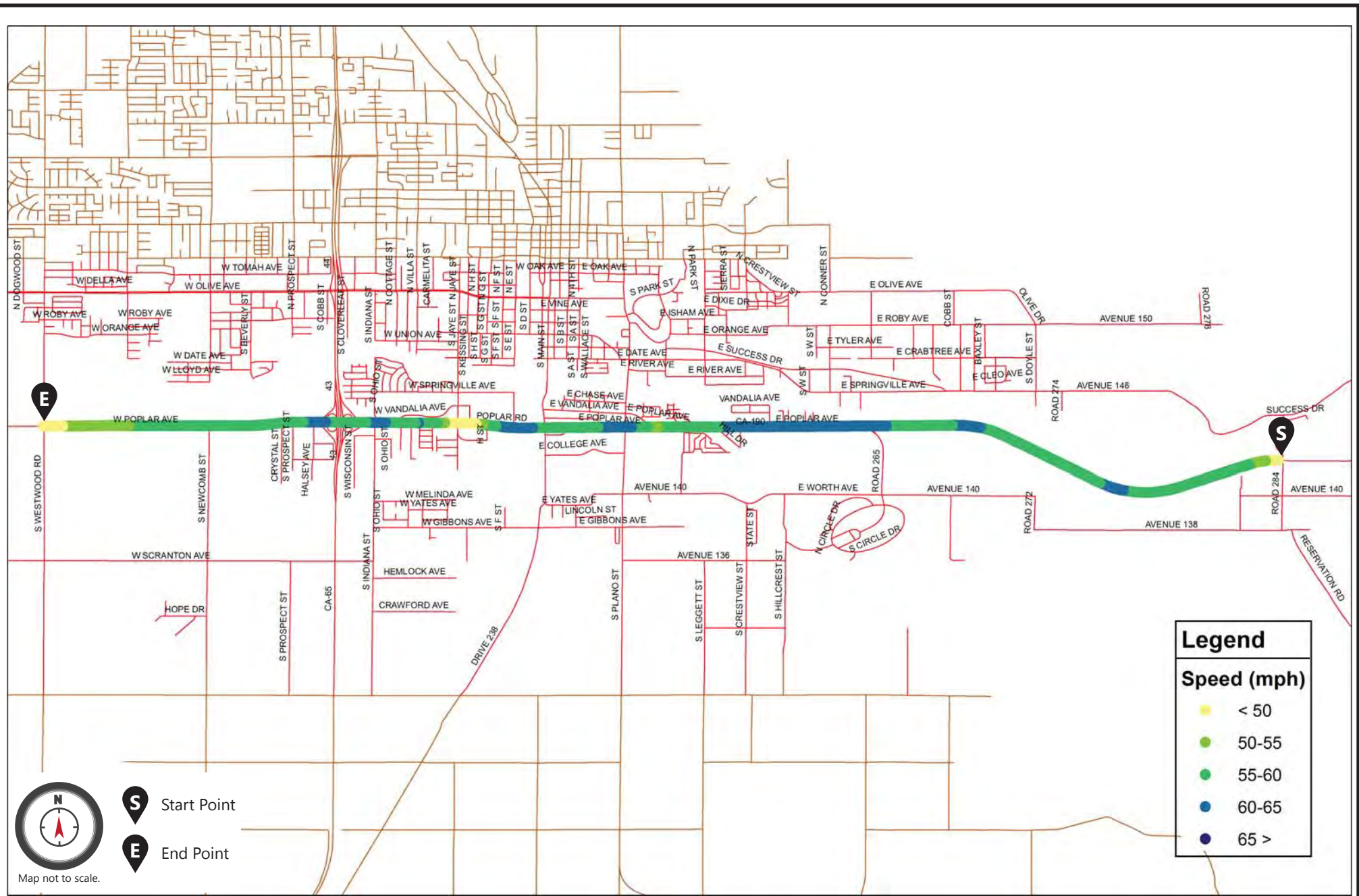


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-9: SR 190 Westbound Weekday PM Peak Period**



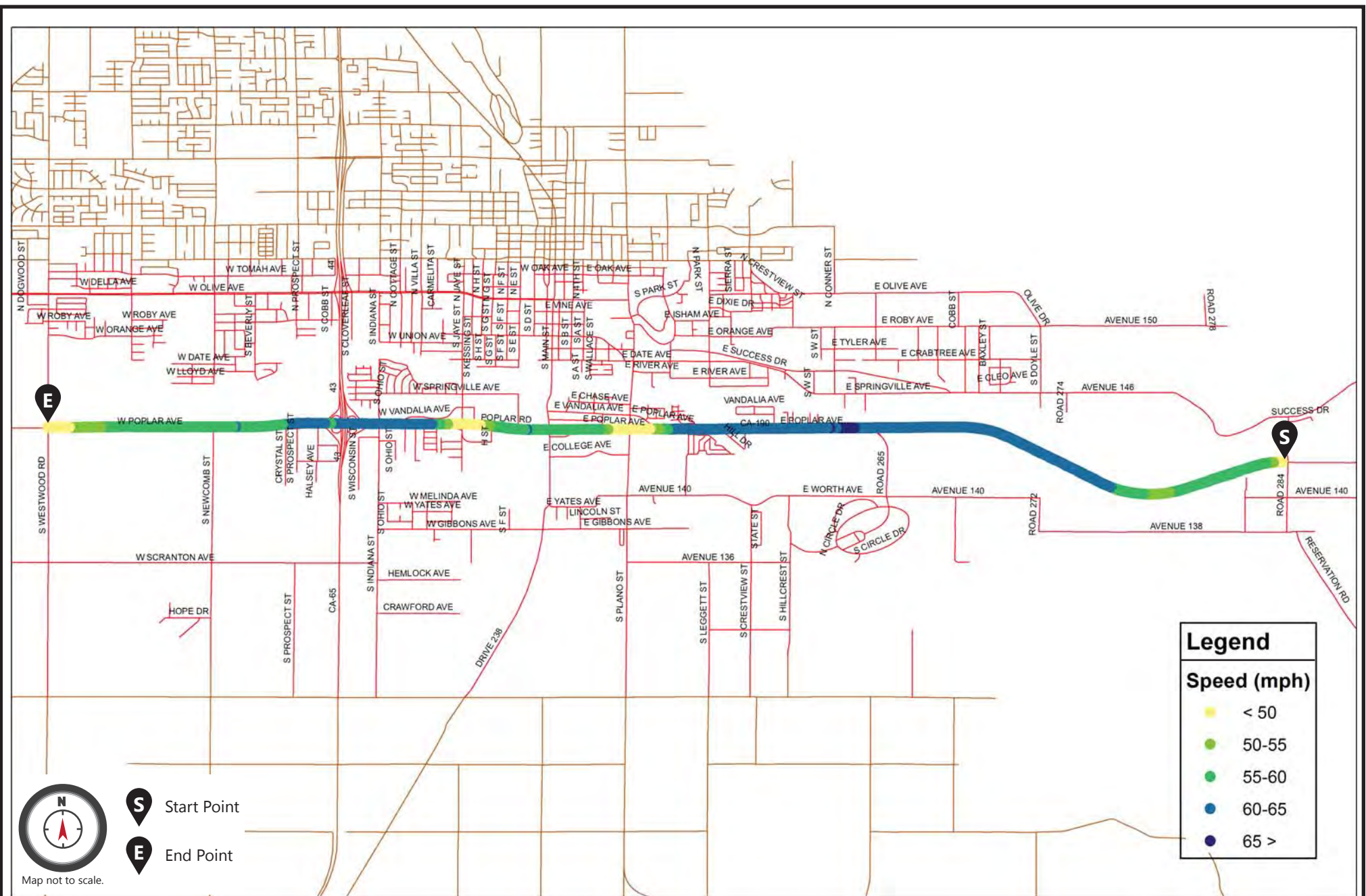




Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-10: SR 190 Westbound Weekend AM Peak Period**



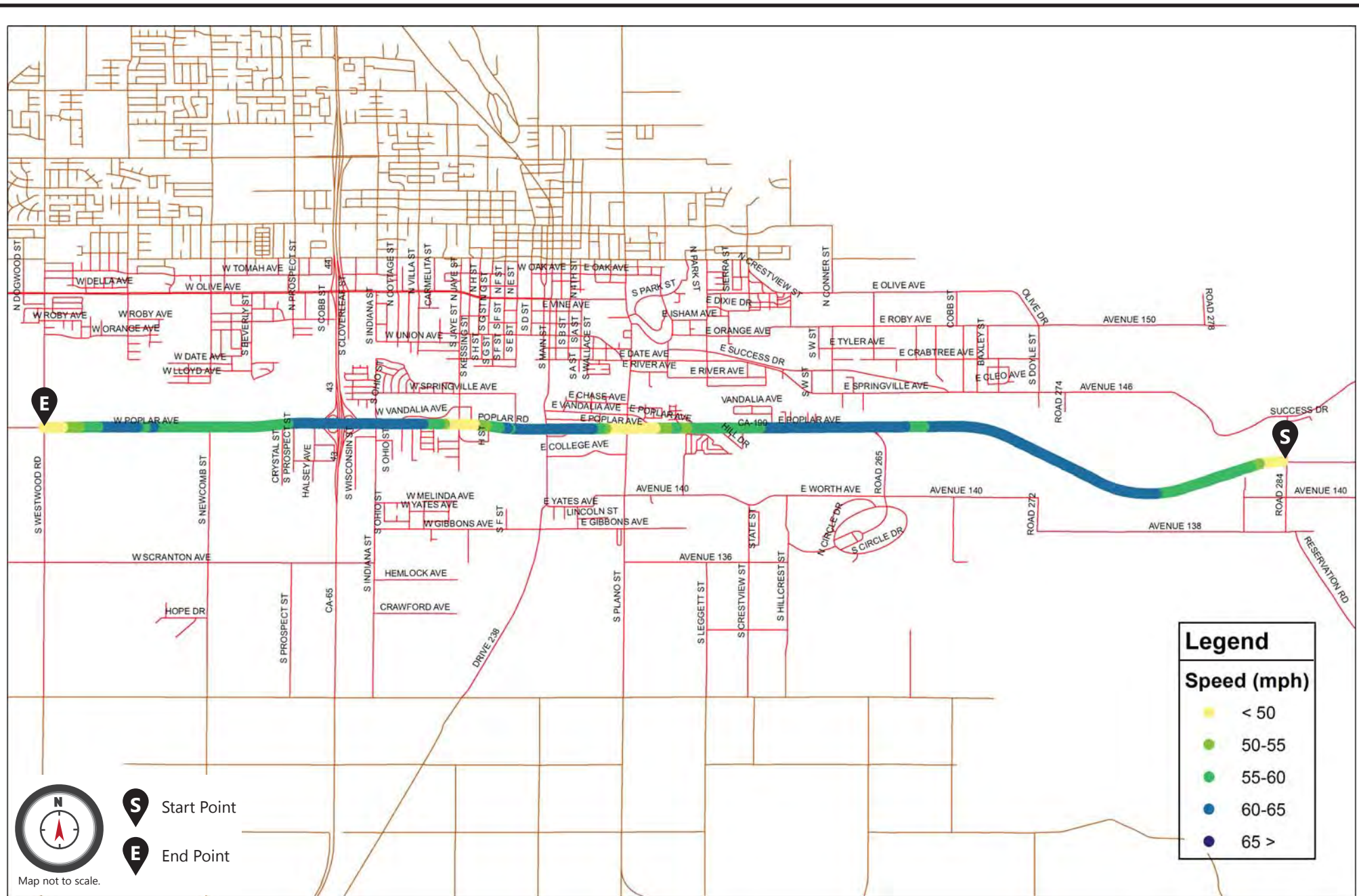


Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-11: SR 190 Westbound Weekend Midday Period**







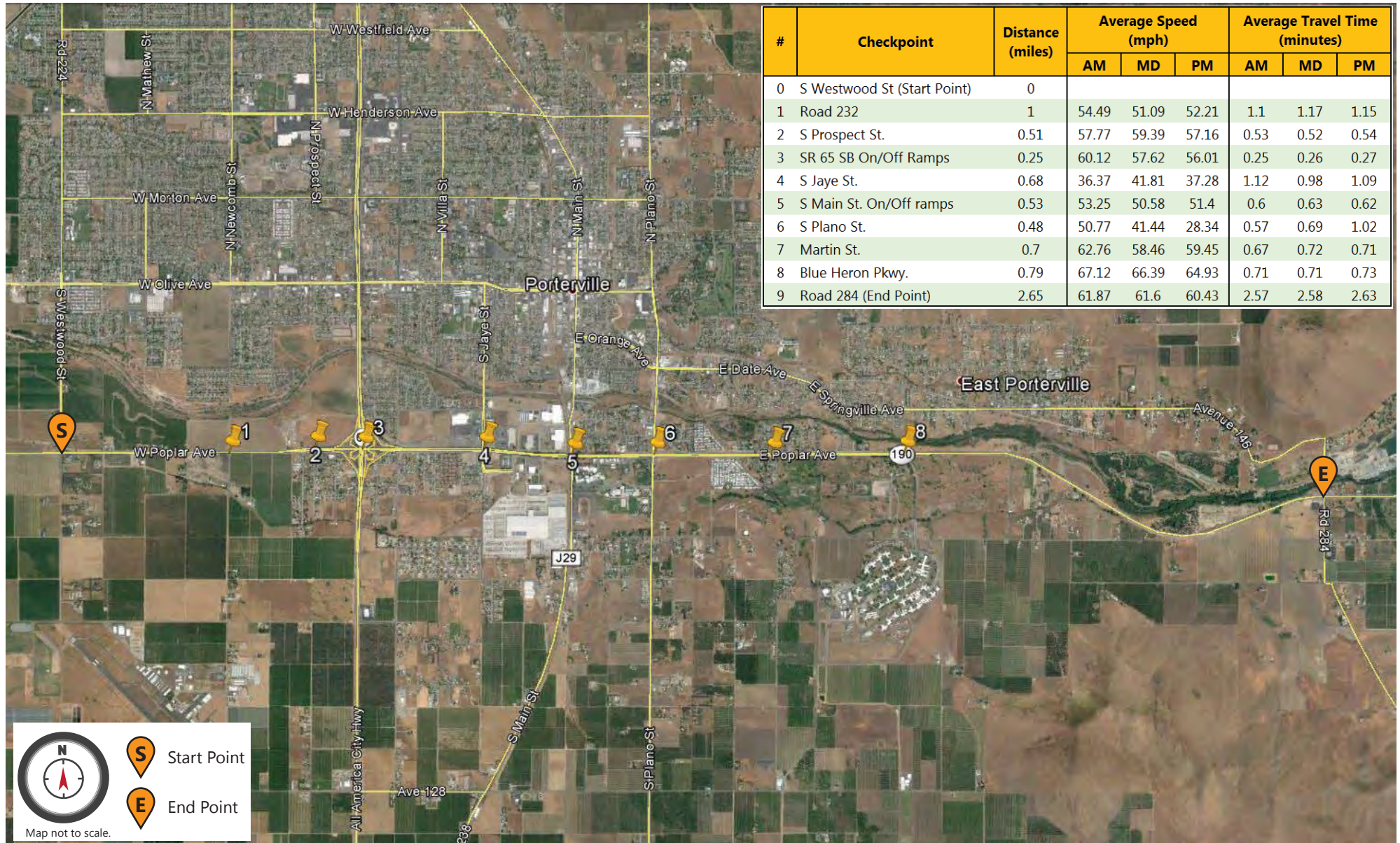
Note: Speed data used from an actual recorded typical travel time run.

**FIGURE B-12: SR 190 Westbound Weekend PM Peak Period**



## Appendix C – SR 190 Checkpoint Summary Maps

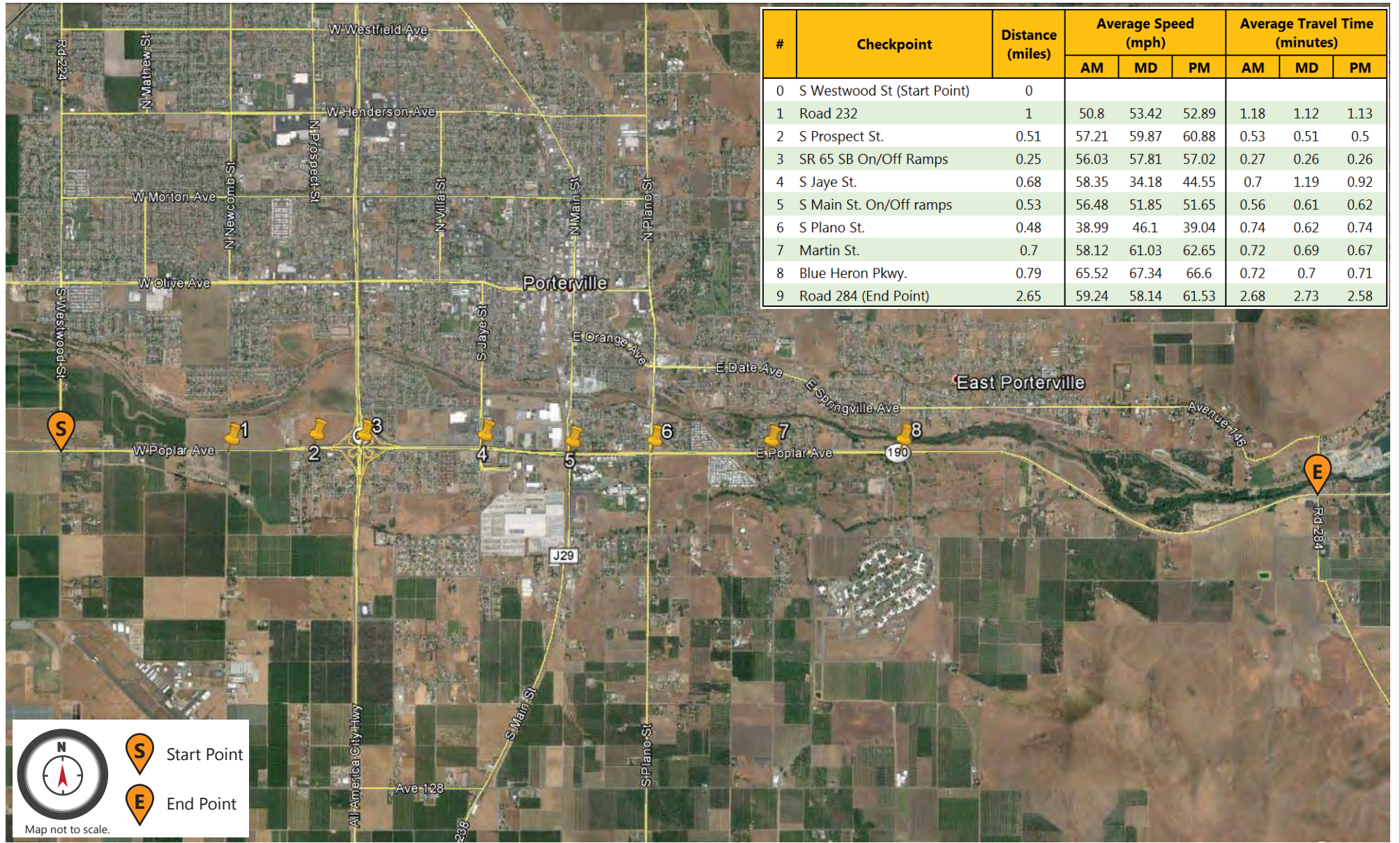




**FIGURE C-1: Checkpoint Summary - SR 190 Eastbound Weekday**





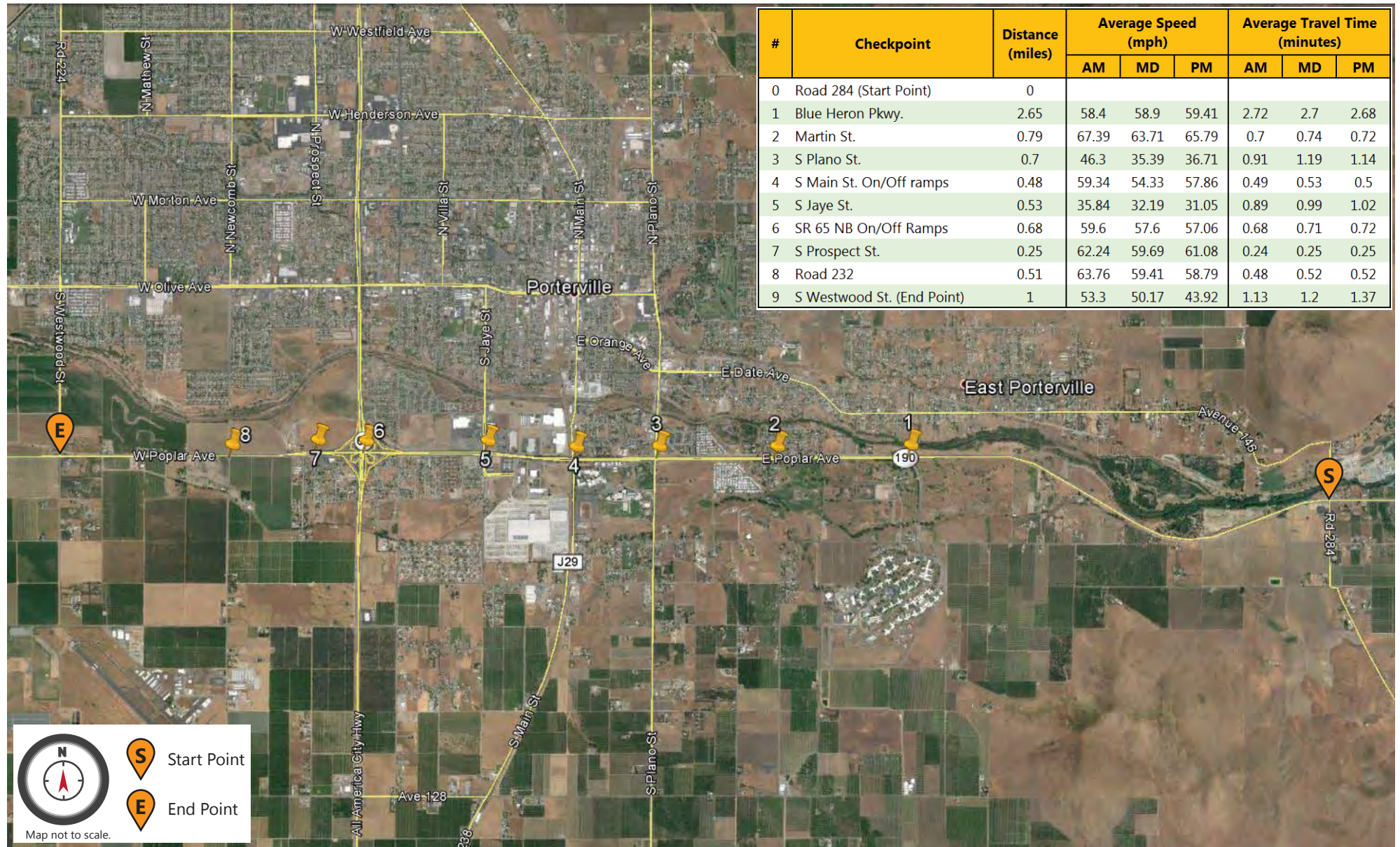


Map not to scale.

**FIGURE C-2: Checkpoint Summary - SR 190 Eastbound Weekend**



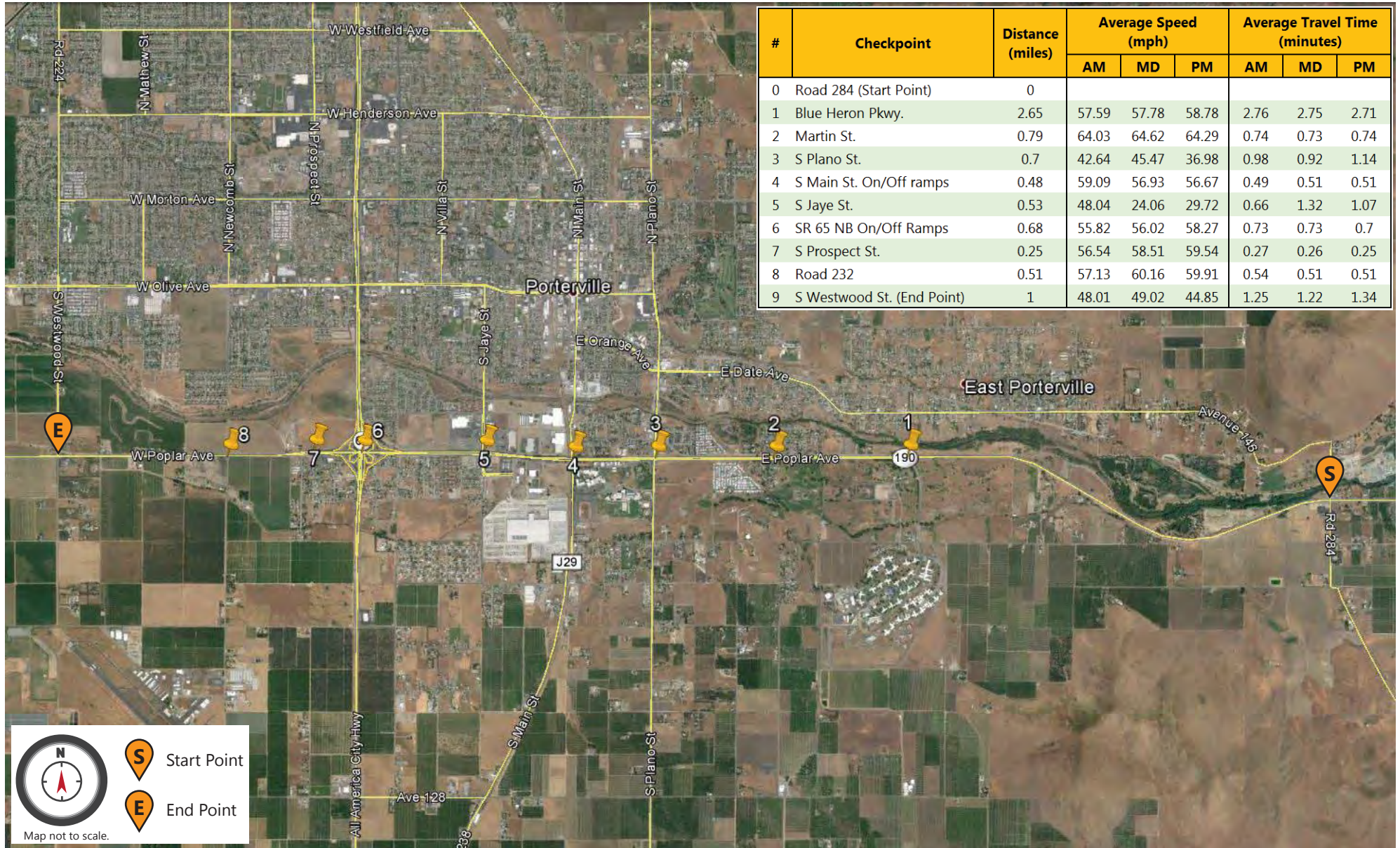




**FIGURE C-3: Checkpoint Summary - SR 190 Westbound Weekday**







**FIGURE C-4: Checkpoint Summary - SR 190 Westbound Weekend**



## Appendix D – SR 190 Checkpoint Summary Tables



**Table D-1: SR 190 Eastbound Weekday Checkpoint Summary**

#	Checkpoint	# of Runs	Average Distance (miles)	Average Speed (mph)	Average Travel Time (min)	Average # of Stops	Average Stopped Time (min)	Average Congested Time (min)	Average Control Delay Time (min)	Average Approach Delay Time (min)	Average Stop Delay Time (min)	TTI Index
<b>AM Peak Period</b>												
0	S Westwood St. (Start Point)	5	0									
1	Road 232	5	1	54.49	1.1	0	0	0	0.05	0.05	0	1.10111947
2	S Prospect St.	5	0.51	57.77	0.53	0	0	0				1.03860135
3	SR 65 SB On/Off Ramps	5	0.25	60.12	0.25	0	0	0				0.99800399
4	S Jaye St.	5	0.68	36.37	1.12	0.8	0.31	0.42	0.59	0.56	0.38	1.6497113
5	S Main St. On/Off ramps	5	0.53	53.25	0.6	0	0	0				1.12676056
6	S Plano St.	5	0.48	50.77	0.57	0.4	0.07	0.12	0.36	0.34	0.18	1.18180028
7	Martin St.	5	0.7	62.76	0.67	0	0	0				1.03569152
8	Blue Heron Pkwy.	5	0.79	67.12	0.71	0	0	0				0.96841478
9	Road 284 (End Point)	5	2.65	61.87	2.57	0	0	0	0	0	0	0.96977534
<b>Mid-day Period</b>												
0	S Westwood St. (Start Point)	5	0									
1	Road 232	5	1	51.09	1.17	0	0	0.01				1.17439812
2	S Prospect St.	5	0.51	59.39	0.52	0	0	0				1.01027109
3	SR 65 SB On/Off Ramps	5	0.25	57.62	0.26	0	0	0				1.0413051
4	S Jaye St.	5	0.68	41.81	0.98	0.4	0.15	0.21	0.43	0.41	0.24	1.43506338
5	S Main St. On/Off ramps	5	0.53	50.58	0.63	0	0	0				1.18623962
6	S Plano St.	5	0.48	41.44	0.69	0.4	0.13	0.21	0.32	0.29	0.17	1.44787645
7	Martin St.	5	0.7	58.46	0.72	0	0	0				1.11187137
8	Blue Heron Pkwy.	5	0.79	66.39	0.71	0	0	0	0	0.01	0	0.97906311
9	Road 284 (End Point)	5	2.65	61.6	2.58	0	0	0	0.02	0	0	0.97402597
<b>PM Peak Period</b>												
0	S Westwood St. (Start Point)	5	0									
1	Road 232	11	1	52.21	1.15	0	0	0				1.14920513
2	S Prospect St.	11	0.51	57.16	0.54	0	0	0				1.04968509
3	SR 65 SB On/Off Ramps	11	0.25	56.01	0.27	0	0	0				1.07123728
4	S Jaye St.	11	0.68	37.28	1.09	0.55	0.25	0.34	0.61	0.59	0.4	1.60944206
5	S Main St. On/Off ramps	11	0.53	51.4	0.62	0	0	0	0.02	0.02	0	1.16731518
6	S Plano St.	11	0.48	28.34	1.02	0.73	0.39	0.5	0.69	0.67	0.52	2.11714891
7	Martin St.	11	0.7	59.45	0.71	0	0	0				1.09335576
8	Blue Heron Pkwy.	11	0.79	64.93	0.73	0	0	0				1.00107808
9	Road 284 (End Point)	11	2.65	60.43	2.63	0	0	0	0	0	0	0.99288433

**Table D-2: SR 190 Eastbound Weekend Checkpoint Summary**

#	Checkpoint	# of Runs	Average Distance (miles)	Average Speed (mph)	Average Travel Time (min)	Average # of Stops	Average Stopped Time (min)	Average Congested Time (min)	Average Control Delay Time (min)	Average Approach Delay Time (min)	Average Stop Delay Time (min)	TTI Index
<b>AM Peak Period</b>												
0	S Westwood St. (Start Point)											
1	Road 232	3	1	50.8	1.18	0	0	0				1.18110236
2	S Prospect St.	3	0.51	57.21	0.53	0	0	0				1.0487677
3	SR 65 SB On/Off Ramps	3	0.25	56.03	0.27	0	0	0				1.0708549
4	S Jaye St.	3	0.68	58.35	0.7	0	0	0				1.02827763
5	S Main St. On/Off ramps	3	0.53	56.48	0.56	0	0	0				1.06232295
6	S Plano St.	3	0.48	38.99	0.74	0.67	0.18	0.26	0.45	0.42	0.28	1.53885612
7	Martin St.	3	0.7	58.12	0.72	0	0	0				1.11837577
8	Blue Heron Pkwy.	3	0.79	65.52	0.72	0	0	0				0.99206349
9	Road 284 (End Point)	3	2.65	59.24	2.68	0	0	0	0.03	0	0	1.01282917
<b>Mid-day Period</b>												
0	S Westwood St. (Start Point)											
1	Road 232	3	1	53.42	1.12	0	0	0				1.12317484
2	S Prospect St.	3	0.51	59.87	0.51	0	0	0				1.00217137
3	SR 65 SB On/Off Ramps	3	0.25	57.81	0.26	0	0	0				1.03788272
4	S Jaye St.	3	0.68	34.18	1.19	1	0.38	0.46	0.53	0.5	0.38	1.75541252
5	S Main St. On/Off ramps	3	0.53	51.85	0.61	0	0	0				1.15718419
6	S Plano St.	3	0.48	46.1	0.62	0.33	0.13	0.16	0.55	0.52	0.38	1.30151844
7	Martin St.	3	0.7	61.03	0.69	0	0	0				1.06504998
8	Blue Heron Pkwy.	3	0.79	67.34	0.7	0	0	0				0.96525097
9	Road 284 (End Point)	3	2.65	58.14	2.73	0	0	0	0	0	0	1.03199174
<b>PM Peak Period</b>												
0	S Westwood St. (Start Point)											
1	Road 232	3	1	52.89	1.13	0	0	0.02				1.13442995
2	S Prospect St.	3	0.51	60.88	0.5	0	0	0				0.98554534
3	SR 65 SB On/Off Ramps	3	0.25	57.02	0.26	0	0	0				1.05226236
4	S Jaye St.	3	0.68	44.55	0.92	0.33	0.12	0.18	0.34	0.32	0.18	1.34680135
5	S Main St. On/Off ramps	3	0.53	51.65	0.62	0	0	0	0.03	0.03	0	1.16166505
6	S Plano St.	3	0.48	39.04	0.74	0.67	0.13	0.19	0.35	0.33	0.2	1.53688525
7	Martin St.	3	0.7	62.65	0.67	0	0	0				1.03750998
8	Blue Heron Pkwy.	3	0.79	66.6	0.71	0	0	0				0.97597598
9	Road 284 (End Point)	3	2.65	61.53	2.58	0	0	0	0.02	0	0	0.97513408

**Table D-3: SR 190 Westbound Weekday Checkpoint Summary**

#	Checkpoint	# of Runs	Average Distance (miles)	Average Speed (mph)	Average Travel Time (min)	Average # of Stops	Average Stopped Time (min)	Average Congested Time (min)	Average Control Delay Time (min)	Average Approach Delay Time (min)	Average Stop Delay Time (min)	TTI Index
<b>AM Peak Period</b>												
0	Road 284 (Start Point)	5	0									
1	Blue Heron Pkwy.	5	2.65	58.4	2.72	0	0	0.02				1.02739726
2	Martin St.	5	0.79	67.39	0.7	0	0	0				0.89033981
3	S Plano St.	5	0.7	46.3	0.91	0.6	0.15	0.23	0.44	0.41	0.25	1.29589633
4	S Main St. On/Off ramps	5	0.48	59.34	0.49	0	0	0.01				1.01112235
5	S Jaye St.	5	0.53	35.84	0.89	0.6	0.26	0.32	0.6	0.58	0.44	1.67410714
6	SR 65 NB On/Off Ramps	5	0.68	59.6	0.68	0	0	0				1.00671141
7	S Prospect St.	5	0.25	62.24	0.24	0	0	0				0.96401028
8	Road 232	5	0.51	63.76	0.48	0	0	0				0.94102886
9	S Westwood St. (End Point)	5	1	53.3	1.13	0.8	0.02	0.09	0.11	0	0.02	1.12570356
<b>Mid-day Period</b>												
0	Road 284 (Start Point)	5	0									
1	Blue Heron Pkwy.	5	2.65	58.9	2.7	0	0	0				1.01867572
2	Martin St.	5	0.79	63.71	0.74	0	0	0				0.94176738
3	S Plano St.	5	0.7	35.39	1.19	0.67	0.34	0.45	0.6	0.57	0.4	1.69539418
4	S Main St. On/Off ramps	5	0.48	54.33	0.53	0	0	0				1.10436223
5	S Jaye St.	5	0.53	32.19	0.99	0.67	0.29	0.4	0.66	0.64	0.44	1.8639329
6	SR 65 NB On/Off Ramps	5	0.68	57.6	0.71	0	0	0				1.04166667
7	S Prospect St.	5	0.25	59.69	0.25	0	0	0				1.0051935
8	Road 232	5	0.51	59.41	0.52	0	0	0				1.00993099
9	S Westwood St. (End Point)	5	1	50.17	1.2	0.5	0.03	0.12	0.13	0	0.02	1.19593382
<b>PM Peak Period</b>												
0	Road 284 (Start Point)	5	0									
1	Blue Heron Pkwy.	5	2.65	59.41	2.68	0	0	0.03				1.00993099
2	Martin St.	5	0.79	65.79	0.72	0	0	0				0.9119927
3	S Plano St.	5	0.7	36.71	1.14	0.5	0.37	0.44	0.69	0.67	0.53	1.63443203
4	S Main St. On/Off ramps	5	0.48	57.86	0.5	0	0	0				1.03698583
5	S Jaye St.	5	0.53	31.05	1.02	0.6	0.35	0.42	0.61	0.59	0.44	1.93236715
6	SR 65 NB On/Off Ramps	5	0.68	57.06	0.72	0	0	0				1.05152471
7	S Prospect St.	5	0.25	61.08	0.25	0	0	0				0.98231827
8	Road 232	5	0.51	58.79	0.52	0	0	0				1.02058173
9	S Westwood St. (End Point)	5	1	43.92	1.37	1.5	0.1	0.24	0.24	0	0.1	1.36612022



**Table D-4: SR 190 Westbound Weekend Checkpoint Summary**

#	Checkpoint	# of Runs	Average Distance (miles)	Average Speed (mph)	Average Travel Time (min)	Average # of Stops	Average Stopped Time (min)	Average Congested Time (min)	Average Control Delay Time (min)	Average Approach Delay Time (min)	Average Stop Delay Time (min)	TTI Index
<b>AM Peak Period</b>												
0	Road 284 (Start Point)	5	0									
1	Blue Heron Pkwy.	5	2.65	57.59	2.76	0	0	0				1.04184754
2	Martin St.	5	0.79	64.03	0.74	0	0	0				0.93706075
3	S Plano St.	5	0.7	42.64	0.98	0.33	0.24	0.28	0.9	0.87	0.72	1.40712946
4	S Main St. On/Off ramps	5	0.48	59.09	0.49	0	0	0				1.01540024
5	S Jaye St.	5	0.53	48.04	0.66	0.33	0.01	0.05	0.16	0.15	0.02	1.2489592
6	SR 65 NB On/Off Ramps	5	0.68	55.82	0.73	0	0	0				1.07488355
7	S Prospect St.	5	0.25	56.54	0.27	0	0	0				1.06119561
8	Road 232	5	0.51	57.13	0.54	0	0	0				1.0502363
9	S Westwood St. (End Point)	5	1	48.01	1.25	1	0.06	0.12	0.13	0	0.04	1.24973964
<b>Mid-day Period</b>												
0	Road 284 (Start Point)	5	0									
1	Blue Heron Pkwy.	5	2.65	57.78	2.75	0	0	0				1.0384216
2	Martin St.	5	0.79	64.62	0.73	0	0	0				0.92850511
3	S Plano St.	5	0.7	45.47	0.92	0.67	0.12	0.19	0.34	0.32	0.18	1.31955135
4	S Main St. On/Off ramps	5	0.48	56.93	0.51	0	0	0				1.05392587
5	S Jaye St.	5	0.53	24.06	1.32	1	0.61	0.69	0.77	0.75	0.61	2.49376559
6	SR 65 NB On/Off Ramps	5	0.68	56.02	0.73	0	0	0				1.07104605
7	S Prospect St.	5	0.25	58.51	0.26	0	0	0				1.02546573
8	Road 232	5	0.51	60.16	0.51	0	0	0				0.99734043
9	S Westwood St. (End Point)	5	1	49.02	1.22	1	0.03	0.09	0.12	0	0.02	1.22399021
<b>PM Peak Period</b>												
0	Road 284 (Start Point)	5	0									
1	Blue Heron Pkwy.	5	2.65	58.78	2.71	0	0	0				1.02075536
2	Martin St.	5	0.79	64.29	0.74	0	0	0				0.93327112
3	S Plano St.	5	0.7	36.98	1.14	1	0.27	0.38	0.45	0.43	0.27	1.62249865
4	S Main St. On/Off ramps	5	0.48	56.67	0.51	0	0	0				1.05876125
5	S Jaye St.	5	0.53	29.72	1.07	1	0.34	0.43	0.51	0.5	0.34	2.01884253
6	SR 65 NB On/Off Ramps	5	0.68	58.27	0.7	0	0	0				1.02968938
7	S Prospect St.	5	0.25	59.54	0.25	0	0	0				1.0077259
8	Road 232	5	0.51	59.91	0.51	0	0	0				1.00150225
9	S Westwood St. (End Point)	5	1	44.85	1.34	1.33	0.12	0.26	0.18	0	0.09	1.33779264

## Appendix E – SR 198 & SR 190 Historical AADT Volume Maps

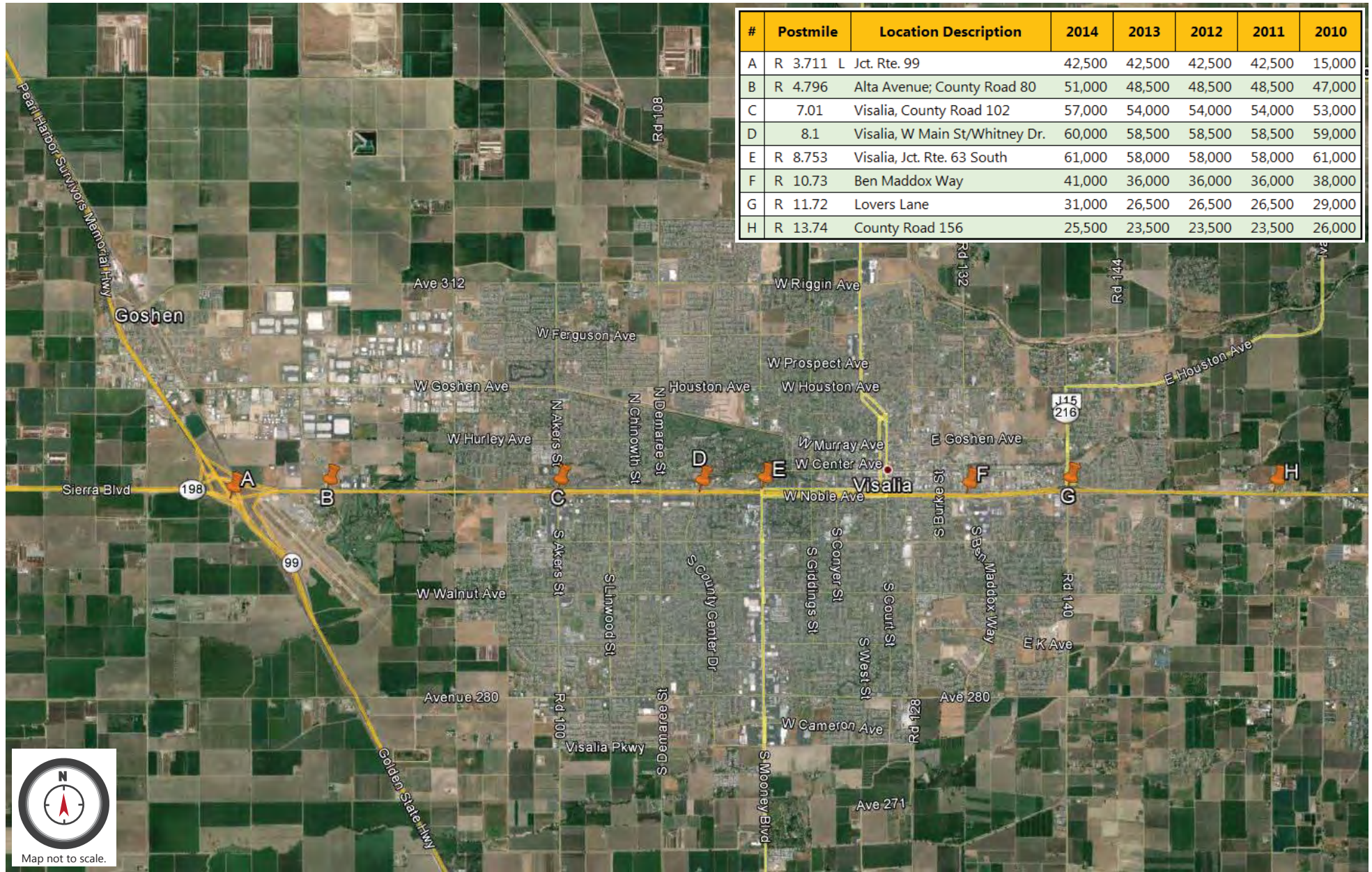
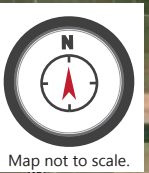
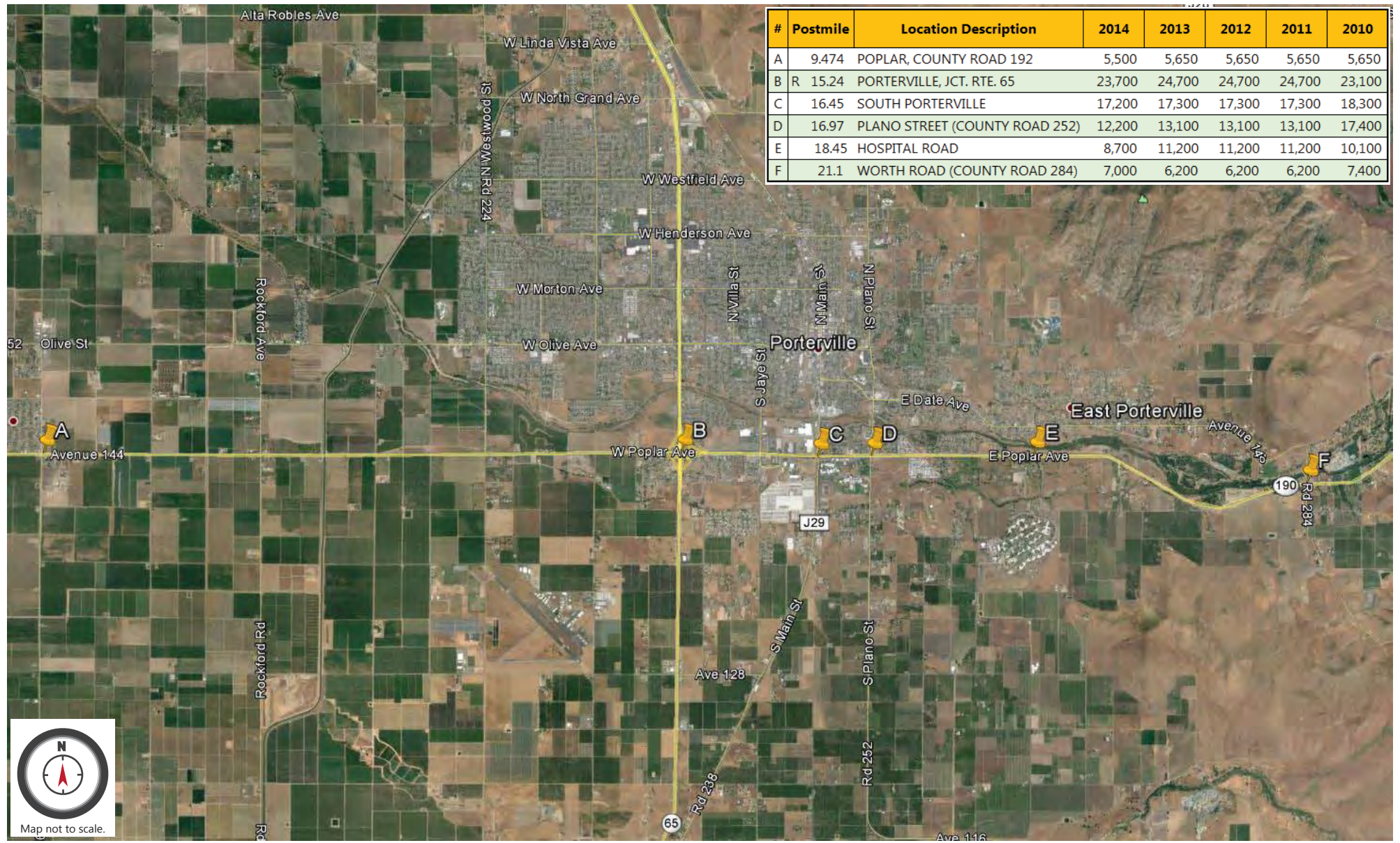


FIGURE E-1: SR 198 Historical (Ahead) AADT Volumes







**FIGURE E-2: SR 190 Historical (Ahead) AADT Volumes**



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