City of Henderson, Clark County, and the Nevada Department of Transportation

I-215 Widening
(Pecos Road to Stephanie Street)
Traffic Report

March 2023

HENDERSON

NEVADA DOT SAFE AND CONNECTED

CLARK COUNTY NEVADA

Prepared by:

Jacobs

This page intentionally left blank

Table of Contents

List of Figures

List of Tables

Appendices

Appendix A: Traffic Operations and Forecasting Methodology Memorandum

Appendix B: Electronic Files of the Aimsun Next Model and other Associated Model Files

Appendix C: Volume Calibration Results

Appendix D: Speed Calibration Results

Appendix E: Modified Calibration Parameters

Appendix F: Year 2050 Forecast Intersection Turning Movement Volumes

Appendix G: Year 2050 Forecast AADT Volumes

Appendix H: Detailed Traffic Operations Analysis Results – Network/Subarea-wide MOEs

Appendix I: Detailed Traffic Operations Analysis Results – Freeway

1. INTRODUCTION AND BACKGROUND

The I-215 (Southern Beltway) freeway is one of the primary east-west freeway corridors in the Las Vegas valley; the I-215 connects the City of Henderson (City) community with the rest of the Las Vegas valley. The I-215 freeway is essential in providing mobility and connecting the City to the rest of the Las Vegas valley. The St. Rose Parkway / Pecos Road and Green Valley Parkway interchanges with I-215 provide access to/from the residential and commercial developments at the west edge of the City. These facilities also provide access to the Dollar Loan Center, which is a 6,000 seat in-door stadium, located on the southeast corner of the Green Valley Parkway and Paseo Verde Parkway intersection in the City. Maintaining the mobility along this corridor is essential in sustaining the competitiveness of Las Vegas as a leading tourist destination.

To this end, the City, together with Clark County and Nevada Department of Transportation (NDOT) have been planning and working on roadway improvement projects along the I-215 to optimize the mobility needs of the residents and improve travel time reliability along this critical transportation corridor. The City completed (in 2016) the I-215 Improvement Study, which identified improvements for the I-215 / St. Rose Parkway / Pecos Road interchange and the intersections adjacent to the freeway along St. Rose Parkway / Pecos Road and Green Valley Parkway. NDOT completed (in November 2018) the Southern Nevada Traffic Study (SNTS) (a long-term planning study) to identify the transportation improvement needs in the Las Vegas valley. Clark County also completed a Feasibility Study (in June 2018) to evaluate the opportunities and challenges in adding a fourth lane (in each direction) to the I-215 freeway from St. Rose Parkway / Pecos Road to Stephanie Street. This Feasibility Study developed a conceptual design, identified the construction conflicts and, developed an estimate of the costs for this improvement. A freeway widening project was completed by Clark County to improve the section of I-215 between Windmill Lane and St. Rose Parkway / Pecos Road. Another project to implement improvements at the I-11/I-515/I-215 interchange is at the later stages of planning by the City and NDOT.

This *I-215 Widening (Pecos Road to Stephanie Street) – Feasibility Study* (Project) evaluated the travel corridor along I-215 beginning west of the St. Rose Parkway / Pecos Road interchange and extending east to the Stephanie Street interchange. This Project

examined alternatives to address overall safety and mobility issues, serve existing and future needs; and improve traffic operations, travel time, and safety compared to a No-Action Alternative.

A *Traffic Operations and Forecasting Methodology Memorandum*[1] (Appendix A) was developed and submitted for the Project; this memorandum summarized the proposed methodology to be used for the traffic operations analyses and for the development of future year volumes for this Project. The Project team has completed traffic analysis to identify, evaluate, refine, and support improvements. The team has also completed comparative traffic operations analysis of the No-Action Alternative and the Build Alternative to evaluate the improvement in traffic operations. This Report documents the model calibration, forecasting of year 2050 volumes, and the results of the traffic analysis.

[1] The *Traffic Operations and Forecasting Methodology Memorandum* was submitted to NDOT on February 7, 2023, and was approved by NDOT Traffic Operations on February 7, 2023 and by NDOT Traffic Information on February 8, 2023.

2. MODELING LIMITS

The primary objective of the traffic analysis is to identify, evaluate, refine, and support improvements for the:

- I-215 freeway between St. Rose Parkway / Pecos Road and Stephanie Street
- I-215 interchange at St. Rose Parkway / Pecos Road and adjacent intersection(s) south of the interchange, leading up to the interchange
- I-215 interchange at Green Valley Parkway and adjacent intersection(s) south of the interchange

To support this objective, along the I-215 freeway, the Aimsun Next model subarea includes I-215 from west of Eastern Avenue to east of Gibson Road.

The following intersections[2,3] are included within the Aimsun Next model subarea:

1. Eastern Avenue and I-215 WB (Signalized)
2. Eastern Avenue and I-215 EB (Signalized)
3. Pecos Road and Pebble Road (Signalized)
4. Pecos Road and I-215 WB (Signalized)
5. Pecos Road and I-215 EB (Signalized)
6. Pecos Road / St. Rose Parkway and Serene Avenue (Stop-controlled)
7. Pecos Road / St. Rose Parkway and Paseo Verde Parkway (Signalized)
8. Pecos Road / St. Rose Parkway and Coronado Center Drive (Signalized)
9. Pecos Road / St. Rose Parkway and Eastern Avenue (Signalized)
10. Green Valley Parkway and Corporate Circle North (Signalized)
11. Green Valley Parkway and Corporate Circle South (Stop-controlled)
12. Green Valley Parkway and I-215 (Signalized)
13. Green Valley Parkway and Village Walk Drive (Signalized)

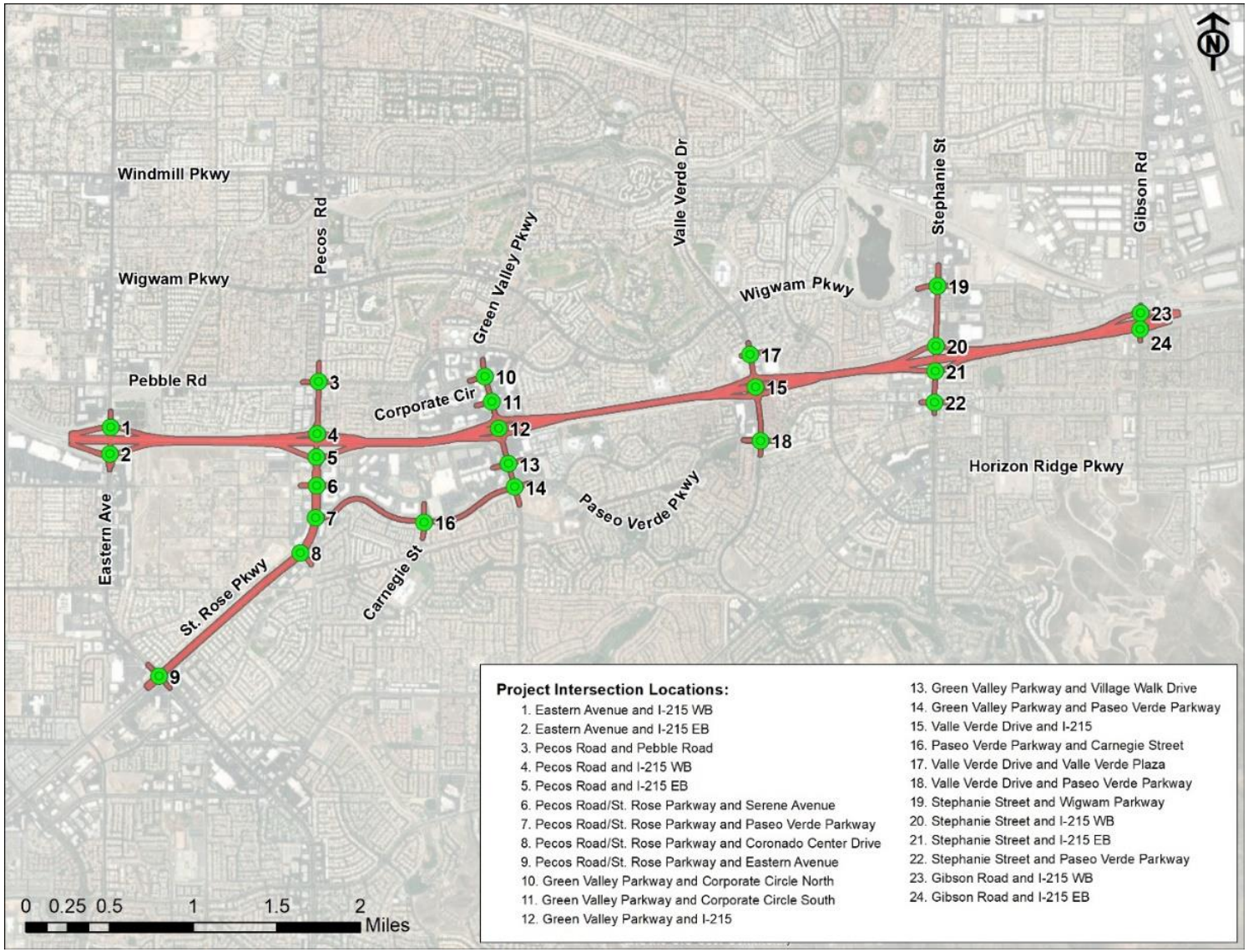
[2] Some of the intersections listed here are included in the Aimsun Next model subarea mainly to process the traffic to the study facilities in a more realistic manner. Therefore, traffic operations performance of these intersections were not evaluated.

[3] A larger geographical area is included in the Aimsun Next model subarea also because, once a subarea is defined in Aimsun Next, expanding the limits is challenging.

14. Green Valley Parkway and Paseo Verde Parkway (Signalized)
15. Valle Verde Drive and I-215 (Signalized)
16. Paseo Verde Parkway and Carnegie Street (Signalized)
17. Valle Verde Drive and Valle Verde Plaza (Signalized)
18. Valle Verde Drive and Paseo Verde Parkway (Signalized)
19. Stephanie Street and Wigwam Parkway (Signalized)
20. Stephanie Street and I-215 WB (Signalized)
21. Stephanie Street and I-215 EB (Signalized)
22. Stephanie Street and Paseo Verde Parkway (Signalized)
23. Gibson Road and I-215 WB (Signalized)
24. Gibson Road and I-215 EB (Signalized)

The modeling limits are shown in Figure 1.

Figure 1: Modeling Limits



3. TECHNICAL GUIDANCE, STANDARDS, AND TOOLS

The following technical documents and guidelines were the key references used in the traffic analysis and modeling of this Project:

- Aimsun Next Modeling Guidelines, NDOT, 2018
- Traffic Forecasting Guidelines, NDOT, 2012
- Regional Transportation Commission of Southern Nevada's (RTCSNV) currently adopted travel demand model[4]
- 2017 Aimsun Next Model Development and Calibration Report (Appendix C of NDOT SNTS Final Report), 2018
- National Performance Management Research Data Set (NPMRDS) available through the Regional Integrated Transportation Information System (RITIS), University of Maryland CATT Lab
- Highway Capacity Manual 7th Edition, Transportation Research Board, 2022

Traffic modeling was completed using Aimsun Next. Traffic signal timings for the intersections for future year conditions were optimized using Synchro and used in Aimsun Next as a starting point. Final traffic operations analysis results are reported from Aimsun Next. Appendix B of this memorandum contains the electronic files for the Aimsun Next model.

[4] At the time of preparation of this document, the "RTC 2015 Regional Travel Demand Model," with a base year of 2015 and a latest horizon year of 2050, is the latest adopted regional travel demand model.

4. ANALYSIS SCENARIOS, MODELING PERIODS, AND MULTIPLE TIME PERIODS

4.1. Analysis Scenarios

Aimsun Next microscopic simulation modeling was completed for the following scenarios:

- Existing conditions (year 2021 – for calibration to existing conditions)
- Future year 2050 No-Action Alternative
- Future year 2050 Build Alternative(s)

The Aimsun Next scenarios for this Project were developed using the Southern Nevada Aimsun Next model provided by NDOT. A new *"I-215 Pecos/Green Valley FS Expanded"* subarea was created for this Project to include the limits described in Section 2.

The year 2050 No-Action Alternative (within this Project's subarea) corresponds to the RTC's currently adopted year 2050 Regional Transportation Plan (RTP) network. Several improvement options were evaluated (see Section 6) for the roadway facilities listed in Section 2. Based on the effectiveness of the improvements options and their ability to complement each other to improve the corridor operations as a whole, the improvement options were combined to create two Build Alternatives. Therefore, the Build Alternatives' network corresponded to the 2050 No-Action Alternative network with the proposed improvements incorporated on top of it. Table 1 shows a summary/comparison of the Build Alternatives; the improvement options included in each Build Alternative are listed here. Further details of these improvement options are included in Section 6.

Table 1: Summary/Comparison of Build Alternatives' Improvements

Location	Build Alternative 1	Build Alternative 2
I-215 between the Pecos Road / St. Rose Parkway interchange and the Green Valley Parkway interchange	Braided ramps	Auxiliary lanes
I-215 / Green Valley Parkway interchange	Upgraded Single Point Urban Interchange (SPUI)	Diverging Diamond Interchange (DDI)
St. Rose Parkway / Paseo Verde Parkway	Intersection improvements (lane additions)	
Northbound St. Rose Parkway leading up to the I-215 interchange	Improvements to extend the right-turn lanes feeeding onto Eastbound I-215	
I-215 / St. Rose Parkway / Pecos Road interchange	Interchange improvements (lane additions)	
I-215 east of Green Valley Parkway	Add two lanes in each direction and associated ramp improvements	
Green Valley Parkway / Village Walk Drive	Pedestrian grade separation to cross Green Valley Parkway (north of Village Walk Drive)	

4.2. Modeling Periods and Multiple Time Periods

The RTC's regional TransCAD travel demand model includes two-hour AM peak (7:00 AM – 9:00 AM) and PM peak (4:00 PM – 6:00 PM) period origin-destination (OD) matrices. These OD matrices were the basis of the Aimsun Next modeling. The Aimsun Next modeling periods for this Project matched the peak periods from the RTC's regional travel demand model. Therefore, the Aimsun Next modeling periods are a two-hour AM peak (7:00 AM – 9:00 AM) and a two-hour PM peak (4:00 PM – 6:00 PM) period. Microsimulation warm-up period of 15 minutes was used for both the AM and the PM peak periods of modeling. Aimsun Next modeling reflected a 15-minute time-varying profile in demand; therefore, each peak period is represented by eight 15-minute periods.

5. AIMSUN NEXT MODELING – METHODOLOGY AND ASSUMPTIONS

Aimsun Next modeling was completed following the methodology and assumptions explained and approved in the *Traffic Operations and Forecasting Methodology Memorandum* (Appendix A).

5.1. Development of the Year 2021 Aimsun Next Model

The modeling limits for this Project correspond to a new subarea ("*I-215 Pecos/Green Valley FS Expanded"* subarea) within the Southern Nevada Aimsun Next model. This new subarea focuses on the freeway sections and intersections listed in Section 2 and shown in Figure 1. All modeling for this Project was completed within this new subarea.

The following are the assumptions and key steps completed for developing the year 2021 model:

1. This Project's subarea was created within the Southern Nevada Aimsun Next model; this subarea was replicated in the RTC's TransCAD travel demand model as well.
2. Year 2020 OD matrices for the AM and PM peak periods, corresponding to this subarea were extracted from the RTC's TransCAD travel demand model. A nominal growth rate of one percent[5] was applied to the year 2020 OD matrices to obtain the year 2021 matrices (to correspond to the Existing Conditions scenario of this Project).
3. The year 2021 OD matrices developed in the previous step were the seed matrices for use in Aimsun Next. These seed matrices were refined through the static and dynamic calibration process in Aimsun Next. The calibration process is described in further detail in Section 5.2.
4. The subarea OD matrices developed after calibration (Step 3), were used to develop and run Static Assignment and Dynamic scenarios for the year 2021 existing conditions.
5. Existing lane configuration and traffic control information was obtained through aerial maps.

[5] A growth rate of approximately one percent was calculated for the Project area using historical count data from NDOT's short-term count stations.

6. The existing traffic signal phasing and timing obtained from RTC FAST were modeled in Aimsun Next.
7. Microsimulation scenarios were run 10 times (replications) and the results reported are based on an average of the 10 runs.

After the base model was developed, error checking was conducted before calibration. A completed "Coded Input Data Checklist" is shown in Table 2.

Table 2: Error Checking - Coded Input Data Checklist

Item	Check
Check time periods and durations to ensure all time periods are specified correctly	✓
Verify warm-up period is long enough for network to become fully loaded	✓
Check basic network connectivity (are all connections present?)	✓
Check link geometry (lengths, number of lanes, free flow speed, facility type, curves, etc.)	✓
Check intersection controls (control type, control data)	✓
Check data pertaining to ramp meters, HOV lanes and other special lanes/requirements	N/A
Check data pertaining to traffic operations and management (incidents, parking, bus operations)	N/A
N/A = Not applicable	

5.2. Calibration of the Year 2021 Model

5.2.1. Calibration Measures of Effectiveness (MOEs) and Targets

Volumes and Speeds were the selected MOEs for calibration. The desired calibration targets for the calibration MOEs are listed in Table 3.

Table 3: Calibration Targets for Acceptable Match

Calibration MOE	Calibration Criteria and Measures	Calibration Target
Volume	Individual Link and Turn Flows: Within 100 veh/h, for Flow < 700 veh/h Within 15%, for 700 veh/h < Flow < 2700 veh/h Within 10%, for 2700 veh/h < Flow < 5000 veh/h Within 250 veh/h, for Flow > 5000 veh/h	 > 85% of cases > 85% of cases > 85% of cases > 85% of cases
	Sum of All Link and Turn Flows	Within 5%
	GEH Statistic < 5 for Individual Link and Turn Flows	> 85% of cases
	GEH Statistic < 10 for Individual Link and Turn Flows	100% of cases
Speed	Absolute difference between field observed Speeds and Aimsun Next model simulated Speeds for select locations along the freeway: within 10 mph	> 85% of cases

5.2.2. Volume Calibration and Development of Traffic Demand

Existing field link volumes and intersection turning movement volumes for volume calibration were compiled from:

- NDOT's short-term count stations and ATRs
- Intersection turning movement volume counts observed as part of this Project and counts observed as part of NDOT's SNTS

Because of the uncertainty and the potential changes in traffic patterns due to the COVID-19 pandemic, the extent of data collection (intersection turning movement counts) as part of this Project was limited to nine[6] out of the 24 intersections shown in Figure 1. Year 2017 counts at several intersections within the modeling limits were avail

[6] Field data collection along the I-215 freeway and ramps was completed on June 16, 2021. Field data collection at the nine intersections was completed on June 23, 2021. The field data collection for the intersections was scheduled for June 16, 2021 (to coincide with the freeway data collection). However, this could not be completed and had to be rescheduled due to a heat wave (during the week of June 13th) and unsafe conditions in the field.

able from a previous study (NDOT's SNTS); these counts were used to supplement the data collected for this Project.

Following data collection in the field, the counts were reviewed to identify changes in traffic levels/patterns. The year 2017 intersection counts from NDOT's SNTS were used as reference in this review. The year 2017 counts from SNTS were factored[7] up to year 2021 volumes using historical growth rates and factors from NDOT's ATR and short-term count station reports. These volumes represent non/pre-COVID set of estimated volumes. Year 2021 volumes observed in the field were generally lower (due to the COVID-19 pandemic) than the non/pre-COVID volumes. Correction factors[8] were calculated and applied to the year 2021 volumes (where needed). In general, the year 2017 counts from SNTS (factored to year 2021) were used where available and the counts observed in the field in year 2021 were used where appropriate to fill-in the data gaps. The volumes from the different years/sources were balanced and used for volume calibration.

The seasonally adjusted count data (7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM) were compiled at both a 15-minute aggregation interval and a two-hour interval and used for OD matrix adjustment in the model. A Static OD Adjustment Experiment was first run to adjust the two-hour OD matrices using the two-hour field count data. The resultant adjusted two-hour OD matrices were then used as input to a Static OD Departure Adjustment Experiment; the 15-minute field count data was used as the basis for this adjustment experiment. This Departure Adjustment Experiment produced 15-minute OD matrices, thus imparting a time-varying "profile" to the demand. These steps were repeated once for the AM period and again for the PM period. At the end of this process, the refined OD matrices produced freeway mainline and ramp volumes in the model that resembled the field counts. Appendix C includes the AM and PM peak period volume calibration results.

[7] A growth rate of approximately one percent was calculated for the Project area using historical count data from NDOT's short-term count stations. Applying relevant seasonal factors, a 1.07 factor was calculated to obtain year 2021 volumes from SNTS' year 2017 volumes.

[8] The correction factors were determined by comparing the year 2017 (SNTS) volumes (factored up for year 2021) and the year 2021 volumes (observed as part of this Project) at the few intersections where both these volumes are available.

5.2.3. Speed Calibration

Speed data along I-215 was available for speed calibration from RITIS. Speed data for a typical weekday (Thursday) June 20, 2019[9] for the following segments (both directions) were obtained for speed calibration:

- I-215 between Eastern Avenue and St. Rose Parkway / Pecos Road
- I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway
- I-215 between Green Valley Parkway and Valle Verde Drive

The field speeds and model speeds for every 15-minute period within the modeling periods were compared for speed calibration. Appendix D includes the AM and PM peak period speed calibration results. During the AM peak period, the model speeds closely match the field observed speeds at all locations and the absolute difference between the speeds is within 10 mph at all locations. During the PM peak period, the model speeds closely match the field observed speeds at all locations except at I-215 EB between Green Valley Parkway and Valle Verde Drive. At this location, the absolute difference between the speeds is greater than 10 mph (10.7 mph). At this location, it is noted that the congestion is replicated in the model in a different 15-minute period than in the field; however, the speed chart (included in Appendix D) shows a similar pattern between the field and model speeds[10]. Overall, the severity and extents of congestion is replicated in the model; therefore, the model is considered suitable for evaluating and comparing future alternatives.

5.2.4. Modified Calibration Parameters

The calibration process was iterative and involved comparing model outputs with the field MOEs, and then adjusting calibration parameters until an acceptable match was achieved. Appendix E lists the adjustments made to the model, the specific location of these adjustments, and the rationale behind the adjustments.

[9] To correspond to non/pre-COVID volumes and to correspond to the same season as the volume data.

[10] The volume and speed data were assembled from different sources over different years and seasons. As a result, obtaining a perfect match between the model and field speeds in unrealistic.

5.3. Development of the Future Year 2050 Aimsun Next Model

5.3.1. Design Year (2050) Peak Hour Volumes

The year 2050 No-Action Alternative and Build Alternative (microsimulation level-of-detail) networks were modeled in Aimsun Next, and the changes to calibration parameters (from the base year 2021 model – listed in Appendix E) were replicated in these future year networks. Roadway network changes corresponding to the future year network were coded as Geometry Configurations in Aimsun Next; changes were made only within this Project's limits. No changes were made to the Aimsun Next roadway network outside of this Project's limits.

The following series of steps were completed to develop the year 2050 No-Action Alternative and Build Alternative scenarios in the Aimsun Next model. These steps were repeated twice, once for the AM modeling period and again for the PM period:

1. Similar to the year 2020 OD matrices, year 2050 OD matrices for the *"I-215 Pecos/Green Valley FS Expanded"* subarea were also extracted from the RTC's TransCAD model.
2. The adjustments made to the year 2021 OD matrices as part of the calibration process were replicated in the year 2050 OD matrices. This was accomplished using the "Pivot-Point Method" utilized in NDOT SNTS.
3. The time-varying "profile" of the year 2021 traffic demand was applied to the year 2050 demand. With this, traffic demands were available for the two-hour modeling period with a time-varying "profile," with the demand varying every 15 minutes.
4. The year 2050 OD matrices, obtained in the previous step, were used to develop and run all the future year Static Assignment and Dynamic scenarios (year 2050 No-Action Alternative and Build Alternatives).
5. For documentation, a peak one-hour (7:30 AM to 8:30 AM for the AM period and 4:30 PM to 5:30 PM for the PM period) demand was also created. The macroscopic static assignment was run using this peak hour demand to develop the year 2050

peak hour static assigned volumes. These year 2050 peak hour volumes are shown in Figure 2 through Figure 7 and are the traffic forecasts[11] for the Project.

6. Traffic signal timings for the year 2050 No-Action and Build Alternatives were optimized in Synchro and used in Aimsun Next. Further minor adjustments to traffic signal timings were made within Aimsun Next; these adjustments were based on visual observations and engineering judgment.
7. For the year 2050 No-Action and Build Alternatives, appropriate Static and Dynamic calibration parameters were coded based on the calibration parameter values in the year 2021 Static and Dynamic scenarios.
8. Ten replications (runs) were operated for the Dynamic scenarios and the average results from these replications are reported.

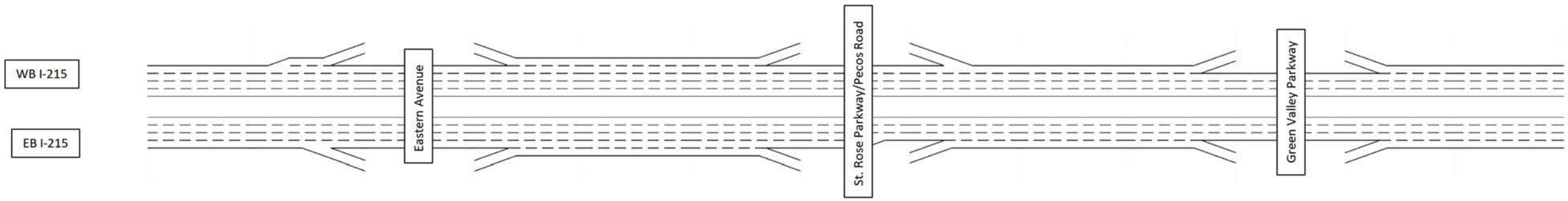
5.3.2. AADT and Heavy Vehicles Forecast

AADT forecasts were developed for the year 2050 No-Action Alternative and the Build Alternative, using the peak hour volumes presented in Figure 2, Figure 3, and Figure 4. A K_{30} of 7.76 percent (from NDOT ATR #0031250 [IR215 0.2 miles east of Eastern Avenue Interchange]) was used to determine the AADT. The AADT forecasts are presented in Appendix G. The heavy vehicles percentage for future year conditions for the Project was calculated based on the trips in the "Truck" OD matrices and the trips in OD matrices for all vehicle types, developed for the *"I-215 Pecos/Green Valley FS Expanded"* subarea. Note that the OD matrices for this Project were developed based on the RTC's regional travel demand model. The heavy vehicles percentage for future year conditions (the year 2050 No-Action Alternative and Build Alternatives) is estimated to be three percent for the AM and the PM peak periods.

[11] Appendix F includes the peak hour intersection turning movement volumes for all intersections included within the modeling limits.

Figure 2: Year 2050 No-Action Alternative Freeway Peak Hour Volumes

Year 2050 AM Demand Volume (vph)	8,360	1,330	7,030	1,180	8,210	800	7,410	1,730	9,130	1,420	7,720	1,830	9,550
Year 2050 PM Demand Volume (vph)	7,560	1,280	6,280	1,390	7,670	1,050	6,620	1,920	8,530	1,110	7,420	1,360	8,780

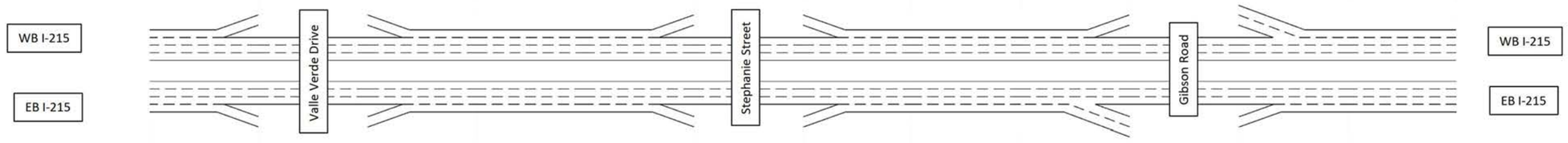


Year 2050 AM Demand Volume (vph)	6,620	1,360	5,260	1,290	6,550	750	5,800	2,160	7,960	1,350	6,610	1,000	7,610
Year 2050 PM Demand Volume (vph)	8,040	1,350	6,700	1,550	8,240	800	7,450	1,940	9,380	1,060	8,320	1,780	10,100

Legend: On/Off ramp

Note: Volumes may not be balanced due to rounding

Year 2050 AM Demand Volume (vph)	1,030	8,520	520	9,040	1,530	7,510	850	8,360	1,390	6,970	420	7,390
Year 2050 PM Demand Volume (vph)	650	8,140	670	8,800	1,810	6,990	880	7,880	1,340	6,540	450	6,990



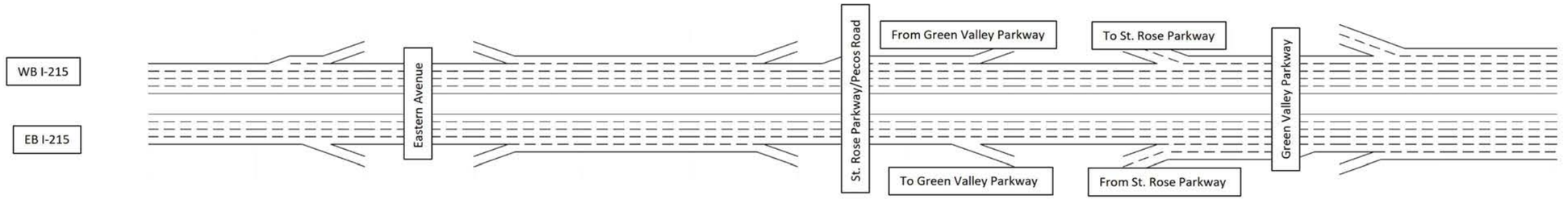
Year 2050 AM Demand Volume (vph)	560	7,050	470	7,520	1,280	6,240	750	6,990	1,150	5,830	710	6,550
Year 2050 PM Demand Volume (vph)	1,180	8,920	500	9,420	1,840	7,590	1,010	8,590	1,230	7,360	650	8,010

Legend: On/Off ramp

Note: Volumes may not be balanced due to rounding

Figure 3: Year 2050 Build Alternative 1 Freeway Peak Hour Volumes

Year 2050 AM Demand Volume (vph)	8,360	1,330	7,030	1,220	8,250	790	7,460	930	6,530	1,640	8,170	1,380	9,550
Year 2050 PM Demand Volume (vph)	7,560	1,280	6,280	1,510	7,790	1,040	6,750	910	5,840	1,740	7,570	1,210	8,780

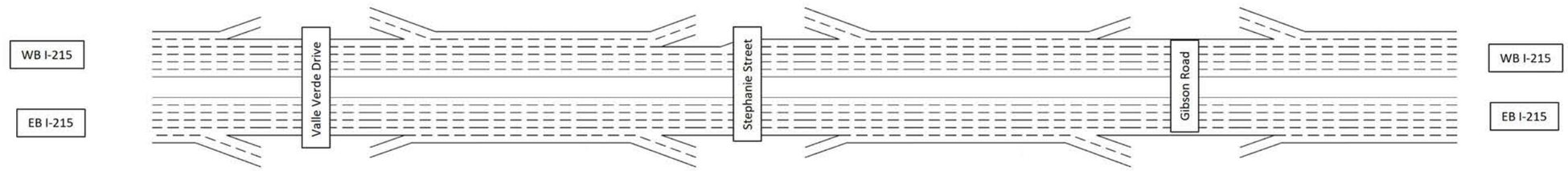


Year 2050 AM Demand Volume (vph)	6,620	1,360	5,260	1,330	6,590	790	5,800	940	4,860	1,750	6,610	1,000	7,610
Year 2050 PM Demand Volume (vph)	8,040	1,350	6,700	1,670	8,370	870	7,490	850	6,650	2,040	8,680	1,420	10,100

Legend: On/Off ramp

Note: Volumes may not be balanced due to rounding

Year 2050 AM Demand Volume (vph)	1,030	8,520	520	9,040	1,530	7,510	850	8,360	1,390	6,970	420	7,390
Year 2050 PM Demand Volume (vph)	650	8,140	670	8,800	1,810	6,990	880	7,880	1,340	6,540	450	6,990



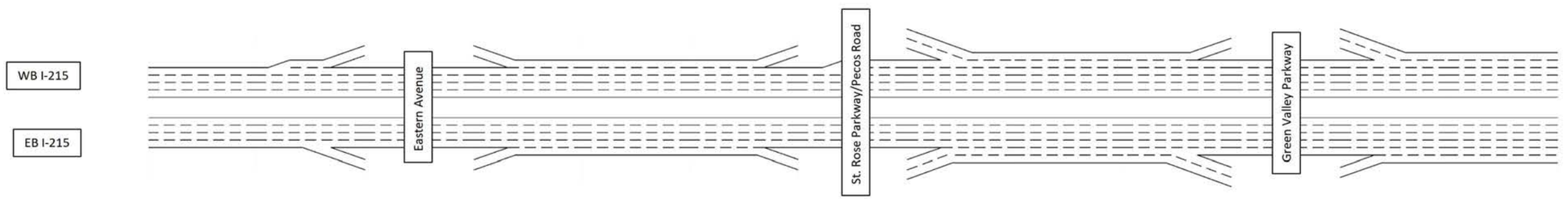
Year 2050 AM Demand Volume (vph)	560	7,050	470	7,520	1,280	6,240	750	6,990	1,150	5,830	710	6,550
Year 2050 PM Demand Volume (vph)	1,180	8,920	500	9,420	1,840	7,590	1,010	8,590	1,230	7,360	650	8,010

Legend: On/Off ramp

Note: Volumes may not be balanced due to rounding

Figure 4: Year 2050 Build Alternative 2 Freeway Peak Hour Volumes

Year 2050 AM Demand Volume (vph)	8,360	1,330	7,030	1,170	8,200	780	7,410	1,920	9,330	1,240	8,090	1,460	9,550
Year 2050 PM Demand Volume (vph)	7,560	1,280	6,280	1,320	7,600	980	6,620	2,080	8,700	1,130	7,570	1,210	8,780

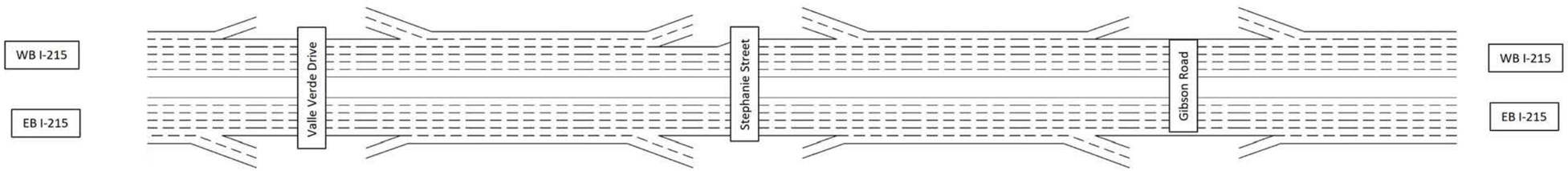


Year 2050 AM Demand Volume (vph)	6,620	1,360	5,260	1,280	6,540	750	5,800	2,170	7,960	1,350	6,610	1,000	7,610
Year 2050 PM Demand Volume (vph)	8,040	1,350	6,700	1,480	8,180	710	7,470	2,290	9,760	1,080	8,680	1,420	10,100

Legend: On/Off ramp

Note: Volumes may not be balanced due to rounding

Year 2050 AM Demand Volume (vph)	1,030	8,520	520	9,040	1,530	7,510	850	8,360	1,390	6,970	420	7,390
Year 2050 PM Demand Volume (vph)	650	8,140	670	8,800	1,810	6,990	880	7,880	1,340	6,540	450	6,990

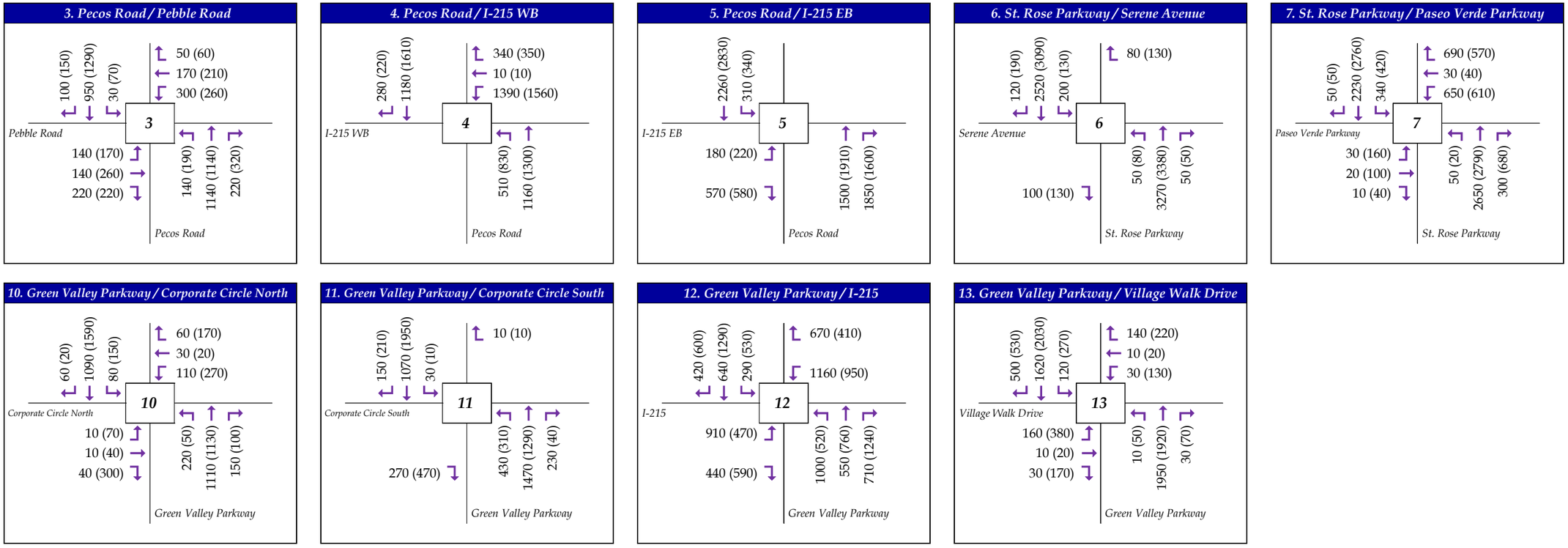


Year 2050 AM Demand Volume (vph)	560	7,050	470	7,520	1,280	6,240	750	6,990	1,150	5,830	710	6,550
Year 2050 PM Demand Volume (vph)	1,180	8,920	500	9,420	1,840	7,590	1,010	8,590	1,230	7,360	650	8,010

Legend: On/Off ramp

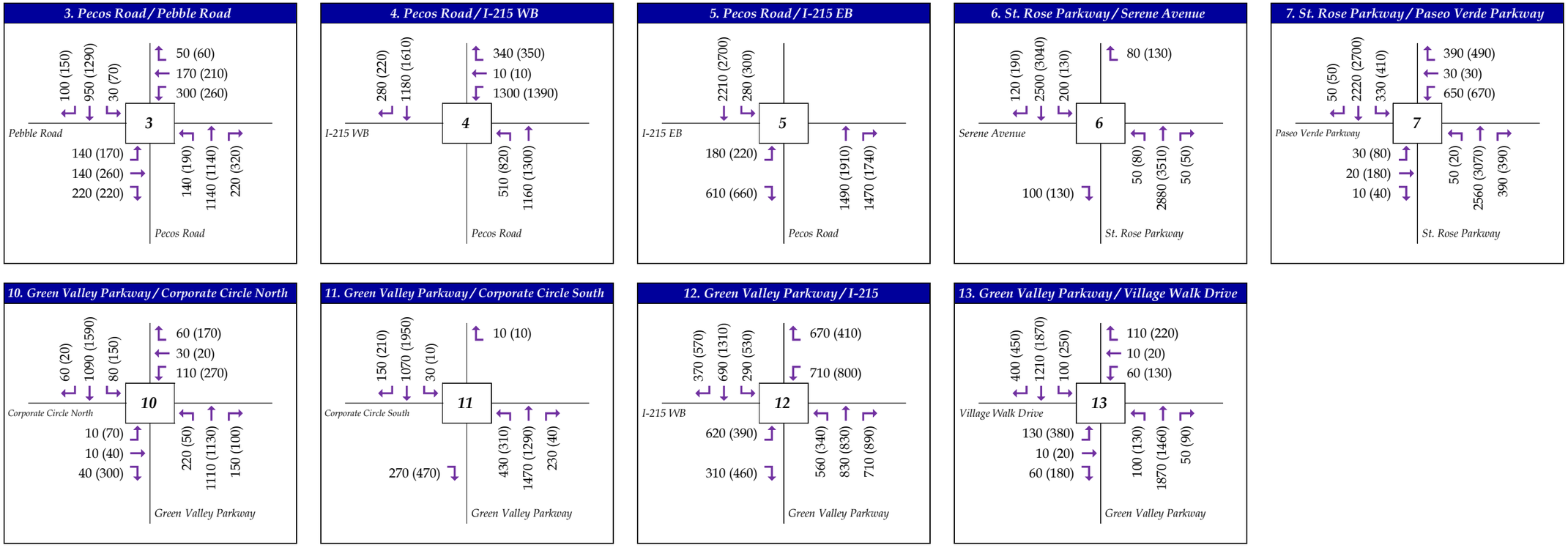
Note: Volumes may not be balanced due to rounding

Figure 5: Year 2050 No-Action Alternative Intersection Peak Hour Volumes



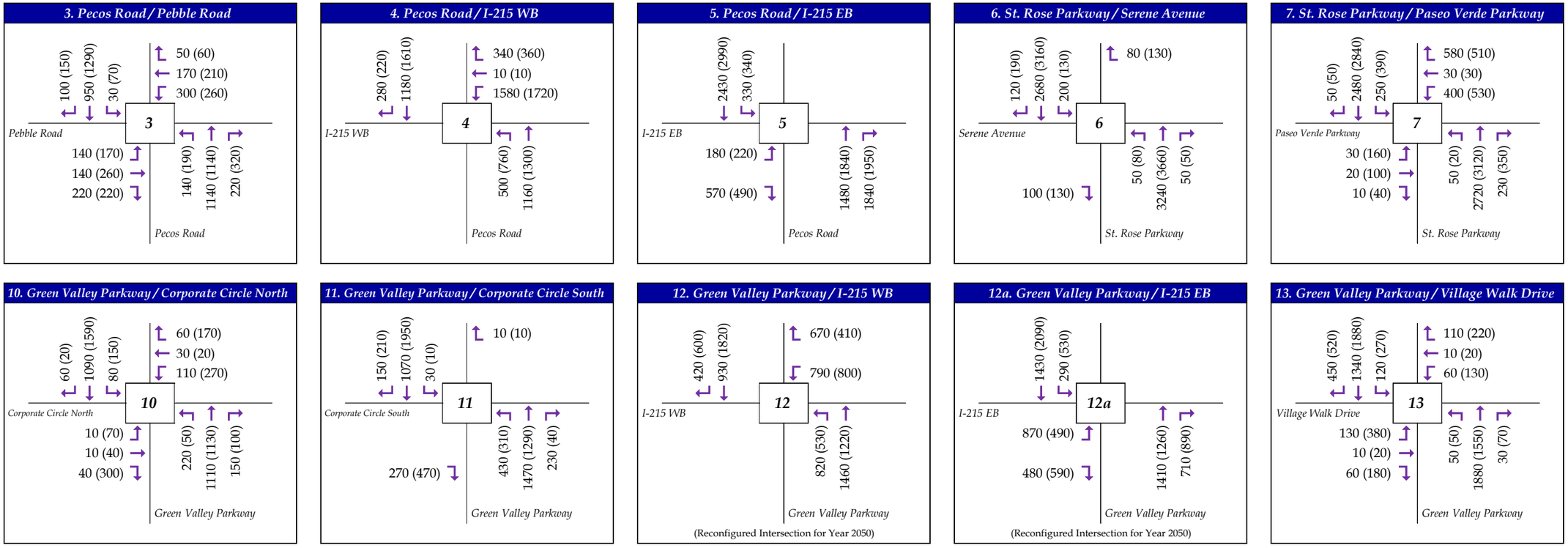
Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

Figure 6: Year 2050 Build Alternative 1 Intersection Peak Hour Volumes



Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

Figure 7: Year 2050 Build Alternative 2 Intersection Peak Hour Volumes



Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

6. TRAFFIC ANALYSIS RESULTS

Sections 6.1 through 6.5 discuss the improvement options that were evaluated for the roadway facilities listed in Section 2 and the corresponding traffic analysis results. Based on the evaluation, the improvements were prioritized and grouped to constitute the Build Alternatives described in Section 4.1.

6.1. I-215 / St. Rose Parkway / Pecos Road Interchange

The proposed improvements at the I-215 / St. Rose Parkway / Pecos Road Interchange include:

- Widening the westbound off-ramp (to two lanes)
- Adding a third lane for the westbound left-turn movement
- Adding a second lane for the eastbound right-turn movement
- Widening the eastbound on-ramp (to two lanes)
- Adding dedicated receiving lanes to the eastbound on-ramp such that the northbound right-turn movement can operate without any conflict from other vehicular movements

These improvements are shown in Figure 8. Figure 10 and Figure 11 show the intersection delays for the year 2050 AM and the PM peak hours, comparing the No-Action Alternative (without the proposed improvements) and the Build Alternative[12] (with the proposed improvements). At the interchange, the proposed improvements are expected to result in significant improvements in intersection delay. At the St. Rose Parkway / Pecos Road / I-215 EB intersection, improvements to the high-volume northbound right-turn movement (in addition to the other improvements listed above) significantly reduces the intersection delay. At the St. Rose Parkway / Pecos Road / I-215 WB intersection, during the PM peak hour, a similar reduction in intersection delay is expected because of the proposed improvements to the high-volume westbound left-turn movement. During the AM peak hour, however, the improvements do not show a reduction in intersection delay; this is because the freeway bottlenecks limit the number of vehicles that can reach this intersection in the No-Action Alternative, resulting in comparable intersection delay to the Build Alternative.

[12] Modeling scenario assumes that the improvements to the other study facilities generally correspond to the improvements identified as Build Alternative 2.

6.2. St. Rose Parkway / Paseo Verde Parkway

The proposed improvements at the St. Rose Parkway / Paseo Verde Parkway intersection include:

- Modifying one of the westbound through lanes to be a third westbound left-turn lane
- Modifying the other westbound through lane to be a shared westbound through / westbound right-turn lane[13]
- Extending the right-turn lanes (along St. Rose Parkway) feeding onto eastbound I-215 to improve lane-positioning to access the freeway. This improvement extends from the I-215 / St. Rose Parkway / Pecos Road interchange to south of the Paseo Verde Parkway intersection

These improvements are shown in Figure 9. Figure 10 and Figure 11 show the intersection delays for the year 2050 AM and the PM peak hours, comparing the No-Action Alternative (without the proposed improvements) and the Build Alternative[14] (with the proposed improvements). From Figure 10 and Figure 11, the proposed improvements are expected to result in significant (greater than 50 percent) reduction in intersection delays in both the AM and the PM peak hours.

[13] To accommodate this improvement, the east-west crosswalk (to cross St. Rose Parkway) on the northern side of the intersection will be removed.

[14] Modeling scenario assumes that the improvements to the other study facilities generally correspond to the improvements identified as Build Alternative 2.

Figure 8: I-215 / St. Rose Parkway / Pecos Road Interchange Improvements

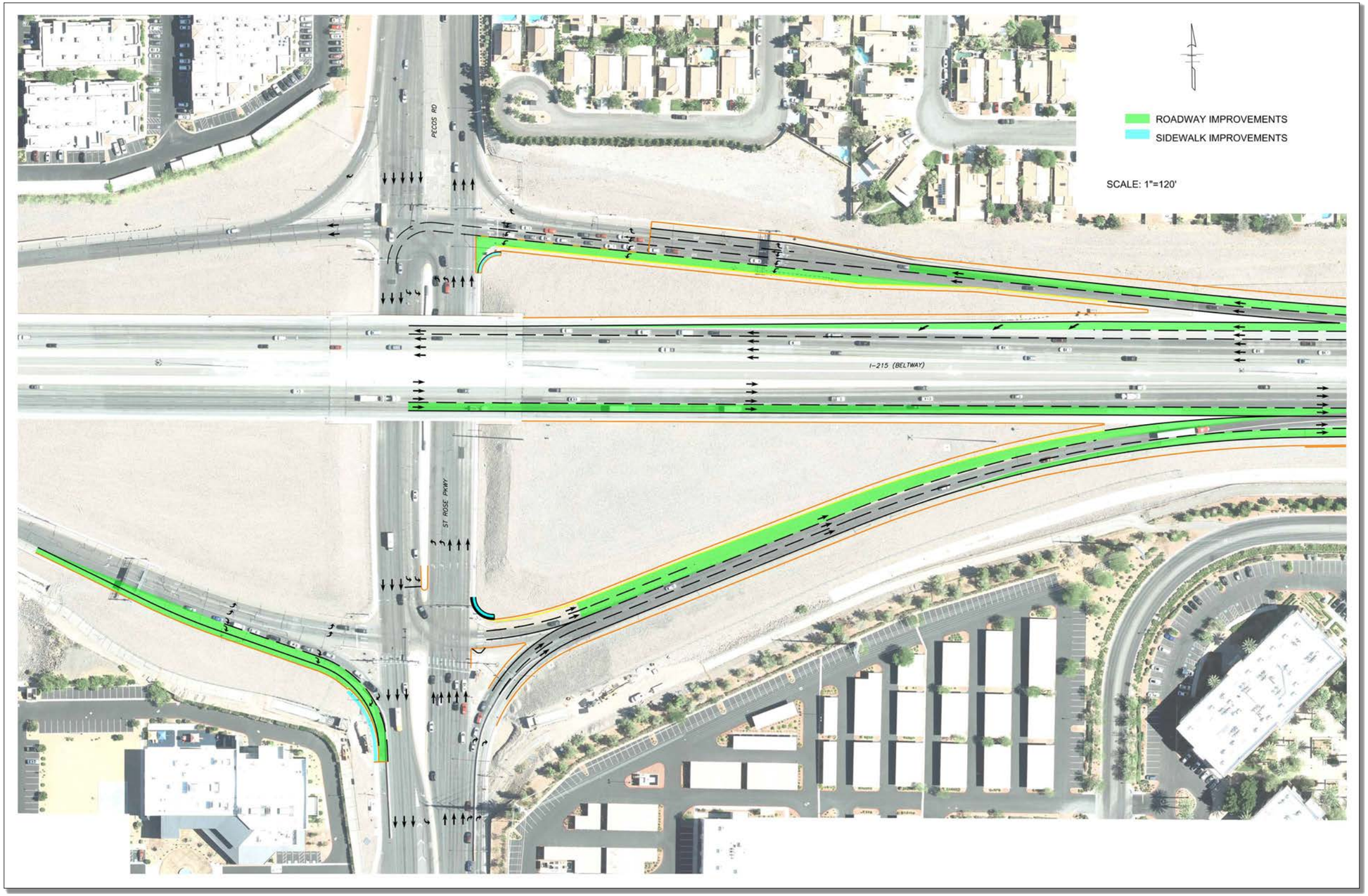


Figure 9: St. Rose Parkway / Paseo Verde Parkway Improvements

Figure 10: Intersection Delay Comparison – St. Rose Parkway / Pecos Road – Year 2050 AM Peak Hour

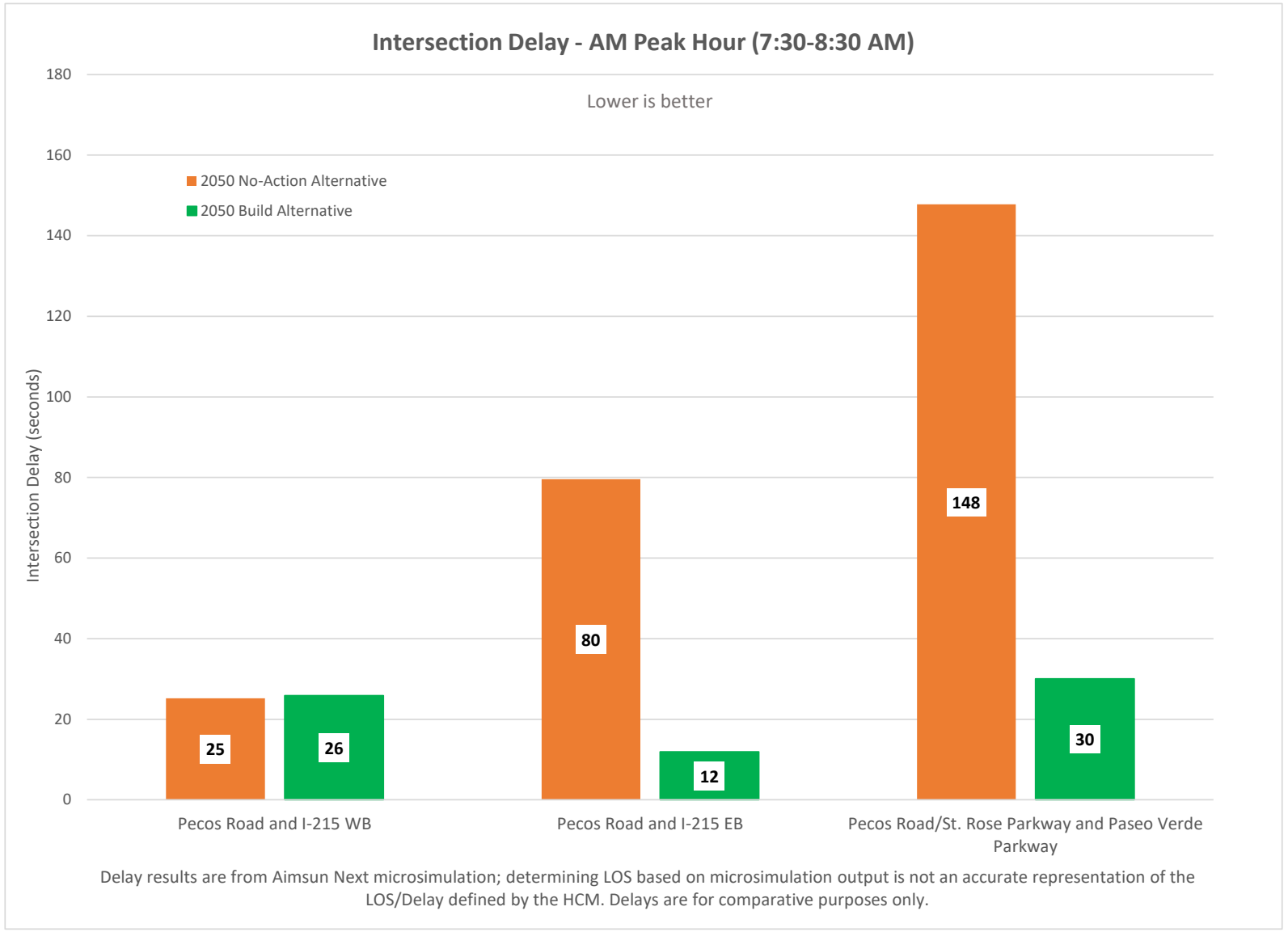
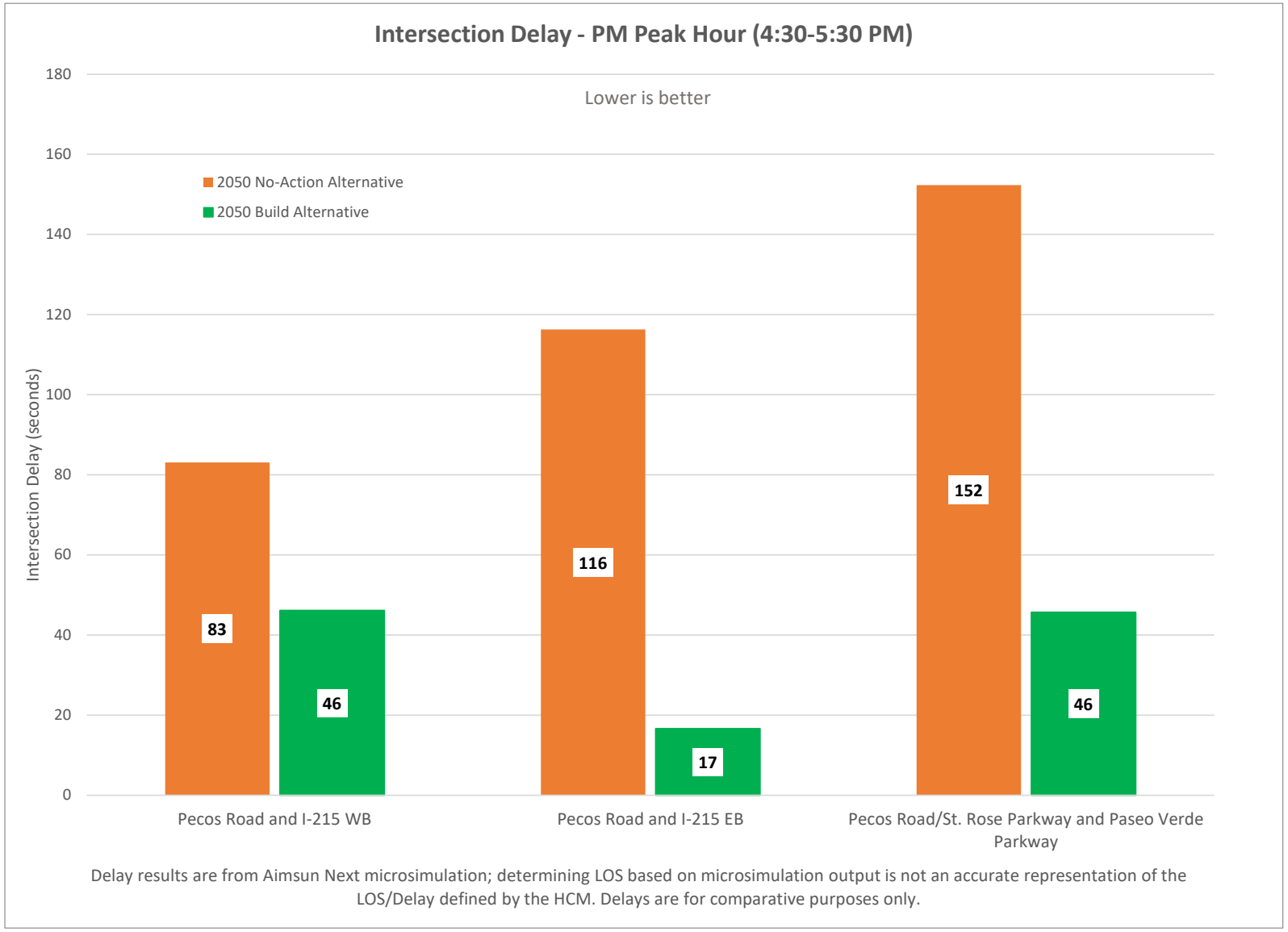


Figure 11: Intersection Delay Comparison – St. Rose Parkway / Pecos Road – Year 2050 PM Peak Hour



6.3. I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway

Figure 12 and Figure 13 show the improvement options evaluated for I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway. The improvement options include ramp braids (Figure 12) between the interchanges and lane additions / auxiliary lanes (Figure 13) between the interchanges. Figure 14 and Figure 15 show the year 2050 freeway speeds for the AM and the PM peak periods. Speeds are shown for I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway and for the wider corridor[15]. Both options are expected to alleviate the existing bottleneck between the interchanges, resulting in reasonably high speeds of operation (faster than 45 mph) throughout the corridor.

With the auxiliary-lanes option, the existing weaving segment between the interchanges will still remain, resulting in slightly slower traffic operations (although still faster than 45 mph) compared to the braided-ramps option, where the weaving segment is eliminated. However, with the braided-ramps option, access[16] will not be available along I-215 to travel between St. Rose Parkway / Pecos Road and Green Valley Parkway. These vehicles would alternatively have to travel along arterial streets (such as Pebble Road, Paseo Verde Parkway, etc.), increasing the delay at intersections along these arterials. Furthermore, the braided-ramps option is expected to be more expensive to construct and maintain compared to the auxiliary lanes option. The braided-ramps option is also expected to have greater environmental impacts and require additional mitigation measures compared to the auxiliary lanes option.

[15] Modeling scenario assumes I-215 east of Green Valley Parkway has five general-purpose lanes (in each direction) and one auxiliary lane (in each direction) between interchanges (Figure 17).

[16] By year 2050, at least 200 vehicles per hour are expected to travel along I-215 between the interchanges in each direction, during both the AM and the PM peak hour.

Figure 12: I-215 Improvements between St. Rose Parkway / Pecos Road and Green Valley Parkway – Braided Ramps

Figure 13: I-215 Improvements between St. Rose Parkway / Pecos Road and Green Valley Parkway – Auxiliary Lanes

Figure 14: I-215 Freeway Speed Comparison – I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway – Year 2050 AM Peak Period

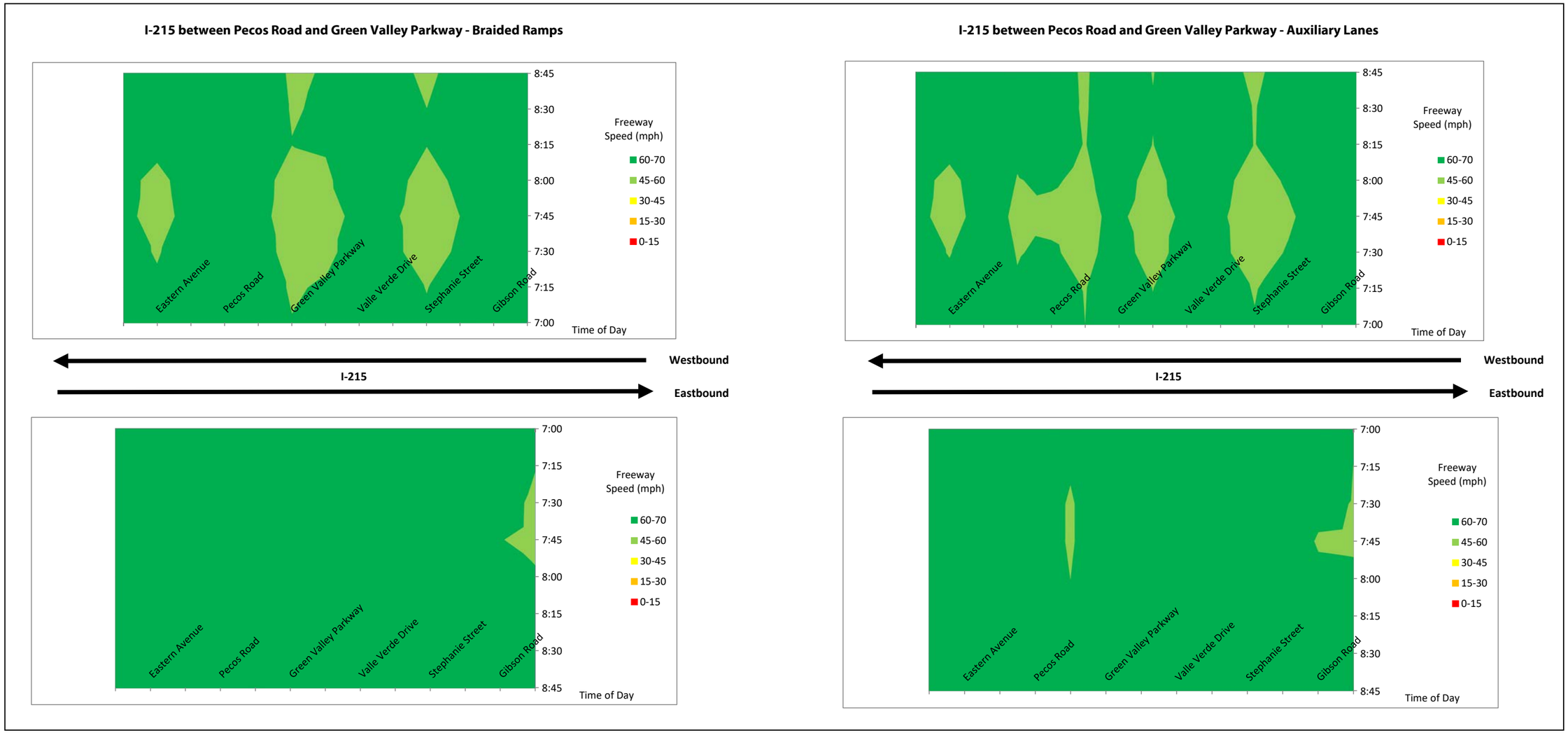
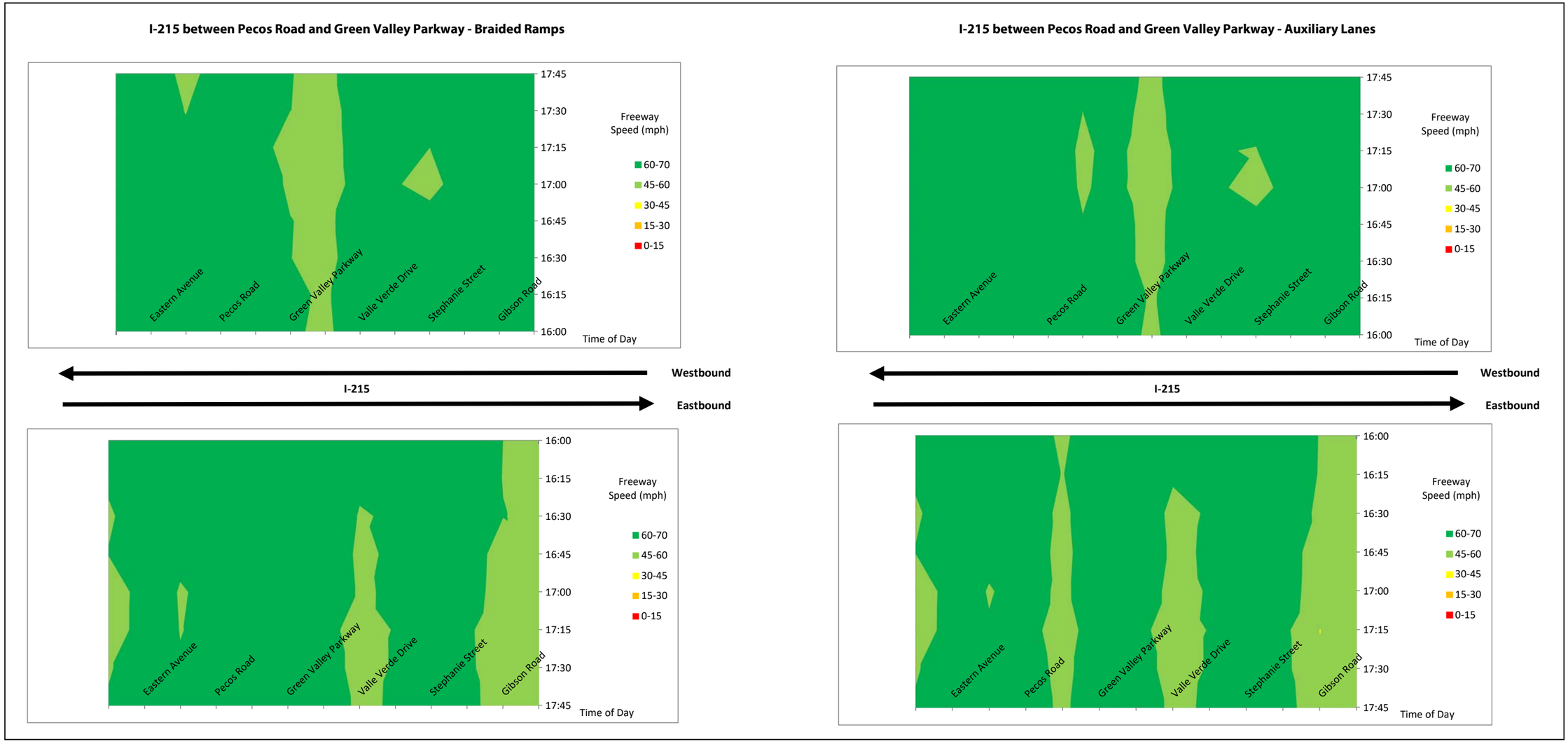


Figure 15: I-215 Freeway Speed Comparison – I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway – Year 2050 PM Peak Period



6.4. I-215 between Green Valley Parkway and Stephanie Street

Figure 16 and Figure 17 show the improvement options evaluated for I-215 between Green Valley Parkway and Stephanie Street. The I-215 corridor within this stretch currently includes three general-purpose lanes in each direction and an auxiliary lane in each direction between the interchanges. The improvement options include widening I-215 by one lane in each direction (Figure 16) and two lanes in each direction (Figure 17). Figure 18 and Figure 19 show the year 2050 freeway speeds for the AM and the PM peak periods. Speeds are shown for I-215 between Green Valley Parkway and Stephanie Street and for the wider corridor[17].

During the year 2050 AM peak period, both options are expected to operate relatively similarly – freeway travel speeds are usually higher than 45 mph; but it is noted that in the westbound direction, with the option to widen by one lane, a longer stretch of the freeway is expected to operate slower than 60 mph. During the year 2050 PM peak period, with the option to widen by one lane, severe bottlenecks and congestion was observed, especially in the eastbound direction. The queue build-up and congestion progressively worsened through the modeling period and did not begin to dissipate even by the end of the modeling period. In contrast, with the option to widen by two lanes, the freeway travel speeds are expected to be faster than 45 mph in both the AM and the PM peak periods.

Furthermore, with the improvement option to widen by two lanes in each direction, I-215 between Green Valley Parkway and Stephanie Street will have five general-purpose lanes in each direction and an auxiliary lane in each direction between the interchanges. This configuration would be consistent with the long-term improvements (without the need for lane-drops) being advanced as part of the Henderson (I-11/I-515/I-215) Interchange project[18].

[17] Modeling scenario assumes I-215 between St. Rose Parkway / Pecos Road and Green Valley Parkway includes lane additions / auxiliary lanes (Figure 13).

[18] The I-11/I-515/I-215 Interchange project is planning to construct improvements along I-215 from Stephanie Street east and along Lake Mead Parkway (east of Eastgate Road).

Figure 16: I-215 Improvements between Green Valley Parkway and Stephanie Street – One Additional Lane in Each Direction

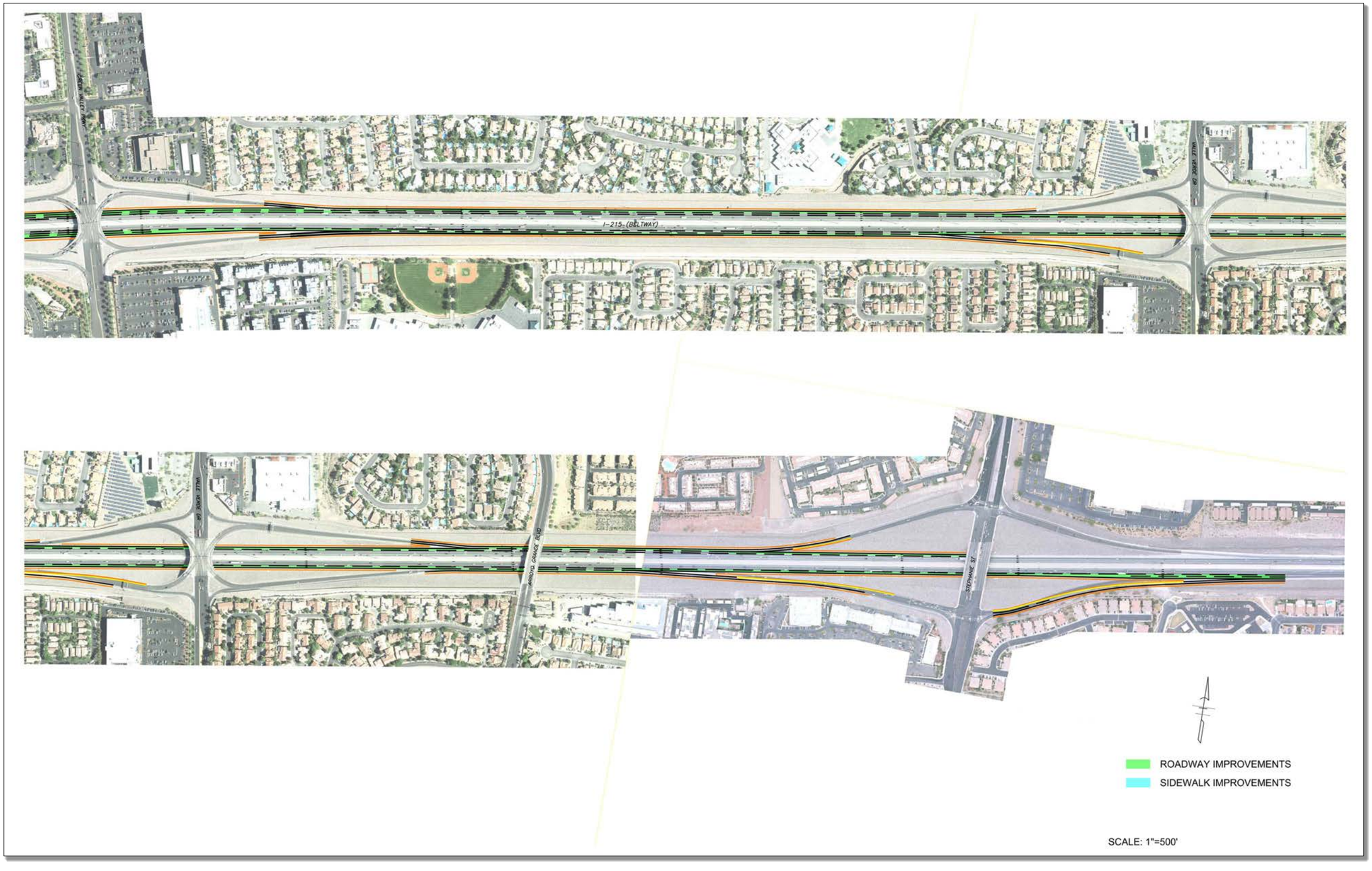


Figure 17: I-215 Improvements between Green Valley Parkway and Stephanie Street – Two Additional Lanes in Each Direction

Figure 18: I-215 Freeway Speed Comparison – I-215 between Green Valley Parkway and Stephanie Street – Year 2050 AM Peak Period

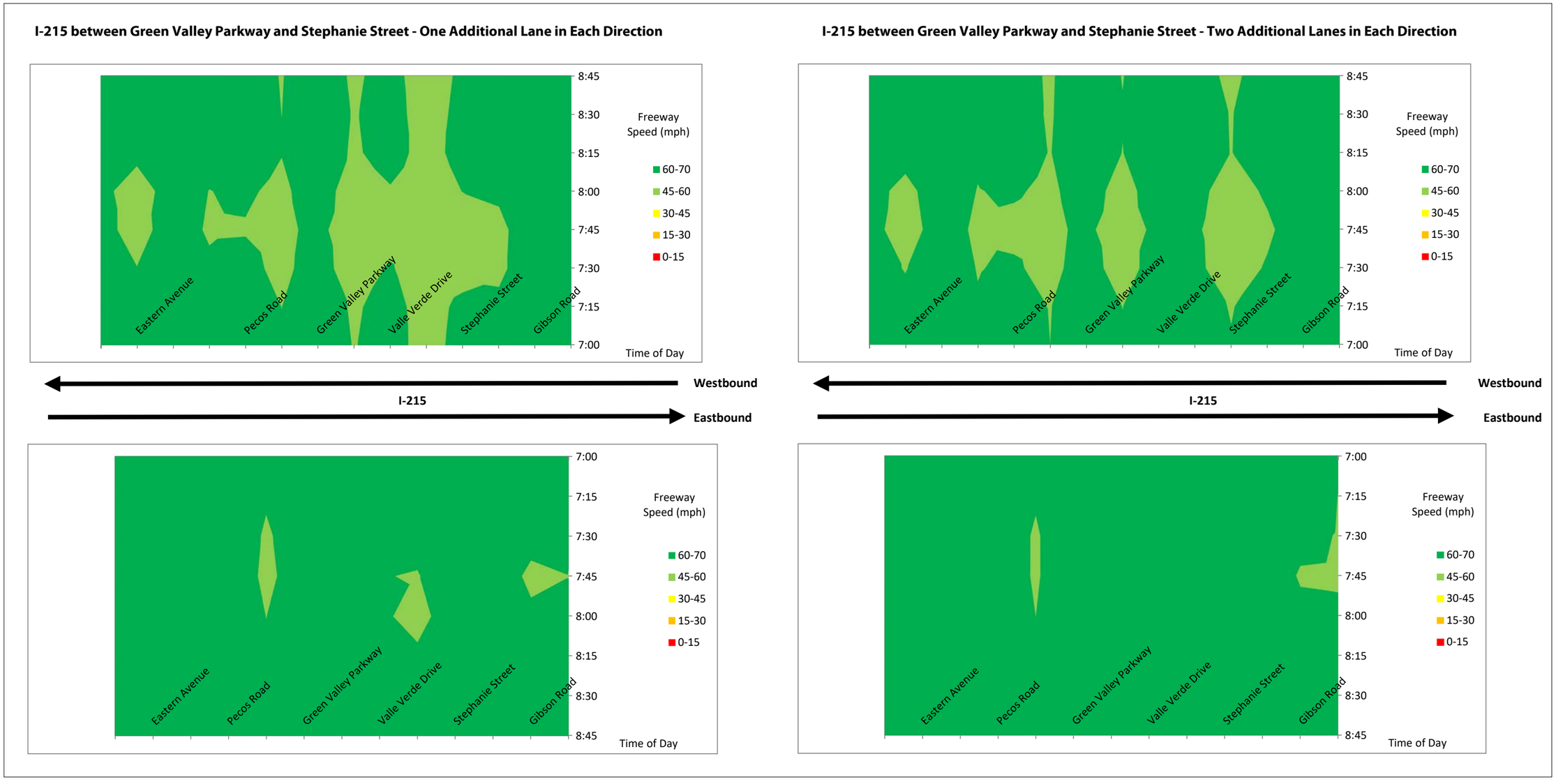
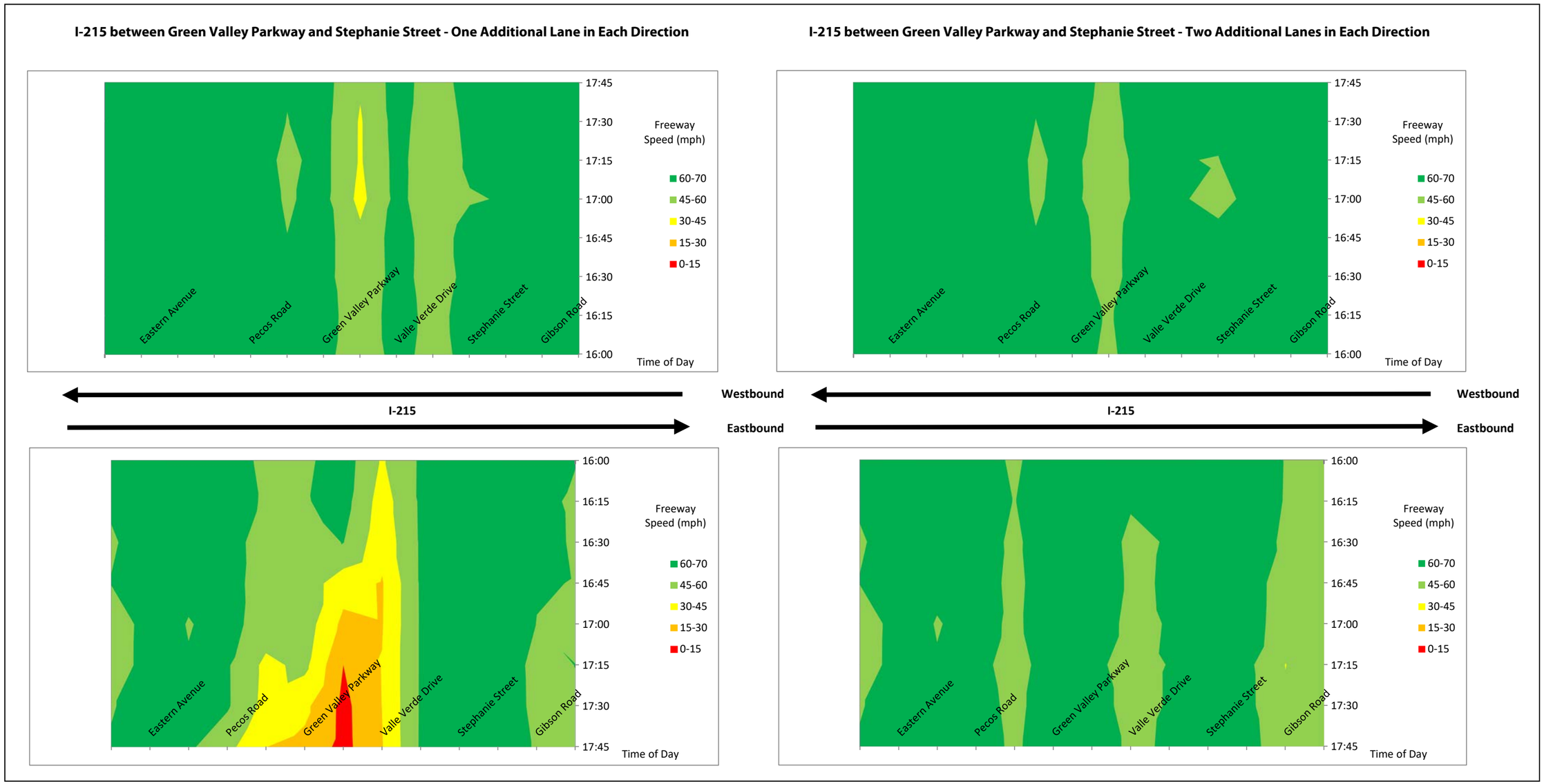


Figure 19: I-215 Freeway Speed Comparison – I-215 between Green Valley Parkway and Stephanie Street – Year 2050 PM Peak Period



6.5. I-215 / Green Valley Parkway Interchange

Several options were evaluated to improve traffic operations at the I-215 / Green Valley Parkway interchange. The Green Valley Parkway / Village Walk Drive intersection south of the interchange was identified to be a critical bottleneck due to its proximity to the interchange. Specifically, the at-grade crosswalks to cross Green Valley Parkway are heavily used and a significant portion of the signal cycle is required to serve these crosswalks, limiting the capacity for Green Valley Parkway. Therefore, improvements at the interchange and at the Green Valley Parkway / Village Walk Drive intersection were evaluated simultaneously. Table 4 shows the improvement option combinations evaluated to improve the traffic operations at the I-215 / Green Valley Parkway interchange.

Table 4: Improvement Options Evaluated for the I-215 / Green Valley Parkway Interchange

Improvement Options Evaluated		Configuration at Green Valley Parkway / Village Walk Drive		
		At-Grade Crosswalk	Grade-Separated Crosswalk	No-Signal
I-215 / Green Valley Parkway Interchange	SPUI (No Upgrades)	Existing conditions	✓	✓
	SPUI (With Upgrades)	✓	✓	✓
	DDI	✓	✓	✓

At the interchange, the existing SPUI, a SPUI with improvements, and a DDI were evaluated. Figure 20 and Figure 21 show the SPUI with improvements and the DDI options. At the Green Valley Parkway / Village Walk Drive intersection, the existing at-grade crosswalk, a grade-separated crosswalk, and a configuration without a traffic signal (stop-controlled intersection; no left-outs and through movements from Village Walk Drive) were evaluated.

To evaluate these options, a new subarea ("*I-215 Pecos/Green Valley FS Expanded - Green Valley Parkway*") focused on Green Valley Parkway was created within the Southern Nevada Aimsun Next model. The year 2050 OD matrices for the AM and PM peak periods,

corresponding to this subarea were extracted[19] from the larger subarea for the Project ("*I-215 Pecos/Green Valley FS Expanded"*).

Figure 22 and Figure 23 show the intersection delays for the I-215 / Green Valley Parkway interchange and the Green Valley Parkway / Village Walk Drive intersection for the year 2050 AM and the PM peak hours, for the improvement options listed in Table 4. Based on the delay results and from observations of the simulation runs, the options with a grade-separated crosswalk and the configuration without a traffic signal[20] at the Green Valley Parkway / Village Walk Drive intersection generally have lower delays. Similarly, the DDI for the I-215 / Green Valley Parkway interchange operates better than the SPUI options.

[19] To also serve as a sensitivity analysis, the year 2050 OD matrices for the new subarea were increased by 10 percent; this corresponded to analyses where all volumes along Green Valley Parkway were 10 percent higher than the forecast year 2050 volumes.

[20] The analysis does not capture the delay for the vehicles that are detoured away from Village Walk Drive to other intersections.

Figure 20: I-215 / Green Valley Parkway Interchange Improvements – SPUI

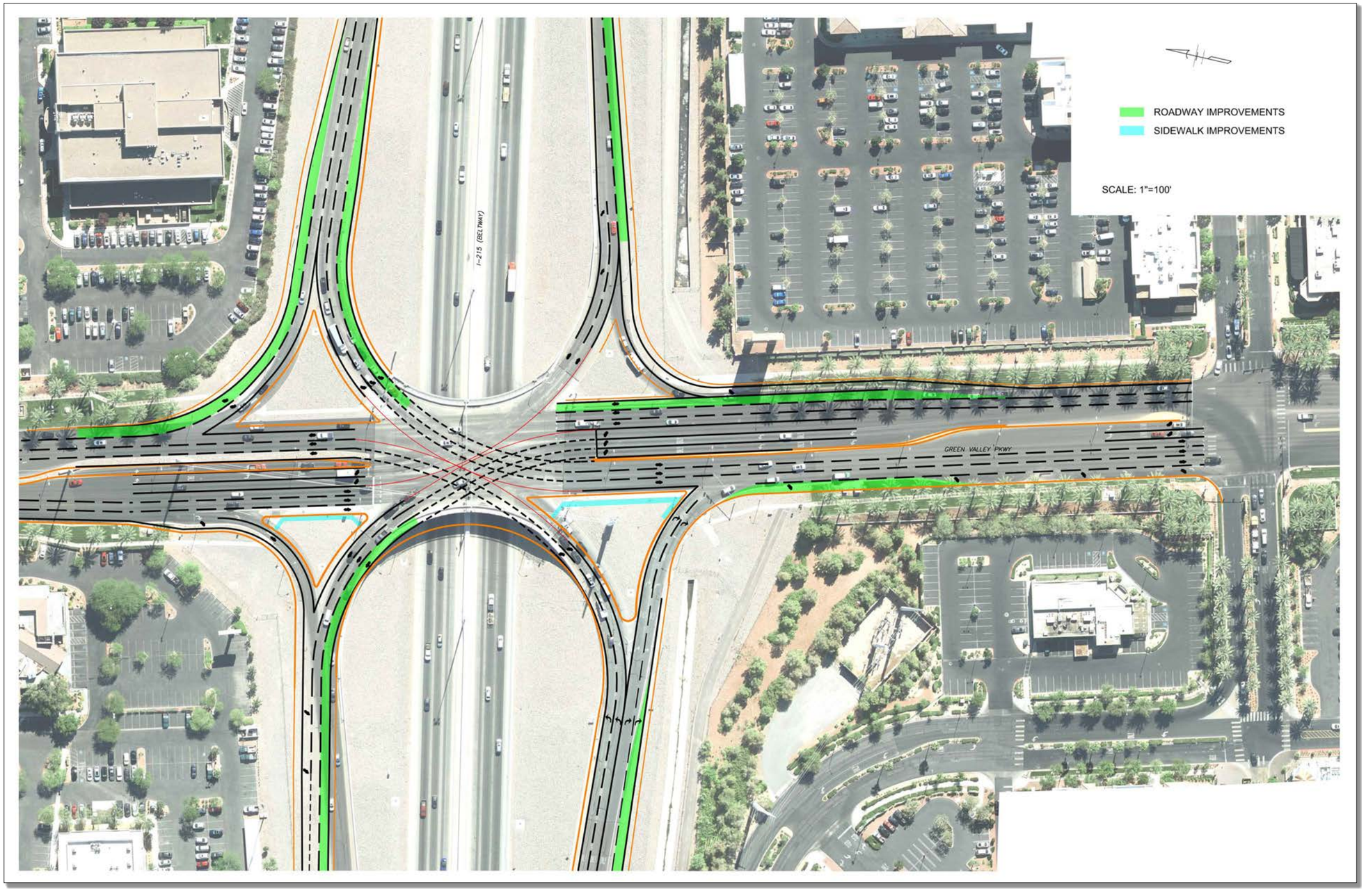


Figure 21: I-215 / Green Valley Parkway Interchange Improvements – DDI

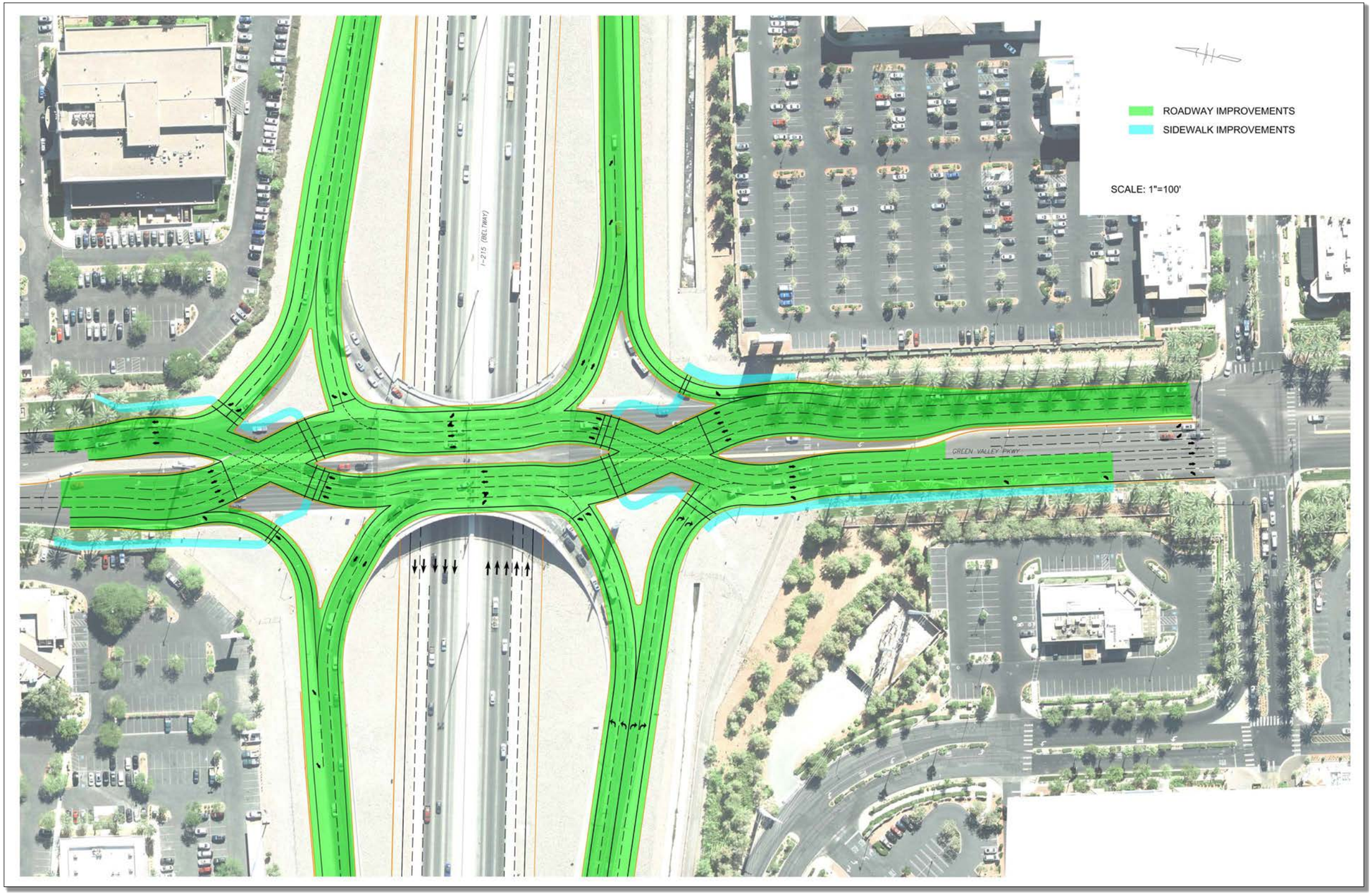


Figure 22: Intersection Delay Comparison – Green Valley Parkway – Year 2050 AM Peak Hour

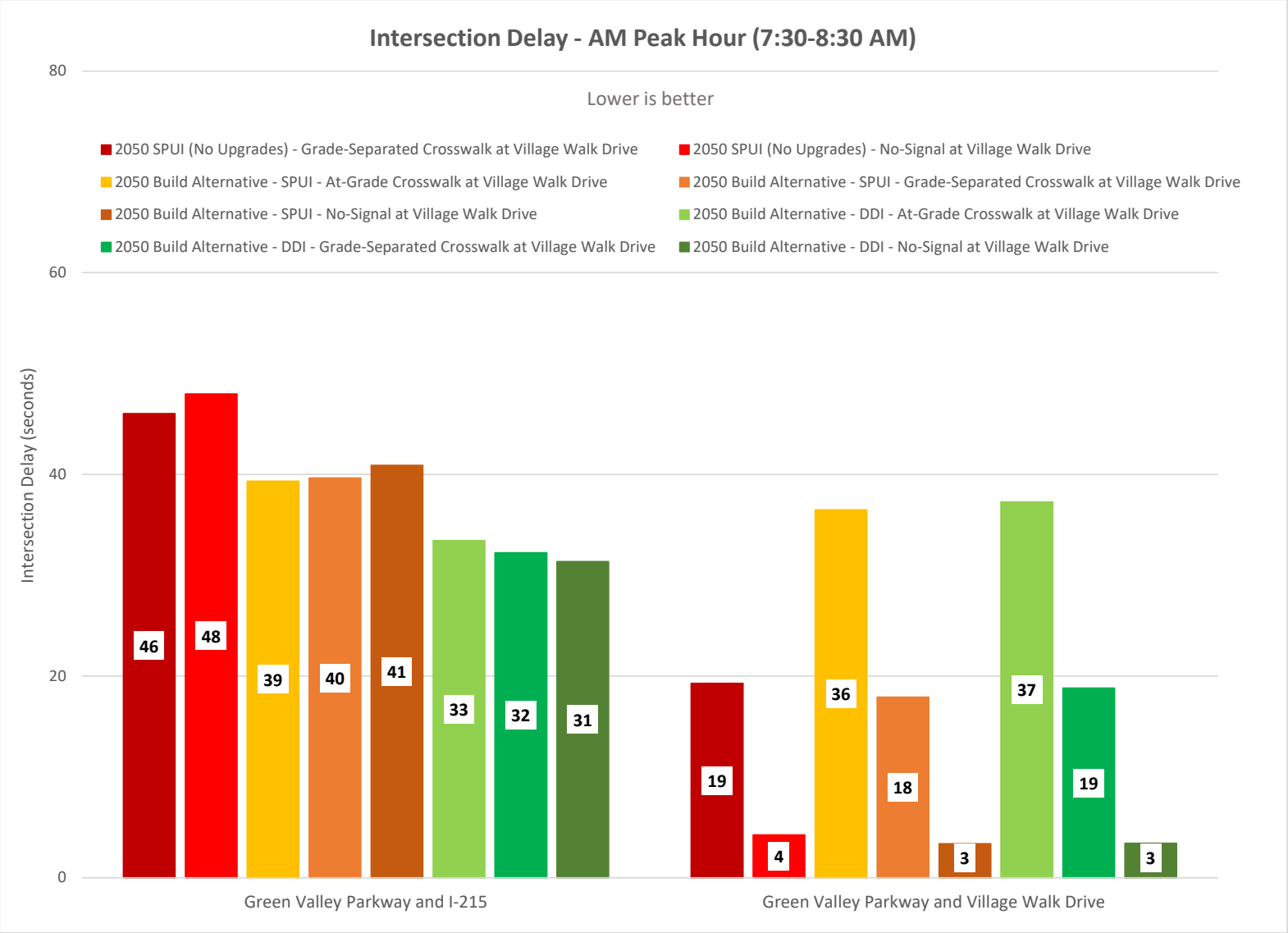
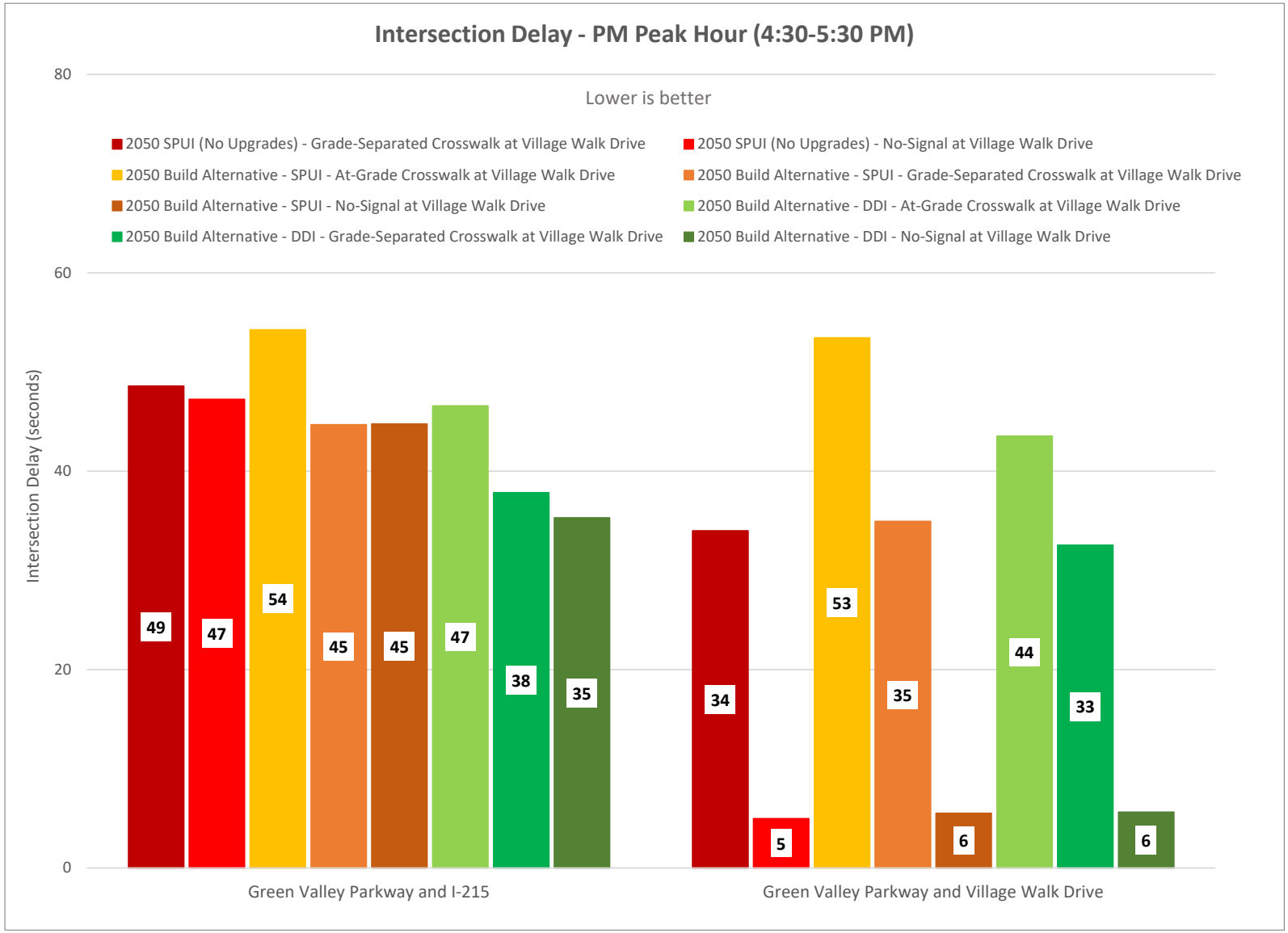


Figure 23: Intersection Delay Comparison – Green Valley Parkway – Year 2050 PM Peak Hour



6.6. Comparison of Results – No-Action Alternative and Build Alternatives

Based on the evaluation of the proposed improvements discussed in Sections 6.1 through 6.5, these improvements were prioritized and grouped to constitute the Build Alternatives described in Section 4.1.

Figure 24 shows a comparison of the subarea-wide Total Network Delay[21] (year 2050) for the No-Action Alternative and the Build Alternatives. Both the Build Alternatives operate significantly better (lower delays) compared to the No-Action Alternative. Comparing the Build Alternatives, Build Alternative 2 operates slightly better than Alternative 1. Appendix H shows the detailed subarea-wide results (including several other MOEs) for the No-Action and the Build Alternatives. These other MOEs show a similar pattern where both the Build Alternatives operate significantly better compared to the No-Action Alternative.

Figure 25 and Figure 26 show the year 2050 freeway speeds for the AM and the PM peak periods for the three alternatives. These show the effectiveness of the Build Alternatives in alleviating congestion along the I-215 freeway. With both Build Alternatives, the freeway speeds are expected to be faster than 45 mph in both the AM and PM peak periods. However, with the No-Action Alternative, severe congestion (slower than 15 mph) is expected in both the AM and PM peak periods, for some stretches of the corridor. Appendix I shows the detailed freeway traffic analysis results for the No-Action and the Build Alternatives.

[21] Total Network Delay represents the amount of time each vehicle is delayed in the simulation and sums them all into a single delay time. The better the network operates, the lower the total network delay.

Figure 24: Comparison of No-Action and Build Alternatives – Subarea Total Network Delay (Year 2050)

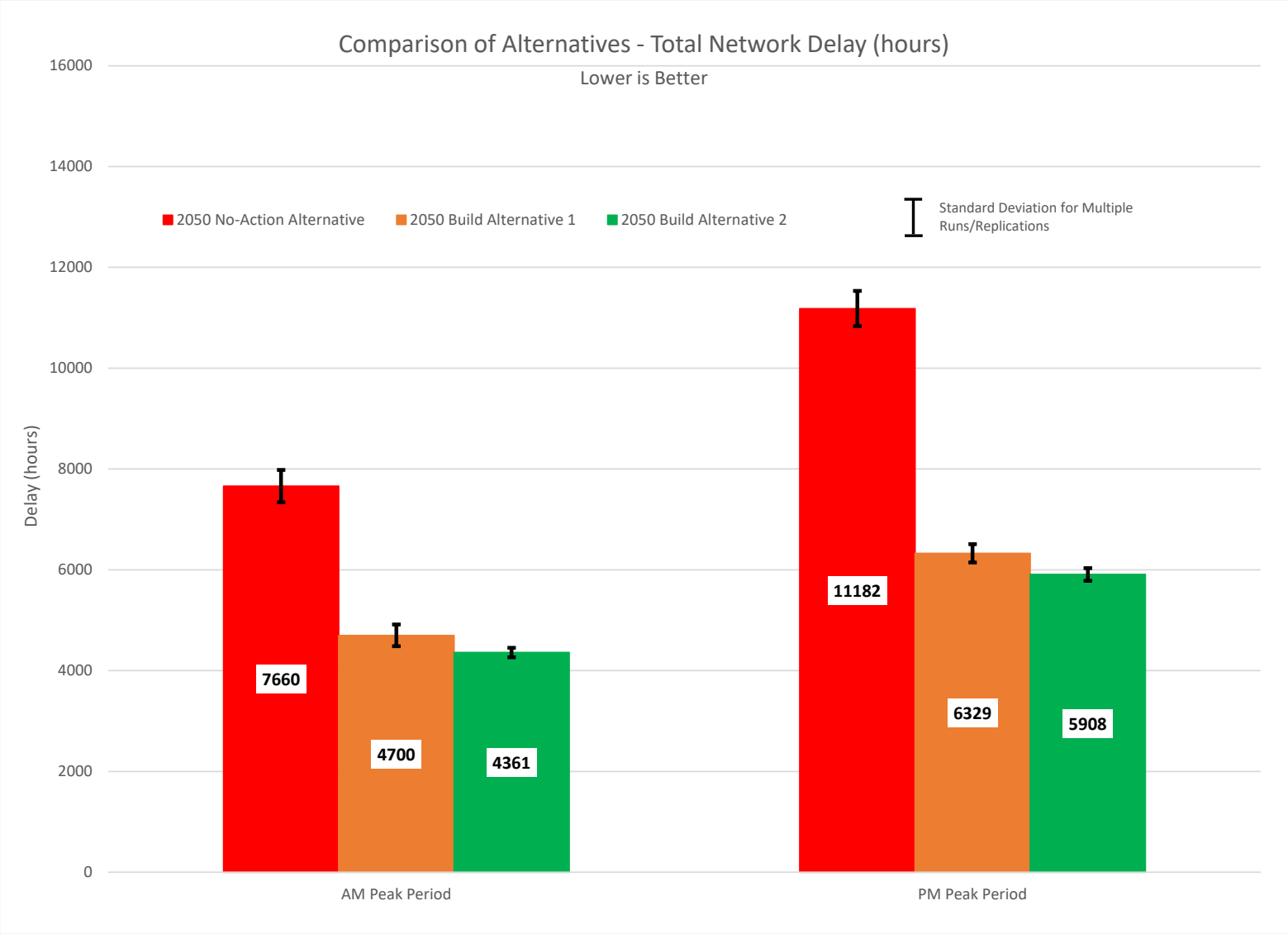


Figure 25: I-215 Freeway Speed Comparison – No-Action and Build Alternatives – Year 2050 AM Peak Period

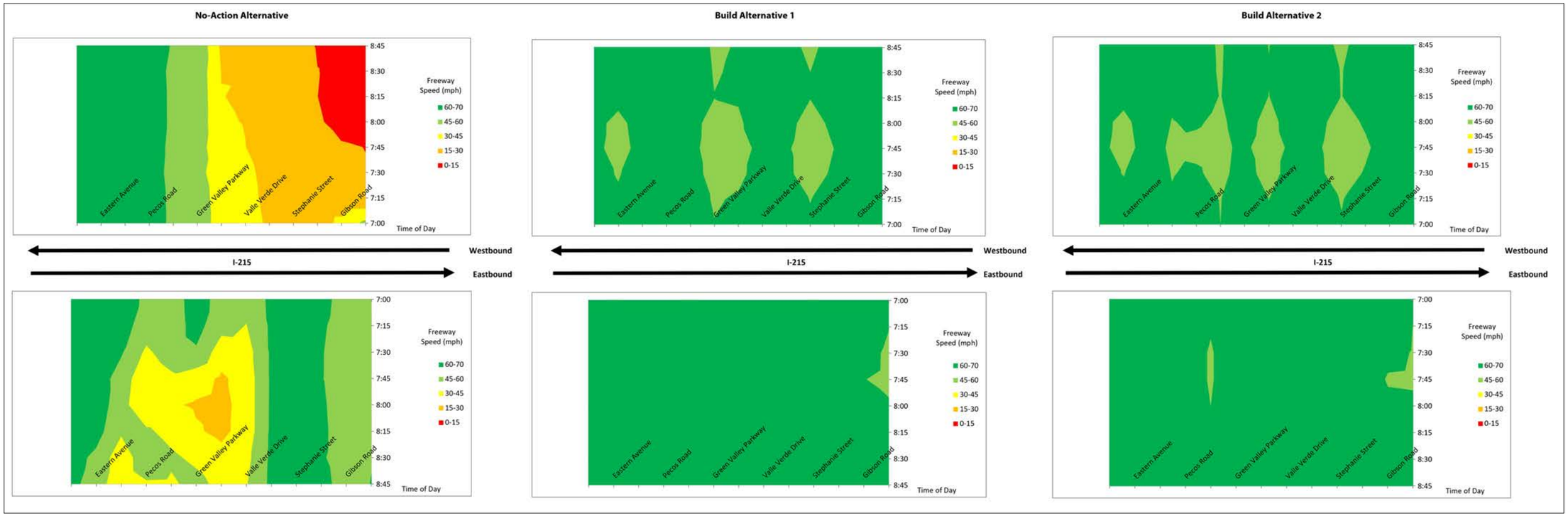
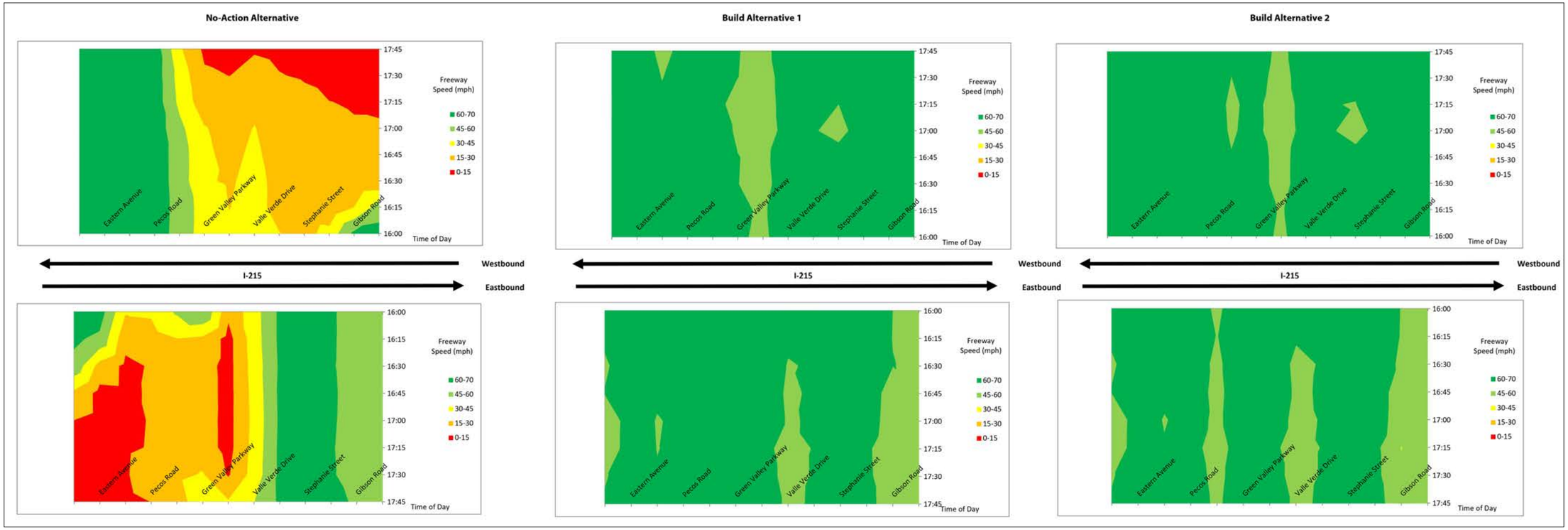


Figure 26: I-215 Freeway Speed Comparison – No-Action and Build Alternatives – Year 2050 PM Peak Period



7. SUMMARY

This Report documents the model calibration completed to represent year 2021 conditions, traffic forecasting to develop year 2050 volumes, and the results of the traffic analysis. The traffic analysis evaluated several potential improvements; these improvements were prioritized and grouped to constitute the Build Alternatives. Traffic results are also documented comparing the No-Action Alternative and the Build Alternatives. Both the Build Alternatives are expected to operate significantly better compared to the No-Action Alternative. Comparing the Build Alternatives, Build Alternative 2 is expected to operate slightly better than Build Alternative 1.

Appendices

Appendix A: Traffic Operations and Forecasting Methodology Memorandum

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

JOE LOMBARDO
Governor

TRACY LARKIN THOMASON, P.E.
Director

February 7, 2023
Via E-Mail: Sharan.Dhanaraju@jacobs.com

Sharan Dhanaraju, PE, PTOE, PTP
Project Engineer
Jacobs Engineering Inc.
1301 North Green Valley Parkway, Suite 200
Las Vegas, NV 89074

Subject: I-215 Widening (Pecos Road to Stephanie Street) Feasibility Study

Dear Mr. Dhanaraju:

The Nevada Department of Transportation (NDOT) Traffic and Operations Division reviewed the Traffic Operations Methodology Memorandum for the subject study provided by your firm on February 7, 2023. The information and documentation provided in the report are acceptable to the Department.

This is a formal NDOT approval letter for the use of the traffic operational analysis procedures depicted in the memorandum for the I-215 Widening (Pecos Road to Stephanie Street) Feasibility Study.

Sincerely,

DocuSigned by:
Rodney Schilling
34837AC0606B456...

Rodney Schilling, PE, PTOE
NDOT Chief Traffic Operations Engineer

CC: Jae Pullen, NDOT Traffic Operations
Samuel Ahiamadi, NDOT Traffic Operations
David Bowers, NDOT Project Management
Dallan Affleck, NDOT Project Management
Chris Wright, NDOT Traffic Information
Eric Hawkins, City of Henderson
Brooke Prescia, City of Henderson
Ken Gilbreth, Jacobs Engineering

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

JOE LOMBARDO
Governor

TRACY LARKIN THOMASON, P.E.
Director

February 8, 2023

Sharan Dhanaraju, P.E., PTOE, PTP
Jacobs
1301 North Green Valley Parkway
Suite 200
Las Vegas, NV 89074

Dear Mr. Dhanaraju:

The Nevada Department of Transportation's Traffic Information Section has reviewed the *forecasting methodology* used in the IR215 Widening Feasibility Study – Traffic Operations and Forecasting Methodology Memorandum produced by Jacobs dated February 7, 2023. The Traffic Information Section agrees with the forecasting methodology that will be used in the development of traffic forecasts. Should you require clarification or additional information, please contact myself or Chris Wright at (775) 888-7443.

Sincerely,

Mark Wooster

Mark Wooster
NDOT Traffic Information Assistant Chief

CC: Sam Ahiamadi, NDOT Traffic Operations
David Bowers, NDOT Project Management
Dallan Affleck, NDOT Project Management
Eric Hawkins, City of Henderson
Brooke Prescia, City of Henderson
Ken Gilbreth, Jacobs

Technical Memorandum

TO: Samuel Ahiamadi, NDOT
Chris Wright, NDOT

DATE: February 7, 2023

FROM: Sharan Dhanaraju, Jacobs

SUBJECT: I-215 Widening (Pecos Road to Stephanie Street) – Feasibility Study – Traffic Operations and Forecasting Methodology Memorandum

COPIES: Brooke Prescia, City of Henderson; Project File

1. INTRODUCTION AND BACKGROUND

The I-215 (Southern Beltway) freeway is one of the primary east-west freeway corridors in the Las Vegas valley; the I-215 connects the City of Henderson (City) community with the Las Vegas valley. The I-215 freeway is essential in providing mobility and connecting the City to the rest of the Las Vegas valley. The Pecos Road and Green Valley Parkway interchanges with I-215 provide access to/from the residential and commercial developments at the west edge of the City. These facilities also provide access to the Dollar Loan Center, which is a 6,000 seat in-door stadium, located on the southeast corner of the Green Valley Parkway and Paseo Verde Parkway intersection in the City. Maintaining the mobility along this corridor is essential in sustaining the competitiveness of Las Vegas as a leading tourist destination.

To this end, the City, together with Clark County and Nevada Department of Transportation (NDOT) have been planning and working on roadway improvement projects along the I-215 to optimize the mobility needs of the residents and improve travel time reliability along this critical transportation corridor. NDOT completed (in November 2018) the Southern Nevada Traffic Study (SNTS) (a long-term planning study) to identify the transportation improvement needs in the Las Vegas valley. Clark County completed a Feasibility Study (in June 2018) to evaluate the opportunities and challenges in adding a fourth lane (in each direction) to the I-215 freeway from Pecos Road to Stephanie Street. This Feasibility Study developed a conceptual design, identified the construction conflicts and, developed an estimate of the costs for this improvement. A freeway widening project

was completed by Clark County to improve the section of I-215 between Windmill Lane and Pecos Road. Another project to implement improvements at the I-11/I-515/I-215 interchange is at the later stages of planning by the City and NDOT.

This *I-215 Widening (Pecos Road to Stephanie Street) – Feasibility Study* (Project) will evaluate the travel corridor along I-215 beginning west of the Pecos Road interchange and extending east to the Stephanie Street interchange, including improvements to the Pecos Road and Green Valley Parkway interchanges. This Project will examine alternatives to address overall safety and mobility issues, serve existing and future needs; and improve traffic operations, travel time, and safety compared to a No-Action Alternative. This memorandum documents the proposed methodology to be used for the traffic operations analyses and for the development of future year volumes for this Project. A completed *"Methodology Memorandum Content Checklist"* is included as Attachment 1 at the end of this memorandum.

2. MODELING LIMITS

The primary objective of the traffic analysis is to identify, evaluate, refine, and support improvements for the:

- I-215 freeway between Pecos Road and Stephanie Street
- I-215 interchange at Pecos Road / St. Rose Parkway and adjacent intersection(s) south of the interchange, leading up to the interchange
- I-215 interchange at Green Valley Parkway and adjacent intersection(s) south of the interchange

To support this objective, along the I-215 freeway, the Aimsun Next model subarea will include I-215 from west of Eastern Avenue to east of Gibson Road.

The following intersections[1,2] will be included within the Aimsun Next model subarea:

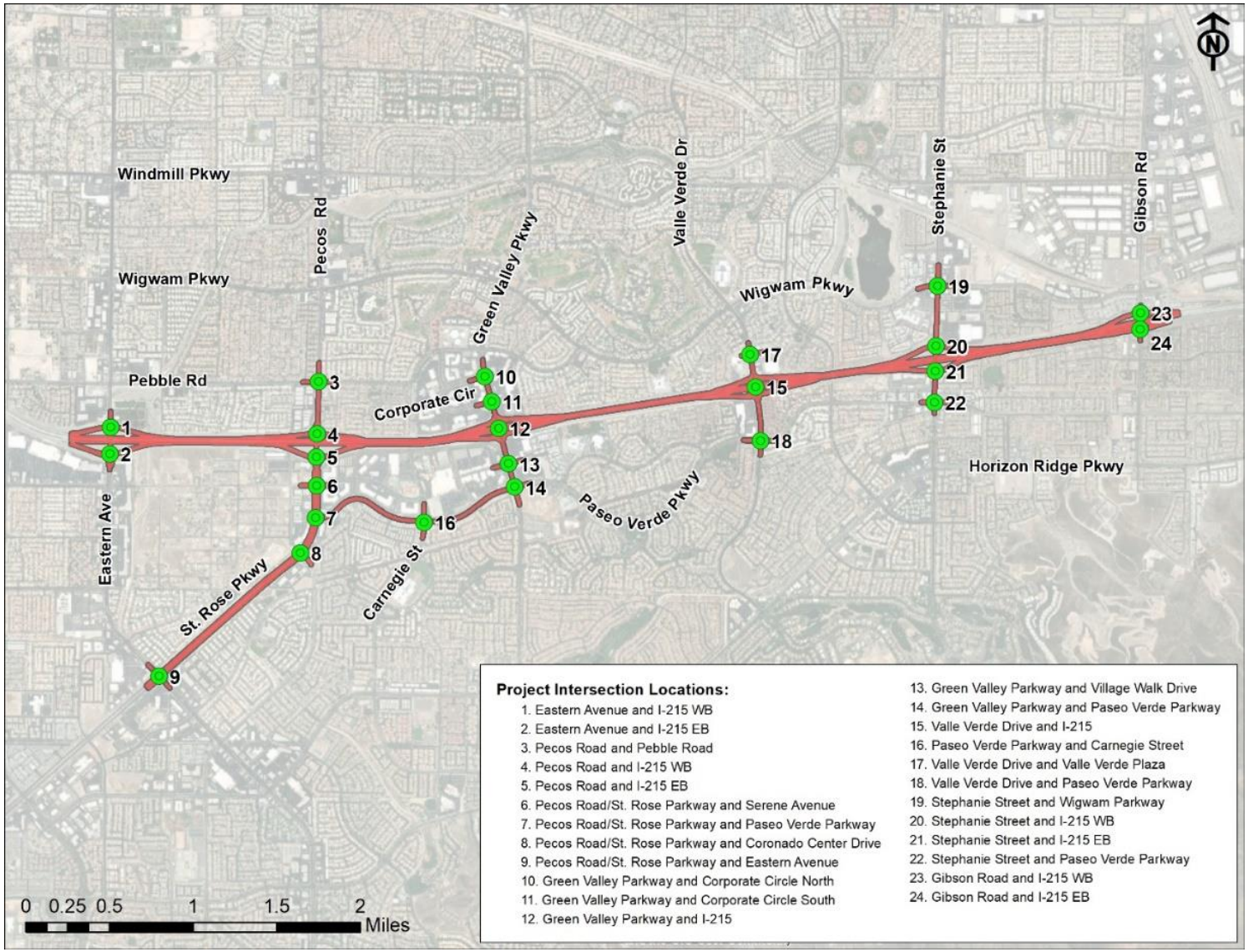
[1] Some of the intersections listed here will be included in the Aimsun Next model subarea mainly to process the traffic to the study facilities in a more realistic manner. Therefore, traffic operations performance of these intersections will not be evaluated.

[2] A larger geographical area will be included in the Aimsun Next model subarea also because, once a subarea is defined in Aimsun Next, expanding the limits is not achieved easily.

1. Eastern Avenue and I-215 WB (Signalized)
2. Eastern Avenue and I-215 EB (Signalized)
3. Pecos Road and Pebble Road (Signalized)
4. Pecos Road and I-215 WB (Signalized)
5. Pecos Road and I-215 EB (Signalized)
6. Pecos Road / St. Rose Parkway and Serene Avenue (Stop-controlled)
7. Pecos Road / St. Rose Parkway and Paseo Verde Parkway (Signalized)
8. Pecos Road / St. Rose Parkway and Coronado Center Drive (Signalized)
9. Pecos Road / St. Rose Parkway and Eastern Avenue (Signalized)
10. Green Valley Parkway and Corporate Circle North (Signalized)
11. Green Valley Parkway and Corporate Circle South (Stop-controlled)
12. Green Valley Parkway and I-215 (Signalized)
13. Green Valley Parkway and Village Walk Drive (Signalized)
14. Green Valley Parkway and Paseo Verde Parkway (Signalized)
15. Valle Verde Drive and I-215 (Signalized)
16. Paseo Verde Parkway and Carnegie Street (Signalized)
17. Valle Verde Drive and Valle Verde Plaza (Signalized)
18. Valle Verde Drive and Paseo Verde Parkway (Signalized)
19. Stephanie Street and Wigwam Parkway (Signalized)
20. Stephanie Street and I-215 WB (Signalized)
21. Stephanie Street and I-215 EB (Signalized)
22. Stephanie Street and Paseo Verde Parkway (Signalized)
23. Gibson Road and I-215 WB (Signalized)
24. Gibson Road and I-215 EB (Signalized)

The modeling limits are shown in Figure 1.

Figure 1: Modeling Limits



3. TECHNICAL GUIDANCE, STANDARDS, AND TOOLS

The following technical documents and guidelines are the key references to be used in the traffic analysis and modeling for this Project:

- Aimsun Next Modeling Guidelines, NDOT, 2018
- Traffic Forecasting Guidelines, NDOT, 2012
- National Performance Management Research Data Set (NPMRDS) available through the Regional Integrated Transportation Information System (RITIS), University of Maryland CATT Lab
- Regional Transportation Commission of Southern Nevada's (RTCSNV) currently adopted travel demand model
- 2017 Aimsun Next Model Development and Calibration Report (Appendix C of NDOT Southern Nevada Traffic Study [SNTS] Final Report), 2018
- Highway Capacity Manual 7th Edition, Transportation Research Board, 2022

Traffic microsimulation modeling will be completed using Aimsun Next. Traffic signal timings for the intersections for future year conditions will be optimized using Synchro and will be used in Aimsun Next as a starting point. Final traffic operations analysis results will be reported from Aimsun Next.

4. ANALYSIS SCENARIOS, MODELING PERIODS, AND MULTIPLE TIME PERIODS

Aimsun Next microscopic simulation modeling will be completed for the following scenarios:

- Existing conditions (year 2021)
- Future year 2050 No-Action Alternative
- Future year 2050 Build Alternative(s)

The Aimsun Next scenarios for this Project will be developed using the Southern Nevada Aimsun Next model provided by NDOT. A new *"I-215 Pecos/Green Valley FS Expanded"* subarea will be created for this Project to include the limits described in Section 2.

The year 2050 No-Action Alternative (within this subarea) will correspond to the RTC's currently adopted year 2050 Regional Transportation Plan (RTP) network, excluding any improvements for the facilities being evaluated by this Project. Up to two (2) Build

Alternatives for the year 2050 will be modeled as part of this Project and the results will be compared against the year 2050 No-Action Alternative. The Build Alternatives' network will include the improvements on top of the No-Action Alternative.

The RTC's regional TransCAD travel demand model includes two-hour AM peak (7:00 AM – 9:00 AM) and PM peak (4:00 PM – 6:00 PM) period origin-destination (OD) matrices. These OD matrices will be the basis of the Aimsun Next modeling. The Aimsun Next modeling periods for this Project will match the peak periods from the RTC's regional travel demand model. Therefore, the Aimsun Next modeling periods will be a two-hour AM peak (7:00 AM – 9:00 AM) and a two-hour PM peak (4:00 PM – 6:00 PM) period. Microsimulation warm-up period of 15 minutes will be used for both the AM and the PM peak periods of modeling. Aimsun Next modeling will reflect a 15-minute time-varying profile in demand.

5. AIMSUN NEXT MODELING – METHODOLOGY AND ASSUMPTIONS

The modeling limits for this Project consist of a new subarea (*I-215 Pecos/Green Valley FS Expanded* subarea) within the Southern Nevada Aimsun Next model. This new subarea focuses on the freeway sections and intersections listed in Section 2 and shown in Figure 1. All modeling for this Project will be completed within this new subarea.

The following are the assumptions and key steps to be completed during the Aimsun Next modeling process:

1. The Project freeway and arterial facilities within the *I-215 Pecos/Green Valley FS Expanded* subarea in the Aimsun Next model will be updated/refined to represent a microsimulation level of network detail.
2. The *I-215 Pecos/Green Valley FS Expanded* subarea created within the Southern Nevada Aimsun Next model will be replicated in the RTC's TransCAD travel demand model.
3. Year 2020 OD matrices corresponding to this subarea will be extracted from the RTC's TransCAD travel demand model. Appropriate growth rates will be calculated and applied to the year 2020 OD matrices to obtain the year 2021 matrices (to correspond to the Existing conditions scenario of this Project).

4. The year 2021 OD matrices developed in the previous step will be the seed matrices for use in Aimsun Next. These seed matrices will be refined through the static and dynamic calibration process in Aimsun Next. The calibration process is described in further detail in Section 6.
5. The subarea OD matrices developed after calibration (Step 4), will be used to develop and run Static Assignment and Dynamic scenarios for the year 2021 existing conditions.
6. The existing traffic signal timing obtained from RTC FAST will be modeled in Aimsun Next.
7. The year 2050 OD matrices for the subarea will be extracted from the TransCAD model similar to the extraction of the year 2020 matrices.
8. The refinements made to the year 2021 OD matrices as part of the calibration process will be replicated in the year 2050 OD matrices. This will be accomplished using the "Pivot-Point Method" utilized in NDOT SNTS.
9. The year 2050 OD matrices, obtained in the previous step, will be used to develop and run all the future year Static Assignment and Dynamic scenarios (year 2050 No-Action Alternative and Build Alternatives). The year 2050 volumes obtained from the Static Assignment scenarios will be the forecast volumes.
10. The heavy vehicles forecast will be obtained based on the OD matrices developed in Step 8.
11. Traffic signal timings for the year 2050 No-Action and Build Alternatives will be optimized in Synchro and used in Aimsun Next. Further minor adjustments to traffic signal timings may be made within Aimsun Next; these adjustments will be based on visual observations and engineering judgment.
12. For the year 2050 No-Action and Build Alternatives, appropriate Static and Dynamic calibration parameters will be coded based on the calibration parameter values used in the year 2021 Static and Dynamic scenarios.
13. Ten replications (runs) will be operated for the Dynamic scenarios and the average results from these replications will be reported.

6. AIMSUN NEXT CALIBRATION PROCESS

The year 2021 model within this Project's subarea will be calibrated following the guidance provided in NDOT's Aimsun Next Modeling Guidelines. Speeds for select freeway segments will be calibrated in addition to volume calibration. The desired calibration targets for the calibration MOEs are listed in Table 1.

Table 1: Calibration Targets

Calibration MOE	Calibration Criteria and Measures	Calibration Target
Volume	Individual Link and Turn Flows: Within 100 veh/h, for Flow < 700 veh/h Within 15%, for 700 veh/h < Flow < 2700 veh/h Within 10%, for 2700 veh/h < Flow < 5000 veh/h Within 250 veh/h, for Flow > 5000 veh/h	 > 85% of cases > 85% of cases > 85% of cases > 85% of cases
	Sum of All Link and Turn Flows	Within 5%
	GEH Statistic < 5 for Individual Link and Turn Flows	> 85% of cases
	GEH Statistic < 10 for Individual Link and Turn Flows	100% of cases
Speed	Absolute difference between field observed Speeds and Aimsun Next model simulated Speeds for select locations along the freeway: within 10 mph	> 85% of cases

6.1. Volume Calibration

Existing field link volumes and intersection turning movement volumes for volume calibration will be compiled from:

- NDOT's short-term count stations and ATRs
- Intersection turning movement volume counts observed as part of this Project and counts observed as part of NDOT's SNTS

Because of the uncertainty and the potential changes in traffic patterns due to the COVID-19 pandemic, the extent of data collection (intersection turning movement counts) as part

of this Project is limited to nine out of the 24 intersections[3] shown in Figure 1. Following data collection in the field, the counts will be reviewed to identify changes in traffic levels/patterns. The year 2017 intersection counts from NDOT's SNTS will be used as reference in this review. The year 2017 counts from SNTS will be factored up for year 2021 using historical growth rates and factors from NDOT's ATR and/or short-term count station reports. These volumes would represent non/pre-COVID set of estimated volumes. If the year 2021 field volumes are lower (due to the COVID-19 pandemic) than the non/pre-COVID volumes, correction factors[4] will be determined and applied to the field volumes. In general, the year 2017 counts from SNTS (factored to year 2021) will be used where available and the counts observed in the field in year 2021 will be used where appropriate to fill-in the data gaps. The volumes from the different years/sources will be balanced and used for volume calibration.

6.2. Speed Calibration

Speed data along I-215 is available for speed calibration from RTC's FAST Dashboard and/or from NPMRDS. Speed calibration will be completed for select freeway locations between interchanges (both directions).

7. ANALYSIS RESULTS AND MEASURES OF EFFECTIVENESS

The traffic operations analysis results (including intersection analysis results) for the future condition (year 2050) No-Action Alternative and Build Alternatives will be obtained from the Aimsun Next model developed for this Project. The analysis results for the freeway segments will be based on density and speed. The analysis results for intersections will be based on intersection delays.

In addition to the location-specific MOEs, relevant network-wide MOEs such as Latent Vehicles, Latent Delay Time, Total Network Delay, Average Network Delay, etc. will be

[3] Field data collection along the I-215 freeway and ramps was completed on June 16, 2021. Field data collection at the nine intersections was completed on June 23, 2021. The field data collection for the intersections was scheduled for June 16, 2021 (to coincide with the freeway data collection). However, this could not be completed and had to be rescheduled due to a heat wave (during the week of June 13th) and unsafe conditions in the field.

[4] The correction factors will be determined by comparing the year 2017 (SNTS) volumes (factored up for year 2021) and the year 2021 volumes (observed as part of this Project) at the few intersections where both these volumes are available.

compared between the No-Action Alternative and the Build Alternatives for the *I-215 Pecos/Green Valley FS Expanded* subarea. Comparison of the performance of the Build Alternatives vs. the No-Action Alternative and amongst the Build Alternatives will primarily be based on the network-wide MOEs.

8. CONCLUSION

Following the completion of the Aimsun Next modeling, the methodology, assumptions, and results of the calibration process, development of future year volumes, and the traffic analysis results will be documented in a Traffic Report. Approval of this Traffic Operations and Forecasting Methodology Memorandum is requested so that the operations analysis can be completed.

Attachment 1: Methodology Memorandum Content Checklist

Item	Description	Check
Project Description and Background	Brief information about the project (purpose, general study area, etc.)	✓
Technical Guidance and Standards	Technical guidance and standards to be followed along with their version (HCM, MUTCD, NDOT Access Management Standards, etc.)	✓
Traffic Analysis Tools	Software to be used along with their version (CORSIM, HCS, TRAFFIX, etc.)	✓
Study Limits	Geographic limits of the analysis. This is to be consistent with the NDOT Microsimulation Modeling Guidelines. List all study intersections to be included	✓
Analysis Years	Design, opening and interim years	✓
Analysis Scenarios	Existing, No-Action, Build - describe build alternatives to the extent possible	✓
Analysis Periods	Modeling periods and multiple time periods description. The use of multiple time periods should conform to NDOT Microsimulation Modeling Guidelines	✓
Existing Conditions	Description of existing conditions and/or how existing analysis will be performed	✓
Data Sources	List of sources of data and relevant information	✓
Traffic Operations Analysis Calculations/Assumptions	Signal timing/phasing, i.e., whether to use optimized timing or actual timing data, peak hour factors, etc.	✓
Truck Percentages	Truck percentage to use for existing and future scenarios and their calculation/estimation	✓
Traffic Forecasts	General methodology for projecting traffic forecasts	✓
Aimsun Coding and Analysis Assumptions	Documentation of support tools (if to be used) for intersection timing/optimization (such as Synchro, TRANSYT-7F, TEAPAC etc), pre-timed versus actuated control for signals, free-flow speeds (measured versus estimated/assumed). Coding items, such as O-Ds, conditional turning movements, handling weave/merge/diverge, and node numbering convention are to conform to the NDOT Microsimulation Modeling Guidelines. HOV lanes, express lanes/managed lanes, and ramp meters are to be addressed	✓
Calibration Approach	Calibration approach is to follow the methodologies described in the NDOT Microsimulation Modeling Guidelines	✓
Calibration MOEs, Locations, Targets	Calibration MOEs, locations to be calibrated and targets for acceptable match	✓
Selected MOEs for Evaluation	List of MOEs for evaluation and alternatives analysis along with the selected threshold for successful operations. Clearly state if intersection/arterial MOEs will be reported from Aimsun output or from the signal timing tool used	✓
Additional item(s)	Any unique item(s) that is appropriate to be discussed/approved by NDOT	**N/A**
Comments:		

Appendix B: Electronic Files of the Aimsun Next Model and other Associated Model Files

(Provided electronically)

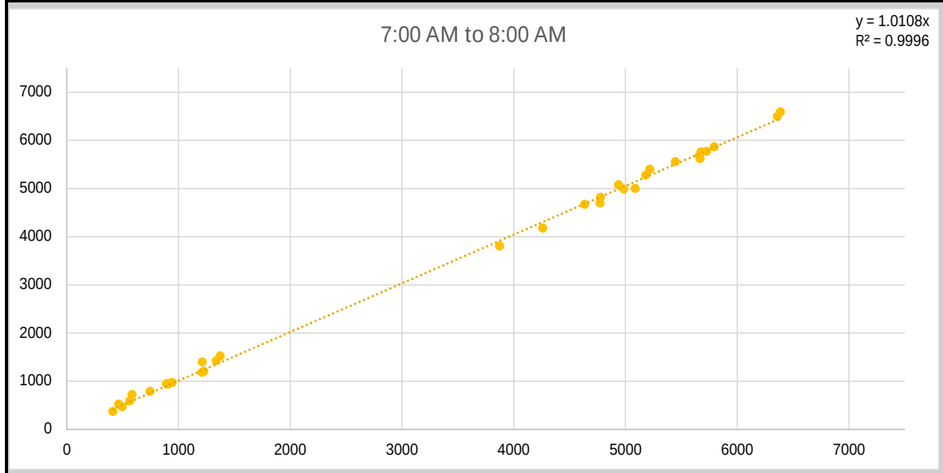
Appendix C: Volume Calibration Results

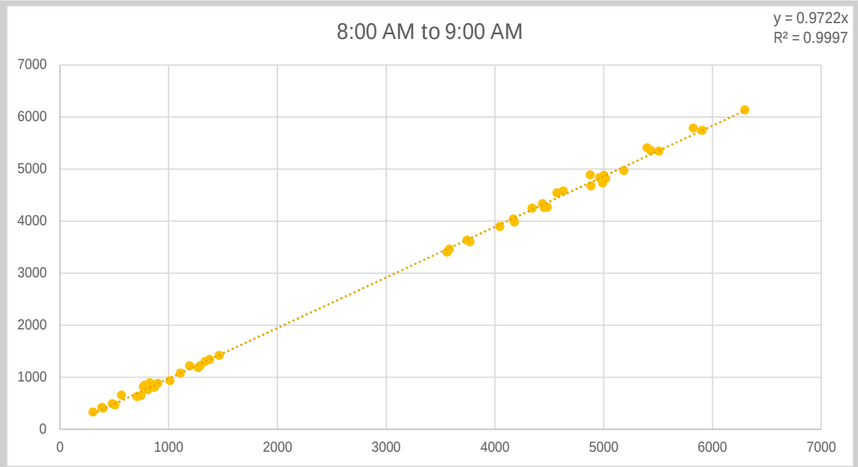
Year 2021 Volume Calibration - AM Peak Period

COUNT

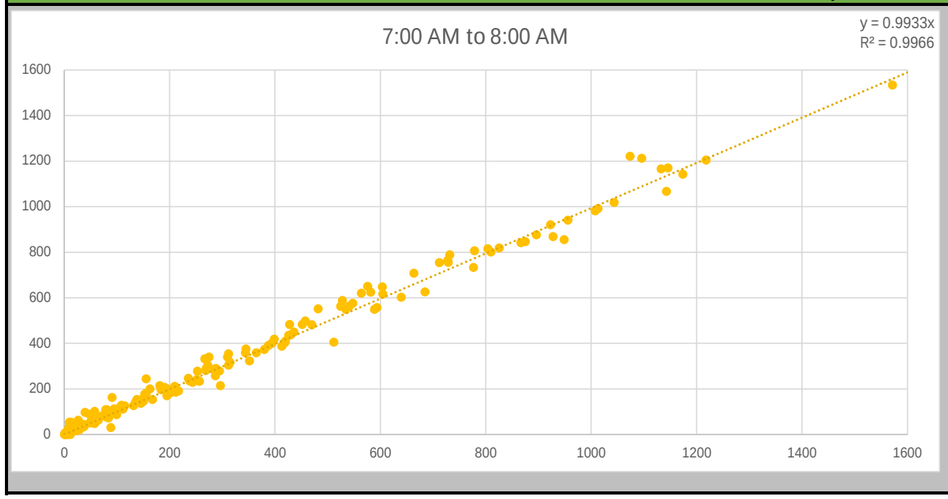
Criteria	Acceptance Target	7:00 AM to 8:00 AM			8:00 AM to 9:00 AM		
		Points	Pass	Acceptance	Points	Pass	Acceptance
FLOW < 700, within 100 veh / h	> 85%	6	6	100.0	8	7	87.5
700 < FLOW < 2700, within 15%	> 85%	18	16	88.9	16	16	100.0
2700 < FLOW < 5000, within 10%	> 85%	9	9	100.0	20	20	100.0
FLOW > 5000 within 250 veh / h	> 85%	17	17	100.0	6	6	100.0
GEH Statistic < 5 for individual link flows	> 85%	50	48	96.0	50	50	100.0
GEH Statistic < 10 for individual link flows	100%	50	50	100.0	50	50	100.0
GEH Stastistic < 5 for all Turns	> 85%	190	180	94.7	190	180	94.7
GEH Stastistic < 10 for all Turns	100%	190	190	100.0	190	190	100.0
Percent GEH Passing	> 95%	240	240	100.0	240	240	100.0
Sum of all link flows	> 95%			98.7			97.2

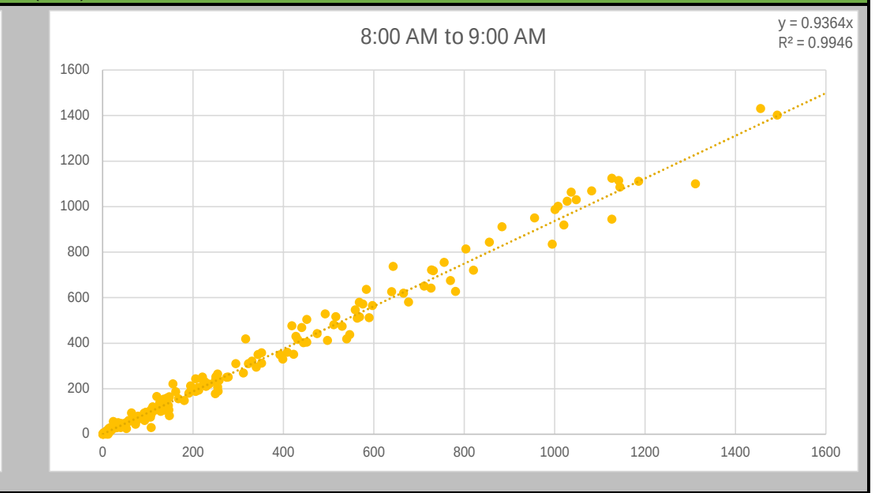
Hourly Count Validation (Sections)





Hourly Count Validation (Turns)





Year 2021 Volume Calibration - AM Peak Period

Section/Link Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
2630: RAMP I215 E ROSE (20089)	564	592	28	5.0%	1.2
17002: RAMP I215 W GIBSON (24913)	414	369	-45	10.8%	2.3
13473: I 215 (24915)	4773	4696	-77	1.6%	1.1
5948: RAMP STEPHANI I215 W (20215)	1214	1398	184	15.2%	5.1
5976: I 215 (18787)	5727	5772	45	0.8%	0.6
2510: RAMP I215 E EASTERN (20201)	1212	1184	-28	2.3%	0.8
2511: I 215 (15610)	3874	3804	-70	1.8%	1.1
2622: I 215 (18758)	4986	4990	4	0.1%	0.1
730: I 215 (18780)	5446	5556	110	2.0%	1.5
6109: I 215 (22255)	4938	5077	139	2.8%	2.0
2621: I 215 (18754)	4260	4178	-82	1.9%	1.3
729: I 215 (18767)	4778	4819	41	0.9%	0.6
2520: RAMP EAST I215 W (20206)	1337	1427	90	6.7%	2.4
2690: I 215 (18769)	6359	6496	137	2.2%	1.7
5977: RAMP VA VERDE I215 W (18796)	945	975	30	3.2%	1.0
17161: RAMP I215 E GIBSON (24911)	895	943	48	5.4%	1.6
356191: RAMP I215 E VA VERDE (18789)	496	469	-27	5.4%	1.2
2689: I 215 (18765)	5660	5674	14	0.3%	0.2
5975: I 215 (18788)	5181	5278	97	1.9%	1.3
13472: RAMP I215 W GIBSON (24914)	894	947	53	5.9%	1.7
11197: I 215 (22253)	5667	5619	-48	0.8%	0.6
2435: I 215 (15606)	5086	5002	-84	1.7%	1.2
2678: RAMP GV PKWY I215 W (18772)	913	947	34	3.7%	1.1
732: RAMP GV PKWY I215 E (18785)	899	937	38	4.2%	1.3
6016: RAMP VA VERDE I215 E (18806)	466	523	57	12.1%	2.5
2623: RAMP I215 W PECOS (18759)	1373	1523	150	11.0%	4.0
2633: I 215 (15607)	5794	5864	70	1.2%	0.9
356173: RAMP I215 W EASTERN (20087)	745	788	43	5.8%	1.6
11194: I 215 (22244)	5218	5399	181	3.5%	2.5
5983: I 215 (18786)	5677	5759	82	1.4%	1.1
356189: RAMP I215 W GV PKWY (18781)	1226	1203	-23	1.9%	0.7
6097: RAMP STEPHANI I215 E (20213)	584	720	136	23.3%	5.3
2434: I 215 (15605)	6386	6587	201	3.1%	2.5
5949: I 215 (20217)	4634	4671	37	0.8%	0.5
11196: I 215 (24910)	4323	4471	148	3.4%	2.2
5950: I 215 (20220)	4964	4803	-161	3.2%	2.3
16075: RAMP GIBSON I215 E (32344)	615	603	-12	2.0%	0.5
5984: I 215 (18790)	6672	6755	83	1.2%	1.0
2370: I 215 (15612)	5049	5121	72	1.4%	1.0
2371: I 215 (15608)	4824	4775	-49	1.0%	0.7
5982: I 215 (20221)	6178	6200	22	0.4%	0.3
356207: RAMP I215 E STEPHANI (20212)	1013	1125	112	11.0%	3.4
356187: RAMP I215 E GV PKWY (18768)	882	851	-31	3.5%	1.0
356214: RAMP I125 W STEPHANI (20214)	703	807	104	14.8%	3.8
5961: I 215 (20216)	5647	5799	152	2.7%	2.0
2629: RAMP PECOS I215 W (20092)	808	856	48	5.9%	1.6
2624: RAMP ROSE I215 E (18760)	1400	1498	98	7.0%	2.6

Year 2021 Volume Calibration - AM Peak Period

Section/Link Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
13474: I 215 (24920)	5187	5076	-111	2.1%	1.5
356194: RAMP I215 W VA VERDE (18802)	451	420	-31	6.9%	1.5
2550: RAMP EAST I215 E (20204)	950	983	33	3.5%	1.1
Sum	158287	160328	2041	1.3%	

Year 2021 Volume Calibration - AM Peak Period

Section/Link Volume Comparison					
8:00 AM to 9:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
2630: RAMP I215 E ROSE (20089)	711	624	-87	12.2%	3.4
17002: RAMP I215 W GIBSON (24913)	308	332	24	7.7%	1.3
13473: I 215 (24915)	4572	4542	-31	0.7%	0.5
5948: RAMP STEPHANI I215 W (20215)	1196	1220	24	2.0%	0.7
5976: I 215 (18787)	5437	5354	-83	1.5%	1.1
2510: RAMP I215 E EASTERN (20201)	1380	1342	-38	2.8%	1.0
2511: I 215 (15610)	3585	3463	-122	3.4%	2.1
2622: I 215 (18758)	4440	4336	-104	2.3%	1.6
730: I 215 (18780)	5006	4878	-128	2.6%	1.8
6109: I 215 (22255)	4049	3891	-158	3.9%	2.5
2621: I 215 (18754)	3746	3632	-114	3.0%	1.9
729: I 215 (18767)	4183	3978	-205	4.9%	3.2
2520: RAMP EAST I215 W (20206)	1338	1303	-35	2.6%	1.0
2690: I 215 (18769)	5908	5740	-168	2.9%	2.2
5977: RAMP VA VERDE I215 W (18796)	864	809	-55	6.4%	1.9
17161: RAMP I215 E GIBSON (24911)	782	847	65	8.3%	2.3
356191: RAMP I215 E VA VERDE (18789)	509	464	-45	8.8%	2.0
2689: I 215 (18765)	5022	4816	-206	4.1%	2.9
5975: I 215 (18788)	4485	4267	-218	4.9%	3.3
13472: RAMP I215 W GIBSON (24914)	829	893	64	7.7%	2.2
11197: I 215 (22253)	5401	5408	7	0.1%	0.1
2435: I 215 (15606)	4965	4836	-129	2.6%	1.8
2678: RAMP GV PKWY I215 W (18772)	902	876	-26	2.8%	0.9
732: RAMP GV PKWY I215 E (18785)	811	757	-54	6.7%	1.9
6016: RAMP VA VERDE I215 E (18806)	401	401	0	0.0%	0.0
2623: RAMP I215 W PECOS (18759)	1468	1416	-52	3.6%	1.4
2633: I 215 (15607)	5188	4972	-216	4.2%	3.0
356173: RAMP I215 W EASTERN (20087)	1016	934	-83	8.1%	2.6
11194: I 215 (22244)	4345	4248	-97	2.2%	1.5
5983: I 215 (18786)	4994	4732	-262	5.2%	3.8
356189: RAMP I215 W GV PKWY (18781)	1295	1225	-70	5.4%	2.0
6097: RAMP STEPHANI I215 E (20213)	571	654	83	14.6%	3.4
2434: I 215 (15605)	5510	5345	-165	3.0%	2.2
5949: I 215 (20217)	3774	3603	-171	4.5%	2.8
11196: I 215 (24910)	3563	3402	-161	4.5%	2.7
5950: I 215 (20220)	4630	4578	-52	1.1%	0.8
16075: RAMP GIBSON I215 E (32344)	486	490	4	0.8%	0.2
5984: I 215 (18790)	6301	6135	-167	2.6%	2.1
2370: I 215 (15612)	4172	4037	-135	3.2%	2.1
2371: I 215 (15608)	4457	4255	-202	4.5%	3.1
5982: I 215 (20221)	5826	5784	-42	0.7%	0.5
356207: RAMP I215 E STEPHANI (20212)	1112	1079	-33	3.0%	1.0
356187: RAMP I215 E GV PKWY (18768)	839	838	-1	0.1%	0.0
356214: RAMP I125 W STEPHANI (20214)	771	817	46	6.0%	1.6
5961: I 215 (20216)	4886	4676	-210	4.3%	3.0
2629: RAMP PECOS I215 W (20092)	748	647	-101	13.5%	3.8
2624: RAMP ROSE I215 E (18760)	1276	1185	-91	7.1%	2.6

Year 2021 Volume Calibration - AM Peak Period

Section/Link Volume Comparison					
8:00 AM to 9:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
13474: I 215 (24920)	4880	4889	9	0.2%	0.1
356194: RAMP I215 W VA VERDE (18802)	389	415	26	6.8%	1.3
2550: RAMP EAST I215 E (20204)	872	808	-64	7.3%	2.2
Sum	144199	140173	-4026	2.8%	

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338155	640	602	-38	6.0%	1.5
37555	210	209	-1	0.6%	0.1
37593	779	806	27	3.5%	1.0
43955	949	855	-94	9.9%	3.1
43938	399	418	19	4.8%	0.9
37563	29	20	-9	31.4%	1.8
361000	604	647	43	7.2%	1.7
358029	10	10	0	4.0%	0.1
32839	91	162	71	77.7%	6.3
358016	79	109	30	37.5%	3.1
338099	548	576	28	5.1%	1.2
338156	156	243	87	56.0%	6.2
358026	7	0	-7	100.0%	3.7
338120	163	199	36	22.1%	2.7
601913792	49	51	2	4.3%	0.3
338175	12	0	-12	100.0%	4.9
32787	200	180	-21	10.3%	1.5
338053	1	0	-1	100.0%	1.4
601913791	184	196	12	6.6%	0.9
358031	27	62	35	130.7%	5.3
32782	38	35	-3	8.7%	0.5
338185	96	96	0	0.4%	0.0
358019	14	53	39	280.0%	6.8
338158	4	0	-4	100.0%	2.8
338123	239	234	-5	2.1%	0.3
50102	430	437	7	1.6%	0.3
44924	1569	1604	35	2.2%	0.9
357994	57	60	3	4.7%	0.4
601913739	8	8	0	2.5%	0.1
601913754	9	29	20	224.4%	4.6
37552	275	339	64	23.2%	3.6
361126	352	323	-30	8.4%	1.6
338157	804	815	11	1.4%	0.4
338159	312	304	-8	2.7%	0.5
43942	1013	991	-22	2.2%	0.7
32783	84	90	6	7.5%	0.7
357996	36	45	9	24.2%	1.4
338122	252	241	-11	4.4%	0.7
361004	310	339	29	9.4%	1.6
37562	195	170	-25	13.0%	1.9
358008	270	291	21	7.7%	1.2
37594	1	0	-1	100.0%	1.4
50105	436	449	13	2.9%	0.6
43949	138	153	15	11.0%	1.3
601913753	25	25	0	1.2%	0.1
50104	1218	1204	-14	1.2%	0.4
338154	728	764	36	4.9%	1.3

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
32805	1674	1558	-116	6.9%	2.9
32831	52	60	8	16.2%	1.1
37560	14	11	-3	19.3%	0.8
32807	482	551	69	14.3%	3.0
32806	9	9	0	3.3%	0.1
357998	8	10	2	30.0%	0.8
358021	100	86	-14	14.1%	1.5
44925	1143	1067	-76	6.7%	2.3
338054	315	316	1	0.2%	0.0
357995	35	31	-4	12.3%	0.8
358010	541	562	21	3.8%	0.9
361118	426	435	9	2.0%	0.4
601913738	24	17	-7	30.4%	1.6
32834	110	116	6	5.2%	0.5
44945	589	549	-40	6.8%	1.7
338104	582	625	43	7.3%	1.7
44373	269	281	12	4.3%	0.7
601913757	26	36	10	36.5%	1.7
32832	112	110	-2	1.6%	0.2
338102	685	625	-60	8.8%	2.4
358017	5	9	4	78.0%	1.5
338100	605	617	12	1.9%	0.5
357988	153	176	23	14.8%	1.8
338189	1008	981	-27	2.7%	0.9
44915	288	289	1	0.5%	0.1
357991	65	62	-3	4.6%	0.4
32784	826	818	-8	1.0%	0.3
358020	109	127	18	16.4%	1.6
357997	11	12	1	4.5%	0.1
358261	236	246	10	4.3%	0.7
601913736	24	32	8	33.8%	1.5
601913755	2	5	3	165.0%	1.7
338055	896	876	-20	2.2%	0.7
32830	1074	1220	146	13.6%	4.3
32838	512	405	-108	21.0%	5.0
357987	928	869	-60	6.4%	2.0
32817	29	48	19	66.9%	3.1
338173	956	941	-15	1.6%	0.5
357992	62	79	17	26.6%	2.0
37753	115	126	11	9.2%	1.0
37556	394	399	5	1.3%	0.3
44372	388	390	2	0.5%	0.1
43950	1778	1726	-52	2.9%	1.3
601913740	17	46	29	171.8%	5.2
43954	7	0	-7	100.0%	3.7
358028	11	11	0	0.0%	0.0
357989	58	101	43	73.6%	4.8

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338188	132	126	-6	4.2%	0.5
32835	470	481	11	2.2%	0.5
338125	182	213	31	17.2%	2.2
361121	428	482	54	12.5%	2.5
358027	17	30	13	74.1%	2.6
43953	1096	1212	116	10.6%	3.4
338195	80	76	-4	4.8%	0.4
43958	535	549	14	2.5%	0.6
361120	273	303	30	11.0%	1.8
32791	867	842	-25	2.9%	0.9
338098	594	556	-38	6.4%	1.6
361123	712	754	42	5.8%	1.5
37557	61	68	7	11.8%	0.9
44377	1931	1913	-18	0.9%	0.4
361113	191	206	15	7.6%	1.0
32829	73	82	9	11.8%	1.0
44944	729	755	26	3.6%	1.0
361114	1133	1165	32	2.8%	0.9
44375	1733	1669	-64	3.7%	1.6
43940	345	374	29	8.5%	1.5
601913752	10	11	1	7.0%	0.2
338058	286	281	-5	1.9%	0.3
338174	452	482	30	6.6%	1.4
32812	40	96	56	140.5%	6.8
43941	1146	1169	23	2.0%	0.7
43946	1174	1142	-32	2.8%	1.0
338136	420	409	-12	2.7%	0.6
32804	24	24	0	0.0%	0.0
37554	150	144	-6	3.9%	0.5
32790	196	184	-13	6.4%	0.9
37558	104	116	12	11.2%	1.1
601913737	18	32	14	80.0%	2.9
37590	380	372	-8	2.0%	0.4
357990	1044	1017	-27	2.6%	0.8
338176	344	358	14	4.1%	0.7
358007	777	733	-44	5.6%	1.6
32837	564	620	56	9.8%	2.3
37688	257	233	-24	9.4%	1.5
338057	923	920	-3	0.3%	0.1
37561	287	257	-30	10.5%	1.8
32786	151	148	-3	1.9%	0.2
44376	217	190	-27	12.3%	1.9
358013	312	353	41	13.2%	2.3
358015	32	30	-2	5.0%	0.3
43943	810	801	-9	1.1%	0.3
37684	11	0	-11	100.0%	4.7
358030	15	16	1	3.3%	0.1

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
361111	664	707	43	6.4%	1.6
358034	2	5	3	155.0%	1.6
43951	267	331	64	23.9%	3.7
338194	136	142	6	4.3%	0.5
360998	365	358	-8	2.1%	0.4
32793	96	108	12	12.3%	1.2
32789	113	118	5	4.0%	0.4
32785	58	48	-11	18.1%	1.4
32819	1925	1852	-73	3.8%	1.7
32818	95	112	17	17.5%	1.6
358038	244	228	-16	6.5%	1.0
338056	1844	1832	-12	0.7%	0.3
32792	84	72	-13	14.9%	1.4
32823	48	88	40	84.0%	4.9
338119	525	562	37	7.1%	1.6
32808	1572	1533	-39	2.5%	1.0
32788	144	151	7	4.6%	0.5
338190	52	50	-2	3.5%	0.3
32836	253	277	24	9.4%	1.5
37588	875	846	-30	3.4%	1.0
455005963	458	498	40	8.7%	1.8
32809	413	387	-27	6.4%	1.3
358260	88	88	0	0.3%	0.0
338186	96	102	6	6.1%	0.6
37559	528	587	59	11.2%	2.5
37591	196	200	4	1.9%	0.3
32833	297	213	-84	28.2%	5.2
37700	419	403	-16	3.9%	0.8
601913741	22	47	25	115.5%	4.3
338172	576	650	74	12.8%	3.0
357993	82	107	25	30.6%	2.6
32816	2259	2234	-25	1.1%	0.5
50107	146	136	-10	6.8%	0.8
358022	23	49	26	110.9%	4.3
32828	89	30	-59	66.1%	7.6
338126	156	181	25	16.0%	1.9
43939	1	0	-1	100.0%	1.4
358037	212	185	-27	12.8%	1.9
601913756	13	6	-7	51.5%	2.2
358014	10	53	43	429.0%	7.6
338192	92	97	5	5.2%	0.5
358262	732	788	56	7.7%	2.0
338103	295	278	-17	5.9%	1.0
44374	210	210	0	0.2%	0.0
358035	12	17	5	37.5%	1.2
358018	2	0	-2	100.0%	2.0
37553	85	75	-10	11.3%	1.1

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
7:00 AM to 8:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338187	168	153	-15	8.9%	1.2
Sum	70571	71281	710	1.0%	

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
8:00 AM to 9:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338155	640	625	-15	2.3%	0.6
37555	212	205	-7	3.5%	0.5
37593	643	736	93	14.5%	3.5
43955	821	720	-101	12.3%	3.6
43938	564	509	-55	9.8%	2.4
37563	12	17	5	41.7%	1.3
361000	590	511	-79	13.4%	3.4
358029	11	11	0	3.6%	0.1
32839	120	166	46	38.1%	3.8
358016	147	107	-40	27.3%	3.6
338099	493	528	35	7.1%	1.6
338156	156	221	65	41.5%	4.7
358026	12	0	-12	99.2%	4.8
338120	213	193	-20	9.6%	1.4
601913792	73	43	-30	40.5%	3.9
338175	12	0	-12	100.0%	4.9
32787	142	158	16	11.0%	1.3
338053	1	0	-1	100.0%	1.4
601913791	206	188	-19	9.0%	1.3
358031	66	59	-8	11.4%	1.0
32782	32	30	-2	6.6%	0.4
338185	96	96	0	0.2%	0.0
358019	34	49	15	44.7%	2.4
338158	4	0	-4	100.0%	2.8
338123	227	230	3	1.3%	0.2
50102	432	416	-16	3.8%	0.8
44924	1456	1430	-26	1.8%	0.7
357994	58	60	2	3.8%	0.3
601913739	9	8	-1	14.4%	0.4
601913754	14	24	10	72.1%	2.3
37552	206	242	36	17.7%	2.4
361126	352	311	-41	11.5%	2.2
338157	804	813	9	1.1%	0.3
338159	312	268	-44	14.1%	2.6
43942	1028	1023	-5	0.5%	0.1
32783	108	87	-21	19.3%	2.1
357996	50	40	-10	19.8%	1.5
338122	258	236	-22	8.6%	1.4
361004	254	241	-13	5.0%	0.8
37562	133	148	15	11.1%	1.2
358008	340	294	-46	13.5%	2.6
37594	1	0	-1	100.0%	1.4
50105	317	419	102	32.1%	5.3
43949	181	148	-33	18.4%	2.6
601913753	17	28	11	64.7%	2.3
50104	1082	1069	-13	1.2%	0.4
338154	728	721	-7	0.9%	0.3

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
8:00 AM to 9:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
32805	1627	1445	-183	11.2%	4.7
32831	93	59	-34	36.1%	3.8
37560	18	13	-5	25.6%	1.2
32807	547	438	-110	20.0%	4.9
32806	14	6	-8	55.0%	2.4
357998	11	9	-3	22.7%	0.8
358021	148	81	-67	45.1%	6.2
44925	1186	1111	-75	6.4%	2.2
338054	331	321	-11	3.2%	0.6
357995	25	29	4	17.2%	0.8
358010	568	579	11	2.0%	0.5
361118	530	474	-56	10.6%	2.5
601913738	10	16	6	58.0%	1.6
32834	113	106	-8	6.6%	0.7
44945	559	545	-14	2.5%	0.6
338104	677	581	-96	14.2%	3.8
44373	278	250	-28	9.9%	1.7
601913757	40	29	-12	28.8%	2.0
32832	129	104	-26	19.8%	2.4
338102	727	642	-85	11.7%	3.3
358017	12	8	-4	36.7%	1.4
338100	666	619	-47	7.1%	1.9
357988	135	153	18	13.6%	1.5
338189	1008	1001	-7	0.7%	0.2
44915	323	310	-14	4.2%	0.8
357991	58	56	-2	4.1%	0.3
32784	781	627	-154	19.7%	5.8
358020	146	125	-21	14.4%	1.8
357997	12	12	0	0.0%	0.0
358261	236	219	-17	7.2%	1.1
601913736	30	27	-3	9.7%	0.5
601913755	2	5	3	155.0%	1.6
338055	1048	1029	-19	1.8%	0.6
32830	1037	1063	26	2.5%	0.8
32838	540	418	-122	22.5%	5.6
357987	884	911	27	3.0%	0.9
32817	25	40	15	59.2%	2.6
338173	956	949	-7	0.7%	0.2
357992	87	69	-18	20.9%	2.1
37753	138	121	-17	12.1%	1.5
37556	445	402	-43	9.7%	2.1
44372	399	329	-70	17.5%	3.7
43950	1693	1581	-112	6.6%	2.8
601913740	45	40	-5	11.6%	0.8
43954	1	0	-1	100.0%	1.4
358028	8	12	4	43.8%	1.1
357989	113	104	-9	7.9%	0.9

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
8:00 AM to 9:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338188	132	122	-10	7.3%	0.9
32835	419	475	56	13.4%	2.7
358033	1	0	-1	100.0%	1.4
338125	255	208	-47	18.5%	3.1
361121	428	429	1	0.3%	0.1
358027	42	31	-11	25.5%	1.8
43953	1127	1124	-3	0.3%	0.1
338195	80	76	-5	5.6%	0.5
43958	498	412	-87	17.4%	4.1
361120	250	235	-15	5.9%	1.0
32791	1127	944	-183	16.2%	5.7
338098	516	516	-1	0.1%	0.0
361123	712	650	-62	8.7%	2.4
37557	76	61	-15	20.1%	1.9
44377	1893	1676	-217	11.5%	5.1
361113	196	191	-5	2.6%	0.4
32829	82	71	-11	13.4%	1.3
44944	770	675	-95	12.4%	3.5
361114	1021	919	-102	10.0%	3.3
44375	1698	1612	-87	5.1%	2.1
43940	452	404	-48	10.7%	2.3
601913752	8	11	3	33.8%	0.9
338058	275	250	-25	9.1%	1.5
338174	452	504	52	11.5%	2.4
32812	64	93	29	45.3%	3.3
43941	1142	1114	-28	2.4%	0.8
43946	1312	1100	-213	16.2%	6.1
338136	423	350	-73	17.2%	3.7
32804	22	20	-2	7.3%	0.3
37554	127	138	11	8.8%	1.0
32790	148	164	16	10.9%	1.3
37558	107	106	-1	0.8%	0.1
601913737	33	29	-4	10.9%	0.6
37590	352	357	5	1.5%	0.3
357990	1001	987	-15	1.4%	0.5
338176	344	349	5	1.5%	0.3
358007	995	834	-161	16.2%	5.3
32837	584	636	52	8.9%	2.1
37688	195	212	17	8.7%	1.2
338057	1145	1085	-60	5.3%	1.8
37561	223	234	11	4.7%	0.7
32786	142	141	-1	1.0%	0.1
44376	250	177	-73	29.1%	5.0
358013	393	349	-44	11.3%	2.3
358032	1	0	-1	100.0%	1.4
358015	53	25	-29	53.8%	4.6
43943	856	843	-13	1.5%	0.5

Year 2021 Volume Calibration - AM Peak Period

Turn Volume Comparison					
8:00 AM to 9:00 AM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
37684	2	0	-2	85.0%	1.6
358030	16	15	-1	6.3%	0.3
361111	597	565	-32	5.4%	1.3
358034	6	5	-1	11.7%	0.3
43951	255	263	8	3.3%	0.5
338194	136	125	-11	8.0%	1.0
360998	409	359	-50	12.3%	2.6
32793	129	99	-30	23.1%	2.8
32789	117	106	-11	9.6%	1.1
32785	42	46	4	9.8%	0.6
32819	1895	1759	-136	7.2%	3.2
32818	122	110	-12	9.5%	1.1
358038	251	228	-23	9.2%	1.5
338056	1839	1826	-13	0.7%	0.3
32792	79	79	0	0.5%	0.0
32823	106	74	-32	30.1%	3.4
338119	441	468	27	6.1%	1.3
32808	1493	1401	-92	6.2%	2.4
32788	141	134	-7	5.1%	0.6
338190	52	49	-3	5.2%	0.4
32836	251	252	1	0.5%	0.1
37588	756	754	-2	0.3%	0.1
455005963	512	480	-32	6.2%	1.4
32809	475	441	-34	7.1%	1.6
358260	88	76	-13	14.2%	1.4
338186	96	95	-1	0.7%	0.1
37559	569	515	-54	9.5%	2.3
37591	191	179	-12	6.2%	0.9
32833	256	189	-67	26.2%	4.5
37700	295	310	15	5.0%	0.8
601913741	32	42	10	31.3%	1.6
338172	576	572	-4	0.7%	0.2
357993	137	106	-31	22.8%	2.8
32816	2227	1942	-285	12.8%	6.2
50107	111	120	9	7.9%	0.8
358022	35	50	15	42.0%	2.3
32828	108	29	-79	73.1%	9.5
338126	147	160	13	9.1%	1.1
358037	162	186	24	14.9%	1.8
601913756	6	5	-1	16.7%	0.4
358014	24	55	31	130.0%	5.0
338192	92	91	-1	0.7%	0.1
358262	732	718	-14	2.0%	0.5
338103	221	250	29	13.2%	1.9
44374	229	210	-19	8.4%	1.3
358035	13	15	2	17.7%	0.6
358018	9	0	-9	100.0%	4.2

Year 2021 Volume Calibration - AM Peak Period

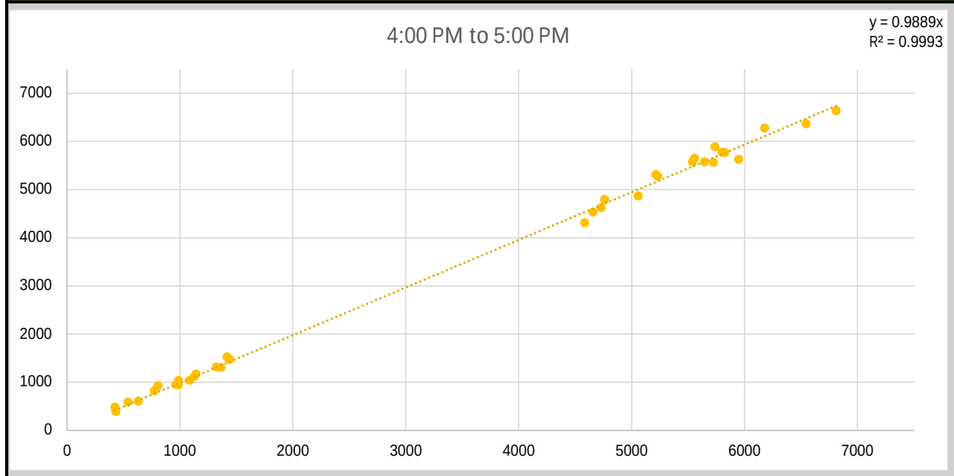
Turn Volume Comparison					
8:00 AM to 9:00 AM					
Object	**Field Counts**	**Model Volumes**	**Absolute Difference**	**Relative Difference (%)**	**GEH**
37553	69	74	5	6.8%	0.6
338187	168	155	-13	7.6%	1.0
Sum	71263	67209	-4054	5.7%	

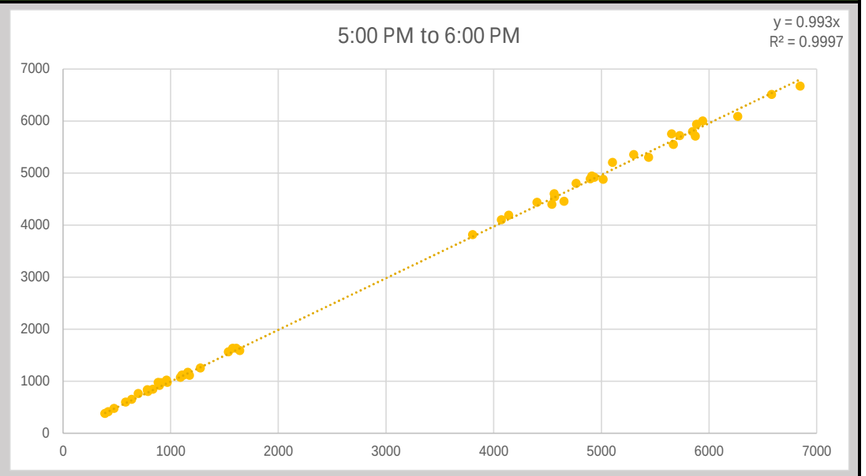
Year 2021 Volume Calibration - PM Peak Period

COUNT

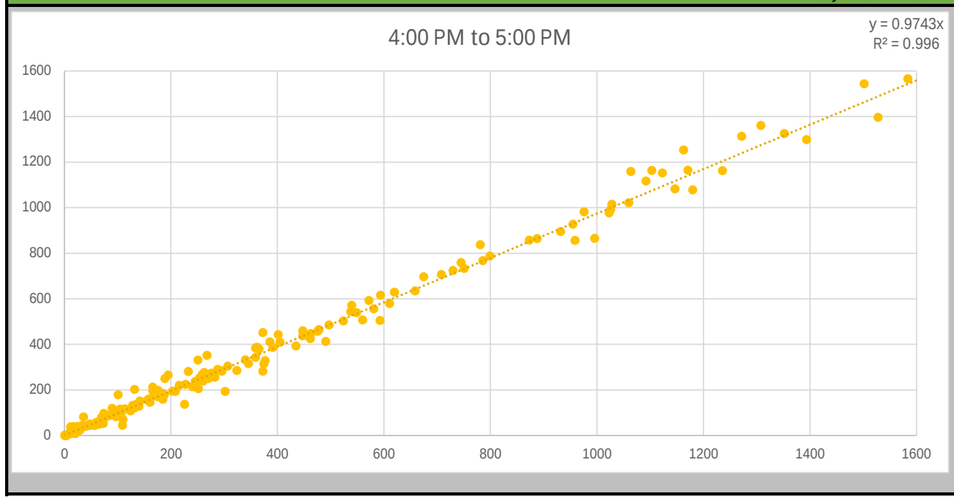
Criteria	Acceptance Target	4:00 PM to 5:00 PM			5:00 PM to 6:00 PM		
		Points	Pass	Acceptance	Points	Pass	Acceptance
FLOW < 700, within 100 veh / h	> 85%	6	6	100.0	5	5	100.0
700 < FLOW < 2700, within 15%	> 85%	18	18	100.0	19	19	100.0
2700 < FLOW < 5000, within 10%	> 85%	9	9	100.0	13	13	100.0
FLOW > 5000 within 250 veh / h	> 85%	17	16	94.1	13	13	100.0
GEH Statistic < 5 for individual link flows	> 85%	50	50	100.0	50	50	100.0
GEH Statistic < 10 for individual link flows	100%	50	50	100.0	50	50	100.0
GEH Stastistic < 5 for all Turns	> 85%	190	181	95.3	190	184	96.8
GEH Stastistic < 10 for all Turns	100%	190	190	100.0	190	190	100.0
Percent GEH Passing	> 95%	240	240	100.0	240	240	100.0
Sum of all link flows	> 95%			99.4			99.6

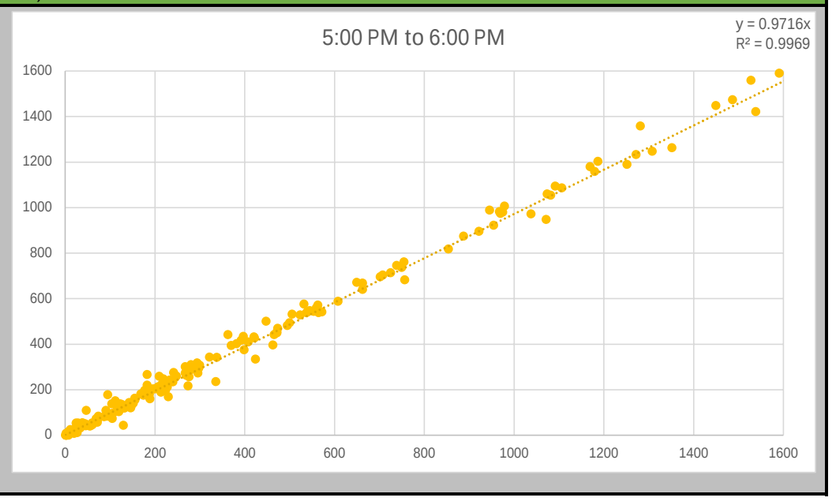
Hourly Count Validation (Sections)





Hourly Count Validation (Turns)





Year 2021 Volume Calibration - PM Peak Period

Section/Link Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
2630: RAMP I215 E ROSE (20089)	633	608	-25	3.9%	1.0
17002: RAMP I215 W GIBSON (24913)	433	395	-38	8.8%	1.9
13473: I 215 (24915)	4659	4529	-130	2.8%	1.9
5948: RAMP STEPHANI I215 W (20215)	1441	1475	34	2.3%	0.9
5976: I 215 (18787)	5800	5771	-29	0.5%	0.4
2510: RAMP I215 E EASTERN (20201)	1364	1307	-57	4.2%	1.6
2511: I 215 (15610)	4585	4309	-276	6.0%	4.1
2622: I 215 (18758)	4762	4793	31	0.7%	0.4
730: I 215 (18780)	5214	5308	94	1.8%	1.3
6109: I 215 (22255)	5232	5275	43	0.8%	0.6
2621: I 215 (18754)	5059	4863	-196	3.9%	2.8
729: I 215 (18767)	5725	5563	-162	2.8%	2.2
2520: RAMP EAST I215 W (20206)	1323	1313	-10	0.7%	0.3
2690: I 215 (18769)	6180	6274	94	1.5%	1.2
5977: RAMP VA VERDE I215 W (18796)	540	585	45	8.4%	1.9
17161: RAMP I215 E GIBSON (24911)	773	823	50	6.5%	1.8
356191: RAMP I215 E VA VERDE (18789)	987	950	-37	3.8%	1.2
2689: I 215 (18765)	6546	6362	-184	2.8%	2.3
5975: I 215 (18788)	5825	5764	-61	1.0%	0.8
13472: RAMP I215 W GIBSON (24914)	988	1039	51	5.2%	1.6
11197: I 215 (22253)	5647	5573	-74	1.3%	1.0
2435: I 215 (15606)	5949	5623	-326	5.5%	4.3
2678: RAMP GV PKWY I215 W (18772)	966	953	-13	1.3%	0.4
732: RAMP GV PKWY I215 E (18785)	1087	1036	-51	4.7%	1.6
6016: RAMP VA VERDE I215 E (18806)	425	484	59	13.9%	2.8
2623: RAMP I215 W PECOS (18759)	1418	1525	107	7.6%	2.8
2633: I 215 (15607)	5558	5644	86	1.5%	1.1
356173: RAMP I215 W EASTERN (20087)	1143	1168	25	2.2%	0.7
11194: I 215 (22244)	5539	5572	33	0.6%	0.4
5983: I 215 (18786)	6812	6634	-178	2.6%	2.2
356189: RAMP I215 W GV PKWY (18781)	1126	1116	-10	0.9%	0.3
6097: RAMP STEPHANI I215 E (20213)	808	928	120	14.8%	4.1
2434: I 215 (15605)	5738	5887	149	2.6%	2.0
5949: I 215 (20217)	4731	4624	-107	2.3%	1.6
11196: I 215 (24910)	4766	4806	40	0.8%	0.6
5950: I 215 (20220)	4921	4826	-95	1.9%	1.4
16075: RAMP GIBSON I215 E (32344)	466	463	-3	0.6%	0.1
5984: I 215 (18790)	6340	6401	61	1.0%	0.8
2370: I 215 (15612)	4415	4519	104	2.4%	1.6
2371: I 215 (15608)	5692	5464	-229	4.0%	3.1
5982: I 215 (20221)	6362	6304	-58	0.9%	0.7
356207: RAMP I215 E STEPHANI (20212)	1519	1648	129	8.5%	3.2
356187: RAMP I215 E GV PKWY (18768)	821	815	-6	0.7%	0.2
356214: RAMP I125 W STEPHANI (20214)	726	751	25	3.5%	0.9
5961: I 215 (20216)	6250	6259	9	0.1%	0.1
2629: RAMP PECOS I215 W (20092)	796	823	27	3.4%	1.0
2624: RAMP ROSE I215 E (18760)	1487	1489	2	0.2%	0.1
13474: I 215 (24920)	5092	4926	-166	3.3%	2.3
356194: RAMP I215 W VA VERDE (18802)	562	539	-23	4.0%	1.0

Year 2021 Volume Calibration - PM Peak Period

Section/Link Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
2550: RAMP EAST I215 E (20204)	1107	1149	42	3.8%	1.2
Sum	166338	165257	-1081	0.6%	

Year 2021 Volume Calibration - PM Peak Period

Section/Link Volume Comparison					
5:00 PM to 6:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
2630: RAMP I215 E ROSE (20089)	792	802	10	1.3%	0.4
17002: RAMP I215 W GIBSON (24913)	422	412	-10	2.4%	0.5
13473: I 215 (24915)	4142	4188	46	1.1%	0.7
5948: RAMP STEPHANI I215 W (20215)	1539	1565	26	1.7%	0.7
5976: I 215 (18787)	5303	5354	51	1.0%	0.7
2510: RAMP I215 E EASTERN (20201)	1280	1251	-29	2.3%	0.8
2511: I 215 (15610)	4570	4544	-26	0.6%	0.4
2622: I 215 (18758)	4076	4103	27	0.7%	0.4
730: I 215 (18780)	4769	4799	30	0.6%	0.4
6109: I 215 (22255)	5020	4880	-140	2.8%	2.0
2621: I 215 (18754)	4939	4917	-22	0.5%	0.3
729: I 215 (18767)	5671	5547	-124	2.2%	1.7
2520: RAMP EAST I215 W (20206)	1094	1073	-21	1.9%	0.6
2690: I 215 (18769)	5656	5754	98	1.7%	1.3
5977: RAMP VA VERDE I215 W (18796)	586	599	13	2.1%	0.5
17161: RAMP I215 E GIBSON (24911)	900	916	16	1.8%	0.5
356191: RAMP I215 E VA VERDE (18789)	972	976	4	0.4%	0.1
2689: I 215 (18765)	6585	6510	-75	1.1%	0.9
5975: I 215 (18788)	5877	5708	-169	2.9%	2.2
13472: RAMP I215 W GIBSON (24914)	965	1019	54	5.6%	1.7
11197: I 215 (22253)	5107	5203	96	1.9%	1.3
2435: I 215 (15606)	5850	5796	-54	0.9%	0.7
2678: RAMP GV PKWY I215 W (18772)	887	974	87	9.8%	2.9
732: RAMP GV PKWY I215 E (18785)	1178	1112	-66	5.6%	1.9
6016: RAMP VA VERDE I215 E (18806)	393	378	-15	3.8%	0.8
2623: RAMP I215 W PECOS (18759)	1580	1632	52	3.3%	1.3
2633: I 215 (15607)	4915	4943	28	0.6%	0.4
356173: RAMP I215 W EASTERN (20087)	1108	1118	10	0.9%	0.3
11194: I 215 (22244)	5443	5302	-142	2.6%	1.9
5983: I 215 (18786)	6849	6671	-178	2.6%	2.2
356189: RAMP I215 W GV PKWY (18781)	1120	1111	-9	0.8%	0.3
6097: RAMP STEPHANI I215 E (20213)	786	837	51	6.5%	1.8
2434: I 215 (15605)	4901	4890	-11	0.2%	0.2
5949: I 215 (20217)	4657	4454	-203	4.4%	3.0
11196: I 215 (24910)	4543	4400	-143	3.2%	2.1
5950: I 215 (20220)	4405	4436	31	0.7%	0.5
16075: RAMP GIBSON I215 E (32344)	477	475	-3	0.5%	0.1
5984: I 215 (18790)	5889	5938	49	0.8%	0.6
2370: I 215 (15612)	3807	3815	8	0.2%	0.1
2371: I 215 (15608)	5731	5718	-13	0.2%	0.2
5982: I 215 (20221)	5944	6001	57	1.0%	0.7
356207: RAMP I215 E STEPHANI (20212)	1613	1633	20	1.3%	0.5
356187: RAMP I215 E GV PKWY (18768)	914	973	59	6.5%	1.9
356214: RAMP I125 W STEPHANI (20214)	702	764	62	8.8%	2.3
5961: I 215 (20216)	6270	6086	-184	2.9%	2.3
2629: RAMP PECOS I215 W (20092)	839	846	7	0.9%	0.3
2624: RAMP ROSE I215 E (18760)	1646	1587	-59	3.6%	1.5
13474: I 215 (24920)	4564	4601	37	0.8%	0.5

Year 2021 Volume Calibration - PM Peak Period

Section/Link Volume Comparison					
5:00 PM to 6:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
356194: RAMP I215 W VA VERDE (18802)	641	650	9	1.4%	0.4
2550: RAMP EAST I215 E (20204)	1161	1171	10	0.9%	0.3
Sum	159078	158434	-644	0.4%	

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338155	888	863	-25	2.8%	0.8
37555	324	285	-39	12.1%	2.3
37593	402	442	40	10.0%	2.0
43955	1123	1152	29	2.6%	0.9
43938	594	615	21	3.6%	0.9
37563	21	13	-9	40.5%	2.1
361000	611	579	-32	5.2%	1.3
358029	56	50	-7	11.6%	0.9
32839	132	201	69	52.4%	5.4
358016	252	205	-47	18.6%	3.1
338099	373	451	78	20.9%	3.8
338156	268	351	83	31.1%	4.7
358026	8	8	0	2.5%	0.1
338120	288	289	1	0.3%	0.1
601913792	110	69	-41	36.9%	4.3
338175	4	0	-4	100.0%	2.8
32787	105	115	10	9.5%	1.0
338053	1	0	-1	100.0%	1.4
601913791	114	116	2	1.8%	0.2
358031	57	43	-14	24.2%	1.9
32782	40	40	0	0.5%	0.0
338185	96	94	-2	2.0%	0.2
358019	90	118	28	31.3%	2.8
338158	4	0	-4	100.0%	2.8
338123	359	342	-17	4.6%	0.9
50102	955	927	-28	3.0%	0.9
44924	1103	1164	61	5.5%	1.8
357994	160	161	1	0.4%	0.1
601913739	12	38	26	216.7%	5.2
601913754	16	24	8	49.4%	1.8
37552	195	265	70	35.9%	4.6
361126	296	281	-15	5.0%	0.9
338157	1092	1116	24	2.2%	0.7
338159	560	507	-53	9.5%	2.3
43942	1023	976	-47	4.6%	1.5
32783	128	122	-6	4.8%	0.6
357996	255	242	-13	5.0%	0.8
338122	463	447	-16	3.5%	0.8
361004	259	267	8	3.2%	0.5
37562	107	97	-10	9.4%	1.0
358008	254	252	-2	0.8%	0.1
37594	5	0	-5	100.0%	3.2
50105	189	250	61	32.1%	4.1
43949	185	158	-27	14.6%	2.1
601913753	21	11	-10	49.5%	2.6
50104	751	733	-18	2.4%	0.7
338154	572	592	20	3.6%	0.8

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
32805	1895	1636	-259	13.7%	6.2
32831	125	107	-18	14.3%	1.7
37560	23	13	-10	42.6%	2.3
32807	581	555	-26	4.5%	1.1
32806	21	8	-13	62.9%	3.5
357998	49	47	-2	3.3%	0.2
358021	241	213	-29	11.8%	1.9
44925	1502	1543	41	2.7%	1.1
338054	216	220	4	1.7%	0.3
357995	21	20	-1	3.3%	0.2
358010	340	331	-9	2.6%	0.5
361118	448	437	-11	2.5%	0.5
601913738	36	81	45	125.8%	5.9
32834	140	127	-13	9.1%	1.1
44945	873	857	-16	1.8%	0.5
338104	976	982	6	0.6%	0.2
44373	373	282	-91	24.5%	5.0
601913757	23	19	-4	16.5%	0.8
32832	226	136	-90	39.9%	6.7
338102	786	768	-19	2.4%	0.7
358017	17	18	1	4.1%	0.2
338100	730	724	-6	0.9%	0.2
357988	48	50	2	3.7%	0.3
338189	1308	1360	52	4.0%	1.4
44915	386	410	24	6.2%	1.2
357991	29	22	-7	23.8%	1.4
32784	1028	1015	-14	1.3%	0.4
358020	359	383	24	6.8%	1.3
357997	71	72	1	2.0%	0.2
358261	228	223	-5	2.1%	0.3
601913736	32	33	1	3.1%	0.2
601913755	18	25	7	37.8%	1.5
338055	1147	1083	-65	5.6%	1.9
32830	781	837	56	7.2%	2.0
32838	497	485	-12	2.5%	0.6
357987	1026	991	-35	3.4%	1.1
32817	18	39	21	117.2%	3.9
338173	1272	1313	41	3.2%	1.1
357992	128	130	2	1.8%	0.2
37753	366	379	13	3.6%	0.7
37556	659	635	-24	3.7%	1.0
44372	377	328	-49	13.1%	2.6
43950	2035	2080	45	2.2%	1.0
601913740	15	13	-2	12.7%	0.5
43954	1	0	-1	100.0%	1.4
358028	24	26	2	7.1%	0.3
357989	97	107	10	10.4%	1.0

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338188	72	66	-6	8.8%	0.8
32835	491	412	-79	16.1%	3.7
358033	1	0	-1	100.0%	1.4
338125	346	315	-31	9.1%	1.7
361121	540	571	31	5.7%	1.3
358027	65	49	-17	25.4%	2.2
43953	1163	1253	90	7.7%	2.6
338195	140	130	-10	7.1%	0.9
43958	620	629	9	1.4%	0.4
361120	176	197	21	11.8%	1.5
32791	996	865	-131	13.2%	4.3
338098	435	392	-43	9.9%	2.1
361123	1180	1078	-102	8.6%	3.0
37557	246	236	-10	4.0%	0.6
44377	2175	2010	-165	7.6%	3.6
361113	263	276	13	4.9%	0.8
32829	76	79	3	4.3%	0.4
44944	675	697	22	3.2%	0.8
361114	1236	1162	-74	6.0%	2.1
44375	1945	1945	0	0.0%	0.0
43940	549	539	-10	1.8%	0.4
601913752	12	14	2	20.0%	0.7
338058	362	386	24	6.7%	1.3
338174	448	459	11	2.4%	0.5
32812	105	106	1	1.1%	0.1
43941	1060	1021	-40	3.7%	1.2
43946	1394	1299	-95	6.8%	2.6
338136	307	303	-4	1.3%	0.2
32804	31	36	5	16.5%	0.9
37554	175	179	4	2.1%	0.3
32790	166	196	30	18.0%	2.2
37558	70	79	9	12.9%	1.0
601913737	74	97	23	30.8%	2.5
37590	932	895	-38	4.0%	1.2
357990	1171	1164	-7	0.6%	0.2
338176	708	706	-2	0.3%	0.1
358007	959	856	-104	10.8%	3.4
32837	1064	1159	95	8.9%	2.8
37688	161	145	-16	10.1%	1.3
338057	1584	1566	-18	1.2%	0.5
37561	175	172	-4	2.0%	0.3
32786	178	172	-6	3.6%	0.5
44376	302	193	-109	36.2%	7.0
358013	405	409	4	1.1%	0.2
358032	1	0	-1	100.0%	1.4
358015	97	82	-15	15.5%	1.6
43943	1352	1325	-27	2.0%	0.7

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
37684	1	0	-1	100.0%	1.4
358030	48	43	-5	10.4%	0.7
361111	745	758	13	1.8%	0.5
358034	13	7	-6	43.1%	1.8
43951	251	330	79	31.6%	4.6
338194	104	91	-13	12.8%	1.3
360998	593	504	-89	15.0%	3.8
32793	133	132	-1	0.5%	0.1
32789	185	184	-1	0.8%	0.1
32785	60	57	-4	5.8%	0.5
32819	2227	2253	26	1.1%	0.5
32818	142	151	9	6.1%	0.7
358038	524	502	-22	4.1%	1.0
338056	1867	1773	-94	5.0%	2.2
32792	84	87	3	3.1%	0.3
32823	132	121	-11	8.3%	1.0
338119	233	280	47	20.3%	2.9
32808	1847	1819	-28	1.5%	0.7
32788	176	170	-6	3.5%	0.5
338190	276	273	-3	1.1%	0.2
32836	209	192	-17	7.9%	1.2
37588	538	543	5	0.9%	0.2
455005963	799	787	-12	1.6%	0.4
32809	462	425	-37	8.1%	1.8
358260	132	133	1	1.1%	0.1
338186	156	155	-1	0.8%	0.1
37559	478	465	-14	2.8%	0.6
37591	294	283	-11	3.7%	0.6
32833	283	255	-28	9.9%	1.7
37700	172	180	8	4.5%	0.6
601913741	12	19	7	60.8%	1.8
338172	392	386	-6	1.6%	0.3
357993	261	239	-22	8.6%	1.4
32816	2498	2339	-159	6.4%	3.2
50107	271	249	-22	8.2%	1.4
358022	73	52	-21	28.9%	2.7
32828	109	44	-65	59.4%	7.4
338126	166	212	46	27.6%	3.3
358037	203	194	-9	4.4%	0.6
601913756	34	43	9	27.6%	1.5
358014	101	179	78	76.8%	6.6
338192	68	66	-2	2.4%	0.2
358262	1528	1396	-132	8.6%	3.5
338103	476	457	-19	4.0%	0.9
44374	375	314	-61	16.3%	3.3
358035	79	83	4	5.4%	0.5
358018	16	19	3	21.3%	0.8

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
4:00 PM to 5:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
37553	26	38	12	47.3%	2.2
338187	188	178	-10	5.4%	0.8
Sum	83236	81604	-1632	2.0%	

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
5:00 PM to 6:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
338155	888	875	-14	1.5%	0.5
37555	281	309	28	10.0%	1.6
37593	397	434	37	9.2%	1.8
43955	1252	1189	-63	5.0%	1.8
43938	563	571	8	1.5%	0.3
37563	21	11	-10	45.7%	2.4
361000	757	682	-75	9.9%	2.8
358029	45	49	4	9.8%	0.6
32839	183	266	83	45.2%	5.5
358016	274	216	-58	21.2%	3.7
338099	363	442	79	21.7%	3.9
338156	268	300	32	12.1%	1.9
358026	7	8	1	11.4%	0.3
338120	284	291	7	2.4%	0.4
601913792	105	73	-32	30.5%	3.4
338175	4	0	-4	100.0%	2.8
32787	120	103	-17	13.9%	1.6
338053	2	0	-2	100.0%	2.0
601913791	116	125	9	7.3%	0.8
358031	39	54	15	37.9%	2.2
32782	55	40	-15	27.5%	2.2
338185	96	95	-1	1.1%	0.1
358019	112	151	39	34.6%	3.4
338158	4	0	-4	100.0%	2.8
338123	408	410	2	0.4%	0.1
50102	970	974	4	0.4%	0.1
44924	1187	1203	16	1.3%	0.5
357994	143	144	1	0.3%	0.0
601913739	38	42	4	9.7%	0.6
601913754	17	21	4	25.9%	1.0
37552	177	197	20	11.1%	1.4
361126	296	273	-23	7.8%	1.4
338157	1092	1094	2	0.2%	0.1
338159	560	559	-1	0.2%	0.0
43942	1074	1059	-15	1.4%	0.5
32783	153	150	-3	2.2%	0.3
357996	219	247	28	12.8%	1.8
338122	466	442	-24	5.2%	1.1
361004	224	197	-27	12.1%	1.9
37562	107	97	-10	9.6%	1.0
358008	298	295	-3	1.0%	0.2
37594	8	0	-8	100.0%	4.0
50105	210	258	48	23.0%	3.2
43949	183	219	36	19.8%	2.6
601913753	27	11	-16	58.1%	3.6
50104	725	714	-11	1.6%	0.4
338154	572	541	-31	5.4%	1.3

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
5:00 PM to 6:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
32805	2120	1822	-298	14.1%	6.7
32831	117	119	2	2.0%	0.2
37560	19	11	-8	42.1%	2.1
32807	554	543	-11	1.9%	0.5
32806	20	7	-13	64.0%	3.5
357998	34	41	7	21.8%	1.2
358021	276	257	-19	7.0%	1.2
44925	1487	1474	-13	0.9%	0.3
338054	196	203	7	3.3%	0.5
357995	15	21	6	40.0%	1.4
358010	370	393	23	6.3%	1.2
361118	608	588	-20	3.3%	0.8
601913738	47	109	62	131.3%	7.0
32834	126	135	9	7.0%	0.8
44945	922	895	-27	3.0%	0.9
338104	955	922	-33	3.5%	1.1
44373	424	334	-90	21.2%	4.6
601913757	22	24	2	7.7%	0.4
32832	230	168	-62	26.8%	4.4
338102	750	736	-14	1.8%	0.5
358017	21	21	0	1.9%	0.1
338100	663	641	-23	3.4%	0.9
357988	26	45	19	73.5%	3.2
338189	1308	1247	-61	4.7%	1.7
44915	532	576	44	8.2%	1.9
357991	12	25	13	104.2%	2.9
32784	1107	1086	-21	1.9%	0.6
358020	322	342	20	6.3%	1.1
357997	69	72	3	4.3%	0.4
358261	228	212	-16	7.0%	1.1
601913736	34	31	-3	9.1%	0.5
601913755	19	21	2	10.5%	0.4
338055	1082	1054	-28	2.6%	0.9
32830	979	1006	27	2.7%	0.9
32838	565	538	-28	4.9%	1.2
357987	975	980	5	0.5%	0.1
32817	25	53	28	110.4%	4.4
338173	1272	1232	-40	3.1%	1.1
357992	124	127	3	2.4%	0.3
37753	495	482	-13	2.7%	0.6
37556	663	668	5	0.7%	0.2
44372	463	396	-67	14.4%	3.2
43950	2240	2219	-21	0.9%	0.4
601913740	23	15	-8	34.3%	1.8
358028	22	28	6	28.6%	1.3
357989	74	83	9	12.2%	1.0
338188	72	67	-5	6.9%	0.6

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
5:00 PM to 6:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
32835	399	375	-24	6.0%	1.2
358033	2	0	-2	100.0%	2.0
338125	300	307	7	2.4%	0.4
361121	540	541	1	0.2%	0.0
358027	29	53	24	83.4%	3.8
43953	1282	1358	76	6.0%	2.1
338195	140	126	-14	10.1%	1.2
43958	650	671	21	3.2%	0.8
361120	189	160	-29	15.3%	2.2
32791	1038	971	-67	6.4%	2.1
338098	382	402	20	5.2%	1.0
361123	1180	1158	-22	1.9%	0.6
37557	270	272	2	0.8%	0.1
44377	2332	2153	-179	7.7%	3.8
361113	240	235	-6	2.3%	0.4
32829	87	81	-6	6.8%	0.6
44944	702	695	-7	1.0%	0.3
361114	1352	1262	-90	6.6%	2.5
44375	2140	2188	48	2.2%	1.0
43940	545	547	2	0.4%	0.1
601913752	8	16	8	93.8%	2.2
338058	422	427	5	1.1%	0.2
338174	448	501	53	11.7%	2.4
32812	91	108	17	18.8%	1.7
43941	854	817	-37	4.3%	1.3
43946	1539	1422	-118	7.6%	3.1
338136	338	341	3	0.9%	0.2
32804	46	41	-5	10.0%	0.7
37554	200	203	3	1.7%	0.2
32790	214	189	-26	11.9%	1.8
37558	94	83	-11	11.5%	1.1
601913737	104	137	33	31.9%	3.0
37590	968	982	14	1.4%	0.4
357990	1170	1179	9	0.8%	0.3
338176	708	704	-4	0.6%	0.2
358007	1072	948	-124	11.6%	3.9
32837	946	989	43	4.5%	1.4
37688	152	140	-12	8.0%	1.0
338057	1591	1589	-2	0.1%	0.0
37561	223	219	-5	2.0%	0.3
32786	175	176	1	0.4%	0.1
44376	336	236	-100	29.9%	5.9
358013	474	470	-4	0.9%	0.2
358032	1	0	-1	100.0%	1.4
358015	95	94	-1	1.1%	0.1
43943	1450	1448	-3	0.2%	0.1
37684	2	0	-2	100.0%	2.0

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
5:00 PM to 6:00 PM					
Object	Field Counts	Model Volumes	Absolute Difference	Relative Difference (%)	GEH
358030	42	42	0	0.7%	0.0
361111	739	746	7	0.9%	0.3
358034	2	7	5	265.0%	2.5
43951	294	318	24	8.1%	1.4
338194	104	93	-11	10.5%	1.1
360998	524	528	4	0.8%	0.2
32793	186	176	-10	5.6%	0.8
32789	222	224	2	0.8%	0.1
32785	72	56	-16	21.7%	1.9
32819	2546	2490	-56	2.2%	1.1
32818	186	184	-2	1.2%	0.2
358038	506	532	26	5.1%	1.1
338056	1732	1666	-67	3.8%	1.6
32792	146	120	-27	18.2%	2.3
32823	122	138	16	12.8%	1.4
338119	248	260	12	4.8%	0.7
32808	2075	2052	-23	1.1%	0.5
32788	155	162	7	4.3%	0.5
338190	276	280	4	1.5%	0.2
32836	148	130	-18	12.4%	1.6
37588	538	538	0	0.1%	0.0
455005963	755	761	6	0.8%	0.2
32809	500	493	-7	1.3%	0.3
358260	132	119	-14	10.2%	1.2
338186	156	155	-1	0.7%	0.1
37559	472	454	-19	3.9%	0.9
37591	270	262	-8	2.9%	0.5
32833	215	222	7	3.0%	0.4
37700	207	212	5	2.2%	0.3
601913741	25	27	2	9.2%	0.4
338172	392	416	24	6.1%	1.2
357993	242	275	33	13.6%	2.0
32816	2769	2547	-222	8.0%	4.3
50107	268	273	5	1.7%	0.3
358022	60	53	-7	11.0%	0.9
32828	130	44	-87	66.5%	9.3
338126	169	181	12	7.2%	0.9
358037	233	241	8	3.6%	0.5
601913756	61	45	-16	26.1%	2.2
358014	95	177	82	86.2%	7.0
338192	68	64	-5	6.6%	0.6
358262	1528	1558	30	2.0%	0.8
338103	421	432	11	2.5%	0.5
44374	472	449	-23	4.9%	1.1
358035	76	79	3	3.6%	0.3
358018	25	22	-3	12.0%	0.6
37553	57	41	-16	27.4%	2.2

Year 2021 Volume Calibration - PM Peak Period

Turn Volume Comparison					
5:00 PM to 6:00 PM					
Object	**Field Counts**	**Model Volumes**	**Absolute Difference**	**Relative Difference (%)**	**GEH**
338187	188	180	-9	4.5%	0.6
Sum	86466	85025	-1441	1.7%	

Appendix D: Speed Calibration Results

Year 2021 Speed Calibration - AM Peak Period

	I-215 Field Observed Speeds (mph)					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
7:00 to 7:15 AM	63.0	64.0	64.9	65.9	68.6	69.3
7:15 to 7:30 AM	62.8	61.3	62.2	63.9	65.0	67.3
7:30 to 7:45 AM	61.5	60.0	60.8	63.5	63.3	65.0
7:45 to 8:00 AM	59.3	55.5	60.7	65.4	66.8	66.8
8:00 to 8:15 AM	59.5	57.9	63.7	65.7	66.1	67.1
8:15 to 8:30 AM	51.8	61.9	63.2	65.0	66.0	67.8
8:30 to 8:45 AM	41.1	55.6	59.1	65.3	65.2	67.6
8:45 to 9:00 AM	60.1	60.5	63.5	64.0	63.8	65.5
7:00 to 9:00 AM	57.4	59.6	62.3	64.8	65.6	67.0

	I-215 Aimsun Next Model Speeds (mph)					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
7:00 to 7:15 AM	49.3	60.4	53.1	65.6	63.9	65.0
7:15 to 7:30 AM	53.4	60.8	58.2	65.3	64.0	65.2
7:30 to 7:45 AM	53.8	61.1	57.5	60.3	60.7	62.0
7:45 to 8:00 AM	49.8	59.0	61.7	58.2	61.4	62.3
8:00 to 8:15 AM	56.0	60.4	60.7	64.4	65.5	66.9
8:15 to 8:30 AM	54.6	59.4	61.7	62.5	65.7	67.0
8:30 to 8:45 AM	53.0	59.0	59.1	62.1	64.5	66.5
8:45 to 9:00 AM	56.8	58.9	61.4	60.5	63.9	65.3
7:00 to 9:00 AM	53.3	59.9	59.2	62.4	63.7	65.0

	Percent Difference between Field Observed Speeds and Aimsun Next Model Speeds					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
7:00 to 7:15 AM	22%	6%	18%	0%	7%	6%
7:15 to 7:30 AM	15%	1%	6%	-2%	2%	3%
7:30 to 7:45 AM	13%	-2%	5%	5%	4%	5%
7:45 to 8:00 AM	16%	-6%	-2%	11%	8%	7%
8:00 to 8:15 AM	6%	-4%	5%	2%	1%	0%
8:15 to 8:30 AM	-5%	4%	2%	4%	0%	1%
8:30 to 8:45 AM	-29%	-6%	0%	5%	1%	2%
8:45 to 9:00 AM	6%	3%	3%	5%	0%	0%
7:00 to 9:00 AM	7%	0%	5%	4%	3%	3%

	Absolute Difference between Field Observed Speeds and Aimsun Next Model Speeds (mph)					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
7:00 to 7:15 AM	13.6	3.5	11.8	0.3	4.6	4.4
7:15 to 7:30 AM	9.5	0.5	4.0	-1.4	1.0	2.1
7:30 to 7:45 AM	7.7	-1.1	3.3	3.2	2.7	2.9
7:45 to 8:00 AM	9.6	-3.5	-1.0	7.2	5.4	4.4
8:00 to 8:15 AM	3.5	-2.5	3.0	1.3	0.6	0.3
8:15 to 8:30 AM	-2.8	2.5	1.5	2.5	0.3	0.8
8:30 to 8:45 AM	-11.9	-3.3	0.0	3.2	0.8	1.1
8:45 to 9:00 AM	3.3	1.5	2.0	3.5	-0.2	0.2
7:00 to 9:00 AM	4.1	-0.3	3.1	2.5	1.9	2.0

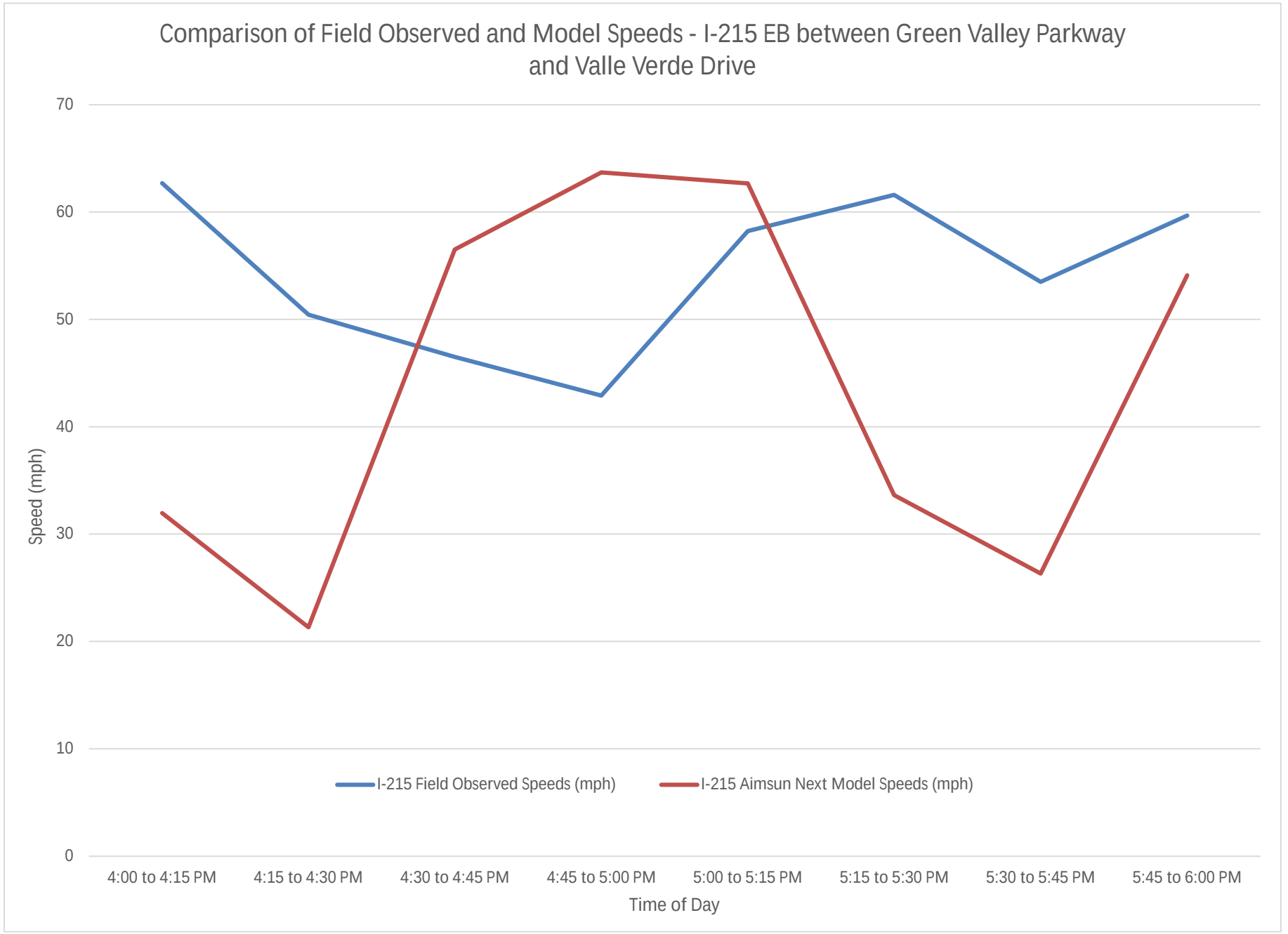
Year 2021 Speed Calibration - PM Peak Period

	I-215 Field Observed Speeds (mph)					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
4:00 to 4:15 PM	27.2	55.2	61.5	60.8	62.5	62.7
4:15 to 4:30 PM	32.6	56.3	62.4	61.1	59.0	50.4
4:30 to 4:45 PM	40.1	56.2	62.8	60.2	53.0	46.5
4:45 to 5:00 PM	59.5	58.7	61.3	61.5	52.3	42.9
5:00 to 5:15 PM	61.7	59.0	63.5	60.9	60.5	58.2
5:15 to 5:30 PM	54.8	55.6	59.2	54.3	61.3	61.6
5:30 to 5:45 PM	47.7	57.8	55.1	58.5	57.3	53.5
5:45 to 6:00 PM	44.8	41.3	59.9	61.6	63.2	59.7
4:00 to 6:00 PM	46.0	55.0	60.7	59.9	58.6	54.4

	I-215 Aimsun Next Model Speeds (mph)					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
4:00 to 4:15 PM	39.4	58.6	51.3	58.6	49.3	31.9
4:15 to 4:30 PM	44.9	59.9	54.7	62.3	56.8	21.3
4:30 to 4:45 PM	44.7	58.2	58.0	53.4	59.8	56.5
4:45 to 5:00 PM	50.6	58.7	57.1	55.8	60.8	63.7
5:00 to 5:15 PM	46.7	58.1	56.9	54.2	56.4	62.7
5:15 to 5:30 PM	48.3	54.3	53.9	52.6	50.4	33.6
5:30 to 5:45 PM	55.1	56.8	56.7	52.0	57.5	26.3
5:45 to 6:00 PM	52.2	56.6	59.4	57.1	59.7	54.1
4:00 to 6:00 PM	47.7	57.6	56.0	55.7	56.3	43.8

	Percent Difference between Field Observed Speeds and Aimsun Next Model Speeds					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
4:00 to 4:15 PM	-45%	-6%	17%	4%	21%	49%
4:15 to 4:30 PM	-38%	-6%	12%	-2%	4%	58%
4:30 to 4:45 PM	-12%	-4%	8%	11%	-13%	-22%
4:45 to 5:00 PM	15%	0%	7%	9%	-16%	-48%
5:00 to 5:15 PM	24%	2%	10%	11%	7%	-8%
5:15 to 5:30 PM	12%	2%	9%	3%	18%	45%
5:30 to 5:45 PM	-16%	2%	-3%	11%	0%	51%
5:45 to 6:00 PM	-16%	-37%	1%	7%	6%	9%
4:00 to 6:00 PM	-4%	-5%	8%	7%	4%	20%

	Absolute Difference between Field Observed Speeds and Aimsun Next Model Speeds (mph)					
	Westbound			Eastbound		
	Between Valle Verde Drive and Green Valley Parkway	Between Green Valley Parkway and Pecos Road	Between Pecos Road and Eastern Avenue	Between Eastern Avenue and Pecos Road	Between Pecos Road and Green Valley Parkway	Between Green Valley Parkway and Valle Verde Drive
4:00 to 4:15 PM	-12.2	-3.4	10.2	2.2	13.2	30.7
4:15 to 4:30 PM	-12.3	-3.6	7.6	-1.2	2.2	29.1
4:30 to 4:45 PM	-4.6	-2.0	4.8	6.8	-6.8	-10.0
4:45 to 5:00 PM	8.8	0.0	4.2	5.7	-8.5	-20.8
5:00 to 5:15 PM	15.0	1.0	6.5	6.7	4.1	-4.4
5:15 to 5:30 PM	6.5	1.3	5.3	1.7	10.9	28.0
5:30 to 5:45 PM	-7.4	1.0	-1.6	6.5	-0.2	27.2
5:45 to 6:00 PM	-7.4	-15.3	0.5	4.5	3.5	5.6
4:00 to 6:00 PM	-1.7	-2.6	4.7	4.1	2.3	10.7


Comparison of Field Observed and Model Speeds - I-215 EB between Green Valley Parkway and Valle Verde Drive
70
60
50
40
30
20
10
0
Speed (mph)
I-215 Field Observed Speeds (mph)
I-215 Aimsun Next Model Speeds (mph)
4:00 to 4:15 PM
4:15 to 4:30 PM
4:30 to 4:45 PM
4:45 to 5:00 PM
5:00 to 5:15 PM
5:15 to 5:30 PM
5:30 to 5:45 PM
5:45 to 6:00 PM
Time of Day

Appendix E: Modified Calibration Parameters

Aimsun Next Modeling - Modified Calibration Parameters

AM Dynamic Model Calibration Log

No.	Location	Aimsun Next Object	Calibration Parameter	Parameter Value	Rationale
1	I-215 Westbound between Valle Verde Drive on-ramp and Green Valley Parkway off-ramp	5984: I 215 (18790) - Section	Acceleration Factor	0.5	With the default parameter values, the model simulated speeds were slightly faster than the field observed speeds. This driver behavior parameter was modified to achieve speed calibration.

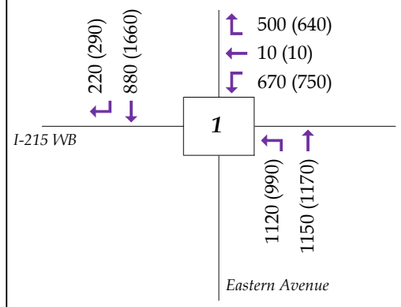
PM Dynamic Model Calibration Log

No.	Location	Aimsun Next Object	Calibration Parameter	Parameter Value	Rationale
1	I-215 Westbound between Valle Verde Drive on-ramp and Green Valley Parkway off-ramp	5984: I 215 (18790) - Section	Acceleration Factor	0.5	With the default parameter values, the model simulated speeds were slightly faster than the field observed speeds. These driver behavior parameters were modified to achieve speed calibration.
2			Lane-Changing Cooperation	20%	
3	I-215 Eastbound between Green Valley Parkway on-ramp and Valle Verde Drive off-ramp	5983: I 215 (18786) - Section	Acceleration Factor	5	With the default parameter values, the model simulated speeds were slightly slower than the field observed speeds. These driver behavior parameters were modified to achieve speed calibration.
4			Lane-Changing Aggressiveness	80%	
5			Imprudent Lane Changing	TRUE	

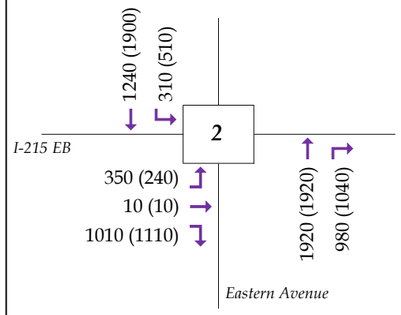
Appendix F: Year 2050 Forecast Intersection Turning Movement Volumes

Year 2050 No-Action Alternative - AM and PM Peak Hour Volumes

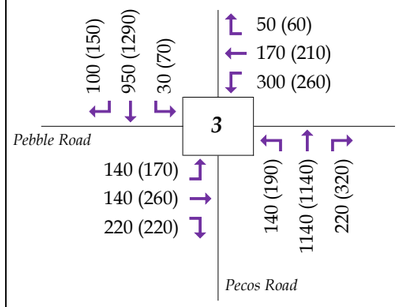
1. Eastern Avenue / I-215 WB



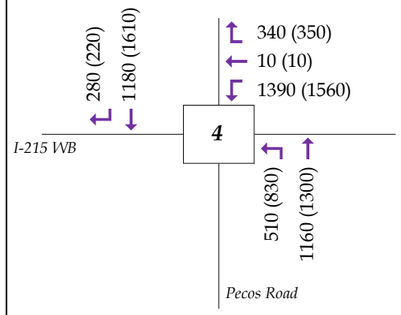
2. Eastern Avenue / I-215 EB



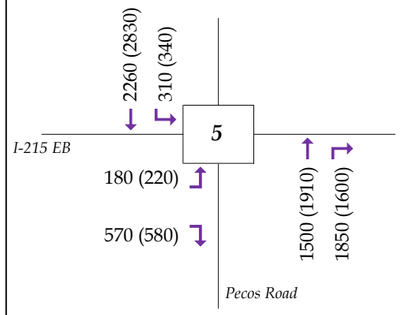
3. Pecos Road / Pebble Road



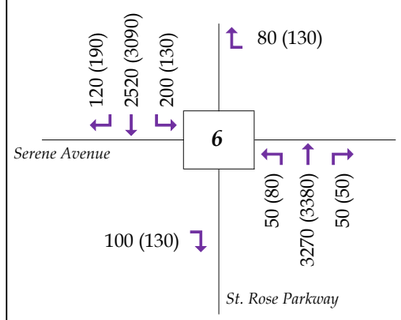
4. Pecos Road / I-215 WB



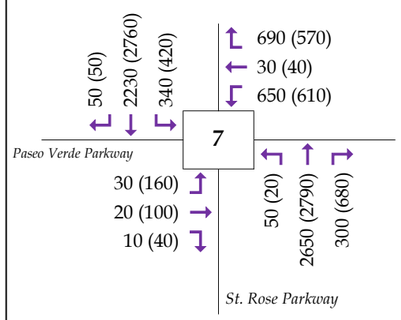
5. Pecos Road / I-215 EB



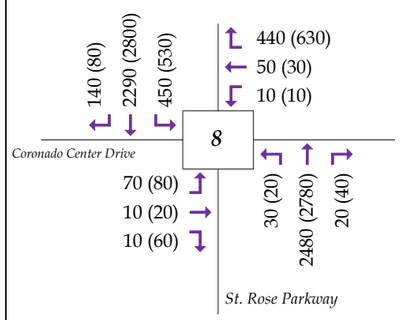
6. St. Rose Parkway / Serene Avenue



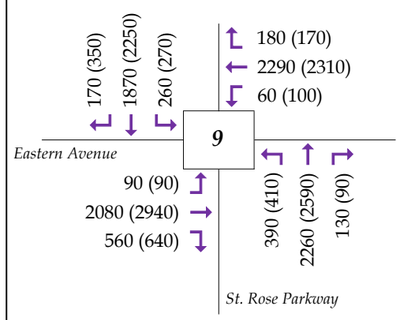
7. St. Rose Parkway / Paseo Verde Parkway



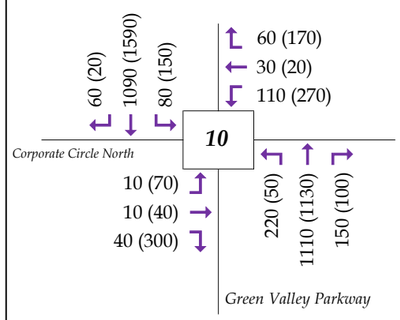
8. St. Rose Parkway / Coronado Center Drive



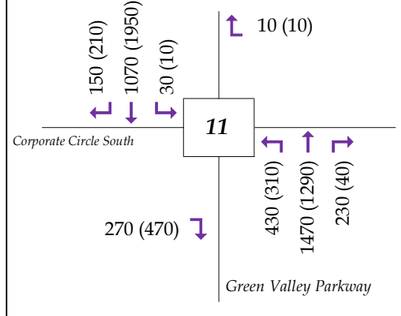
9. St. Rose Parkway / Eastern Avenue



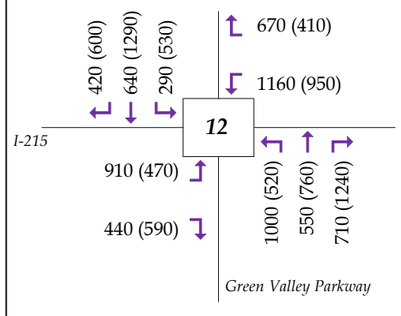
10. Green Valley Parkway / Corporate Circle North



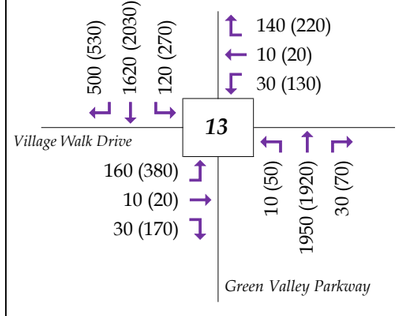
11. Green Valley Parkway / Corporate Circle South



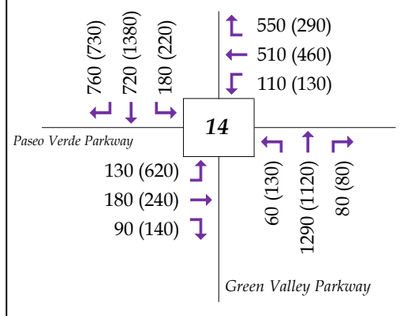
12. Green Valley Parkway / I-215



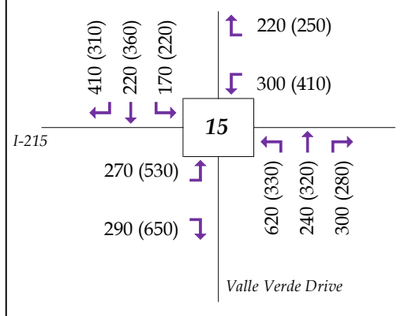
13. Green Valley Parkway / Village Walk Drive



14. Green Valley Parkway / Paseo Verde Parkway



15. Valle Verde Drive / I-215

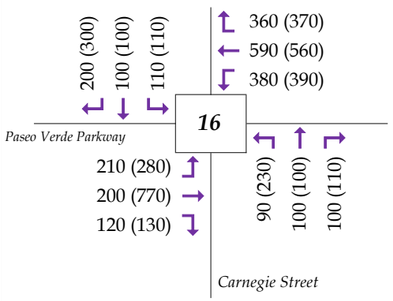


Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

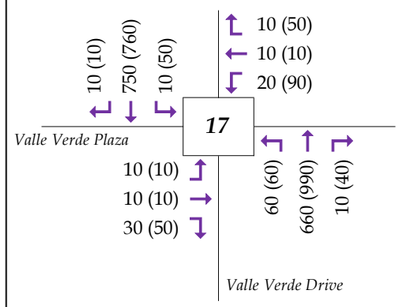
Note: Some of these intersections are included within the modeling limits primarily to process the traffic to the study facilities in a more realistic manner. Therefore, volumes shown are order-of-magnitude forecast volumes.

Year 2050 No-Action Alternative - AM and PM Peak Hour Volumes

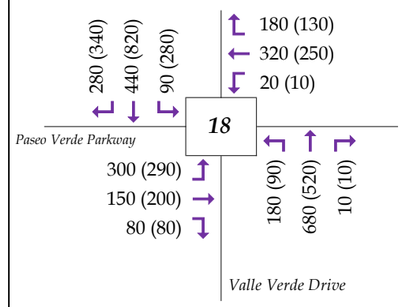
16. Paseo Verde Parkway / Carnegie Street



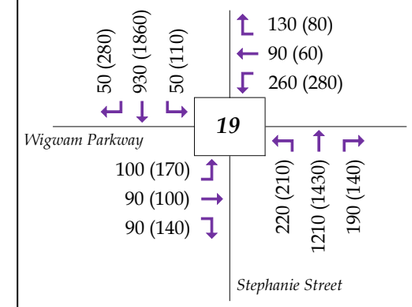
17. Valle Verde Drive / Valle Verde Plaza



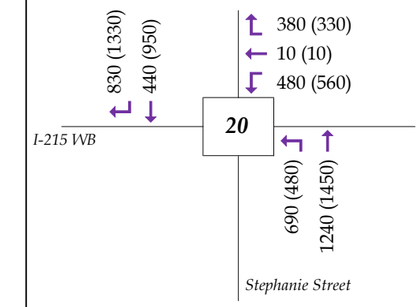
18. Valle Verde Drive / Paseo Verde Parkway



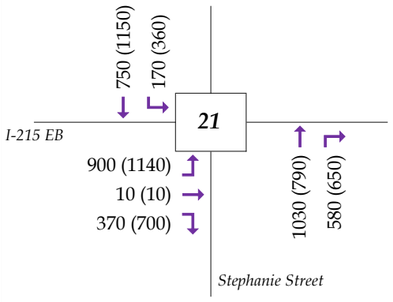
19. Stephanie Street / Wigwam Parkway



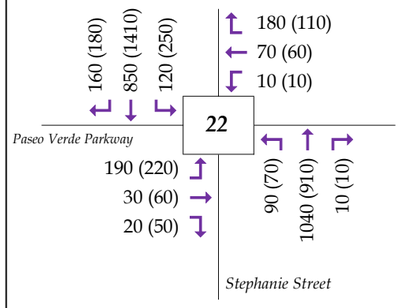
20. Stephanie Street / I-215 WB



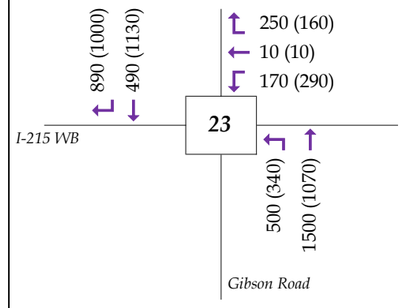
21. Stephanie Street / I-215 EB



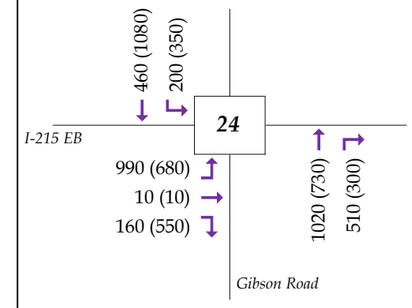
22. Stephanie Street / Paseo Verde Parkway



23. Gibson Road / I-215 WB



24. Gibson Road / I-215 EB

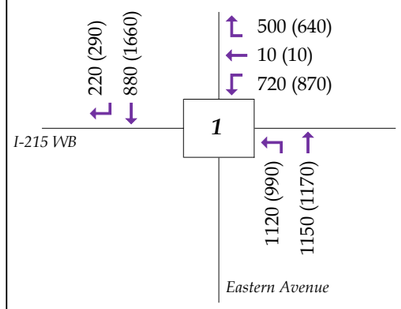


Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

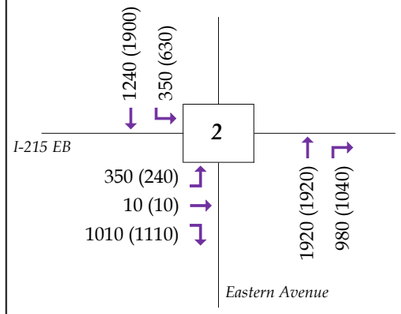
Note: Some of these intersections are included within the modeling limits primarily to process the traffic to the study facilities in a more realistic manner. Therefore, volumes shown are order-of-magnitude forecast volumes.

Year 2050 Build Alternative 1 - AM and PM Peak Hour Volumes

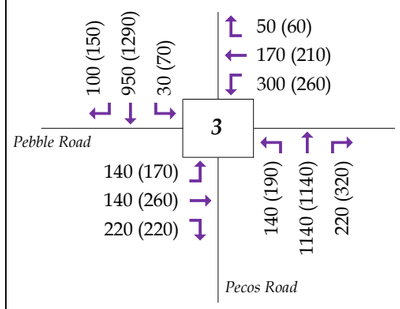
1. Eastern Avenue / I-215 WB



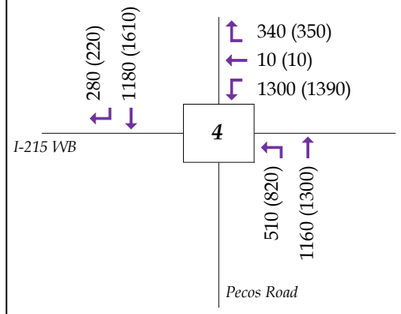
2. Eastern Avenue / I-215 EB



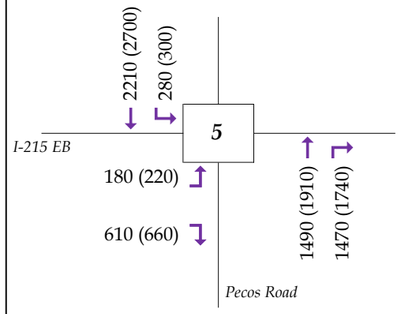
3. Pecos Road / Pebble Road



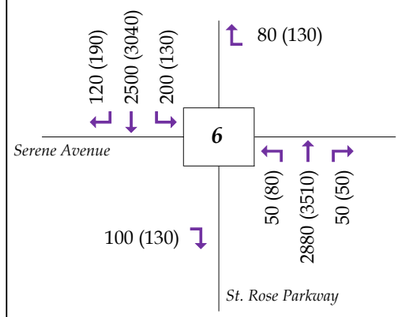
4. Pecos Road / I-215 WB



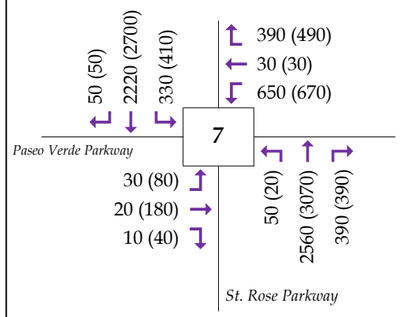
5. Pecos Road / I-215 EB



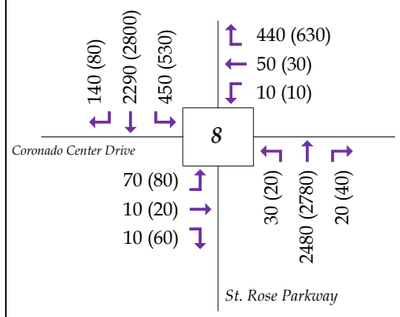
6. St. Rose Parkway / Serene Avenue



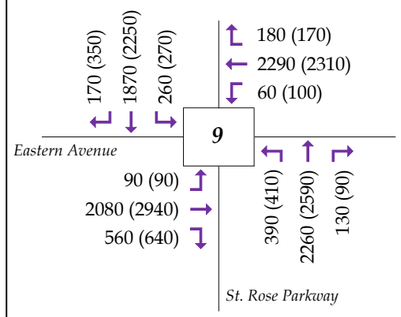
7. St. Rose Parkway / Paseo Verde Parkway



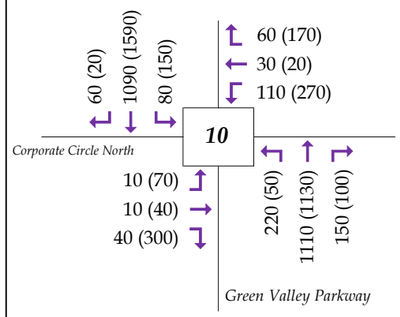
8. St. Rose Parkway / Coronado Center Drive



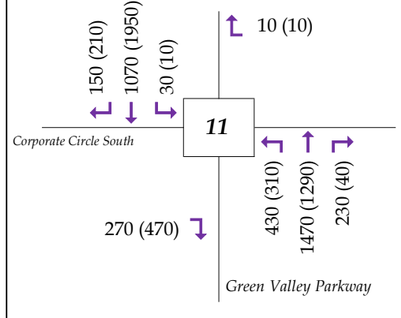
9. St. Rose Parkway / Eastern Avenue



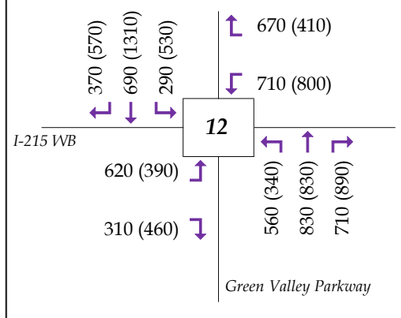
10. Green Valley Parkway / Corporate Circle North



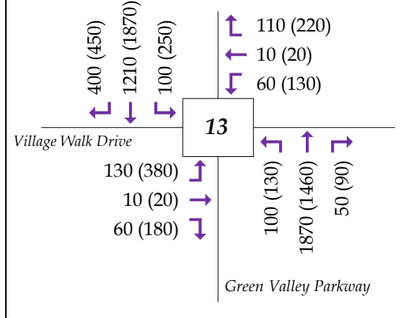
11. Green Valley Parkway / Corporate Circle South



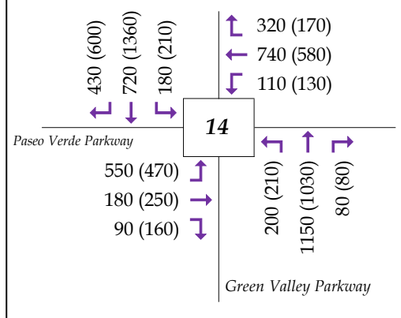
12. Green Valley Parkway / I-215 WB



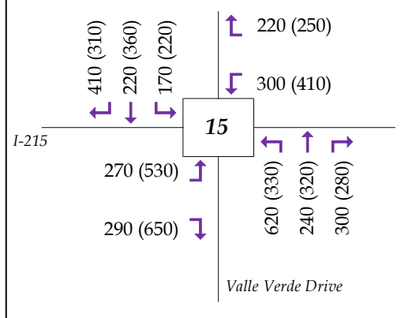
13. Green Valley Parkway / Village Walk Drive



14. Green Valley Parkway / Paseo Verde Parkway



15. Valle Verde Drive / I-215

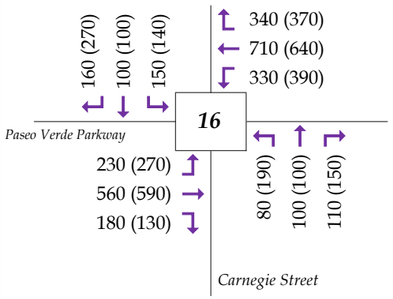


Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

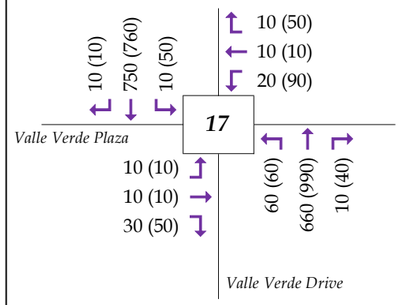
Note: Some of these intersections are included within the modeling limits primarily to process the traffic to the study facilities in a more realistic manner. Therefore, volumes shown are order-of-magnitude forecast volumes.

Year 2050 Build Alternative 1 - AM and PM Peak Hour Volumes

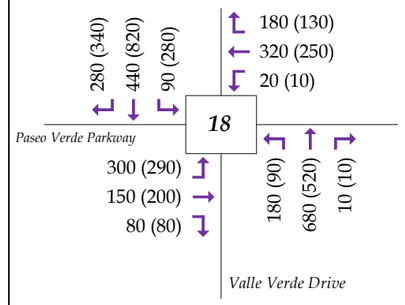
16. Paseo Verde Parkway / Carnegie Street



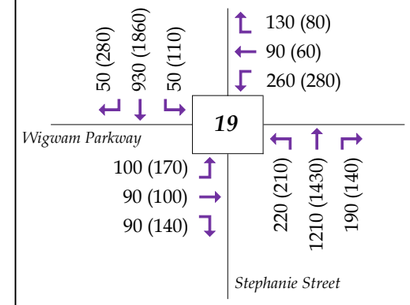
17. Valle Verde Drive / Valle Verde Plaza



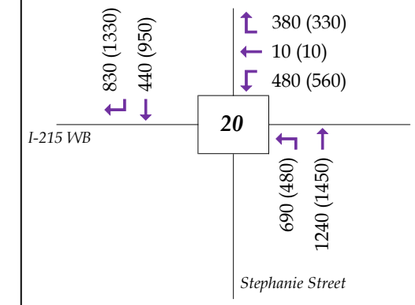
18. Valle Verde Drive / Paseo Verde Parkway



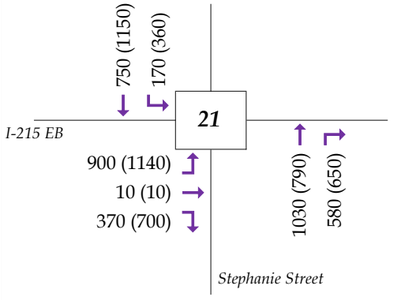
19. Stephanie Street / Wigwam Parkway



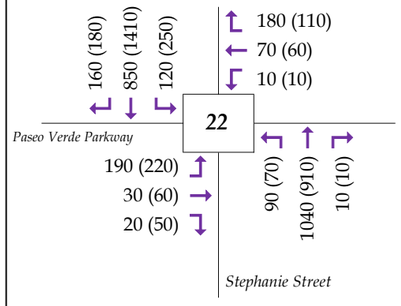
20. Stephanie Street / I-215 WB



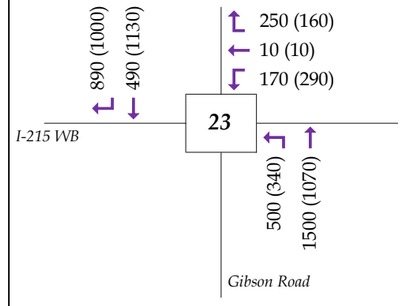
21. Stephanie Street / I-215 EB



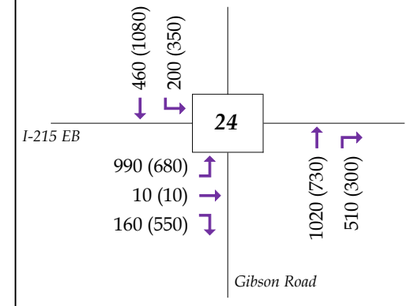
22. Stephanie Street / Paseo Verde Parkway



23. Gibson Road / I-215 WB



24. Gibson Road / I-215 EB

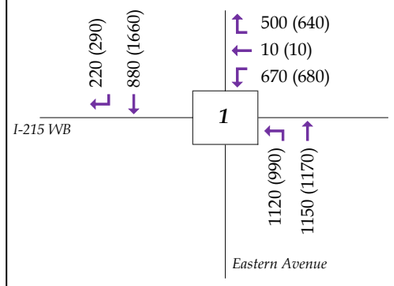


Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

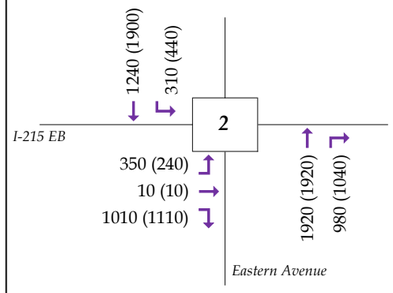
Note: Some of these intersections are included within the modeling limits primarily to process the traffic to the study facilities in a more realistic manner. Therefore, volumes shown are order-of-magnitude forecast volumes.

Year 2050 Build Alternative 2 - AM and PM Peak Hour Volumes

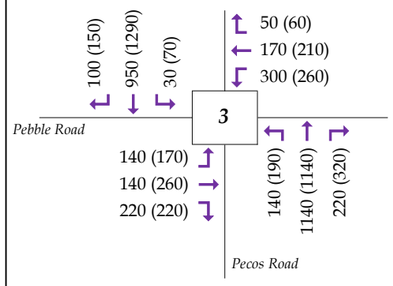
1. Eastern Avenue / I-215 WB



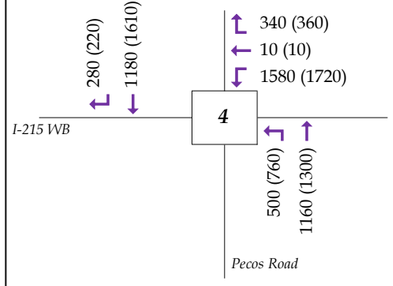
2. Eastern Avenue / I-215 EB



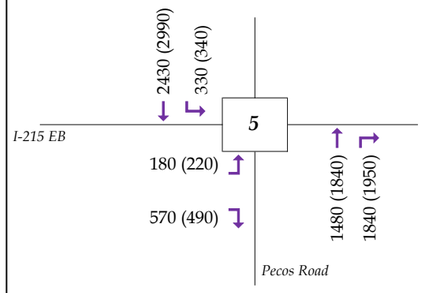
3. Pecos Road / Pebble Road



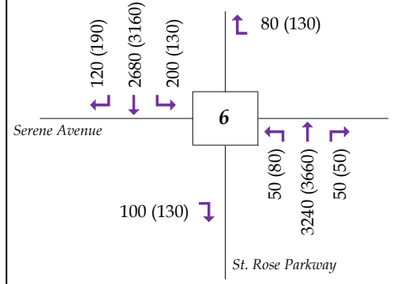
4. Pecos Road / I-215 WB



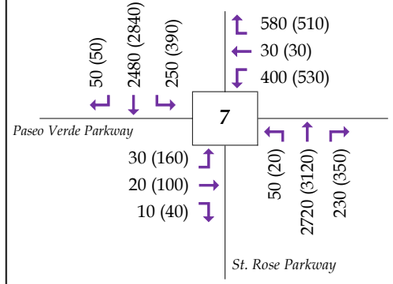
5. Pecos Road / I-215 EB



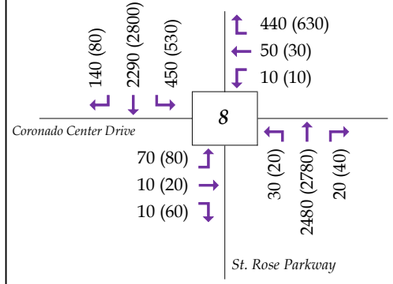
6. St. Rose Parkway / Serene Avenue



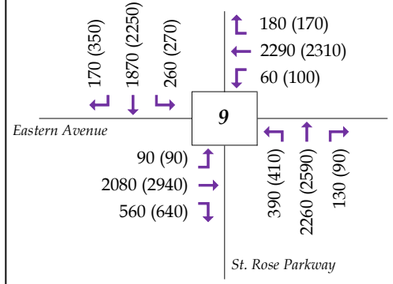
7. St. Rose Parkway / Paseo Verde Parkway



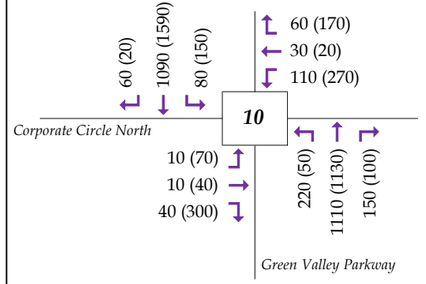
8. St. Rose Parkway / Coronado Center Drive



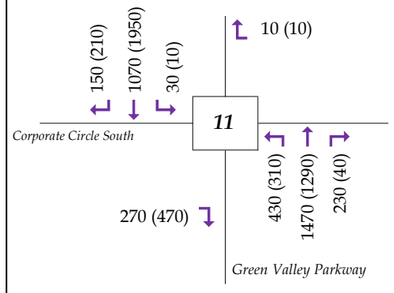
9. St. Rose Parkway / Eastern Avenue



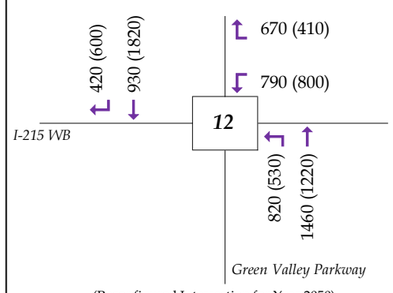
10. Green Valley Parkway / Corporate Circle North



11. Green Valley Parkway / Corporate Circle South

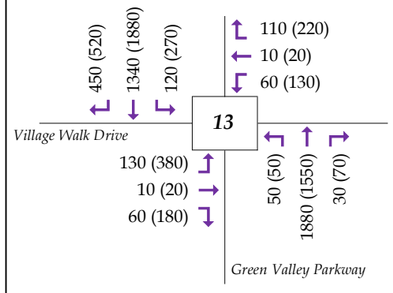


12. Green Valley Parkway / I-215 WB

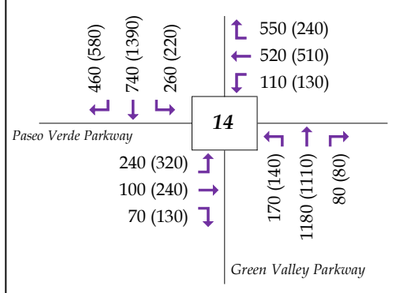


(Reconfigured Intersection for Year 2050)

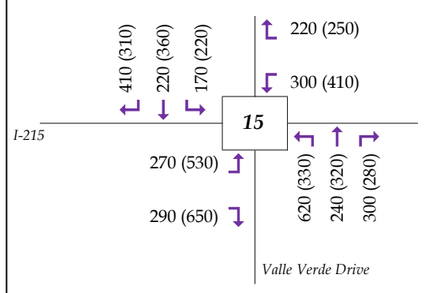
13. Green Valley Parkway / Village Walk Drive



14. Green Valley Parkway / Paseo Verde Parkway



15. Valle Verde Drive / I-215

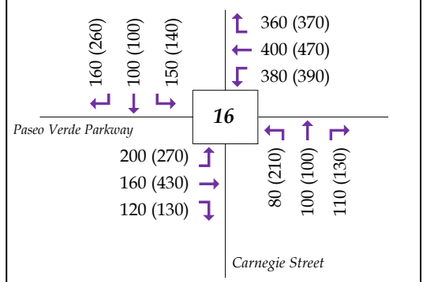


Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

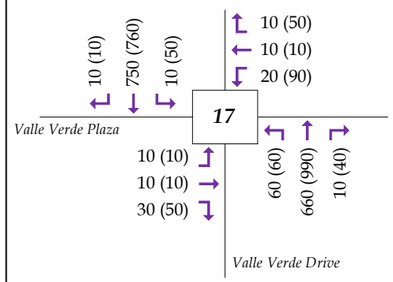
Note: Some of these intersections are included within the modeling limits primarily to process the traffic to the study facilities in a more realistic manner. Therefore, volumes shown are order-of-magnitude forecast volumes.

Year 2050 Build Alternative 2 -
AM and PM Peak Hour Volumes

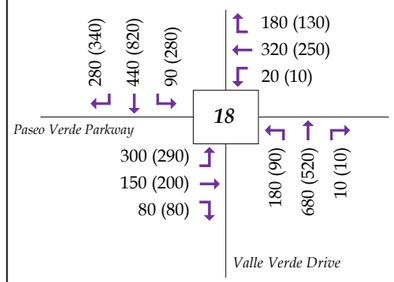
16. Paseo Verde Parkway / Carnegie Street



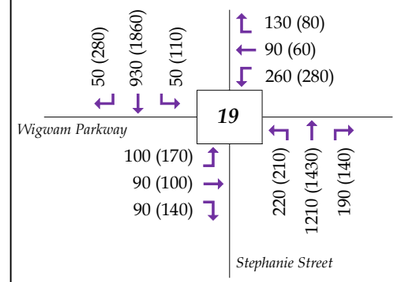
17. Valle Verde Drive / Valle Verde Plaza



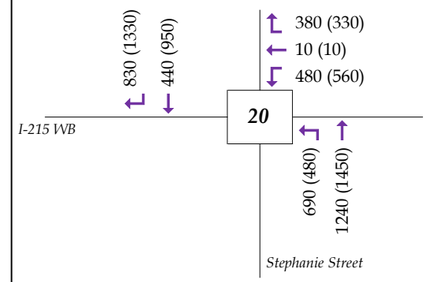
18. Valle Verde Drive / Paseo Verde Parkway



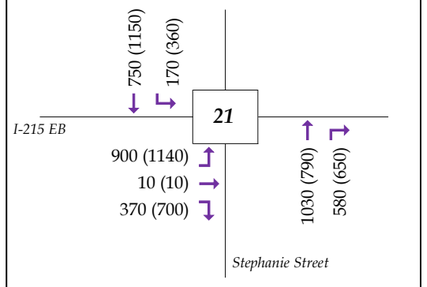
19. Stephanie Street / Wigwam Parkway



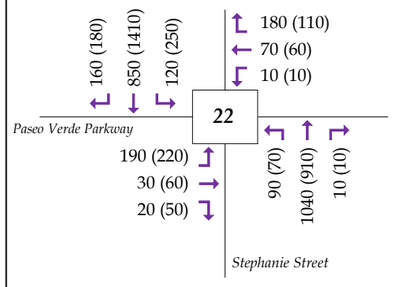
20. Stephanie Street / I-215 WB



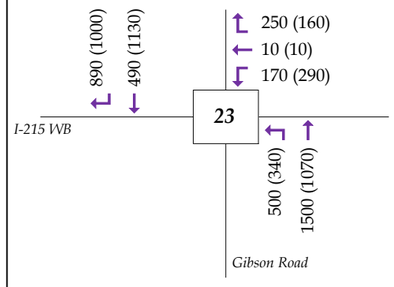
21. Stephanie Street / I-215 EB



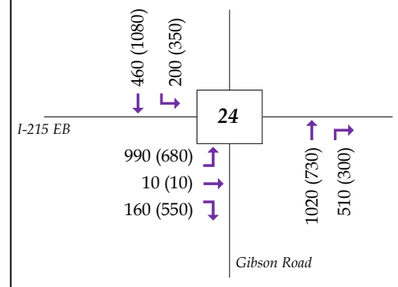
22. Stephanie Street / Paseo Verde Parkway



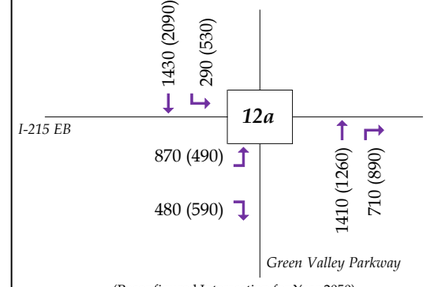
23. Gibson Road / I-215 WB



24. Gibson Road / I-215 EB



12a. Green Valley Parkway / I-215 EB



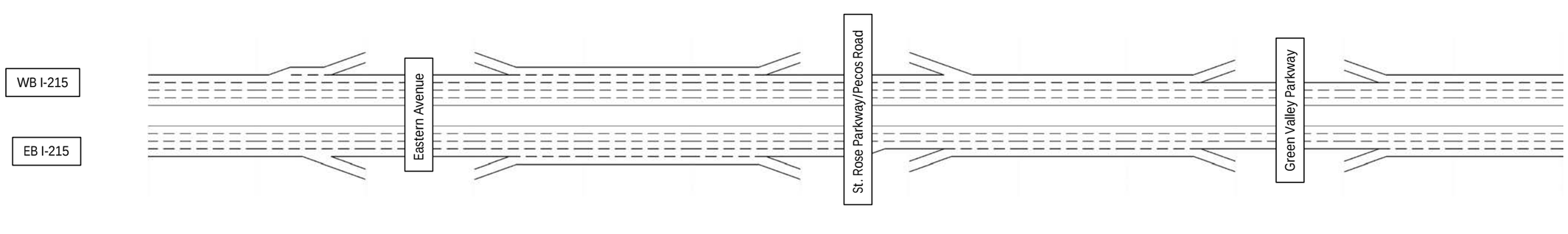
Static Assigned Volumes from the Aimsun Next model are shown as-is. A minimum nominal volume of 10 vph is shown when the volumes in the model are lower.
xx (xx): AM (PM) Peak Hour Volumes; AM Peak Hour = 7:30 AM to 8:30 AM; PM Peak Hour = 4:30 PM to 5:30 PM. Volumes may not be balanced between adjacent intersections due to rounding.

Note: Some of these intersections are included within the modeling limits primarily to process the traffic to the study facilities in a more realistic manner. Therefore, volumes shown are order-of-magnitude forecast volumes.

Appendix G: Year 2050 Forecast AADT Volumes

Year 2050 No-Action Alternative

Year 2050 AADT (vpd)	108,000	17,000	90,500	18,000	106,000	13,500	95,500	24,500	118,000	18,500	99,500	23,500	123,000



Year 2050 AADT (vpd)	104,000	17,500	86,500	20,000	106,000	10,500	96,000	28,000	121,000	17,500	107,000	23,000	130,000

Legend: On/Off ramp

Note:

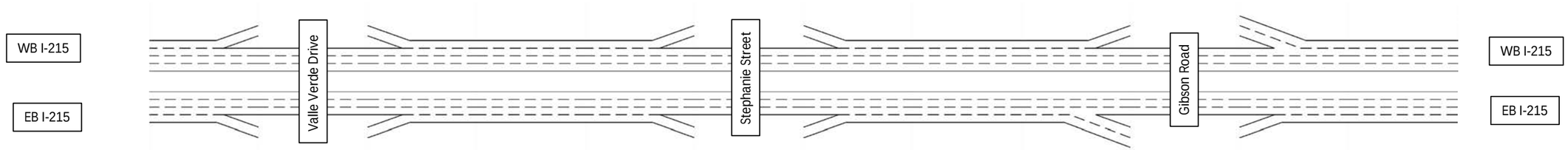
Volumes may not be balanced due to rounding

AADTs are estimated based on peak hour volume forecasts; therefore, AADTs are an approximate estimate

K30 of 7.76% was used to estimate Year 2050 AADT.

Year 2050 No-Action Alternative

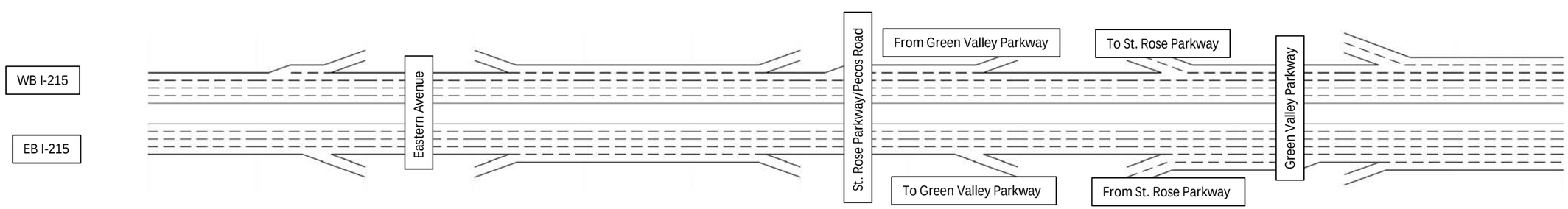
Year 2050 AADT (vpd)	13,500	110,000	8,600	116,000	23,500	97,000	11,500	108,000	18,000	90,000	5,800	95,000



Year 2050 AADT (vpd)	15,000	115,000	6,400	121,000	23,500	98,000	13,000	111,000	16,000	95,000	9,100	103,000

Year 2050 Build Alternative 1

Year 2050 AADT (vpd)	108,000	17,000	90,500	19,500	106,000	13,500	96,000	12,000	84,000	22,500	105,000	18,000	123,000



Year 2050 AADT (vpd)	104,000	17,500	86,500	21,500	108,000	11,000	96,500	12,000	85,500	26,500	112,000	18,500	130,000

Legend: On/Off ramp

Note:

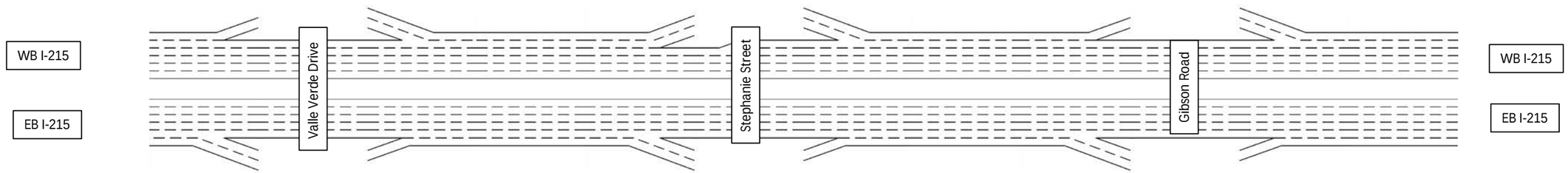
Volumes may not be balanced due to rounding

AADTs are estimated based on peak hour volume forecasts; therefore, AADTs are an approximate estimate

K30 of 7.76% was used to estimate Year 2050 AADT.

Year 2050 Build Alternative 1

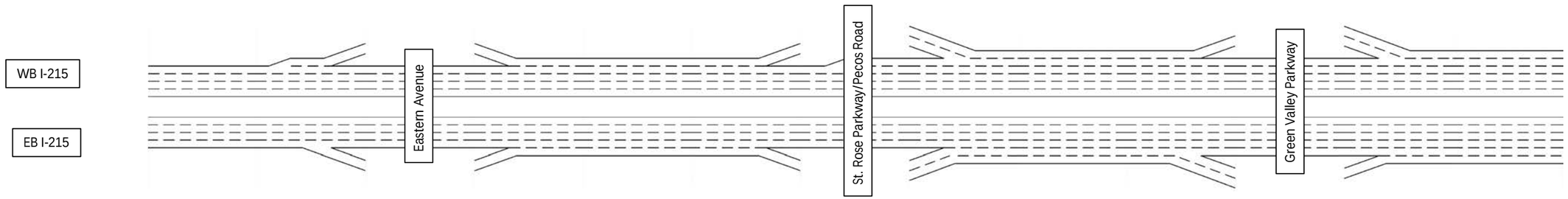
Year 2050 AADT (vpd)	13,500	110,000	8,600	116,000	23,500	97,000	11,500	108,000	18,000	90,000	5,800	95,000



Year 2050 AADT (vpd)	15,000	115,000	6,400	121,000	23,500	98,000	13,000	111,000	16,000	95,000	9,100	103,000

Year 2050 Build Alternative 2

Year 2050 AADT (vpd)	108,000	17,000	90,500	17,000	106,000	12,500	95,500	27,000	120,000	16,000	104,000	19,000	123,000



Year 2050 AADT (vpd)	104,000	17,500	86,500	19,000	105,000	9,700	96,500	29,500	126,000	17,500	112,000	18,500	130,000

Legend: On/Off ramp

Note:

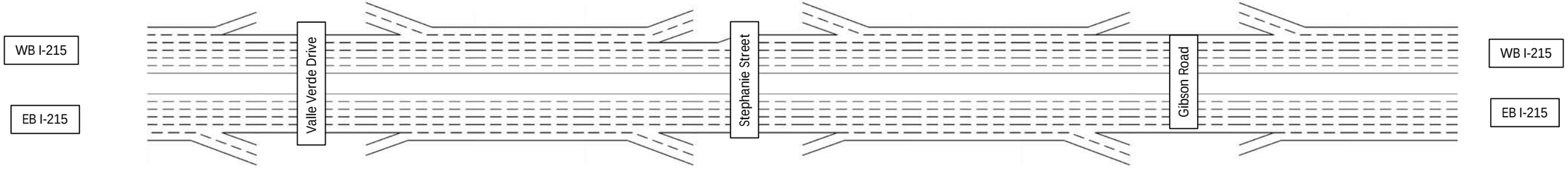
Volumes may not be balanced due to rounding

AADTs are estimated based on peak hour volume forecasts; therefore, AADTs are an approximate estimate

K30 of 7.76% was used to estimate Year 2050 AADT.

Year 2050 Build Alternative 2

Year 2050 AADT (vpd)	13,500	110,000	8,600	116,000	23,500	97,000	11,500	108,000	18,000	90,000	5,800	95,000



Year 2050 AADT (vpd)	15,000	115,000	6,400	121,000	23,500	98,000	13,000	111,000	16,000	95,000	9,100	103,000

Appendix H: Detailed Traffic Operations Analysis Results – Network/Subarea-wide MOEs

I-215 Widening (Pecos Road to Stephanie Street) - Network Performance - AM Peak Period (7:00-9:00 AM)							
				2050 Build Alternative 1 vs. 2050 No-Action Alternative		2050 Build Alternative 2 vs. 2050 No-Action Alternative	
Parameter	2050 No-Action Alternative	2050 Build Alternative 1	2050 Build Alternative 2	Absolute Difference	Percent Difference	Absolute Difference	Percent Difference
Total Travelled Distance (mi)	**234,886**	**272,889**	**273,126**	**38,002**	**16%**	**38,239**	**16%**
Total Travel Time (hr)	**9,139**	**6,891**	**6,698**	**2,248**	**25%**	**2,441**	**27%**
Latent Vehicles (veh)	4,866	433	412	4,433	91% ▼	4,454	92% ▼
Number of Arrived Vehicles	80,444	87,987	88,122	7,543	9% ▲	7,678	10% ▲
Number of Active Vehicles	6,876	3,489	3,330	3,387	49% ▼	3,546	52% ▼
Total Network Vehicles (veh)	**92,186**	**91,909**	**91,864**	**277**	**0%**	**322**	**0%**
Total Delay Time (hr, inside network)	6,318	4,590	4,259	1,728	27% ▼	2,059	33% ▼
Delay Time (sec/mi/veh, inside network)	97	61	56	36	37% ▼	41	42% ▼
Latent Delay Time (hr)	1,342	110	102	1,233	92% ▼	1,241	92% ▼
Total Network Delay (hr)	**7,660**	**4,700**	**4,361**	**2,960**	**39%** ▼	**3,300**	**43%** ▼
Average Network Delay (sec/veh)	**299**	**184**	**171**	**115**	**38%** ▼	**128**	**43%** ▼

I-215 Widening (Pecos Road to Stephanie Street) - Network Performance - PM Peak Period (4:00-6:00 PM)							
				2050 Build Alternative 1 vs. 2050 No-Action Alternative		2050 Build Alternative 2 vs. 2050 No-Action Alternative	
Parameter	2050 No-Action Alternative	2050 Build Alternative 1	2050 Build Alternative 2	Absolute Difference	Percent Difference	Absolute Difference	Percent Difference
Total Travelled Distance (mi)	**222,314**	**293,865**	**293,420**	**71,552**	**32%**	**71,106**	**32%**
Total Travel Time (hr)	**11,773**	**8,143**	**7,820**	**3,630**	**31%**	**3,952**	**34%**
Latent Vehicles (veh)	9,671	411	490	9,260	96% ▼	9,181	95% ▼
Number of Arrived Vehicles	83,356	99,081	99,294	15,725	19% ▲	15,938	19% ▲
Number of Active Vehicles	11,096	4,244	3,887	6,852	62% ▼	7,209	65% ▼
Total Network Vehicles (veh)	**104,123**	**103,736**	**103,671**	**387**	**0%**	**452**	**0%**
Total Delay Time (hr, inside network)	8,923	6,247	5,794	2,677	30% ▼	3,129	35% ▼
Delay Time (sec/mi/veh, inside network)	144	77	71	68	47% ▼	73	51% ▼
Latent Delay Time (hr)	2,259	82	113	2,177	96% ▼	2,146	95% ▼
Total Network Delay (hr)	**11,182**	**6,329**	**5,908**	**4,853**	**43%** ▼	**5,275**	**47%** ▼
Average Network Delay (sec/veh)	**387**	**220**	**205**	**167**	**43%** ▼	**181**	**47%** ▼

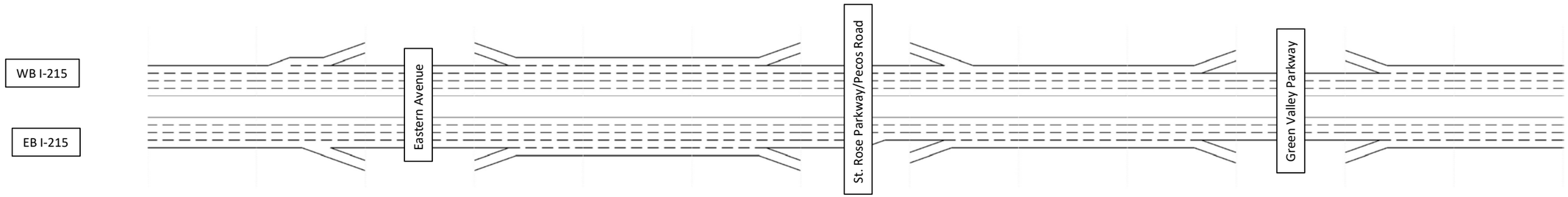
Appendix I: Detailed Traffic Operations Analysis Results – Freeway

Year 2050 No-Action Alternative

AM
Notes: On/Off Ramp

7-9 AM

Density (veh/mi/ln)	25.9	164.5	20.9	16.2	19.4	12.3	21.0	23.0	33.8	37.5	36.8	102.3	65.0
Speed (mph)	65.2	7.5	67.4	56.9	67.6	59.9	68.9	63.1	56.4	39.9	55.0	27.4	32.7
Peak 15 Flow(veh/hr)	6934	1209	5856	944	6752	808	5962	1514	7481	1403	6082	1422	7494
Peak 60 Flow (veh/hr)	6835	1156	5755	925	6689	770	5918	1464	7375	1356	6047	1367	7428
Flow (veh/hr)	6720	1115	5599	903	6500	728	5767	1436	7193	1321	5865	1303	7178
Volume (veh)	13441	2230	11199	1806	13001	1456	11535	2872	14385	2642	11729	2606	14357
Demand Volume (veh)	16282	2598	13684	2297	15982	1550	14432	3351	17783	2647	15136	3461	18597
Percent Served	83%	86%	82%	79%	81%	94%	80%	86%	81%	100%	77%	75%	77%



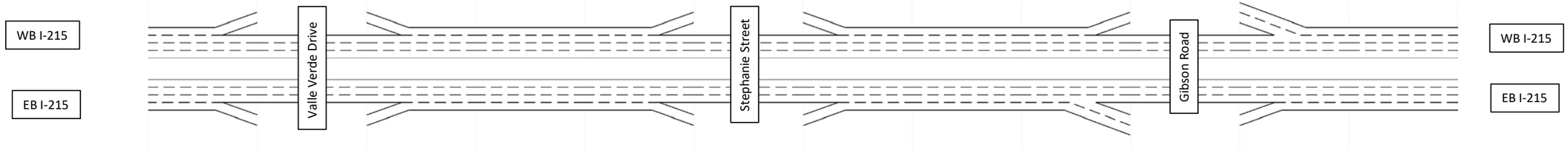
Density (veh/mi/ln)	25.1	14.1	23.7	62.2	51.9	80.3	46.2	92.2	50.4	32.1	51.7	20.6	57.8
Speed (mph)	65.0	60.4	65.2	50.9	52.5	50.1	45.3	24.4	45.6	59.5	47.2	50.2	37.1
Peak 15 Flow(veh/hr)	7032	1443	5590	1403	6914	841	5924	1879	7735	1319	6235	1052	7023
Peak 60 Flow (veh/hr)	6644	1369	5300	1283	6498	755	5740	1819	7460	1264	6103	1007	7003
Flow (veh/hr)	6465	1324	5097	1104	6119	651	5401	1728	7095	1202	5873	971	6835
Volume (veh)	12930	2647	10193	2208	12237	1302	10801	3456	14190	2405	11745	1942	13670
Demand Volume (veh)	12896	2651	10245	2514	12759	1468	11292	4215	15507	2628	12879	1950	14829
Percent Served	100%	100%	99%	88%	96%	89%	96%	82%	92%	92%	91%	100%	92%

Year 2050 No-Action Alternative

AM
Notes: On/Off Ramp

7-9 AM

Density (veh/mi/ln)	22.0	73.6	6.0	76.6	142.1	102.2	13.5	109.7	146.0	115.9	3.2	99.3
Speed (mph)	52.9	31.0	61.7	24.6	10.6	20.1	46.6	16.3	10.8	17.5	61.0	19.6
Peak 15 Flow(veh/hr)	1103	6550	392	6935	1371	5596	679	6328	1242	5392	451	6244
Peak 60 Flow (veh/hr)	1039	6439	379	6837	1358	5498	652	6184	1224	5052	415	5593
Flow (veh/hr)	992	6243	369	6650	1317	5356	621	6005	1178	4887	401	5357
Volume (veh)	1984	12486	739	13299	2634	10712	1241	12010	2355	9773	803	10715
Demand Volume (veh)	2007	16590	1012	17601	2977	14625	1661	16285	2718	13568	820	14387
Percent Served	99%	75%	73%	76%	88%	73%	75%	74%	87%	72%	98%	74%



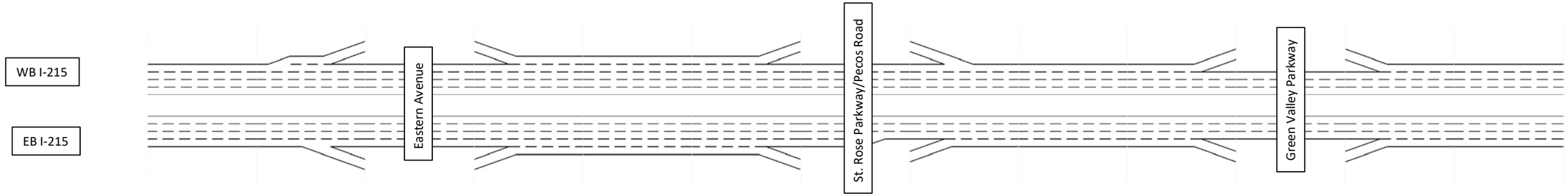
Density (veh/mi/ln)	8.1	55.2	7.5	27.3	20.1	29.0	14.2	26.1	19.3	34.7	11.0	26.2
Speed (mph)	62.1	40.7	60.4	63.0	59.3	65.0	55.5	62.0	49.4	52.5	55.3	59.2
Peak 15 Flow(veh/hr)	545	6484	493	6973	1222	5779	842	6630	1201	5452	761	6189
Peak 60 Flow (veh/hr)	518	6471	469	6931	1198	5736	804	6531	1172	5362	718	6080
Flow (veh/hr)	497	6334	450	6787	1173	5616	780	6395	1135	5255	692	5949
Volume (veh)	994	12669	901	13575	2346	11231	1560	12790	2270	10510	1384	11898
Demand Volume (veh)	1095	13734	907	14640	2492	12148	1458	13606	2245	11361	1388	12749
Percent Served	91%	92%	99%	93%	94%	92%	107%	94%	101%	93%	100%	93%

Year 2050 No-Action Alternative

PM
Notes: On/Off Ramp

4-6 PM

Density (veh/mi/ln)	22.0	113.5	16.7	26.0	17.3	15.3	17.1	91.2	55.7	52.8	86.0	20.9	86.7
Speed (mph)	65.5	15.9	68.5	54.5	67.6	55.7	69.2	41.4	48.3	38.9	29.1	54.8	24.4
Peak 15 Flow(veh/hr)	6307	1205	5196	1172	6258	992	5326	1674	6981	1037	5972	1053	7036
Peak 60 Flow (veh/hr)	6272	1182	5101	1113	6199	943	5285	1649	6939	1011	5949	1000	6976
Flow (veh/hr)	5740	1155	4559	1012	5558	843	4719	1371	6104	869	5280	902	6304
Volume (veh)	11480	2309	9119	2025	11116	1685	9438	2743	12208	1738	10561	1803	12609
Demand Volume (veh)	14271	2419	11852	2617	14468	1975	12493	3656	16149	1904	14245	2334	16579
Percent Served	80%	95%	77%	77%	77%	85%	76%	75%	76%	91%	74%	77%	76%



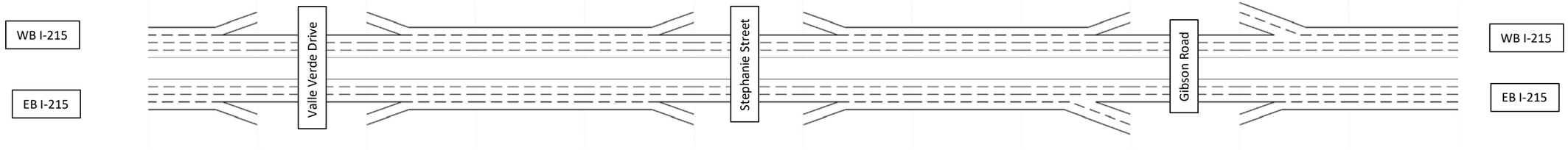
Density (veh/mi/ln)	87.5	14.4	120.1	189.3	146.6	52.6	112.1	147.3	92.9	56.5	75.3	38.3	178.3
Speed (mph)	35.3	50.6	27.4	15.1	16.0	43.6	20.6	13.6	27.2	58.2	31.4	46.0	13.6
Peak 15 Flow(veh/hr)	7526	1265	6048	1316	6886	622	6167	1709	7879	894	6852	1478	7223
Peak 60 Flow (veh/hr)	7060	1190	5530	893	6189	562	5524	1470	6939	804	6038	1455	7196
Flow (veh/hr)	6368	1064	5081	682	5601	494	5008	1237	6182	660	5504	1377	6889
Volume (veh)	12737	2127	10161	1365	11202	987	10015	2474	12363	1321	11009	2754	13779
Demand Volume (veh)	15185	2545	12640	2924	15564	1472	14092	3897	17990	1990	16000	3065	19065
Percent Served	84%	84%	80%	47%	72%	67%	71%	63%	69%	66%	69%	90%	72%

Year 2050 No-Action Alternative

PM
Notes: On/Off Ramp

4-6 PM

Density (veh/mi/ln)	12.9	85.4	7.8	84.0	146.0	107.0	14.2	108.6	124.9	108.6	3.4	91.6
Speed (mph)	55.1	29.5	61.2	23.0	10.1	19.2	47.0	18.1	18.7	23.9	60.8	27.4
Peak 15 Flow(veh/hr)	671	6512	553	7124	1478	5706	744	6572	1263	5838	454	6318
Peak 60 Flow (veh/hr)	632	6413	525	6973	1448	5549	716	6301	1226	5237	431	5781
Flow (veh/hr)	608	5832	476	6404	1331	5122	660	5842	1139	4851	415	5365
Volume (veh)	1215	11665	953	12807	2663	10244	1320	11683	2278	9701	830	10730
Demand Volume (veh)	1221	15359	1258	16616	3417	13199	1668	14867	2528	12340	849	13189
Percent Served	100%	76%	76%	77%	78%	78%	79%	79%	90%	79%	98%	81%



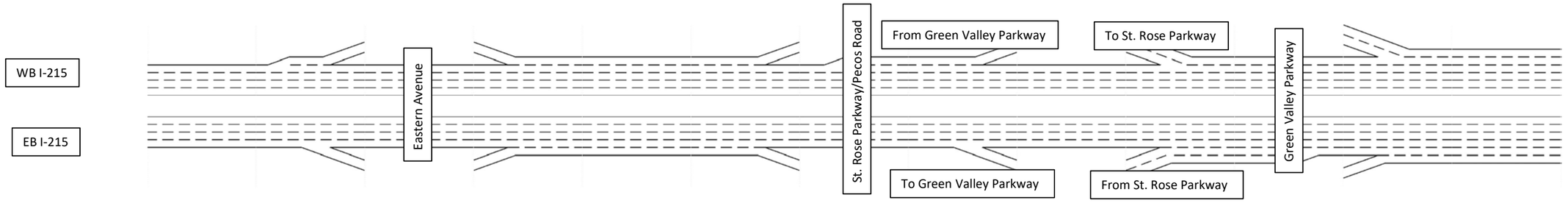
Density (veh/mi/ln)	13.8	57.6	7.9	26.9	29.5	26.4	17.4	25.5	7.7	33.7	10.4	26.5
Speed (mph)	61.2	36.9	60.2	62.9	57.4	66.5	53.5	62.0	64.9	53.4	52.2	58.0
Peak 15 Flow(veh/hr)	915	6337	512	6835	1377	5514	963	6426	994	5443	696	6088
Peak 60 Flow (veh/hr)	885	6306	485	6790	1357	5435	939	6360	951	5415	624	6031
Flow (veh/hr)	840	6078	471	6544	1300	5246	919	6173	946	5243	610	5854
Volume (veh)	1680	12157	942	13087	2600	10492	1838	12346	1892	10486	1220	11708
Demand Volume (veh)	2227	16837	952	17789	3467	14322	1901	16223	2322	13901	1220	15122
Percent Served	75%	72%	99%	74%	75%	73%	97%	76%	81%	75%	100%	77%

Year 2050 Build Alternative 1

AM
Notes: On/Off Ramp

7-9 AM

Density (veh/mi/ln)	31.0	174.3	30.0	23.7	25.5	13.6	27.1	19.1	23.5	12.3	29.5	11.8	27.5
Speed (mph)	63.5	6.2	60.6	53.9	65.3	58.9	63.1	49.0	67.6	66.4	56.3	57.7	58.8
Peak 15 Flow(veh/hr)	8421	1065	7367	1353	8746	888	7899	1064	6878	1719	8592	1437	10089
Peak 60 Flow (veh/hr)	8076	1043	7051	1282	8324	812	7519	986	6542	1687	8230	1386	9607
Flow (veh/hr)	7845	1023	6822	1254	8082	790	7293	951	6336	1624	7961	1348	9316
Volume (veh)	15690	2046	13644	2508	16165	1580	14586	1902	12672	3248	15922	2696	18631
Demand Volume (veh)	16282	2598	13684	2371	16055	1542	14513	1795	12718	3167	15886	2711	18597
Percent Served	96%	79%	100%	106%	101%	102%	101%	106%	100%	103%	100%	99%	100%



Density (veh/mi/ln)	25.1	14.1	18.6	26.2	19.9	13.4	21.5	13.9	17.0	13.1	19.5	19.4	19.1
Speed (mph)	65.1	60.4	69.3	52.9	66.1	64.2	66.1	65.5	69.8	62.7	66.1	44.4	65.7
Peak 15 Flow(veh/hr)	7034	1442	5592	1488	7062	950	6120	997	5148	1889	6964	1060	7958
Peak 60 Flow (veh/hr)	6644	1367	5299	1377	6670	873	5797	937	4865	1785	6653	1011	7667
Flow (veh/hr)	6465	1323	5141	1346	6489	852	5631	909	4720	1721	6441	975	7417
Volume (veh)	12930	2647	10283	2692	12979	1704	11262	1817	9439	3442	12881	1951	14834
Demand Volume (veh)	12896	2651	10245	2588	12833	1536	11297	1825	9472	3403	12875	1954	14829
Percent Served	100%	100%	100%	104%	101%	111%	100%	100%	100%	101%	100%	100%	100%

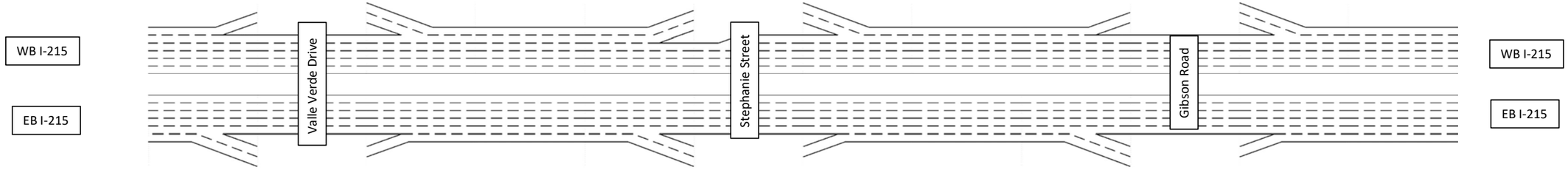
Year 2050 Build Alternative 1

AM

Notes: On/Off Ramp

7-9 AM

Density (veh/mi/ln)	17.2	24.7	3.8	24.8	12.9	31.7	8.1	21.9	27.9	19.5	3.0	17.1
Speed (mph)	58.5	68.0	65.8	64.1	59.2	56.7	59.3	64.3	54.2	69.8	66.7	70.2
Peak 15 Flow(veh/hr)	1101	9006	539	9522	1666	7883	1021	8936	1620	7395	450	7871
Peak 60 Flow (veh/hr)	1037	8562	516	9082	1566	7517	962	8483	1522	6962	420	7373
Flow (veh/hr)	1001	8319	502	8819	1521	7300	944	8251	1493	6757	404	7162
Volume (veh)	2002	16638	1004	17638	3042	14600	1888	16502	2987	13514	809	14324
Demand Volume (veh)	2007	16590	1012	17601	2977	14625	1661	16285	2718	13568	820	14387
Percent Served	100%	100%	99%	100%	102%	100%	114%	101%	110%	100%	99%	100%



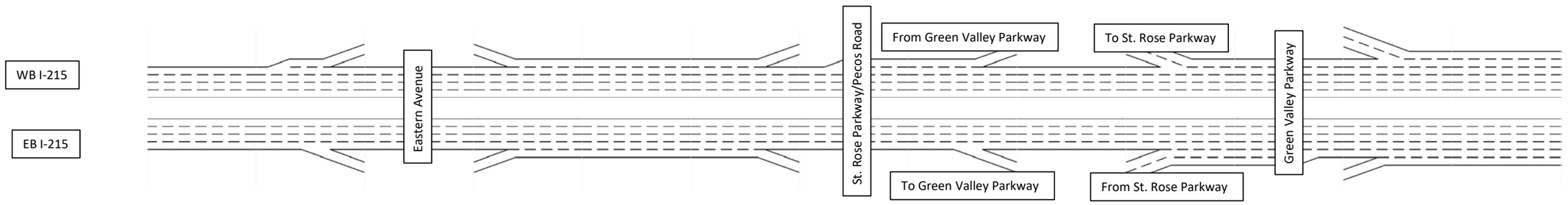
Density (veh/mi/ln)	4.1	20.8	7.6	19.4	17.7	17.7	15.0	18.9	81.2	18.2	11.0	19.4
Speed (mph)	66.1	66.6	60.1	64.2	53.6	68.9	57.4	65.1	19.6	63.1	55.4	60.3
Peak 15 Flow(veh/hr)	604	7414	497	7908	1329	6560	914	7437	1243	6111	763	6859
Peak 60 Flow (veh/hr)	564	7087	470	7554	1294	6261	866	7128	1218	5840	717	6555
Flow (veh/hr)	542	6877	452	7325	1267	6052	850	6893	1200	5651	692	6343
Volume (veh)	1084	13754	905	14651	2534	12104	1700	13787	2400	11302	1384	12687
Demand Volume (veh)	1095	13734	907	14640	2492	12148	1458	13606	2245	11361	1388	12749
Percent Served	99%	100%	100%	100%	102%	100%	117%	101%	107%	99%	100%	100%

Year 2050 Build Alternative 1

PM
Notes: On/Off Ramp

4-6 PM

Density (veh/mi/ln)	27.1	164.8	22.6	40.4	26.1	20.4	22.5	16.4	20.2	13.4	25.1	11.1	27.4
Speed (mph)	64.5	6.7	65.9	47.7	62.6	53.0	65.8	54.2	68.4	65.7	59.4	51.8	54.6
Peak 15 Flow(veh/hr)	7387	1110	6312	1596	7892	1103	6928	962	5955	1886	7819	1186	8864
Peak 60 Flow (veh/hr)	7067	1047	6049	1557	7597	1061	6559	929	5642	1800	7442	1151	8612
Flow (veh/hr)	6921	1027	5893	1511	7405	1017	6400	902	5502	1752	7255	1131	8385
Volume (veh)	13843	2054	11786	3021	14810	2034	12799	1803	11005	3504	14510	2261	16771
Demand Volume (veh)	14271	2419	11852	2821	14673	2006	12667	1652	11015	3284	14298	2281	16579
Percent Served	97%	85%	99%	107%	101%	101%	101%	109%	100%	107%	101%	99%	101%



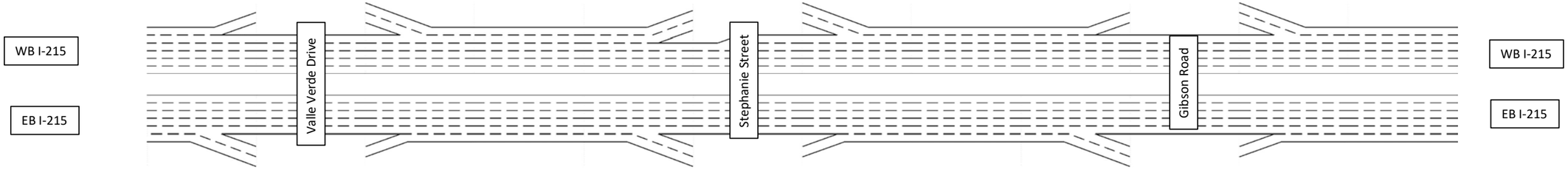
Density (veh/mi/ln)	34.4	17.0	23.4	34.2	26.9	14.6	28.2	12.5	23.2	16.9	26.6	30.4	23.3
Speed (mph)	57.5	53.5	68.1	49.6	61.2	62.5	63.5	65.8	68.2	57.8	63.1	40.0	69.1
Peak 15 Flow(veh/hr)	8130	1343	6728	1746	8427	960	7505	869	6651	2204	8866	1380	10250
Peak 60 Flow (veh/hr)	7835	1311	6530	1685	8207	927	7290	837	6453	2092	8520	1355	9868
Flow (veh/hr)	7640	1281	6360	1644	7999	904	7093	819	6274	2006	8280	1324	9604
Volume (veh)	15279	2563	12720	3287	15998	1808	14186	1638	12548	4012	16561	2648	19209
Demand Volume (veh)	15185	2545	12640	3128	15768	1623	14146	1602	12544	3842	16386	2679	19065
Percent Served	101%	101%	101%	105%	101%	111%	100%	102%	100%	104%	101%	99%	101%

Year 2050 Build Alternative 1

PM
Notes: On/Off Ramp

4-6 PM

Density (veh/mi/ln)	10.2	22.8	4.7	24.4	16.2	24.1	7.4	19.0	24.3	17.6	3.2	15.7
Speed (mph)	60.0	68.2	65.3	61.4	55.3	61.9	60.3	66.3	55.3	70.2	65.8	70.6
Peak 15 Flow(veh/hr)	688	8415	664	9044	1868	7256	986	8379	1514	6950	470	7471
Peak 60 Flow (veh/hr)	633	7970	639	8599	1844	6773	905	7683	1356	6328	438	6765
Flow (veh/hr)	610	7761	617	8377	1770	6607	888	7496	1330	6164	423	6588
Volume (veh)	1221	15521	1235	16754	3541	13214	1775	14992	2660	12327	846	13175
Demand Volume (veh)	1221	15359	1258	16616	3417	13199	1668	14867	2528	12340	849	13189
Percent Served	100%	101%	98%	101%	104%	100%	106%	101%	105%	100%	100%	100%



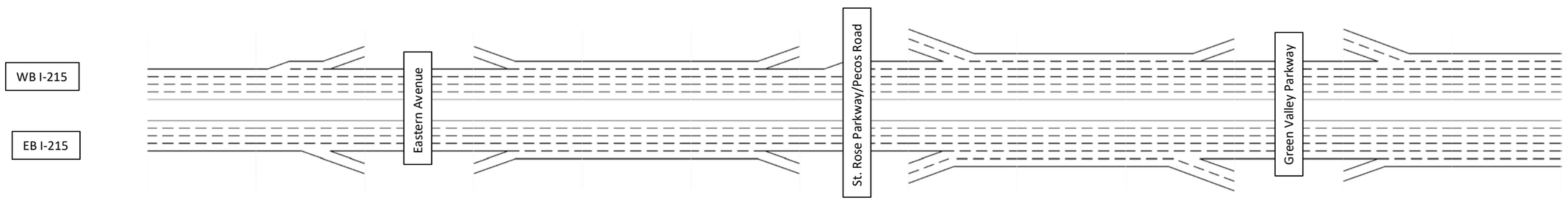
Density (veh/mi/ln)	8.4	30.9	8.0	25.3	15.2	21.1	18.2	22.2	9.5	27.3	10.4	24.3
Speed (mph)	66.7	57.3	59.6	61.7	60.6	68.2	55.6	64.7	64.2	54.2	52.2	58.4
Peak 15 Flow(veh/hr)	1180	9094	519	9567	1904	7664	1036	8728	1262	7356	696	7938
Peak 60 Flow (veh/hr)	1149	8718	486	9196	1843	7349	1021	8356	1223	7149	622	7773
Flow (veh/hr)	1114	8486	472	8959	1802	7153	1000	8158	1205	6949	610	7558
Volume (veh)	2227	16971	943	17918	3604	14306	2001	16316	2410	13898	1219	15117
Demand Volume (veh)	2227	16837	952	17789	3467	14322	1901	16223	2322	13901	1220	15122
Percent Served	100%	101%	99%	101%	104%	100%	105%	101%	104%	100%	100%	100%

Year 2050 Build Alternative 2

AM
Notes: On/Off Ramp

7-9 AM

Density (veh/mi/ln)	31.1	173.6	29.8	21.0	24.7	13.0	29.7	15.8	28.0	18.4	23.8	12.6	28.8
Speed (mph)	63.6	6.2	60.9	55.2	65.7	59.4	60.5	62.4	58.4	38.6	66.4	58.1	56.7
Peak 15 Flow(veh/hr)	8403	1089	7346	1244	8627	859	7820	2083	9915	1405	8545	1547	10076
Peak 60 Flow (veh/hr)	8096	1054	7051	1168	8214	786	7429	2011	9435	1328	8118	1484	9595
Flow (veh/hr)	7851	1032	6822	1138	7965	765	7201	1946	9150	1280	7868	1450	9318
Volume (veh)	15702	2064	13645	2277	15931	1530	14403	3892	18301	2560	15736	2901	18636
Demand Volume (veh)	16282	2598	13684	2283	15967	1527	14440	3746	18186	2425	15761	2836	18597
Percent Served	96%	79%	100%	100%	100%	100%	100%	104%	101%	106%	100%	102%	100%



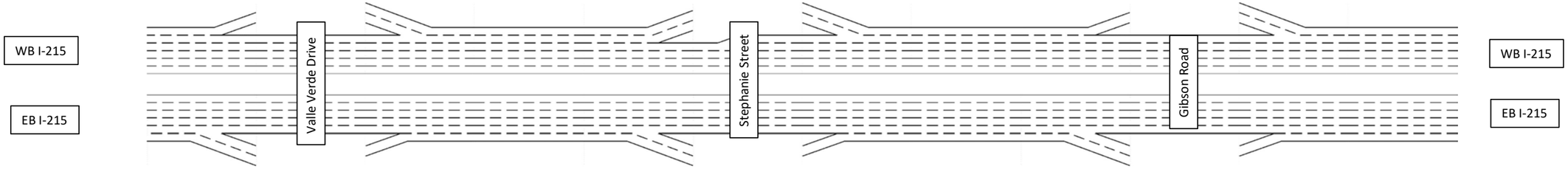
Density (veh/mi/ln)	25.1	14.1	18.6	23.3	19.5	11.6	21.0	14.9	22.4	11.6	18.7	14.5	18.8
Speed (mph)	65.1	60.4	69.3	55.1	66.5	65.1	67.8	60.3	60.5	58.5	69.2	45.5	66.6
Peak 15 Flow(veh/hr)	7034	1442	5592	1411	6990	846	6162	2346	8470	1471	7013	1082	8050
Peak 60 Flow (veh/hr)	6644	1368	5299	1299	6595	770	5821	2208	8021	1385	6639	1045	7694
Flow (veh/hr)	6465	1323	5141	1260	6402	747	5651	2129	7776	1344	6430	1011	7439
Volume (veh)	12930	2647	10283	2519	12804	1493	11302	4258	15552	2688	12861	2022	14878
Demand Volume (veh)	12896	2651	10245	2500	12745	1453	11292	4236	15527	2652	12875	1954	14829
Percent Served	100%	100%	100%	101%	100%	103%	100%	101%	100%	101%	100%	104%	100%

Year 2050 Build Alternative 2

AM
Notes: On/Off Ramp

7-9 AM

Density (veh/mi/ln)	17.2	24.6	3.8	23.6	12.9	32.3	8.1	22.4	27.7	19.7	3.0	17.2
Speed (mph)	58.5	68.0	65.8	64.2	59.3	56.2	59.0	63.6	54.4	69.8	66.6	70.1
Peak 15 Flow(veh/hr)	1105	9026	543	9547	1678	7900	1002	8872	1614	7393	451	7868
Peak 60 Flow (veh/hr)	1036	8565	514	9085	1570	7519	951	8473	1518	6961	420	7372
Flow (veh/hr)	1001	8324	501	8821	1522	7301	939	8246	1490	6757	404	7162
Volume (veh)	2002	16647	1001	17642	3043	14601	1878	16491	2979	13513	809	14324
Demand Volume (veh)	2007	16590	1012	17601	2977	14625	1661	16285	2718	13568	820	14387
Percent Served	100%	100%	99%	100%	102%	100%	113%	101%	110%	100%	99%	100%



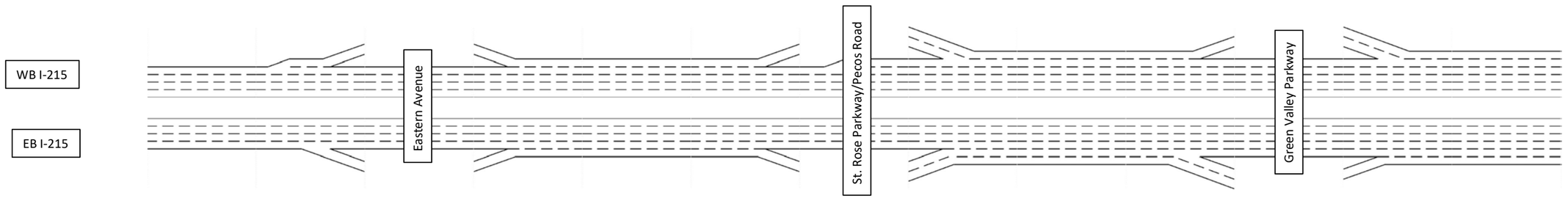
Density (veh/mi/ln)	4.4	21.0	7.6	20.7	24.8	17.7	14.9	18.2	77.9	18.3	11.0	18.7
Speed (mph)	63.2	66.3	60.0	64.0	48.5	69.0	57.4	65.3	19.3	63.1	55.3	60.6
Peak 15 Flow(veh/hr)	610	7478	493	7970	1314	6610	904	7480	1246	6167	763	6915
Peak 60 Flow (veh/hr)	566	7116	468	7583	1291	6277	857	7132	1221	5856	717	6572
Flow (veh/hr)	545	6897	452	7347	1271	6070	846	6908	1204	5665	692	6358
Volume (veh)	1090	13794	904	14694	2543	12139	1692	13815	2409	11330	1384	12715
Demand Volume (veh)	1095	13734	907	14640	2492	12148	1458	13606	2245	11361	1388	12749
Percent Served	100%	100%	100%	100%	102%	100%	116%	102%	107%	100%	100%	100%

Year 2050 Build Alternative 2

PM
Notes: On/Off Ramp

4-6 PM

Density (veh/mi/ln)	27.1	167.3	22.9	24.0	22.4	17.2	23.2	18.8	24.0	14.8	22.2	11.9	27.3
Speed (mph)	64.4	6.2	65.6	53.5	65.5	54.9	65.2	59.0	60.4	42.4	64.9	52.0	54.6
Peak 15 Flow(veh/hr)	7408	1033	6328	1378	7643	1011	6702	2217	8875	1247	7668	1286	8880
Peak 60 Flow (veh/hr)	7063	1009	6082	1303	7360	969	6411	2139	8557	1184	7375	1242	8614
Flow (veh/hr)	6901	1000	5900	1257	7158	927	6230	2088	8319	1152	7164	1218	8382
Volume (veh)	13802	2000	11800	2514	14316	1855	12461	4176	16638	2304	14328	2435	16765
Demand Volume (veh)	14271	2419	11852	2490	14342	1841	12501	3949	16451	2152	14298	2281	16579
Percent Served	97%	83%	100%	101%	100%	101%	100%	106%	101%	107%	100%	107%	101%



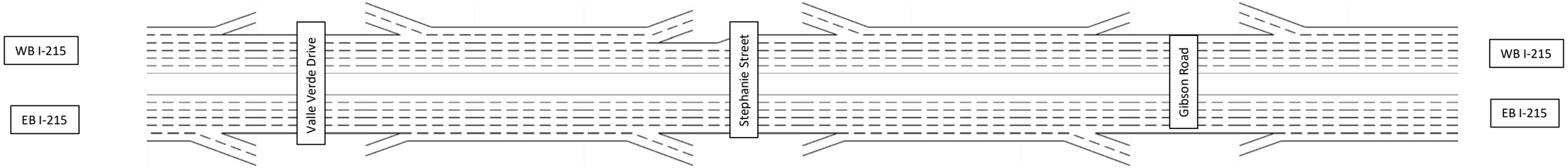
Density (veh/mi/ln)	34.4	17.0	23.4	27.6	25.7	10.5	27.3	16.3	28.9	9.1	24.4	21.2	23.3
Speed (mph)	57.5	53.5	68.1	52.6	62.1	64.3	65.4	57.7	57.4	59.4	67.6	43.6	69.1
Peak 15 Flow(veh/hr)	8130	1343	6728	1580	8232	732	7479	2392	9916	1131	8784	1454	10212
Peak 60 Flow (veh/hr)	7835	1311	6531	1457	7975	693	7284	2300	9556	1098	8443	1425	9868
Flow (veh/hr)	7640	1281	6360	1411	7768	672	7095	2192	9283	1069	8216	1395	9608
Volume (veh)	15279	2563	12720	2822	15536	1343	14190	4383	18566	2138	16432	2789	19216
Demand Volume (veh)	15185	2545	12640	2798	15438	1335	14102	4325	18428	2042	16386	2679	19065
Percent Served	101%	101%	101%	101%	101%	101%	101%	101%	101%	105%	100%	104%	101%

Year 2050 Build Alternative 2

PM
Notes: On/Off Ramp

4-6 PM

Density (veh/mi/ln)	10.2	22.9	4.8	23.9	16.1	24.6	7.4	19.1	24.2	17.6	3.2	15.7
Speed (mph)	60.0	68.1	65.3	61.5	55.6	61.7	60.1	66.2	55.4	70.2	65.7	70.5
Peak 15 Flow(veh/hr)	687	8389	664	9027	1859	7247	977	8369	1512	6950	470	7470
Peak 60 Flow (veh/hr)	631	7977	640	8602	1848	6772	904	7681	1353	6329	438	6766
Flow (veh/hr)	608	7764	619	8384	1776	6607	886	7493	1327	6164	423	6588
Volume (veh)	1217	15528	1238	16767	3552	13214	1771	14986	2654	12327	846	13176
Demand Volume (veh)	1221	15359	1258	16616	3417	13199	1668	14867	2528	12340	849	13189
Percent Served	100%	101%	98%	101%	104%	100%	106%	101%	105%	100%	100%	100%



Density (veh/mi/ln)	8.8	31.9	8.0	25.7	15.6	21.2	18.2	21.5	9.5	27.4	10.4	25.1
Speed (mph)	63.7	56.2	59.6	61.5	60.4	68.3	55.6	64.5	64.2	53.9	52.2	58.4
Peak 15 Flow(veh/hr)	1179	9092	521	9556	1920	7672	1031	8713	1259	7373	696	7967
Peak 60 Flow (veh/hr)	1147	8723	486	9197	1848	7347	1020	8365	1229	7161	622	7783
Flow (veh/hr)	1114	8493	471	8965	1809	7156	1000	8160	1206	6951	609	7559
Volume (veh)	2227	16986	942	17930	3618	14312	2000	16321	2411	13902	1219	15118
Demand Volume (veh)	2227	16837	952	17789	3467	14322	1901	16223	2322	13901	1220	15122
Percent Served	100%	101%	99%	101%	104%	100%	105%	101%	104%	100%	100%	100%