FLORENCE BOULEVARD TRAFFIC ANALYSIS

Congestion and Route Analysis using Acyclica Technology

Abstract

The following report is a detailed analysis of route utilization and congestion on westbound Florence Boulevard between Camino Mercado and Marshall Road. This assessment specifically examines traffic originating near the offramp of Interstate 10 and traveling west through Casa Grande

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Overview

The following report is an analysis of traffic on West-bound Florence Boulevard during the one-week period from the 16th of September 2017 through the 22nd of September 2017. The analysis captures typical traffic patterns on Florence Boulevard and identifies potential bottlenecks which result in elevated travel-times for those who travel the duration of the roadway from Interstate 10 through the city of Casa Grande.

Technology

The technology used for the following analyses includes the Acyclica RoadTrend sensors and Go software analytics platform. The RoadTrend sensors capture roughly 40% of all roadway traffic and aggregates the information to better understand how people are using the roadway. These sensors are installed in traffic cabinets where they can accurately monitor travel-times and intersection delay by movement and by approach. The data from the RoadTrend sensors is transmitted to the cloud-based Go software platform which analyzes the data and produced the analyses included in this report.

Privacy

The RoadTrend sensors anonymously capture Wifi MAC addresses from roadway users using Acyclica's patented technology. These MAC addresses are hashed, or irreversibly anonymized, using best-in-class anonymization techniques which protect the privacy of roadway users by making it impossible to identify them based on the information captured. The anonymization procedures of been verified assessed by independent third-party consultants and a copy of that report is available by request.

Destination Analysis

The following analysis shows the utilization of Florence Boulevard for all traffic originating at Camino Mercado. For this analysis, the origin was constrained at the intersection of Florence Boulevard and Camino Mercado while the destination was left unbounded. The map below is colored based on the number of segment traversals captured by the Acyclica RoadTrend sensors at each intersection. The purpose of the destination analysis is to examine how traffic originating from I-10 travel down Florence Boulevard.

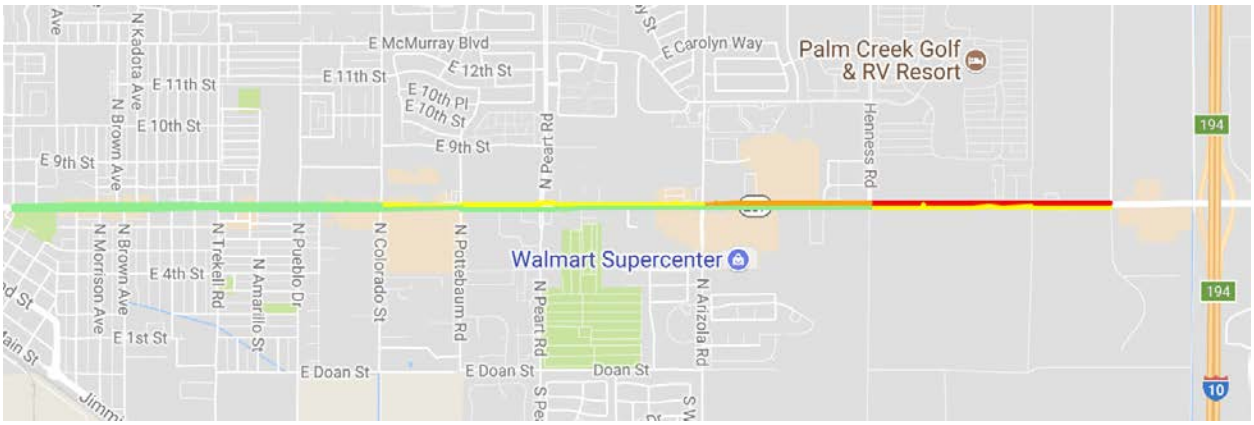

Figure 1. This roadway utilization map shows how many people travel each segment of road based on originating at Florence & Camino Mercado, just off of I-10. The map segments are colored based on the number of vehicles traversing those segments.

Since no RoadTrend sensors are currently installed either north or south of Florence Boulevard, we do not know the ultimate destination of the drivers but the following route analysis can show how far along the defined route vehicles traveled.

Table 1 below shows a list of all the segments which were traveled as part of routes which originated at Florence Blvd and Camino Mercado. As one would expect, the most frequently traveled segments are those near the origin of the route. Since there are no RoadTrend sensors north, south or east of this location, all traffic that is tracked travels west. The initial segment captured 21,380 matches while the following segments captured 13,725 and 12,661 respectively, suggesting that many vehicles turn either north or south at Henness Road.

Start	End	Segment Count	Distance	Travel-Time
273227 - Florence Blvd. & Camino Mercado	273110 - Florence Blvd & Henness Rd	21380	1.2 mi	1:01 (mm:ss)
273110 - Florence Blvd & Henness Rd	273113 - Florence Blvd. & Banner Med. Ctr.	13725	0.5 mi	0:38 (mm:ss)
273113 - Florence Blvd. & Banner Med. Ctr.	273653 - Florence Blvd & Arizola Rd	12661	0.33 mi	0:34 (mm:ss)
273651 - Florence Blvd. & Peart Rd.	273652 - Florence Blvd. & Pottebaum Rd.	8391	0.39 mi	0:45 (mm:ss)
273653 - Florence Blvd & Arizola Rd	273651 - Florence Blvd. & Peart Rd.	8325	0.82 mi	1:04 (mm:ss)
273110 - Florence Blvd & Henness Rd	273227 - Florence Blvd. & Camino Mercado	7813	1.2 mi	1:02 (mm:ss)
273652 - Florence Blvd. & Pottebaum Rd.	273138 - Florence Blvd. & Colorado St.	6632	0.41 mi	0:46 (mm:ss)
273653 - Florence Blvd & Arizola Rd	273113 - Florence Blvd. & Banner Med. Ctr.	3765	0.33 mi	0:30 (mm:ss)
273652 - Florence Blvd. & Pottebaum Rd.	273651 - Florence Blvd. & Peart Rd.	3410	0.4 mi	0:46 (mm:ss)
273138 - Florence Blvd. & Colorado St.	273673 - Trekell Rd & Florence Blvd	3311	0.81 mi	1:12 (mm:ss)
273113 - Florence Blvd. & Banner Med. Ctr.	273110 - Florence Blvd & Henness Rd	2937	0.5 mi	0:32 (mm:ss)
273138 - Florence Blvd. & Colorado St.	273652 - Florence Blvd. & Pottebaum Rd.	2687	0.4 mi	0:45 (mm:ss)
273673 - Trekell Rd & Florence Blvd	273111 - Florence Blvd. & Cameron St.	2211	0.7 mi	0:49 (mm:ss)
273111 - Florence Blvd. & Cameron St.	273226 - Florence Blvd. and Marshall St.	1615	0.31 mi	0:28 (mm:ss)
273651 - Florence Blvd. & Peart Rd.	273653 - Florence Blvd & Arizola Rd	1503	0.8 mi	1:01 (mm:ss)
273226 - Florence Blvd. and Marshall St.	273111 - Florence Blvd. & Cameron St.	872	0.31 mi	0:28 (mm:ss)
273111 - Florence Blvd. & Cameron St.	273673 - Trekell Rd & Florence Blvd	844	0.71 mi	0:51 (mm:ss)
273673 - Trekell Rd & Florence Blvd	273138 - Florence Blvd. & Colorado St.	744	0.83 mi	1:15 (mm:ss)

Table 1 shows the number of matches on each segment of roadway for traffic that originated at Florence Blvd and Camino Mercado. The coloring in the table corresponds to the coloring of the map segments in the map above.

Route Analyses

Below, Figure 2 shows a summary of the five most frequently traveled which originated at Camino Mercado and Florence Boulevard. In total, 15,132 distinct trips were analyzed starting at Camino Mercado and an assumption can be made that most of this traffic is originating from I-10.

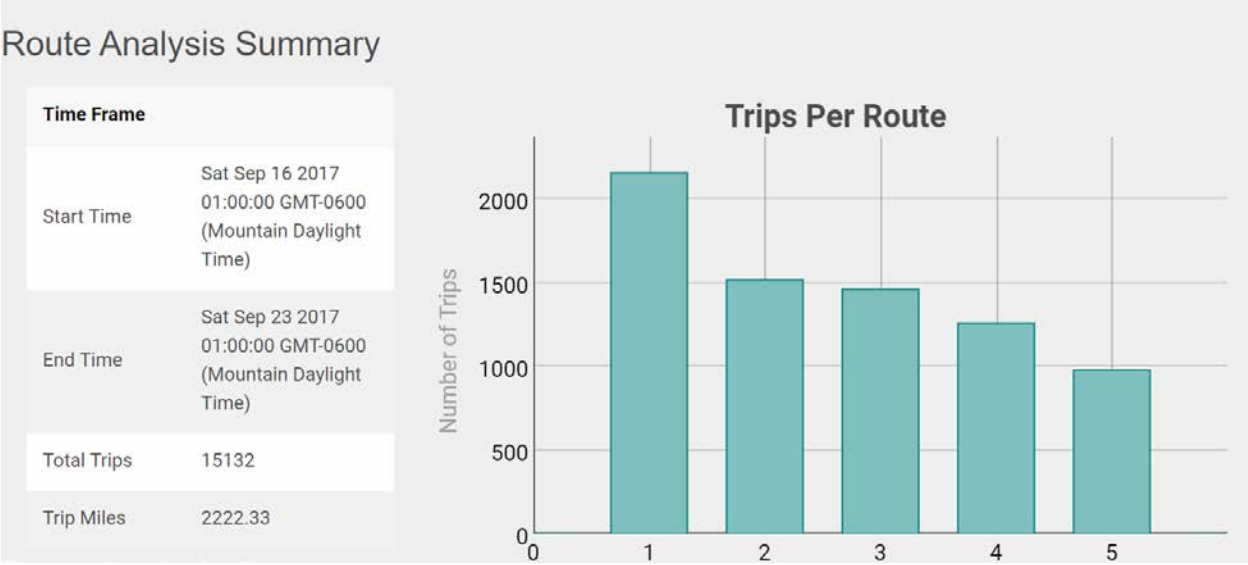

Figure 2 shows the frequency of travel for the 5 most traveled routes originating at Camino Mercado and traveling west bound.

Figure 3 through Figure 7 show the details of the five most traveled routes originating at Camino Mercado.

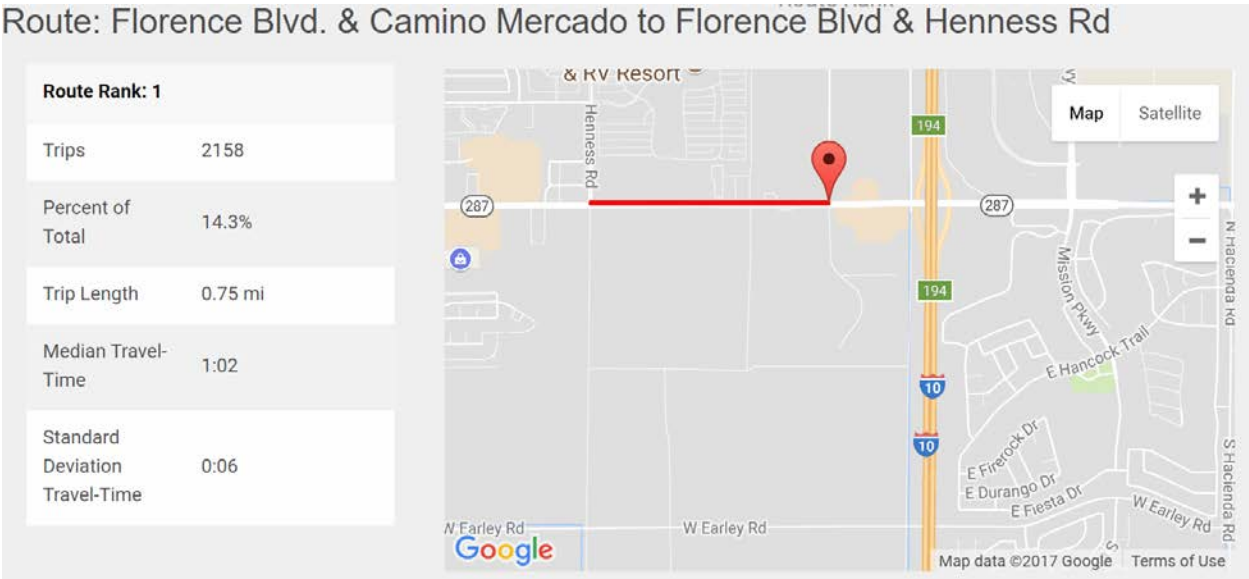

Figure 3 shows that 2,158 trips were observed for people who traveled from Camino Mercado to Henness Rd., but no further, on Florence Boulevard.

Route: Florence Blvd. & Camino Mercado to Florence Blvd & Arizola Rd

Route Rank: 2	
Trips	1518
Percent of Total	10.0%
Trip Length	1.26 mi
Median Travel-Time	2:16
Standard Deviation Travel-Time	0:12

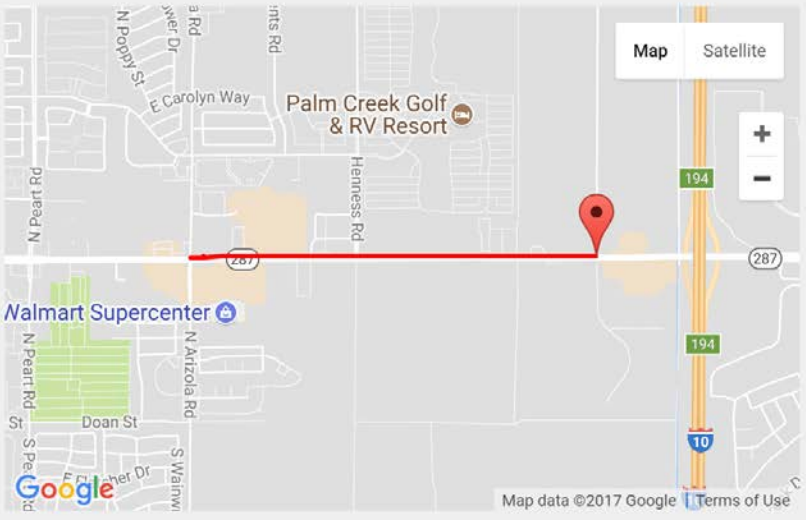

Figure 4 shows that 1,518 trips were observed for people who traveled from Camino Mercado to Arizola Rd., but no further, on Florence Boulevard.

Route: Florence Blvd. & Camino Mercado to Florence Blvd. & Banner Med. Ctr.

Route Rank: 3	
Trips	1463
Percent of Total	9.7%
Trip Length	1.05 mi
Median Travel-Time	1:40
Standard Deviation Travel-Time	0:07

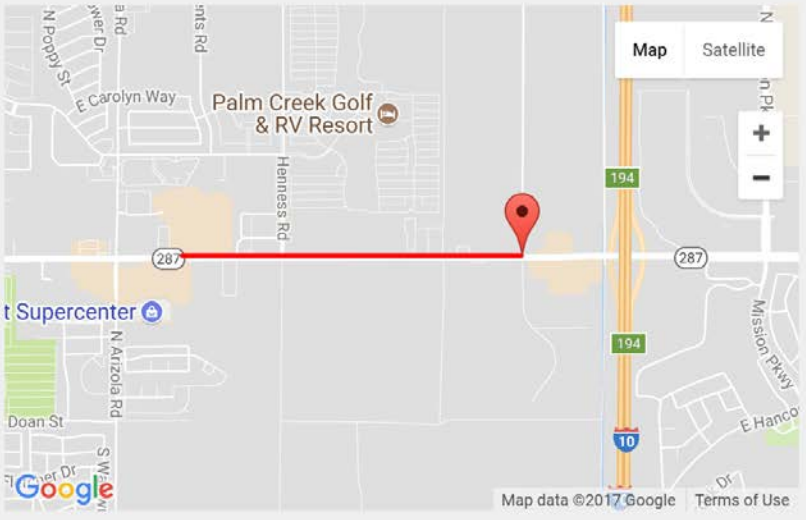

Figure 5 shows that 1,463 trips were observed for people who traveled from Camino Mercado to Banner Medical Center, but no further, on Florence Boulevard.

Route: Florence Blvd. & Camino Mercado to Florence Blvd. & Peart Rd.

Route Rank: 4	
Trips	1260
Percent of Total	8.3%
Trip Length	1.77 mi
Median Travel-Time	3:22
Standard Deviation Travel-Time	0:18

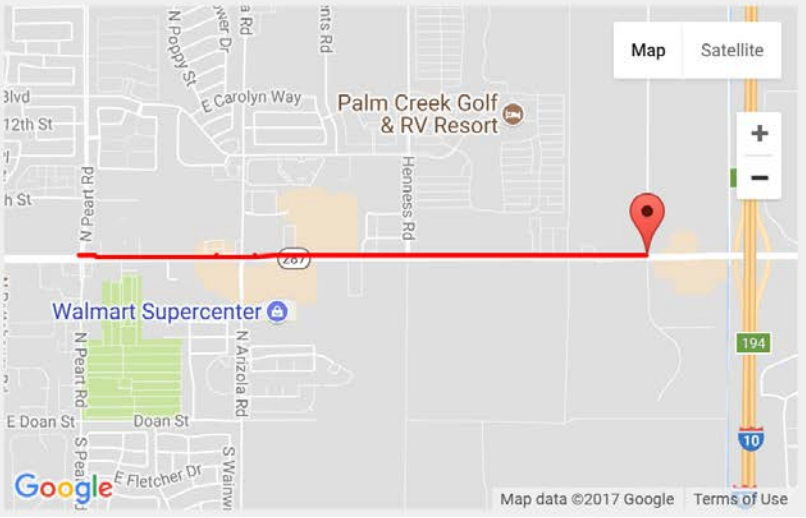

Figure 6 shows that 1,260 trips were observed for people who traveled from Camino Mercado to Peart Rd., but no further, on Florence Boulevard.

Route: Florence Blvd. & Camino Mercado to Florence Blvd. & Colorado St.

Route Rank: 5	
Trips	979
Percent of Total	6.5%
Trip Length	2.27 mi
Median Travel-Time	4:55
Standard Deviation Travel-Time	0:36

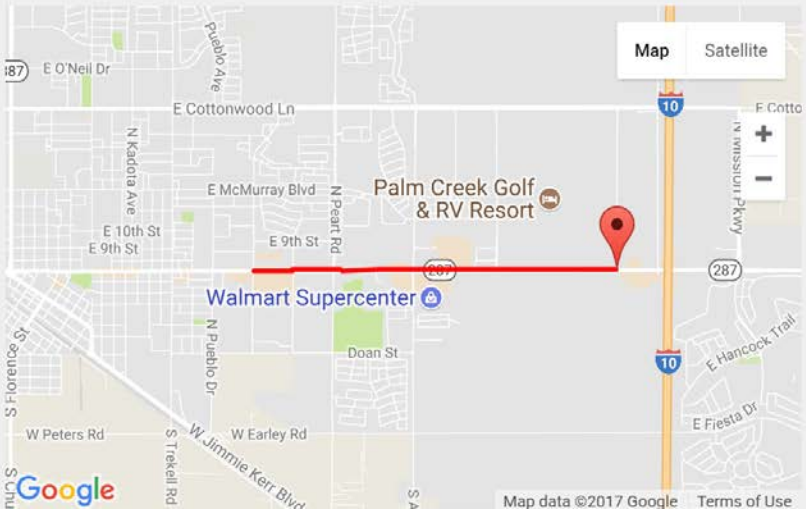

Figure 7 shows that 979 trips were observed for people who traveled from Camino Mercado to Colorado St., but no further, on Florence Boulevard.

Analysis of Travel Times

In addition to examining the utilization of Florence Boulevard from Interstate 10, an analysis of the entire route in the westbound direction was performed. Figure 8 shows the travel-time of traffic on Westbound Florence Boulevard in green compared to the travel-time of Eastbound Florence Boulevard depicted in blue. As one might expect, the high volume of traffic originating from Interstate 10 likely causes elevated travel-time.

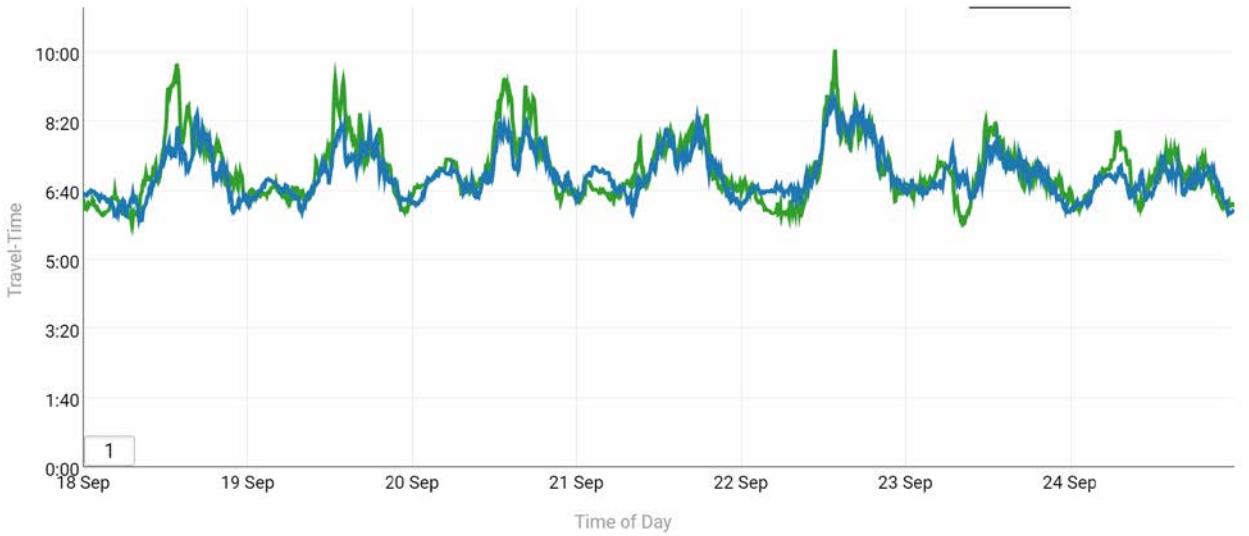

Figure 8 shows the travel time of Florence Boulevard for westbound traffic (green) compared with eastbound traffic (blue)

Segment Analysis

In order to assess which segments, if any, contribute to the high spikes in travel-time, a travel-time by segment analysis was performed as shown in Figure 9. The top line (orange) shows the aggregate travel-time for the entire westbound route on Florence Boulevard from Camino Mercado to Marshall St. Each one of the constituent components are broken down individually which provides interesting insights. Upon careful examination, it is clear that the purple line, representing the segment from Peart Road to Pottebaum Road disproportionately contributes to the spiking travel-time, particularly during the afternoon peak period.

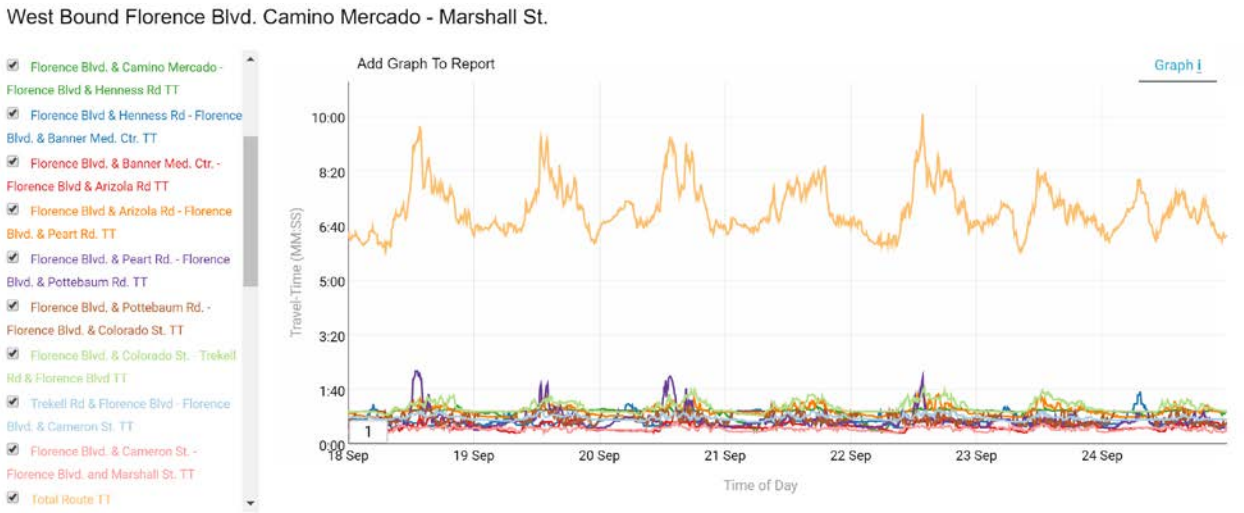

Figure 9 shows travel-time by segment. The top orange line depicts the aggregate travel time for the route which is made up of the contituent components below.

Identifying the key segment which causes the travel-time to jump for the overall route is critical for developing a congestion mitigation strategy. In order to better characterize the congestion, a delay analysis is needed.

Intersection Delay Analysis

Intersection delay is calculated by analyzing the amount of time that vehicles are within the detectable range of the RoadTrend sensor. Intersection delay, or dwell time, can be further broken down in several different ways due to the unique nature of Acyclica's WiFi technology:

- Total delay: time from the first detection at an intersection until the last detection at an intersection
- Upstream delay: time from the first detection at an intersection until the time of the peak signal strength
- Downstream delay: time of the detection of the peak signal strength to the time of the last detection
- Delay by approach: intersection delay associated with an individual approach to an intersection (i.e. westbound approach delay)
- Delay by movement: intersection delay associated with a movement (i.e. eastbound, left-turn delay)

Due to the placement of sensors, it is not possible to identify delay except for westbound and eastbound approaches. To examine side-street delay and associate the northbound or southbound approaches or delays associated with movement, additional RoadTrend sensors should be placed north and/or south of the desired intersections. Below, Figure 10 shows the total intersection delay at each intersection along the route. The results of the intersection delay analysis corroborate the travel-time by segment analysis showing that the intersection delay at Florence Boulevard and Pottebaum Road is significantly higher than other intersections.

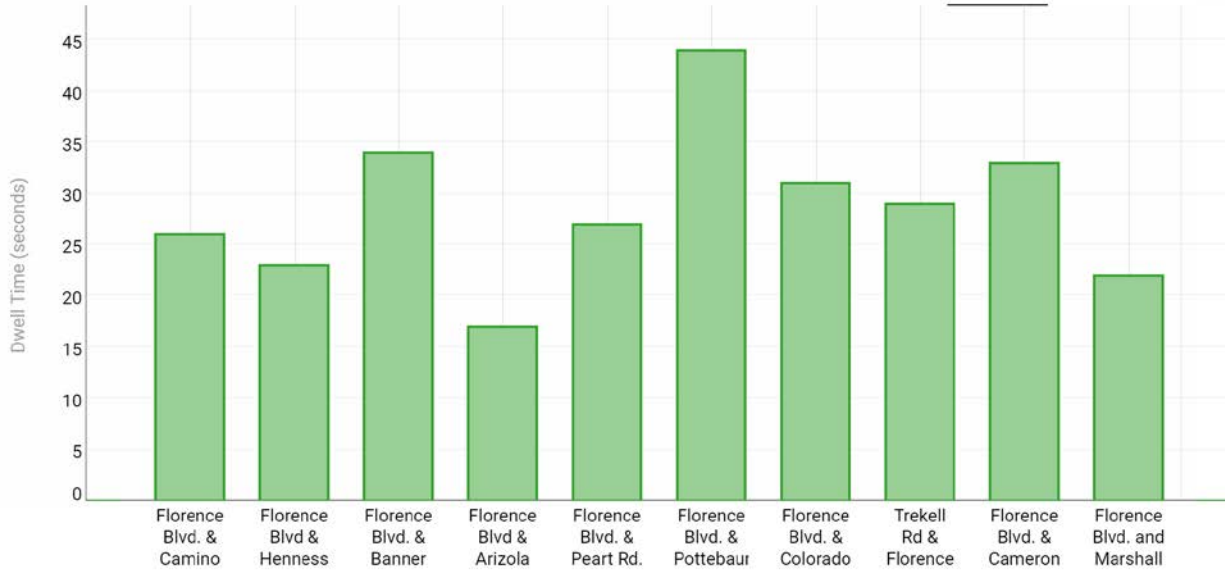

Figure 10 shows the route delay report which shows the intersection dwell time at all intersections along the route.

An intersection delay heatmap such as the one shown Figure 11 is colored based on the relative delay of all intersections along Florence Bouldevard.

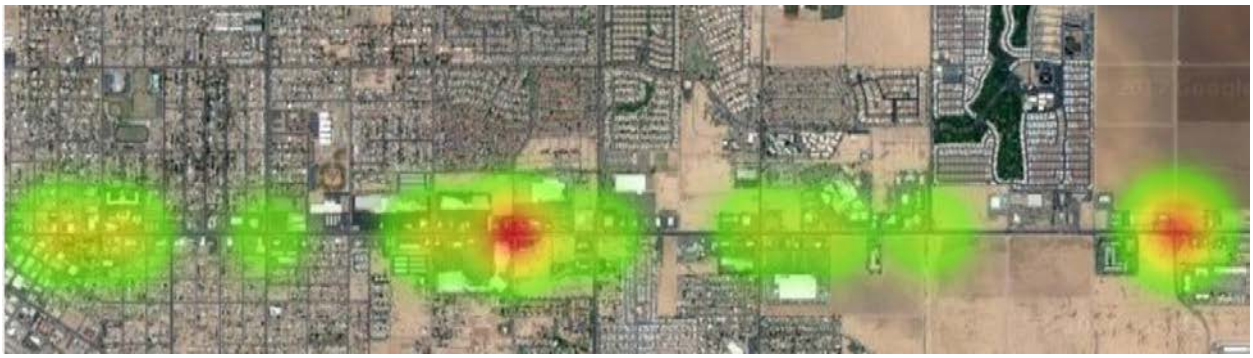

Figure 11 delay heatmap where increased intersection delay is depicted by deeper reds whereas intersections with comparatively low delay are colored green.

Acyclica's analysis tools allows us to examine the delay at Florence Boulevard and Pottebaum Rd. in more detail by examining the approach delay as we see in Figure 12. The figure clearly shows that the traffic approaching from Peart Road has an average delay of nearly two minutes during one of the travel-time peaks on the 22nd of September.

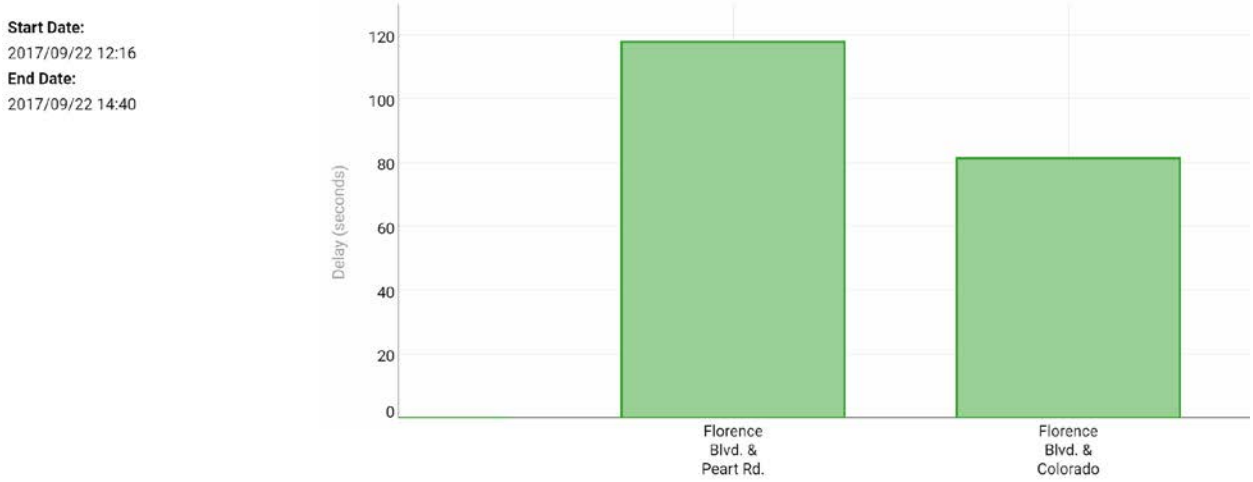

Figure 12 shows intersection delay by approach at Florence Boulevard and Pottebaum Rd.

Conclusions

In order to measure congestion and develop mitigation strategies, the city of Casa Grande has installed a number of Acyclica RoadTrend sensors along Florence Boulevard. These sensors allow both real-time and historical analysis of traffic conditions. This report provides a detailed synopsis and analysis of traffic traveling westbound on Florence Boulevard with specific detail of troips originating near the I-10 off ramps. A route utilization analysis was performed to determine that most traffic travels from I-10 with a destination between Henness and Arizola Roads.

Furthermore, a detailed congestion analysis shows that the segment of roadway between Peart and Pottebaum roads overwhelmingly contributes to elevated route travel times during peak period. In further assessing the congestion conditions, it appears likely that the primary cause of this delay is related to dwell time at the intersection of Pottebaum road on the westbound approach from Peart road.