LEVEL 'B' PLANNED COMMUNITY TECHNICAL REPORT

FOR

2016 SANTOLINA LEVEL 'B' MASTER PLAN

TRANSPORTATION MASTER PLAN

SECOND REVISED SUBMITTAL SEPTEMBER 30, 2016
REVISED SUBMITTAL – JULY 1, 2016
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LEVEL 'B' PLANNED COMMUNITY
TECHNICAL REPORT

FOR

2016 SANTOLINA LEVEL 'B' MASTER PLAN

TRANSPORTATION MASTER PLAN TECHNICAL APPENDIX

COUNTY OF BERNALILLO, NEW MEXICO

SECOND REVISED SUBMITTAL – SEPTEMBER 30, 2016
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ORIGINAL SUBMITTAL – JANUARY 25, 2016

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2016 SANTOLINA LEVEL B TRANSPORTATION MASTER PLAN TECHNICAL APPENDIX

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I. LEVEL A UPDATE

A. CORRELATION WITH LEVEL A TRANSPORTATION MASTER PLAN

As a condition of approval of the Level A Master Plan, it was required that an updated Level A Transportation Master Plan Technical Report be prepared. That report has been prepared and has been submitted to Bernalillo County under separate cover. The Updated Level A Transportation Master Plan Report incorporated the comments and changes from the Level A Master Plan review. These comments and changes were primarily limited to:

- Adding a parallel road to the Frontage Road to reduce development traffic usage of the Frontage Road
- Additional connections to existing/future roadways
- Inclusion in the transportation analysis the relocation of the Urban Center so it was no longer bisected by two (2) principal arterials
- Refinement of the road network to result in a more gridded structure
- Addition and clarification of the access management policy for the Master Plan area

These items were incorporated into the Updated Level A Transportation Master Plan Technical Report.

The updated Level A Master Plan land use and roadway network are shown in Figure 1.

B. LAND USE MODIFICATIONS FROM ORIGINAL LEVEL A TRANSPORTATION ANALYSIS

There have been no material changes in the overall land use plan since the adoption of the Level A Master Plan, as the number of future dwelling units and employment in the Updated Level A Transportation Master Plan are equivalent to that in the approved Level A Master Plan. However, as the Master Plan changed from what was evaluated in the Level A Transportation Master Plan Technical Report, the transportation analysis was updated to reflect the adopted land use plan.

The largest change incorporated into the transportation analysis was the relocation of the Urban Center so that it was no longer bisected by Atrisco Vista and Dennis Chavez Boulevard, as it was in the original Level A Transportation Master Plan Technical Report. This change was made based on comments received during the review of the Level A Master Plan. As shown in Figure 1, the Urban Center is now in the northwest quadrant of the intersection of Atrisco Vista and Dennis Chavez, and is bordered on the east by Atrisco Vista, on the west by Paseo del Volcan, on the south by Dennis Chavez and on the north by Gibson.

The other changes in land use were modifications to the Town Center and Business Park acreages resulting from the addition of the new parallel road to the Frontage Road, as requested by the NMDOT.

SANTOLINA

LEVEL A

LEGEND

- VILLAGE
- INDUSTRIAL AND BUSINESS PARK
- OPEN SPACE
- URBAN CENTER
- BUSINESS PARK
- TOWN CENTER
- LEVEL A BOUNDARY
- FUTURE INTERCHANGE
- VILLAGE CENTER
- PRINCIPAL – 2-3 LANES EACH DIRECTION*
- MINOR – 2-3 LANES EACH DIRECTION*
- COLLECTOR– 1-2 LANES EACH DIRECTION*
- LOCAL– 1-2 LANES EACH DIRECTION*

NORTH

LEVEL A LAND USE AND ROAD NETWORK

FIGURE 1

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C. STREET NETWORK MODIFICATIONS FROM ORIGINAL LEVEL A TRANSPORTATION ANALYSIS

The request to add the parallel road to the Frontage Road, and to increase the gridding of the road network required refinement of the roadway network from that evaluated in the original Level A Master Plan.

Figure 1 shows the updated Level A Transportation Master Plan roadway network. This updated road network includes the addition of the road parallel to the Frontage Road, as well as a more detailed network on internal minor arterial and collector streets in a more gridded fashion. This additional roadway density allows for a more even distribution of traffic onto alternate roadways than the original Level A Master Plan, which had fewer roadways included in the analysis.

During the development of the gridded road network in the Updated Level A Transportation Master Plan Technical Report, the intersection spacing criteria from the Santolina Access Management Plan, adopted in the Level A Master Plan, was applied to the road network. The Santolina Access Management Plan, also discussed in the Level B Master Plan Transportation section, identifies the intersection spacing criteria for the Santolina Master Plan area. The Santolina Access Management Plan is identical to that in the New Mexico Department of Transportation (NMDOT) State Access Management Manual for urban principal arterials, urban minor arterials and urban collectors.

The final substantial street network modification from the original Level A Transportation Master Plan Technical Report was the alignment of future Paseo del Volcan south of I-40. The Updated Level A Master planning efforts have identified the right-of-way requirements and intersection/interchange spacing for Paseo del Volcan south of I-40 to match what is planned north of I-40.

D. CONNECTIONS TO OFF-SITE ROADWAY NETWORK

The Updated Level A Transportation Master Plan maintains the Atrisco Vista, Central Avenue, Dennis Chavez, 118th Street, and Gibson extension as connections to the off-site roadway network. The planned, future Interstate 40 (I-40) interchanges at 118th Street and Paseo del Volcan from the 2040 Metropolitan Transportation Plan (MTP) are also included in the updated Level A analysis.

As a result of comments received during the review of the Level A Transportation Master Plan, additional connections to the off-site roadway network were added to the Updated Level A Transportation Master Plan Technical Report analysis.

The new road parallel to the Frontage Road was added as a connection to Atrisco Vista as the result of a request from the County and NMDOT.

This new road will serve as an alternate to the Frontage Road for Master Plan traffic and traverses the entire length of Santolina. In the MRCOG 2040 MTP Long Range Roadway System map, this road is proposed to extend to the east to 118th Street after the year 2040.

A future extension of Gun Club Road from 118th Street to the Santolina Loop Road (Loop Road) was included in the adopted Level A Master Plan and is a part of the Full Build Level A road network. This extension is also included in the MRCOG 2040 MTP Long Range Roadway System.

As discussed in the original Level A Transportation Master Plan Technical Report, two overpasses over I-40, between Atrisco Vista and Paseo del Volcan, and Paseo del Volcan and Shelly Road have been planned for to relieve traffic from Paseo del Volcan and Atrisco Vista. These overpasses are not needed by 2040 under current planning forecasts, but it was considered appropriate to provide them for future growth, as the area north of I-40 and west of Atrisco Vista grow into the future.

E. COMPARISONS OF TRAFFIC GENERATION AND DISTRIBUTION

As the Updated Level A Transportation Master Plan Technical Report and this Level B Transportation Master Plan Technical Appendix utilized the same modeling inputs, the traffic generation and distribution methodology between the Updated Level A and Level B are similar. In addition, the overall land use in the original Level A Transportation Master Plan Technical Report and the Updated Level A Transportation Master Technical Report were also essentially the same, so the traffic generation between the two Level A plans are comparable, although there are differences due to changes in the MRCOG employment forecasts.

However, comparisons of screenline traffic volumes are not directly analogous as the two Level A modeling analyses were performed using different socioeconomic forecasts and roadway network assumptions. The original Level A Transportation Master Plan used the MRCOG 2035 MTP socioeconomic forecast. Since that time, the MRCOG Board has approved a 2040 MTP socioeconomic forecast. The 2040 forecast is lower than the 2035 forecast due to the availability of new information regarding growth trends in the region, the 2040 forecast was not finalized for use at the completion of the original Level A Santolina Transportation Master Plan analyses.

The following table shows the screenline comparisons between the original Level A Transportation Master Plan and the Updated Level A Transportation Master Plan.

The comparison shows the traffic levels on the screenlines have decreased by over 15% compared to the original Level A transportation analysis.

Table 1 – Screenline Comparison of Build-Out Traffic		
Location of Screenline	**ADT – Original Level A**	**ADT – Updated Level A**
Between I-40 & Central		
118th Street	27,700	25,200
Atrisco Vista	90,900	49,300
Overpass Between Atrisco Vista and PdV	0	9,900
Paseo del Volcan	75,000	53,100
Overpass Between PdV and Shelly Road	0	1,000
Total	**193,600**	**138,500**
Difference		**-28.5%**
West of 118th Street		
Central	66,000	55,500
Gibson	90,500	43,000
Dennis Chavez	38,800	45,000
Gun Club	0	43,900
Pajarito	0	2,100
Total	**195,300**	**189,500**
Difference		**-3%**
Total – Both Screenlines	**388,900**	**328,000**
Difference – Both Screenlines		**-15.7%**

F. TRAVEL DEMAND MODELING AT BUILD-OUT

The following figures, Figure 2 through Figure 9, show the key parameters for the Updated Level A Transportation Master Plan travel demand modeling. The methodology and assumptions used in the development of the travel demand model for the updated Level A Analysis and the Level B analysis is the same as used in the original Level A Transportation Master Plan analysis, and has been coordinated and reviewed with MRCOG Staff.
Details of the development of the travel demand model and databases is included in Technical Appendix T – 1 Travel Demand Model Socioeconomic Forecast, and the Updated Level A Transportation Master Plan Technical Report.

Graphics showing the functional classification, as defined for the MRCOG Cube regional travel demand model database requirements, modeled number of lanes and travel speed, average daily traffic, peak hour traffic, and volume-to-capacity (a surrogate for level of service) deficiencies are identified. The volume-to-capacity ratings as utilized by MRCOG are presented to remain consistent with MRCOG evaluations.

The roadway network as modeled shows slightly less roadways than does the Master Plan graphic in Figure 1 on page 3. This is due to the fact that the model only considers roadways classified as Collectors and above, and the roadways that have been excluded from the travel demand model road network are identified as Local streets in Figure 1.

Volume-to-capacity ratios less than 0.9 are not shown in the figures, but are included in Technical Appendix T – 2 Analysis of Travel Demand Forecast. With the given assumptions for laneage, the on-site deficiencies are generally located at future intersections that will be evaluated in greater detail during site specific intersection capacity analysis that will be performed during Level C Plans and during specific site planning. Off-site deficiencies are primarily the result of requiring additional lanes above that anticipated in the 2040 MTP. As the buildout is not anticipated to occur until 2065, a future roadway network at that time is not available. The buildout analysis is primarily useful for identifying locations that will require future study, as the development proceeds past 2040, and with future Level B submittals.

As with the original Level A Transportation Master Plan Technical Report results, the results show congestion along the major corridors serving the development, such as Gun Club, Dennis Chavez, Gibson, Central, Atrisco Vista and the I-40 ramps at Atrisco Vista and Paseo del Volcan. These results suggest, that as future development occurs after 2040, additional connections would prove beneficial, such as the parallel road to the Frontage Road extending east to 118th Street and a future Shelly Road interchange with I-40.

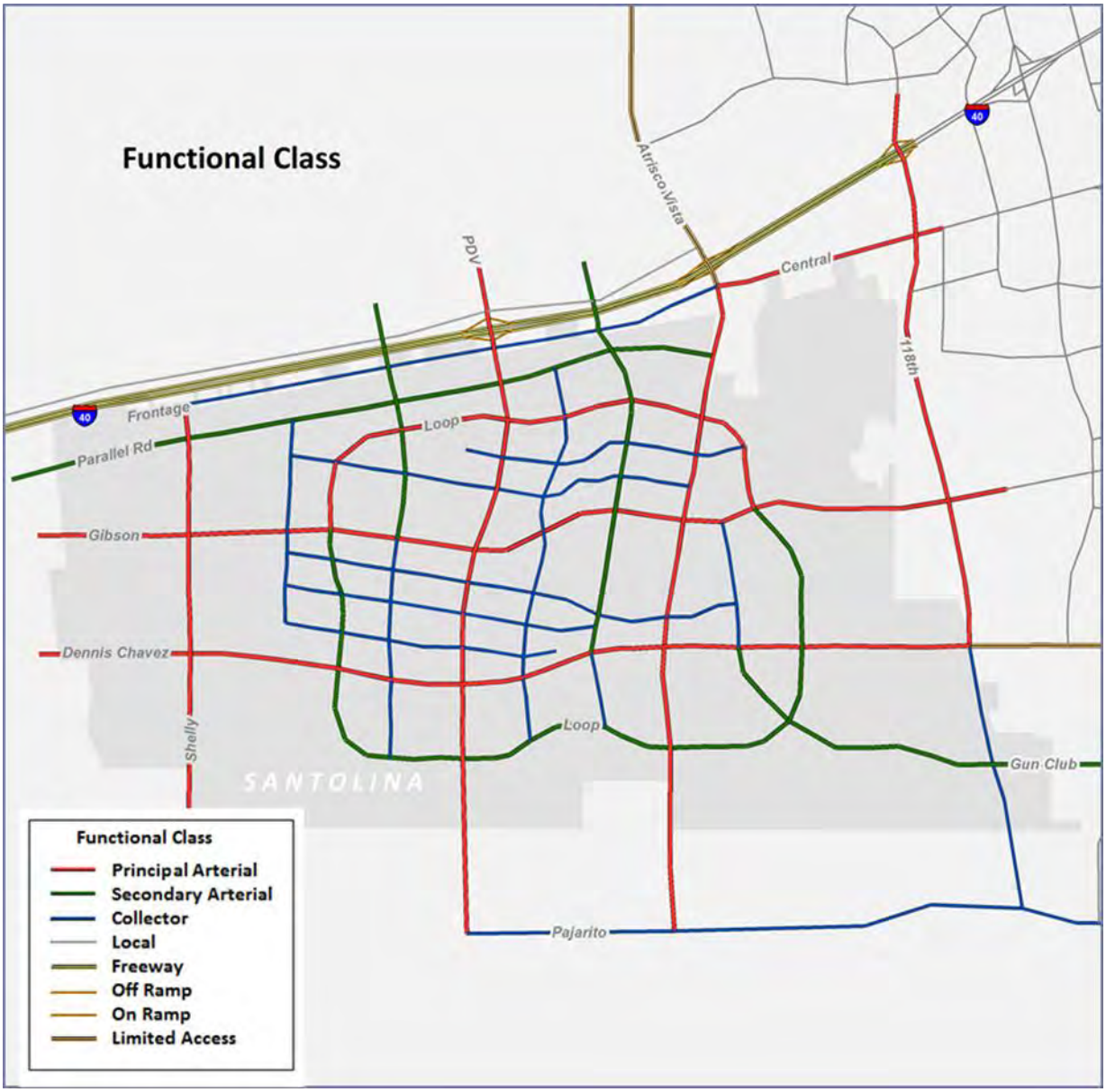


Figure 2 – Functional Classification – Full Buildout

The functional classification identified above are as defined by the MRCOG regional travel demand model requirements for modeling purposes. The functional classification shown in Figure 1 also is preliminary and the final functional classifications will be determined in the future and will be consistent with FHWA categories. The future roadway classification will also include major and minor collectors.

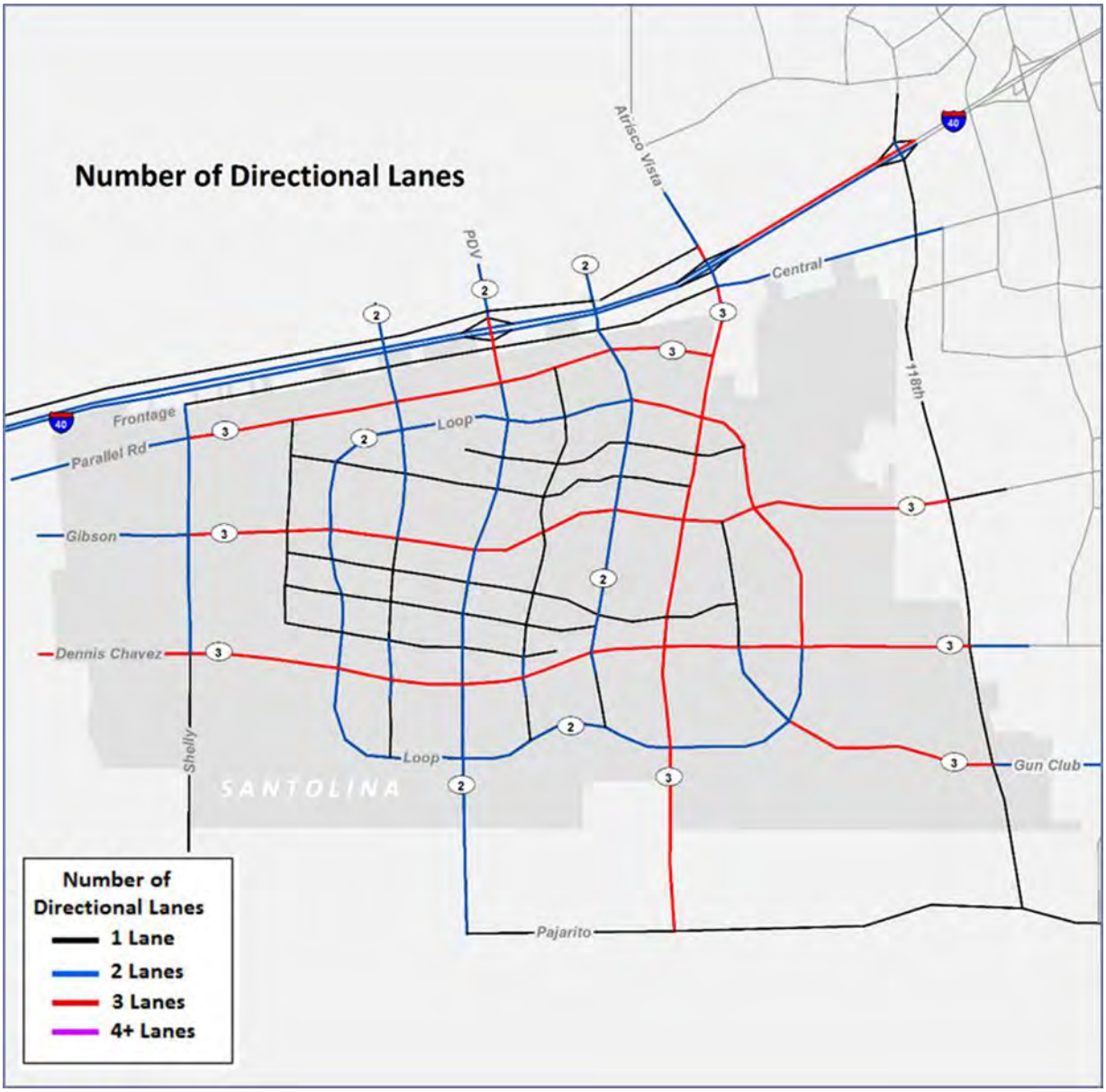


Figure 3 – Modeled Number of Lanes – Full Buildout

A table listing the number of lane miles added for each model functional classification for full buildout, 2040 and 2025 is shown on page 11 of the Technical Appendix T – 2 Analysis of Travel Demand Forecast.

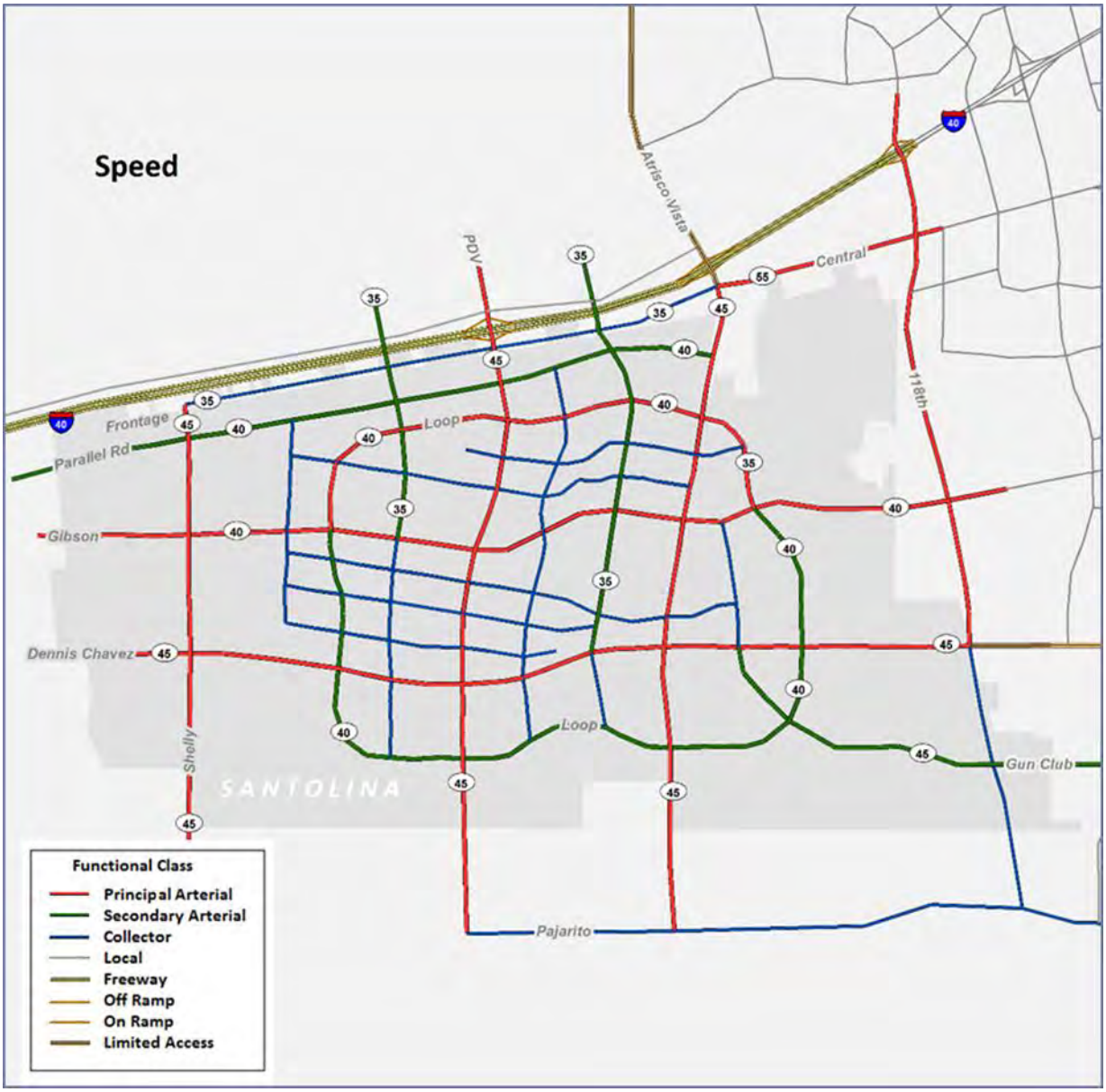


Figure 4 – Modeled Travel Speed – Full Buildout

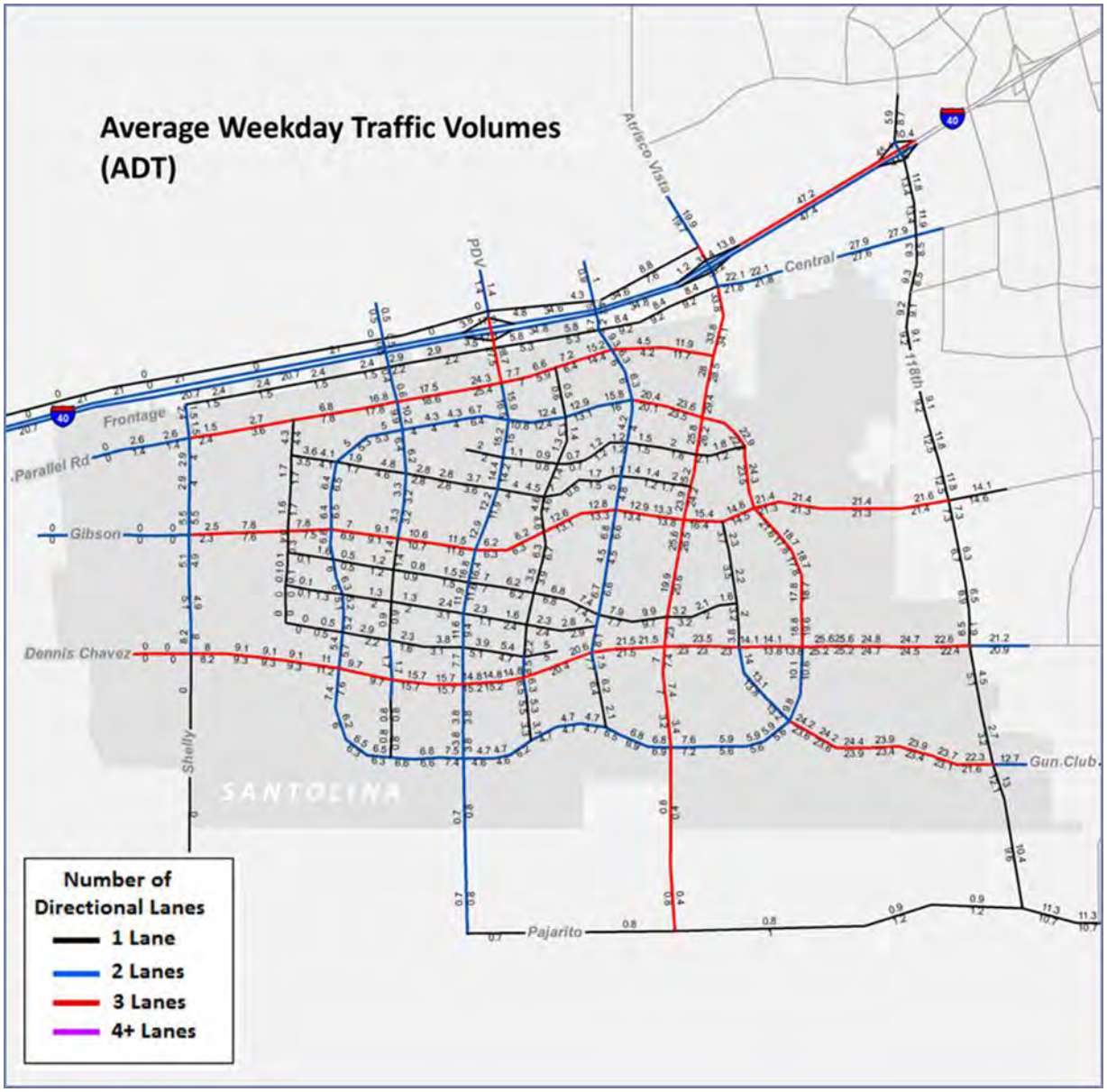


Figure 5 – Average Daily Traffic 1,000's (Directional) – Full Buildout

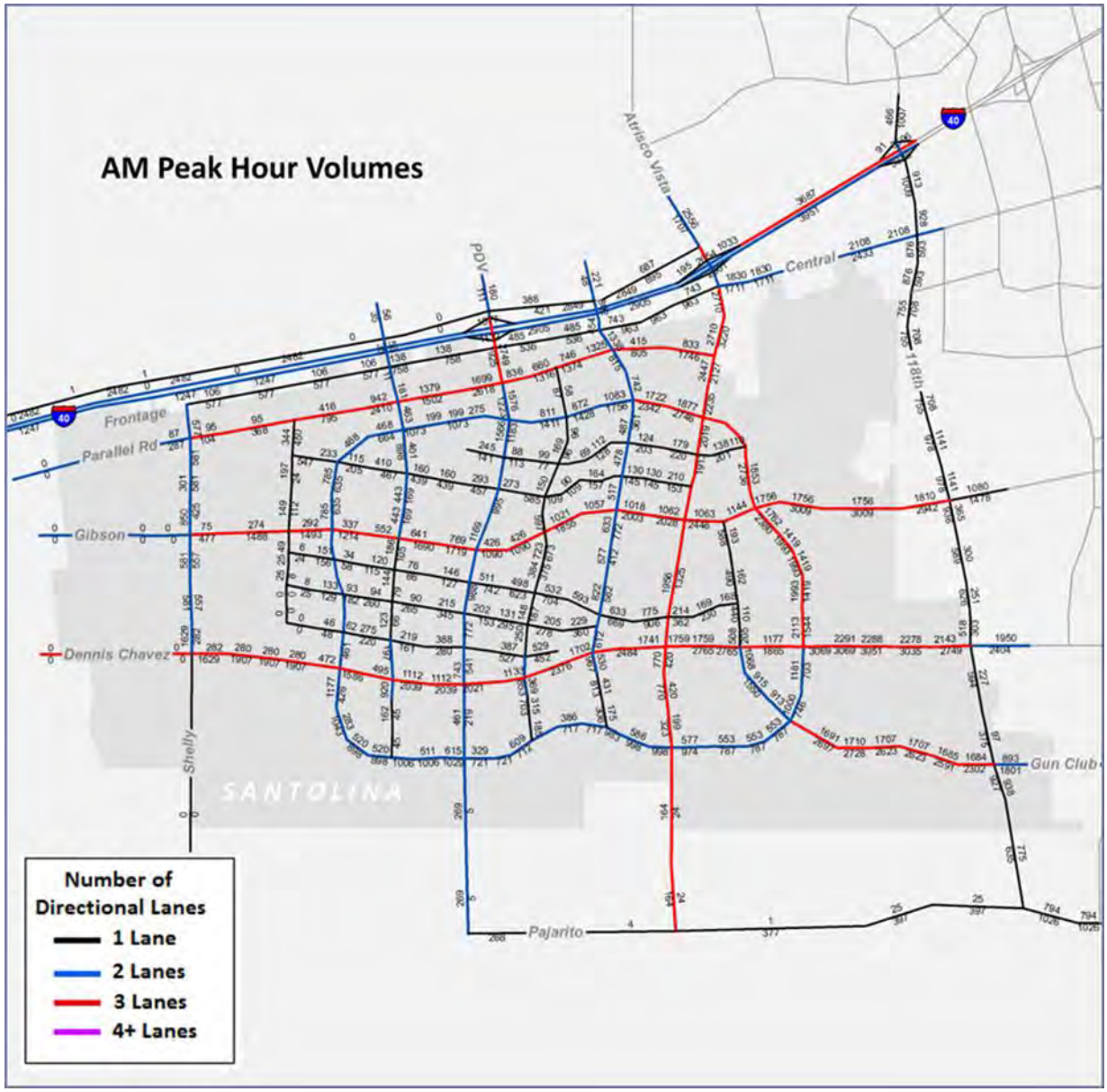


Figure 6 – Traffic Volume AM Peak Hour – Full Buildout

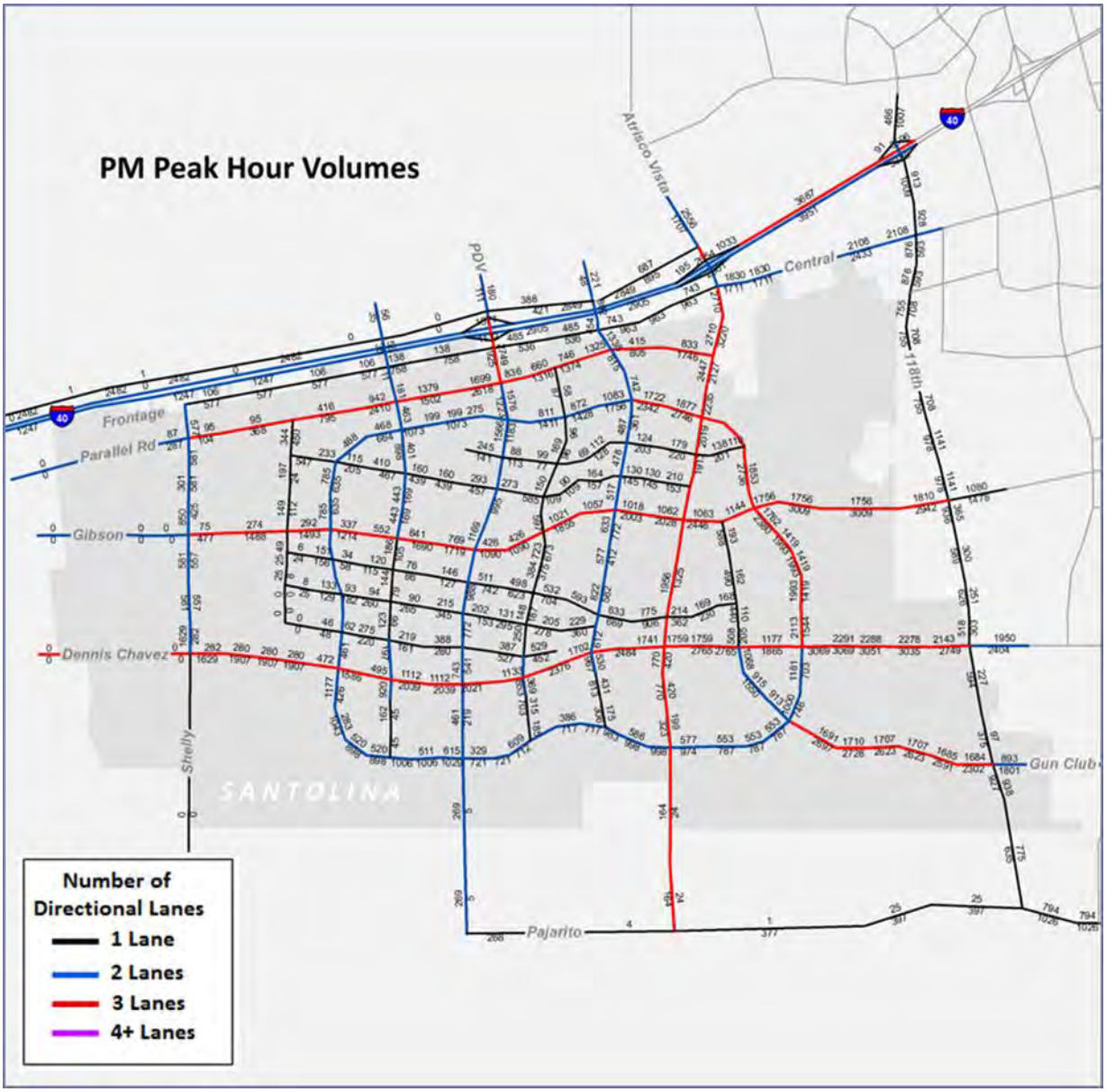


Figure 7 – Traffic Volume PM Peak Hour – Full Buildout

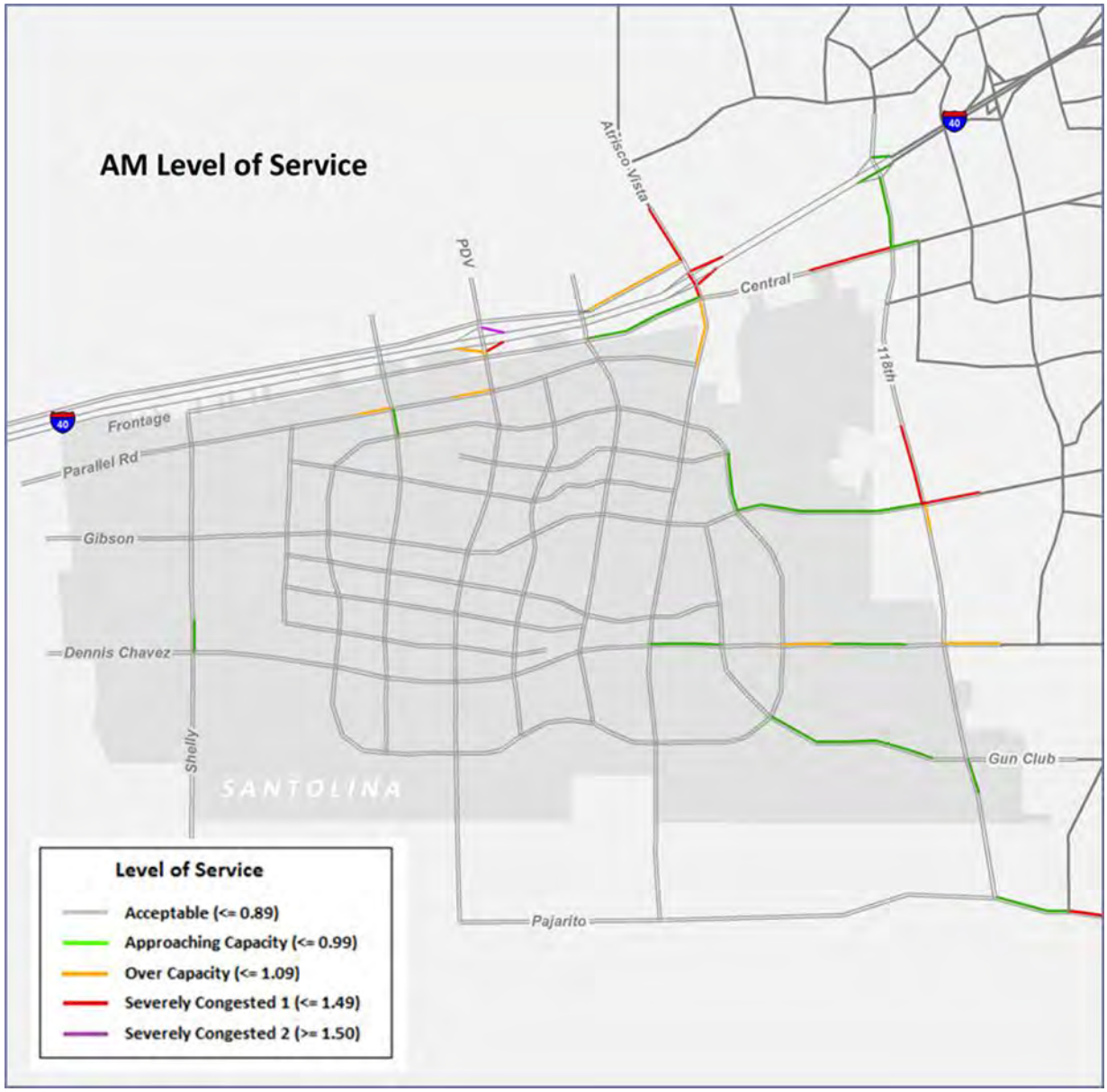


Figure 8 – Forecast Traffic Volume to Capacity Ratio AM Peak Hour – Full Buildout

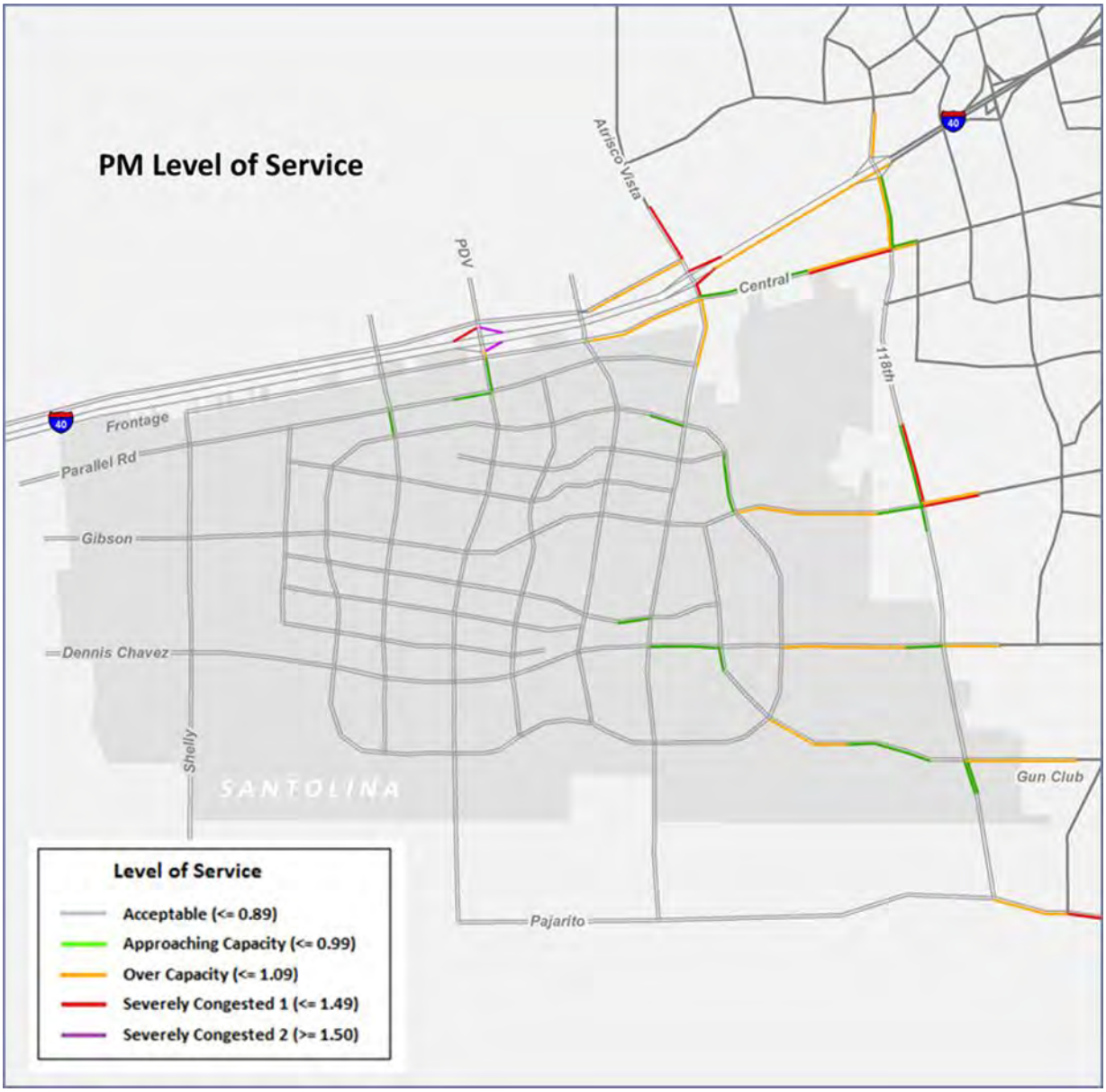


Figure 9 – Forecast Traffic Volume to Capacity Ratio PM Peak Hour – Full Buildout

II. LEVEL B STREET NETWORK

The Level B street network for the Level B Plan area is shown in Figure 10. Figures discussed later in Section III.B, Traffic Volume Projections, will present the number of lanes and forecast traffic volumes for each roadway in the Level B Plan Area for 2025 and 2040, as well as identify locations of congestion and key intersections of interest for future study.

A. INTERSECTION TRAFFIC CONTROL REQUIREMENTS

The Santolina Access Management Plan identifies the preferred intersection spacing and traffic control policy for the Santolina Maser Plan area.

The Santolina Access Management Plan is shown below, and is identical to the NMDOT State Access Management Manual criteria for urban primary arterials, minor arterial and collectors. The traffic signals identified in Figure 10 conform to the policy identified in the Santolina Access Management Plan.

Table 2 – Proposed Santolina Access Spacing Standards for Intersections and Driveways (centerline to centerline spacing in feet)

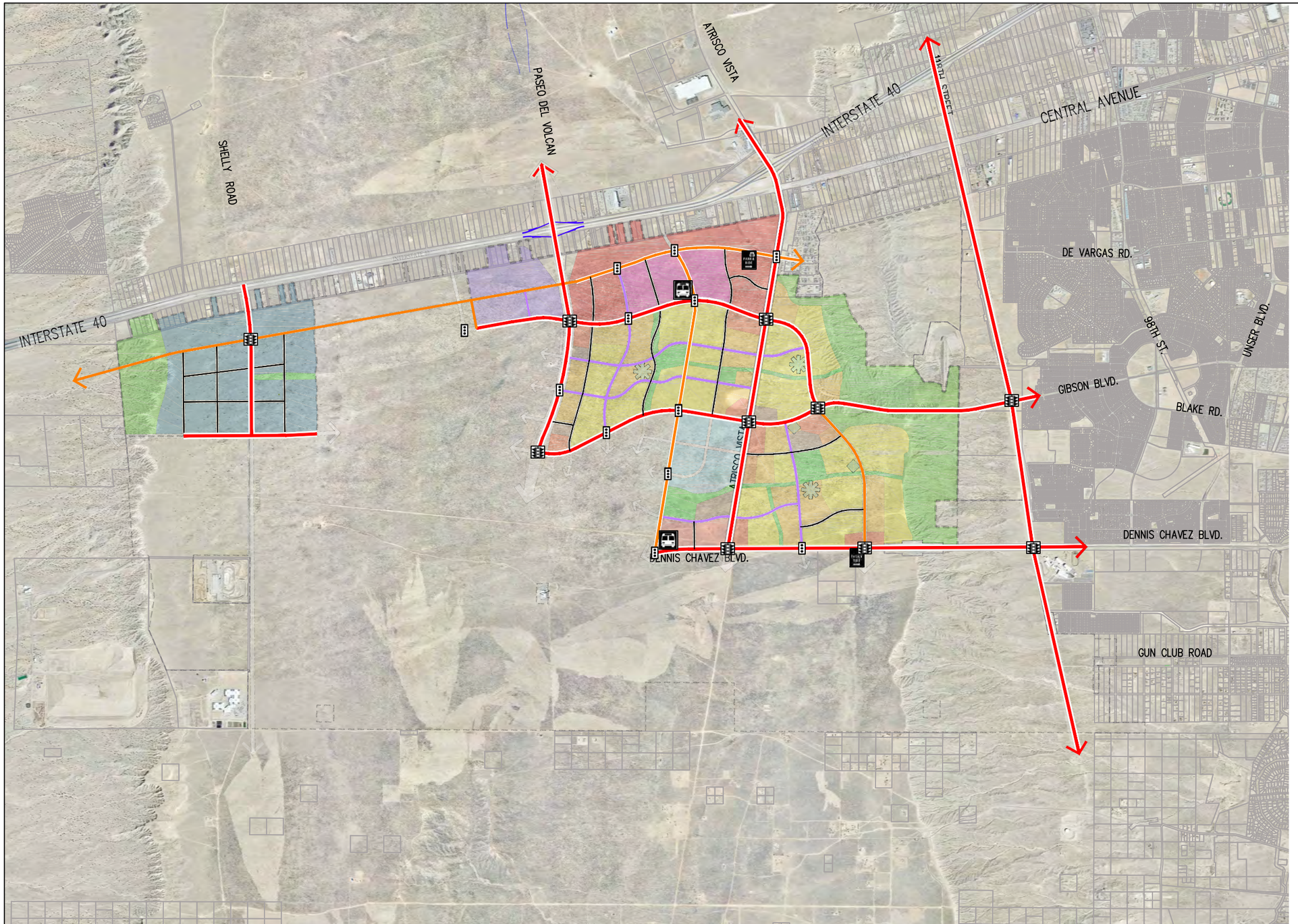
Access Category	Posted Speed (mph)	Intersection Spacing (feet)[1]		Driveway Spacing (feet)[2]		
				Non Traversable Median		Traversable Median[4]
		Signalized	Unsignalized[3]	Full Access	Partial Access	
Urban Principal Arterial	≤30 mph 35 to 40 mph 45 to 50 mph ≥55 mph	2,640 2,640 2,640 5,280	1,320 1,320 1,320 1,320	1,320 1,320 1,320 1,320	200 325 450 625	200 325 450 625
Urban Minor Arterial	≤30 mph 35 to 40 mph 45 to 50 mph ≥55 mph	1,760 1,760 2,640 5,280	660 660 660 1,320	660 660 660 1,320	175 275 400 600	175 275 400 600
Urban Collector	≤30 mph 35 to 40 mph 45 to 55 mph	1,100 1,320 1,760	330 330 660	330 330 660	150 225 350	150 225 350

1. Intersection – Potential public street or other access serving a large area or a major traffic generator(s) where full access is typically provided (not required, but is permitted).
2. Driveway – Potential public or private access serving a limited area where traffic signal control is not necessary.
3. Spacing should be consistent with the established street spacing along the facility.
4. Includes roadways with no median or painted median. The type of access, full or partial, is determined at the discretion of Bernalillo County Public Works.

Minor intersections will generally operate with two-way stop control, with all-way stop control used at higher volume intersections that do not meet traffic signal warrants, or locations where all-way stop control would prove beneficial, such as the intersections of minor collectors in residential areas. At this time no locations for roundabouts have been identified, however roundabouts can be an efficient means of traffic control, and can be implemented in the appropriate location. Roundabouts are not precluded in this Master Plan. Right-of-way will be provided in the event previously granted ROW is not adequate.

As the roadways will be constructed and expanded in phases to meet traffic demand, traffic signals will be constructed and installed as traffic volumes satisfy traffic signal warrants. In some instances, it may be appropriate to construct the traffic signals with the roadway expansion, or to construct the traffic signal conduits to prepare the intersection for future signalization.

On major arterials consideration should be given to installation of adaptive signal control and intelligent transportation system (ITS) technologies to assist in improving traffic operations. All ITS implementation should be consistent and coordinated with the regional ITS plan.



SANTOLINA

LEVEL B

LEGEND

- FUTURE INTERCHANGE
- MAJOR SIGNALIZED INTERSECTION
- POTENTIAL FUTURE SIGNALIZED INTERSECTION
- PARK AND RIDE
- TRANSIT CENTER
- PRINCIPAL – 2–3 LANES EACH DIRECTION*
- MINOR – 2–3 LANES EACH DIRECTION*
- COLLECTOR– 1–2 LANES EACH DIRECTION*
- LOCAL– 1–2 LANES EACH DIRECTION*
- SCHOOL
- PUBLIC SAFETY FACILITY

NORTH

LEVEL B PLAN AREA ROAD NETWORK AND INTERSECTION TRAFFIC CONTROL

FIGURE 10

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III. TRAVEL DEMAND MODELING RESULTS FOR 2025 AND 2040

A. ABSORPTION SCHEDULE / PROJECT LAND USE

An absorption schedule has been developed that anticipates the level of development in the Level B plan area for 2025 and 2040. This land use absorption schedule was used as the basis for the development of the socioeconomic forecast used in the 2025 and 2040 travel demand model. The process of incorporating the forecast development in Santolina into the MRCOG regional socioeconomic development was closely coordinated with MRCOG Staff and was conducted in the same manner as that utilized in the original Level A Transportation Master Plan analyses. Details of the development of the Santolina travel demand model and databases is included in Appendix T-1 and T-2.

Table 3 – Land Use and Absorption – Level B Plan Area – 2025 and 2040

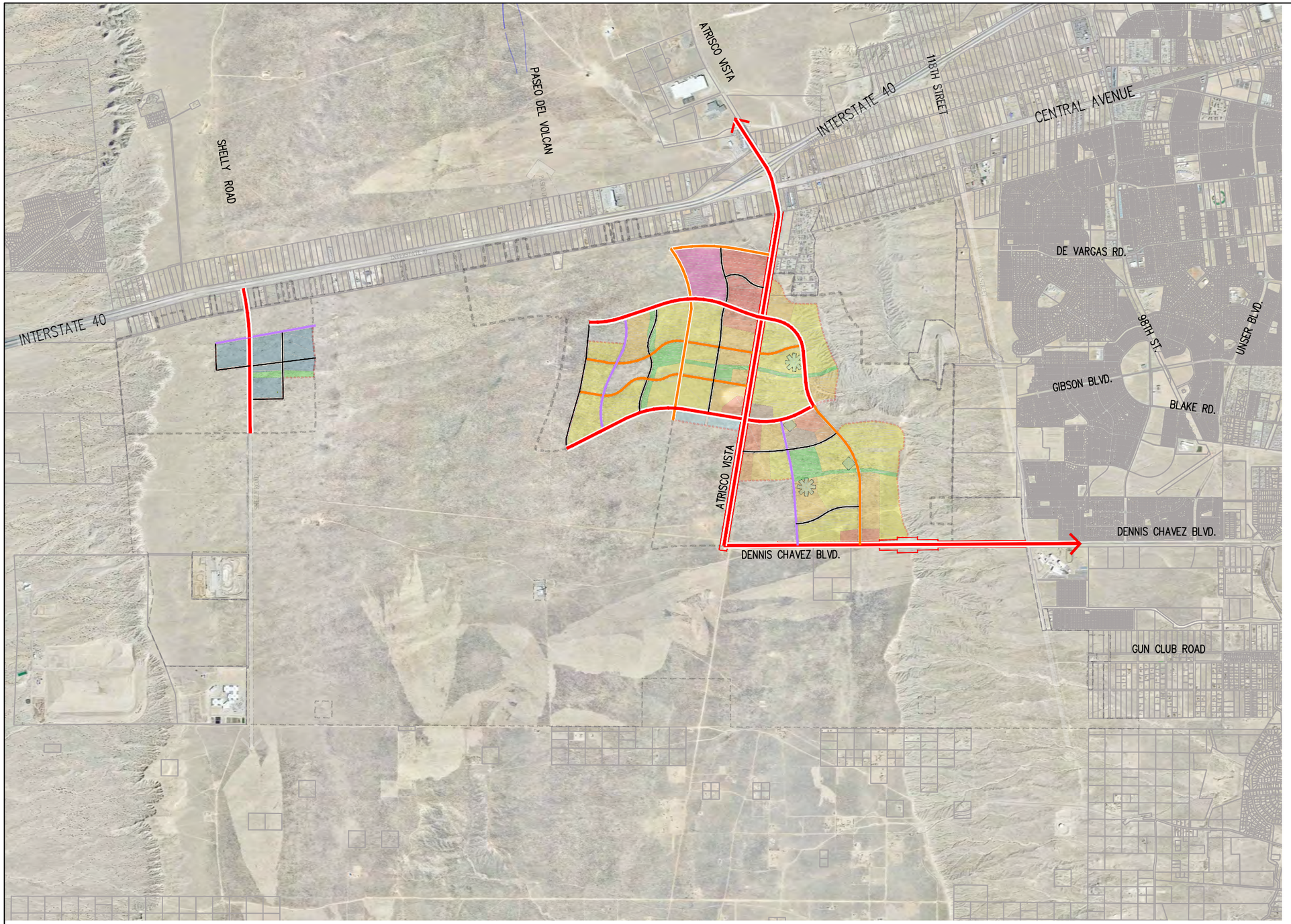
2025	Total	Residential					Non-Residential			
Area	**Acres**	**Acreage**	**SFH**	**MFH**	**Population**	**DU's/Acre**	**Acreage**	**Employment SF**	**Ave FAR**	**Jobs**
Verde	800.4	672.5	3,730	654	10,832	6.52	127.9	911,624	0.16	3,177
Amarillo	161.6	131.4	737	0	1,820	5.61	30.2	203,599	0.15	758
Oro	204.2	191.0	1,080	0	2,669	5.65	13.2	103,499	0.18	290
Industrial & Business Park	148.5	0.0	0	0	0	0.00	148.5	1,034,986	0.16	1,455
Town Center	82.2	0.0	0	*	*	0.00	82.2	715,691	0.20	1,789
Urban Center	40.0	0.0	0	0	0	0.00	40.0	209,088	0.12	1,208
Total - 2025	**1,436.9**	**994.9**	**5,547**	**654**	**15,321**	**6.23**	**442.0**	**3,178,486**	**0.17**	**8,677**
2040		**Residential**					**Non-Residential**			
Area	**Acres**	**Acreage**	**SFH**	**MFH**	**Population**	**DU's/Acre**	**Acreage**	**Employment SF**	**Ave FAR**	**Jobs**
Verde	889.3	761.4	4,174	654	11,930	6.34	127.9	911,624	0.16	3,177
Amarillo	369.7	326.0	1,969	0	4,860	6.04	43.7	309,450	0.16	1,046
Oro	340.0	297.4	1,806	314	5,236	7.13	42.6	296,121	0.16	1,052
Industrial & Business Park	670.9	0.0	0	0	0	0.00	670.9	4,675,905	0.16	6,580
Town Center	285.2	0.0	0	*	*	0.00	285.2	2,484,662	0.20	6,212
Urban Center	270.9	26.3	0	526	1,299	20.00	244.6	1,452,900	0.14	6,945
Business Park	194.8	0.0	0	0	0	0.00	194.8	2,036,517	0.24	6,444
Total - 2040	**3,020.8**	**1,411.1**	**7,949**	**1,494**	**23,325**	**6.69**	**1,609.7**	**12,167,179**	**0.17**	**31,456**
* - Town Center modified to allow mixed use residential development. Overall Master Plan DU cap level is maintained.										

Table 3 above lists the land use assumptions developed by Western Albuquerque Land Holdings anticipated to occur by 2040 for this first Level B Plan area, as incorporated in the Level B travel demand model. The dwelling units were developed using proposed zoning per area consistent with the approved Level A Master Plan. The employment was broken into the job categories used in the regional travel demand model based on the regional control totals, mixed use assumptions, anticipated floor-to-area ratio (FAR), and estimates of square footage required per employee.

The values above may differ from others presented as they were developed consistent with the methodology used to develop the inputs to the travel demand model. Further discussion of these calculations is included in Technical Appendix T – 1, Travel Demand Model Socioeconomic Forecast.

Figure 11 and Figure 12 show the location of the land uses identified in Table 3.

It is important to note for the 2025 and 2040 Santolina Level B transportation analyses, regional control totals of population and employment were held constant to MRCOG forecasts in order to maintain consistency with adopted forecasts and policy. This results in the total amount of population and number of jobs in the MRCOG planning area for the Santolina 2025 and 2040 analysis is identical to that used in the MRCOG 2040 MTP 2025 and 2040 analyses. In addition, the type of employment, as defined in the MRCOG regional travel demand model (basic, service or retail), was also held constant for the region as that projected by MRCOG in 2025 and 2040. Furthermore, only future growth of employment and population was reassigned to Santolina. No existing population or employment in the Albuquerque Metropolitan Planning Area was reassigned to Santolina in the development of the future socioeconomic forecast for Santolina. All forecast Santolina 2025 and 2040 population and employment can be accommodated within the regional growth forecast by MRCOG. This allows the proposed Santolina Level B Transportation Master Plan analysis results to be directly compared to the and 2040 MTP 2025 and 2040 results.



SANTOLINA

LEVEL B

LEGEND

- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ELEMENTARY SCHOOL
- URBAN VILLAGE/ PRIMARY EDUCATION CAMPUS
- URBAN VILLAGE/ SECONDARY EDUCATION CAMPUS
- PUBLIC SAFETY FACILITY
- COMMERCIAL
- TOWN CENTER
- OFFICE
- ENERGY PARK
- PARKS AND INTERNAL OPEN SPACE
- OPEN SPACE (ESCARPMENT)
- PRINCIPAL – 2-3 LANES EACH DIRECTION*
- MINOR – 2-3 LANES EACH DIRECTION*
- COLLECTOR– 1-2 LANES EACH DIRECTION*
- LOCAL– 1-2 LANES EACH DIRECTION*
- SCHOOL
- PUBLIC SAFETY FACILITY

NORTH

LEVEL B LAND USE AND ABSORPTION 2025

FIGURE 11

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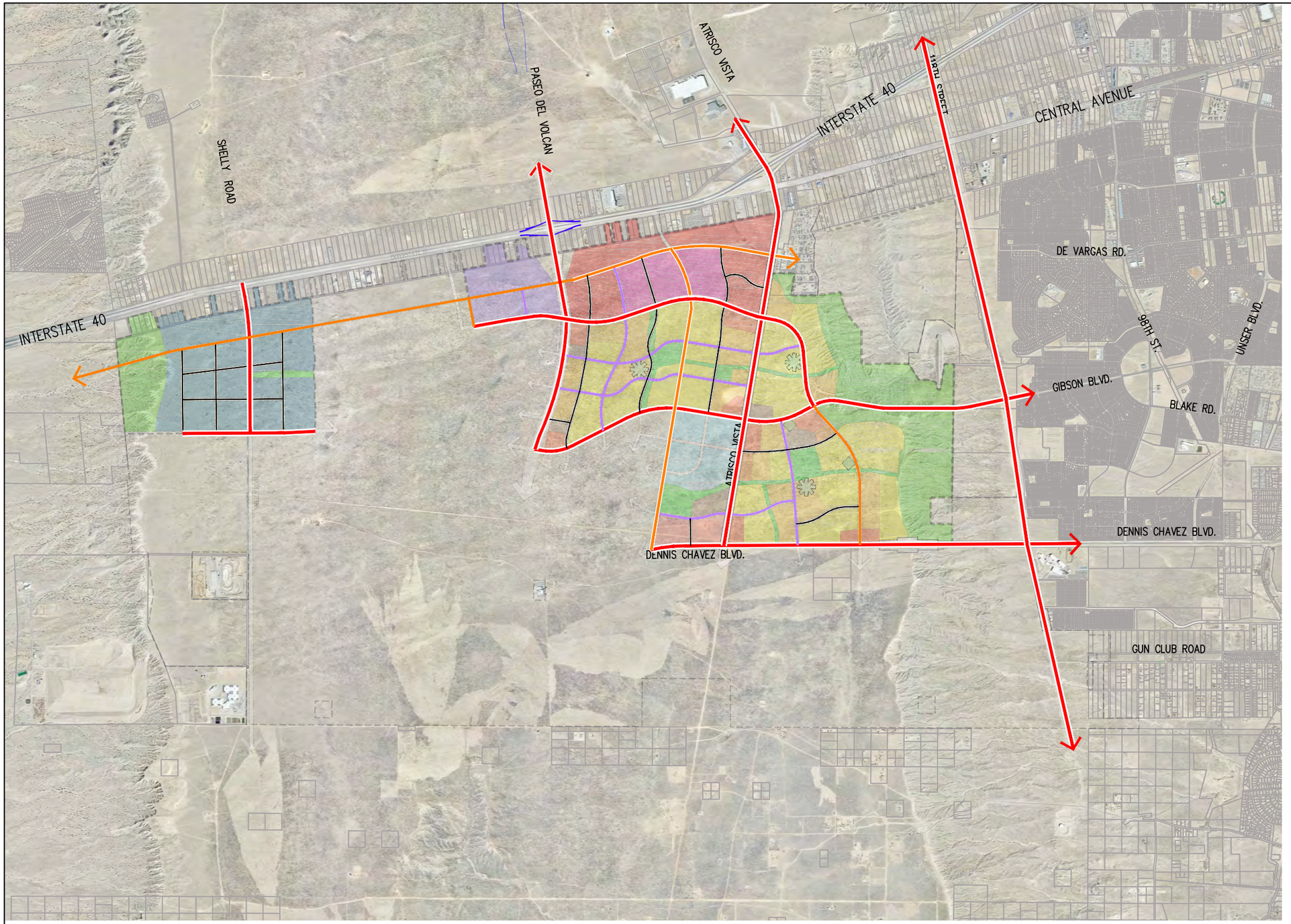

SANTOLINA

LEVEL B

LEGEND

- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ELEMENTARY SCHOOL
- URBAN CENTER/ PRIMARY EDUCATION CAMPUS
- URBAN CENTER/ SECONDARY EDUCATION CAMPUS
- PUBLIC SAFETY FACILITY
- COMMERCIAL
- TOWN CENTER
- URBAN CENTER/ HIGH DENSITY RESIDENTIAL
- URBAN CENTER/ COMMERCIAL
- OFFICE
- BUSINESS PARK
- INDUSTRIAL AND BUSINESS PARK
- PARKS AND INTERNAL OPEN SPACE
- OPEN SPACE (ESCARPMENT)
- PRINCIPAL – 2-3 LANES EACH DIRECTION*
- MINOR – 2-3 LANES EACH DIRECTION*
- COLLECTOR– 1-2 LANES EACH DIRECTION*
- LOCAL– 1-2 LANES EACH DIRECTION*
- SCHOOL
- PUBLIC SAFETY FACILITY

NORTH

LEVEL B LAND USE AND ABSORPTION 2040

FIGURE 12

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B. TRAFFIC VOLUME PROJECTIONS

Travel demand model projections were developed for 2025 and 2040 for the Level B plan area, utilizing the MRCOG's Cube model, as was done for the original and Updated Level A Transportation Master Plan Technical Report. These models incorporated the anticipated level of development in Santolina discussed above, combined with the MRCOG 2025 and 2040 roadway networks, modified to include the anticipated Santolina road network. Although the MRCOG did not publish an official 2025 travel demand forecast, they did prepare a 2025 socioeconomic forecast and roadway network. The 2025 MTP forecast presented herein was run using the MRCOG socioeconomic and roadway network forecasts and the MRCOG Cube model, but was not prepared by MRCOG.

The figures on the following pages present the results of the travel demand modeling performed for 2025 and 2040 for the Santolina Level B plan area. Roadway functional classification as defined for the MRCOG Cube regional travel demand model database requirements, modeled number of lane and travel speed, average daily traffic, peak hour traffic, and volume-to-capacity ratio (a surrogate for level of service) are included.

It can be seen from Figure 19 and Figure 20, within the Level B plan area the 2025 volume-to-capacity ratio does not exceed 0.9, indicating generally accepted levels of service. Isolated locations near the Level B plan area do exceed 1.0 (Atrisco Vista ramps with I-40), and these locations will be areas of interest for future evaluation during Level C and site planning evaluations, and mitigated as required. Off-site impacts will be discussed more in Section IV, Off-Site Roadway Effects, beginning on page 39.

Figure 27 and Figure 28 indicate that in 2040, additional intersections within Santolina will begin to have increased congestion, primarily located at key principal arterial intersections within the Level B plan area, such as Dennis Chavez and the Loop Road, Atrisco Vista and Gibson, 118th Street and Gibson and 118th Street and Dennis Chavez, as well as the Atrisco Vista and future Paseo del Volcan ramps with I-40. Some of this congestion is due to limiting the off-site roadways to the number of lanes anticipated by MRCOG. Along 118th Street for example is just 1-lane in each direction in the MRCOG model. It will need to be widened to accommodate Santolina traffic, and will be evaluated in future studies. Others, such as the Paseo del Volcan ramps, will be studied during the evaluation of the interchange as required by NMDOT guidelines and procedures. All intersections will be evaluated in future Level C analyses as detailed land use development proposals are brought forward for review.

The 2040 travel demand model includes all anticipated development within Santolina by 2040. This anticipated development not only includes the initial Level B plan area, but also future development within Santolina anticipated to occur by 2040 in subsequent Level B submittals. It was considered appropriate to evaluate all development expected to occur by 2040 in order to develop a full understanding of future road network requirements.

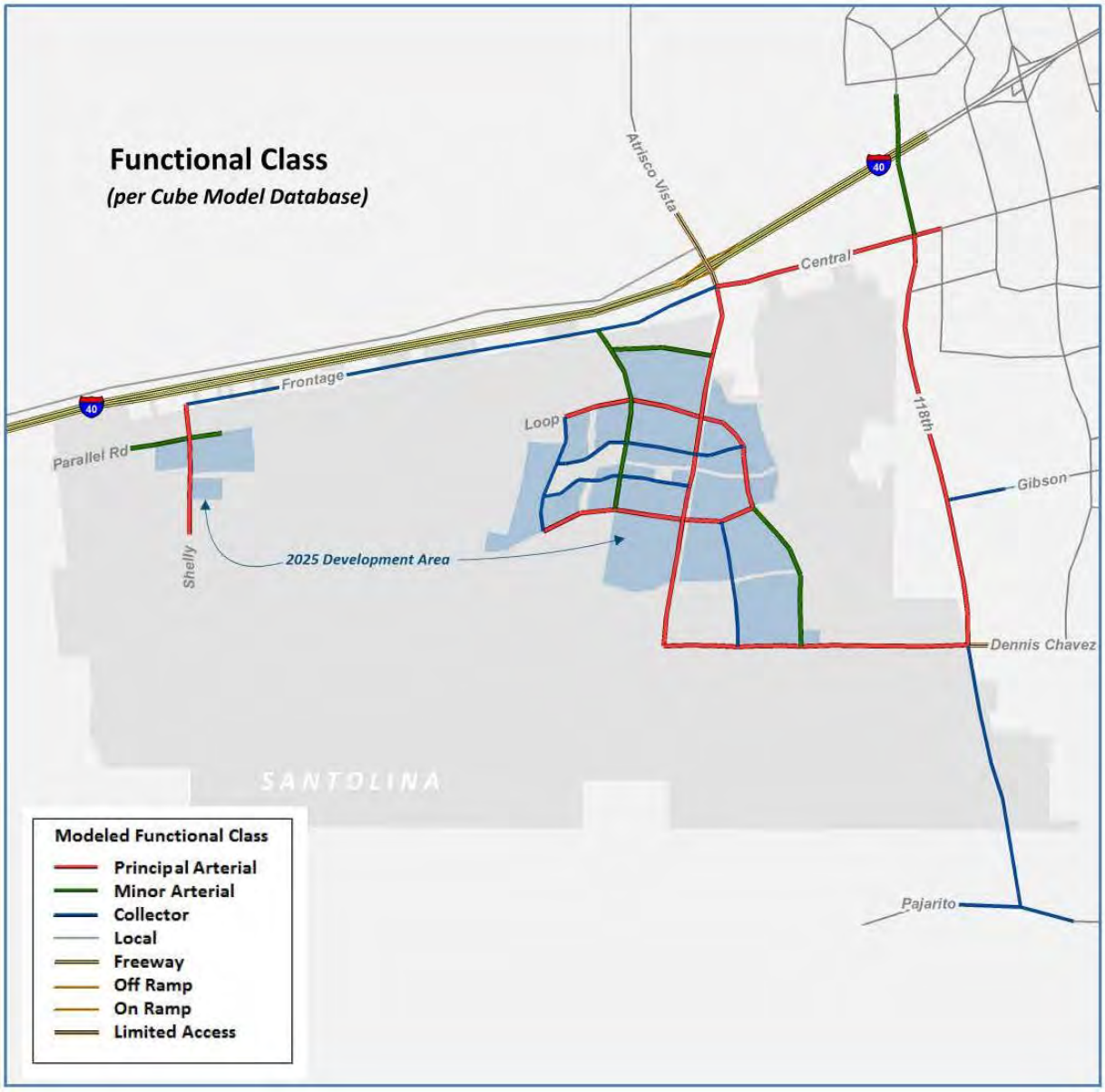


Figure 13 – Functional Classification – 2025

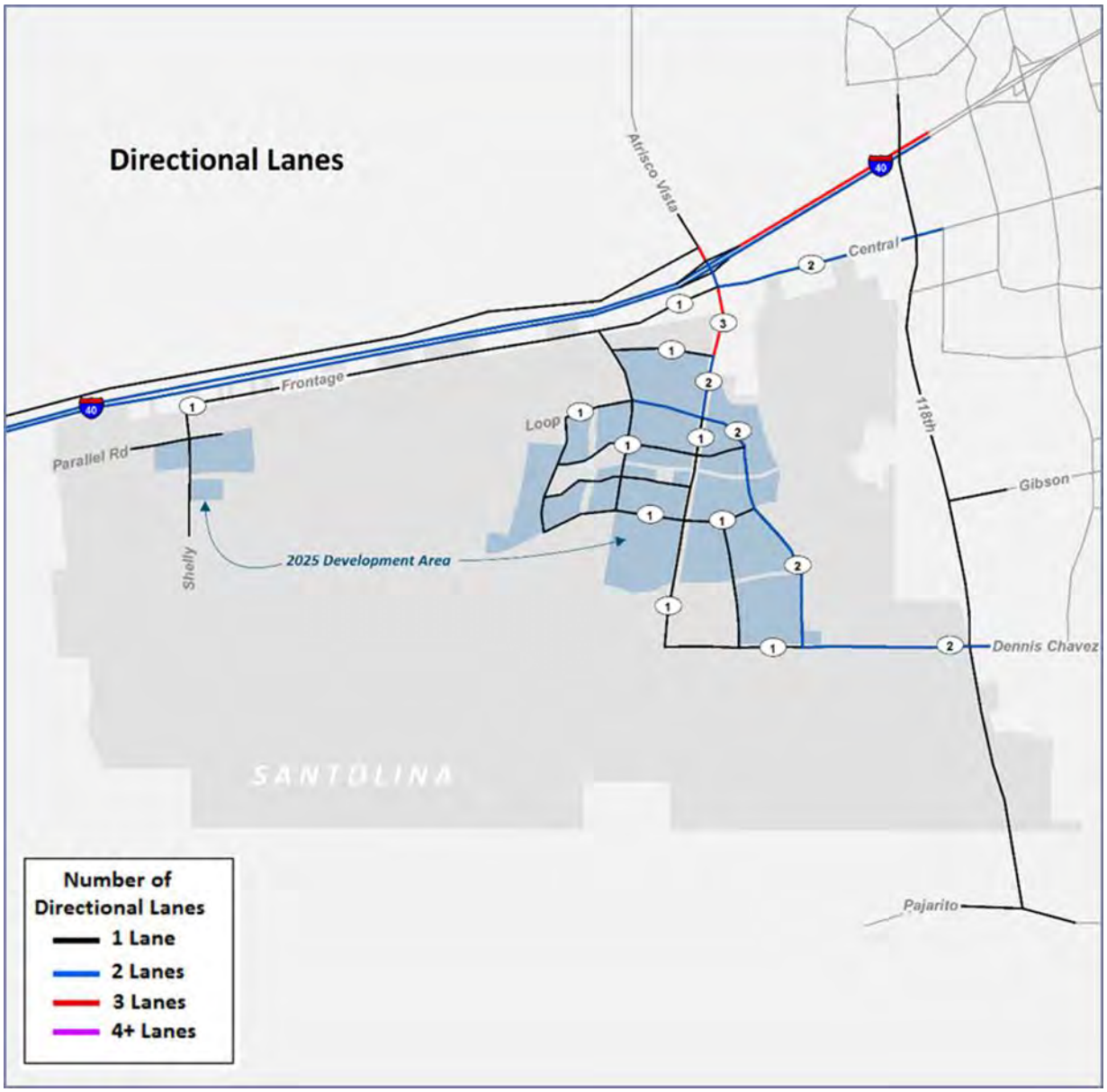


Figure 14 – Modeled Number of Lanes – 2025

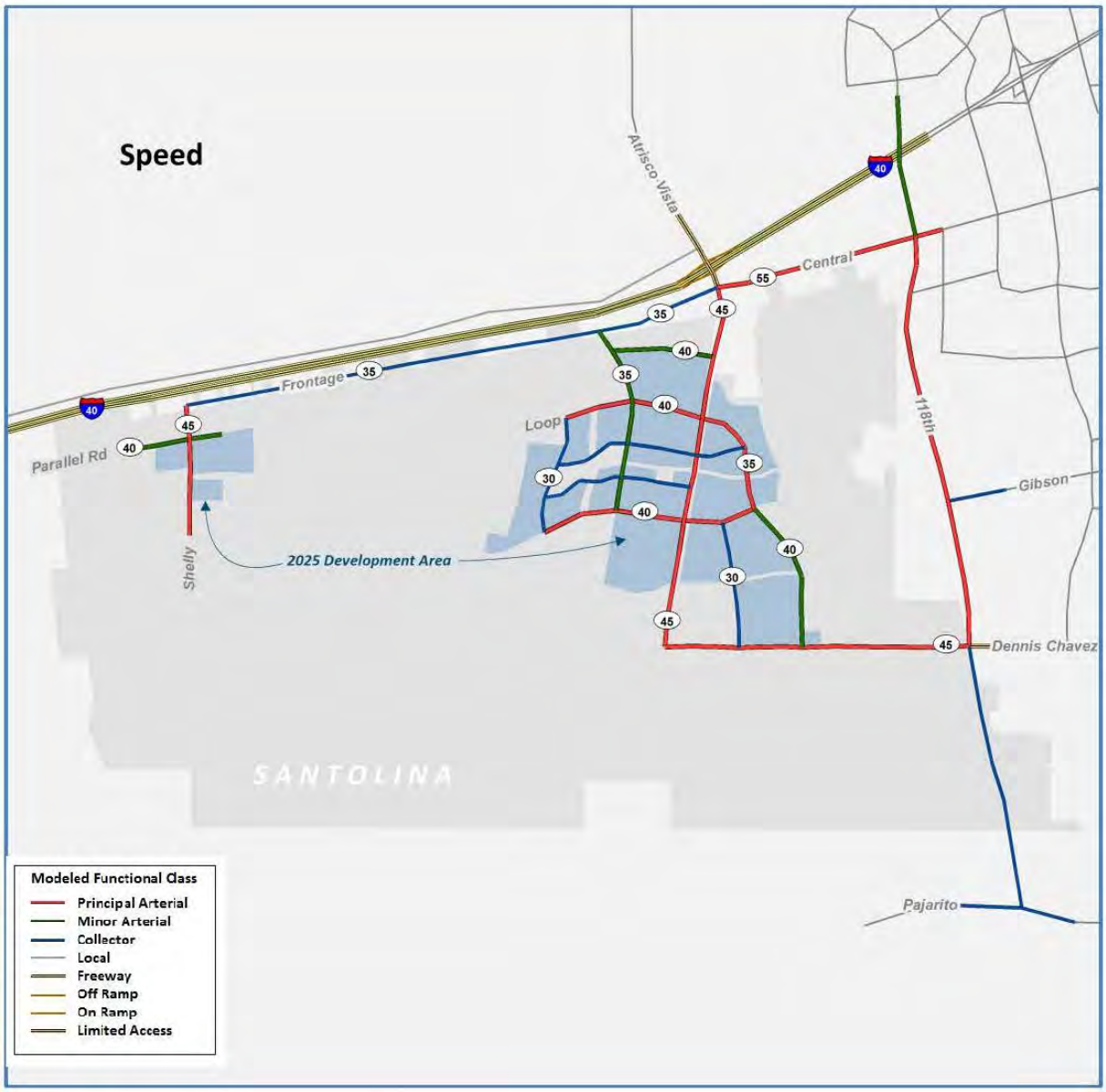


Figure 15 – Modeled Travel Speed – 2025

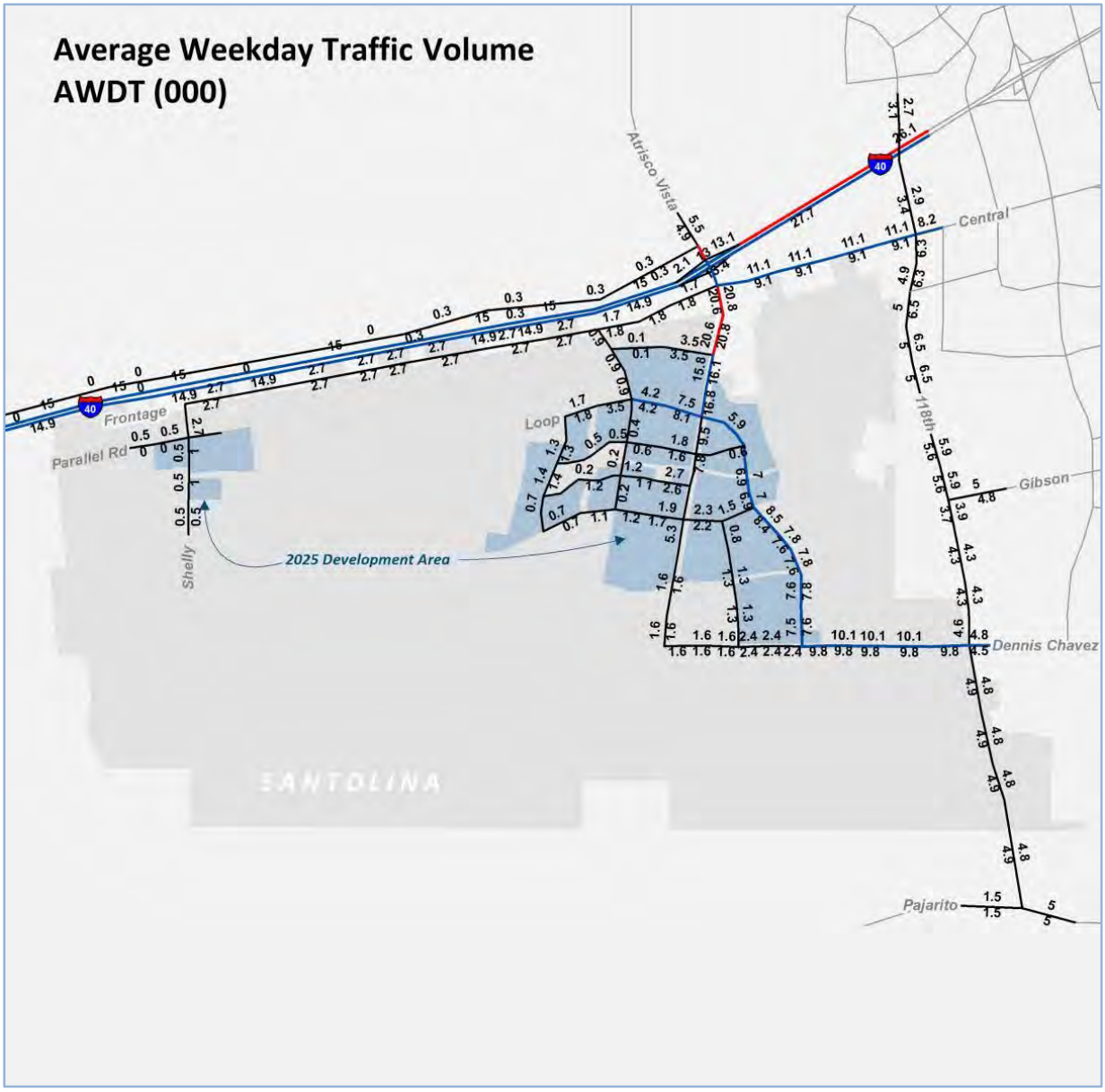


Figure 16 – Average Daily Traffic in 1,000's (Directional) – 2025

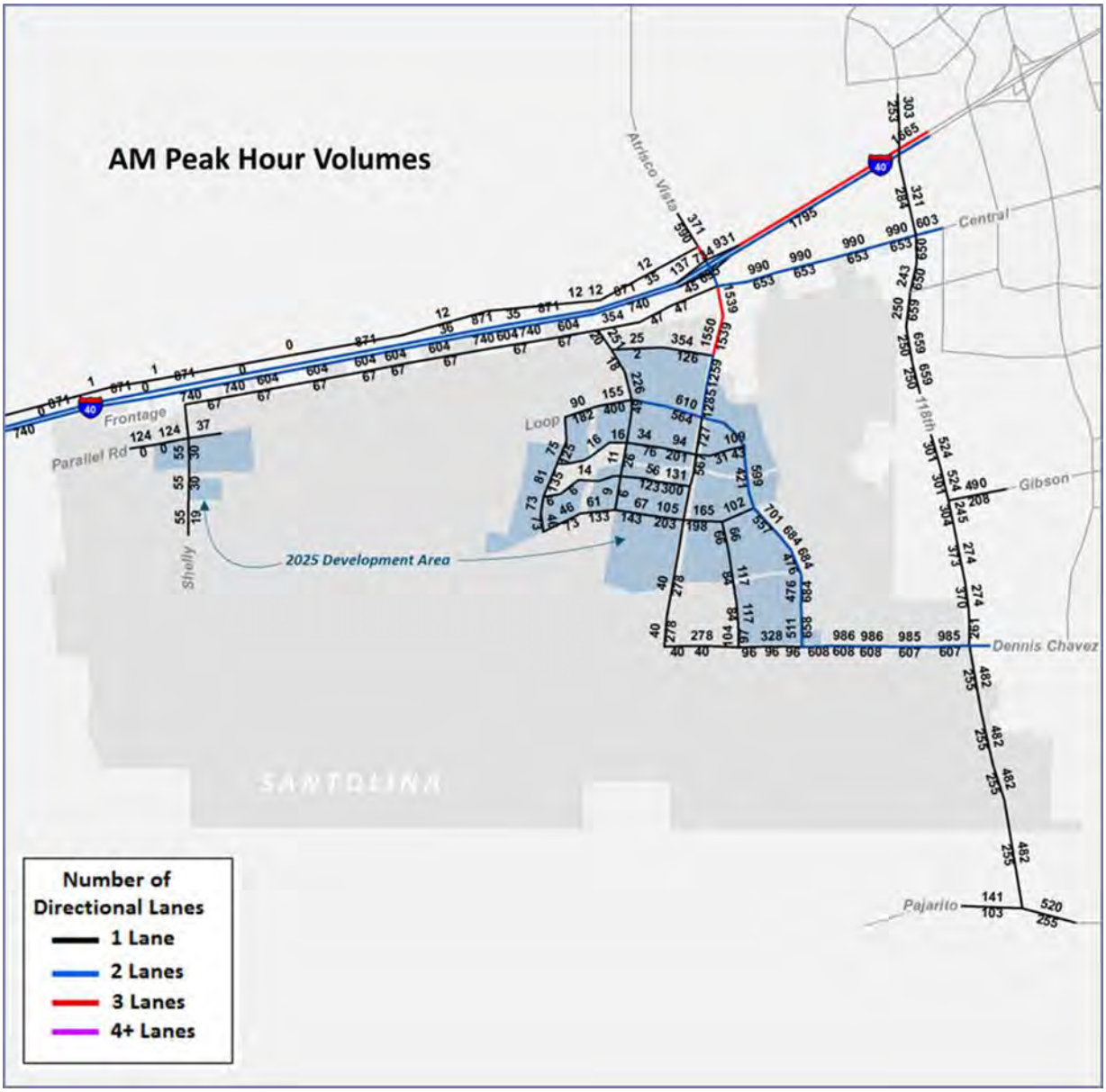


Figure 17 – Traffic Volume AM Peak Hour – 2025

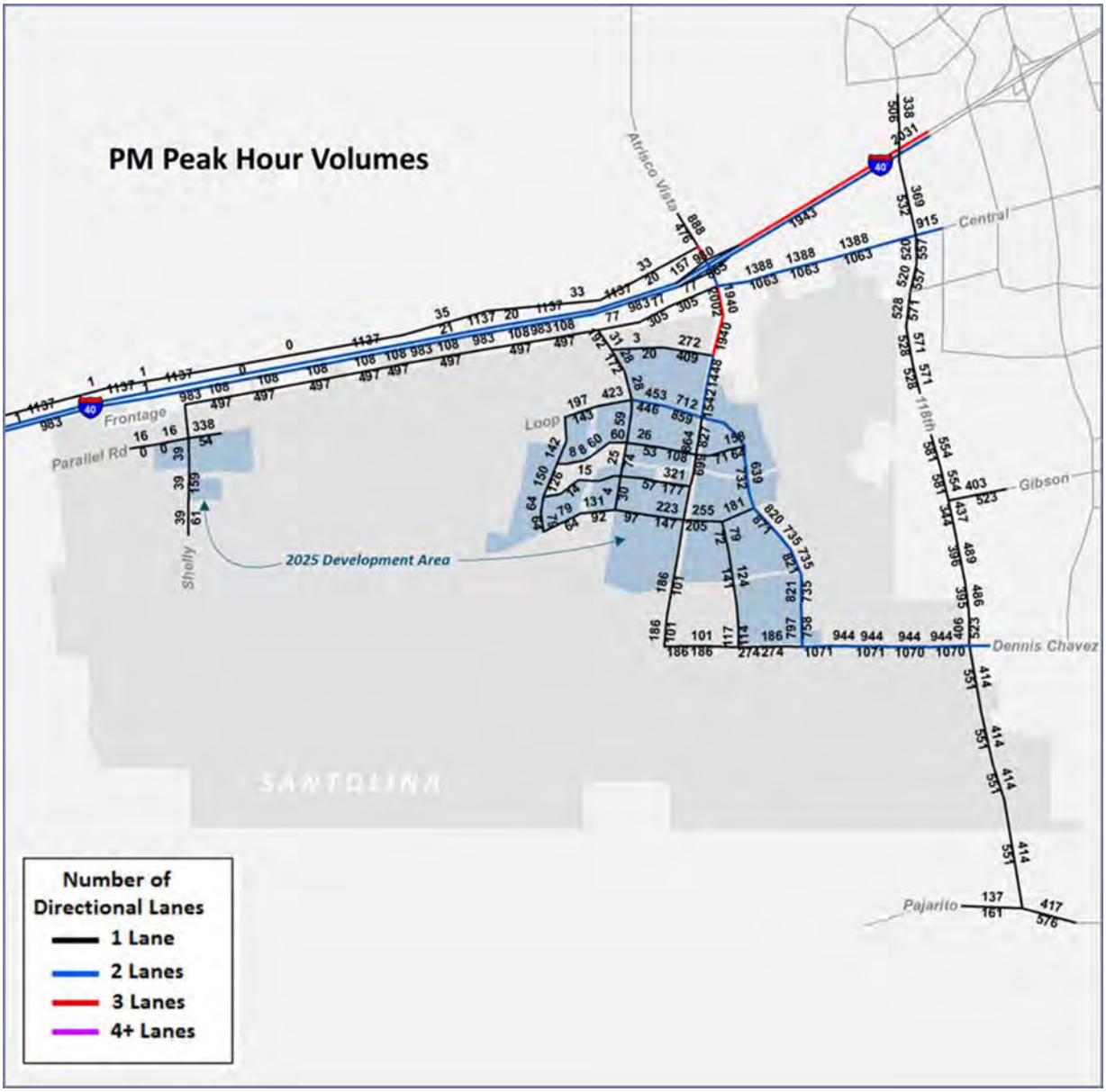


Figure 18 – Traffic Volume PM Peak Hour – 2025

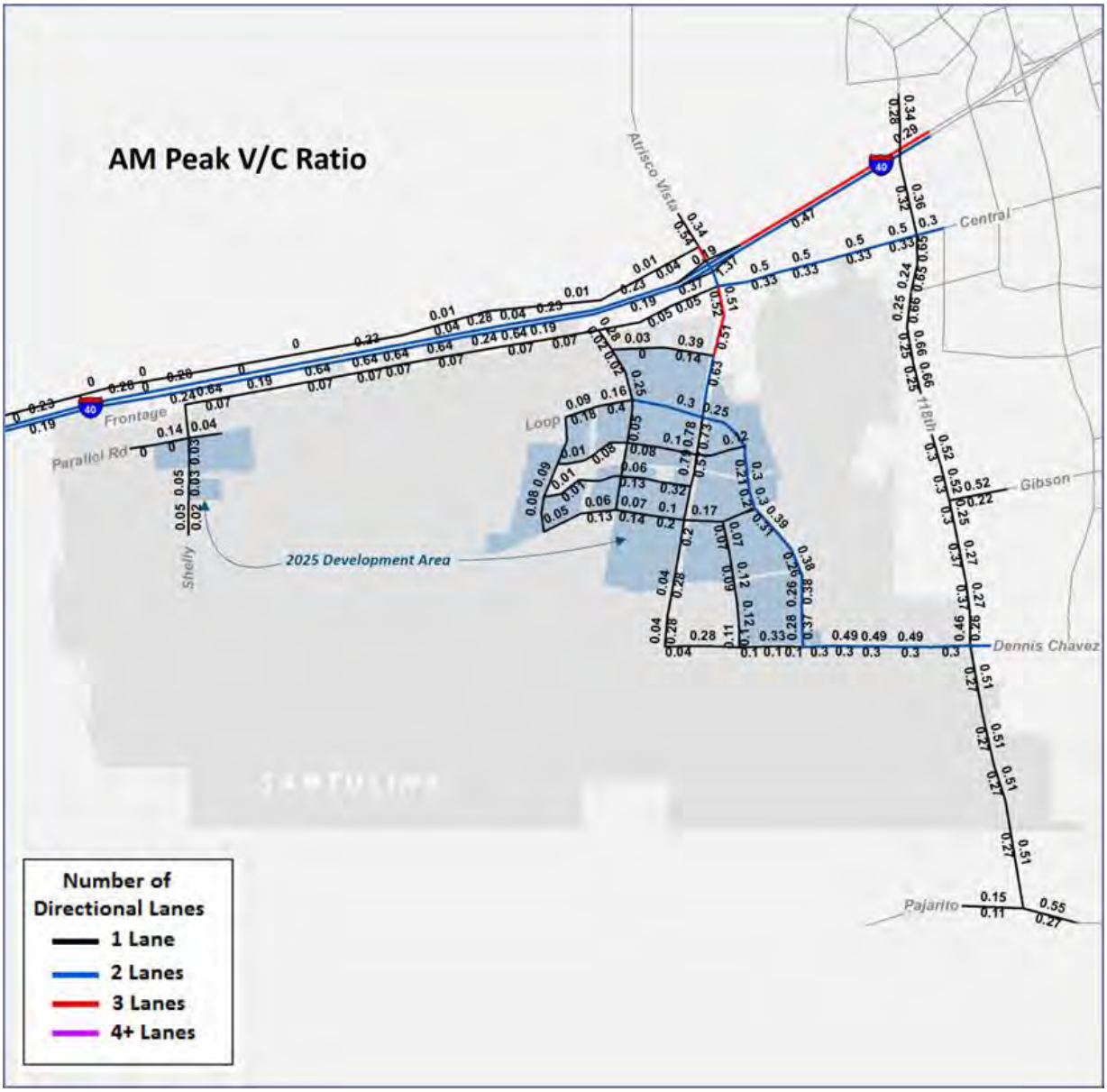


Figure 19 – Forecast Traffic Volume to Capacity Ratio AM Peak Hour – 2025

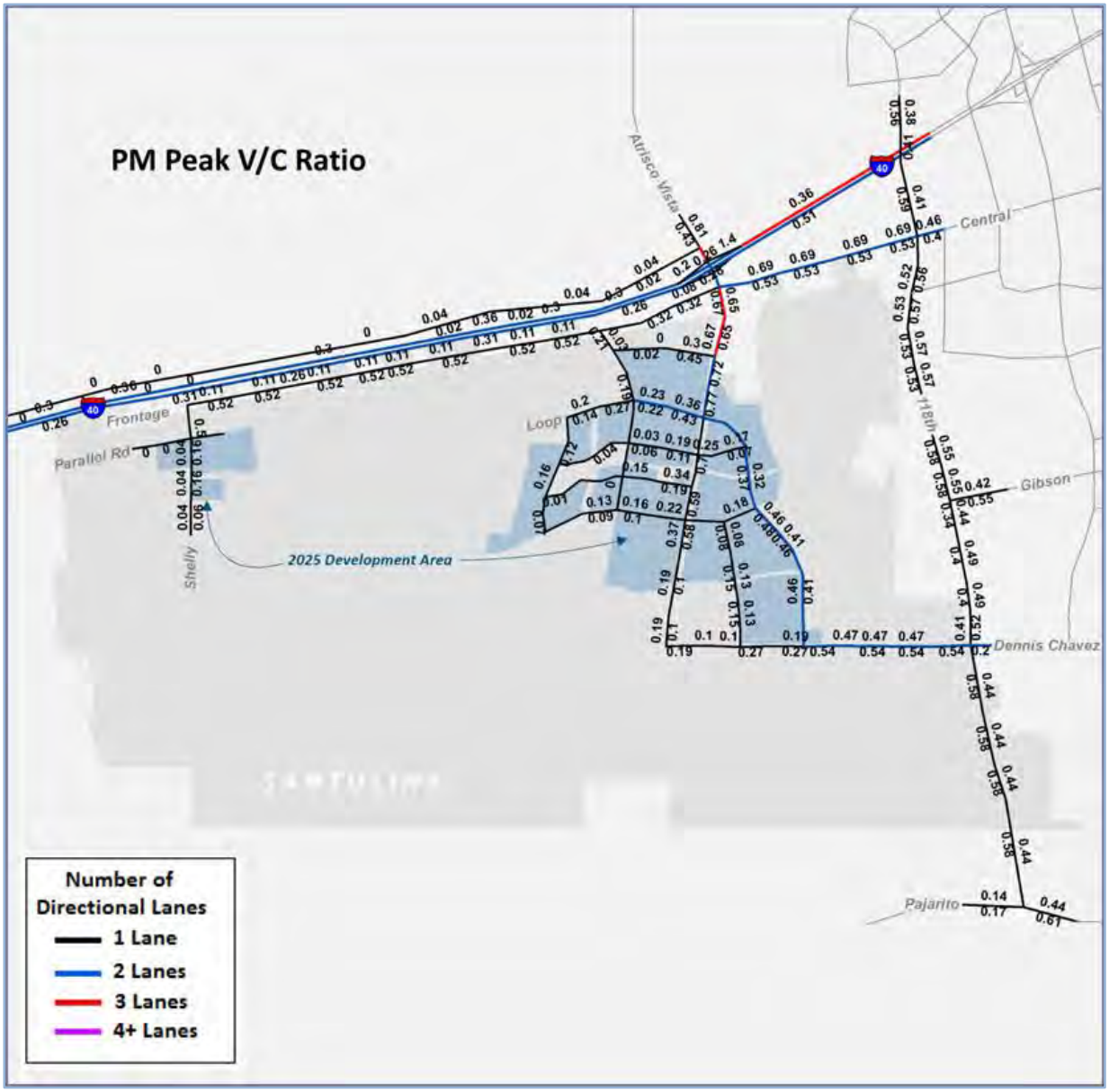


Figure 20 – Forecast Traffic Volume to Capacity Ratio PM Peak Hour – 2025

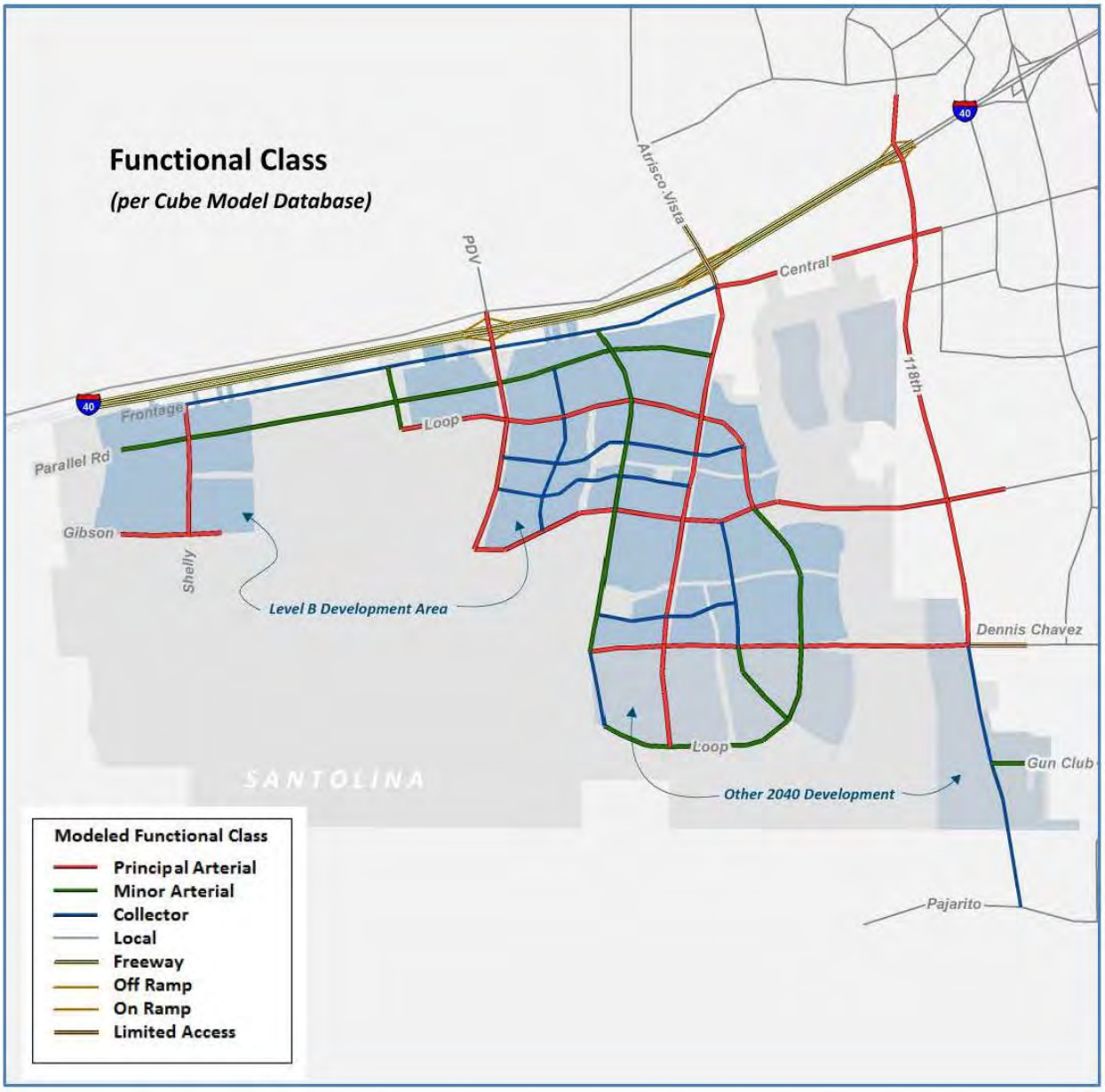


Figure 21 – Functional Classification – 2040

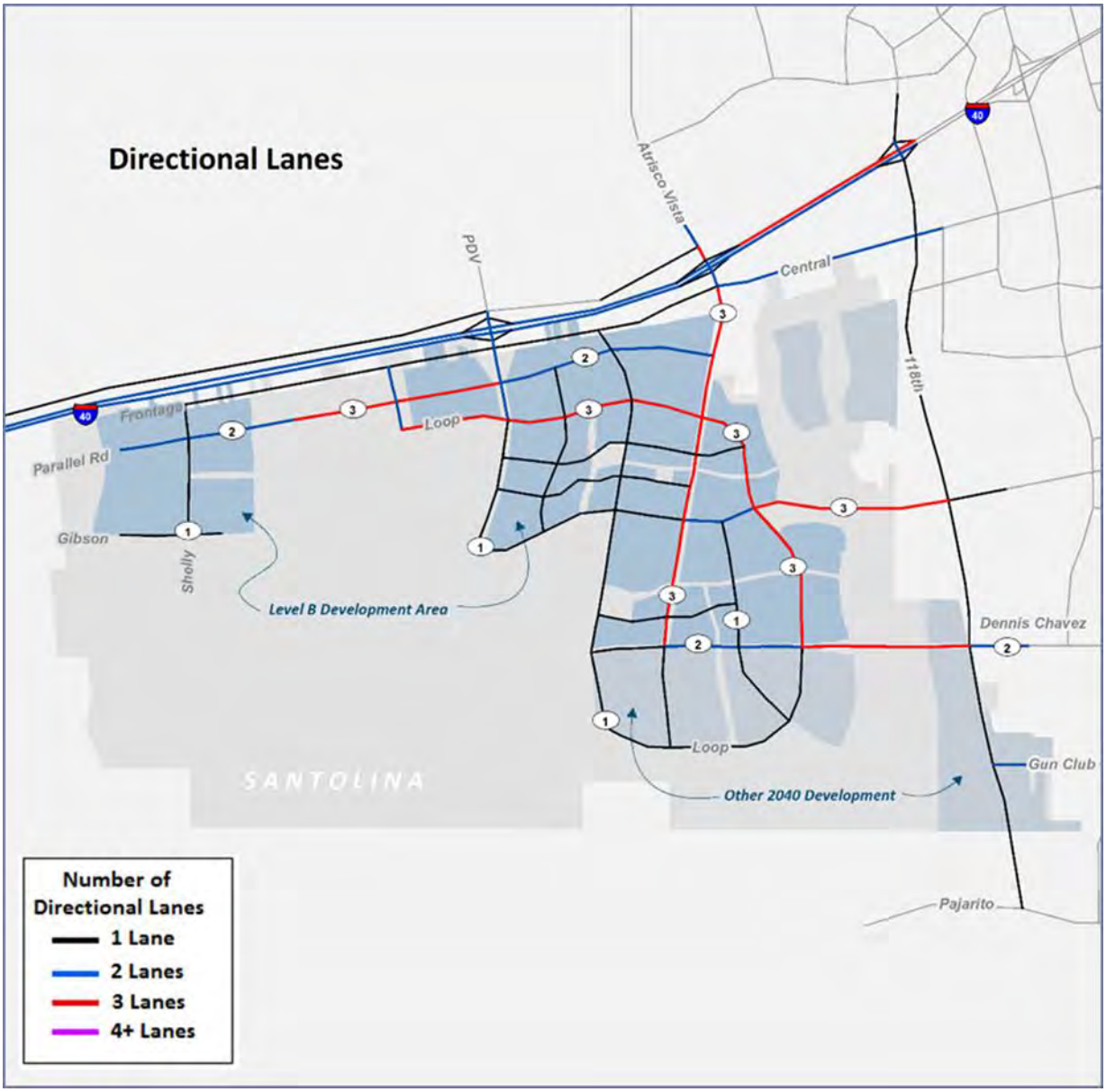


Figure 22 – Modeled Number of Lanes – 2040

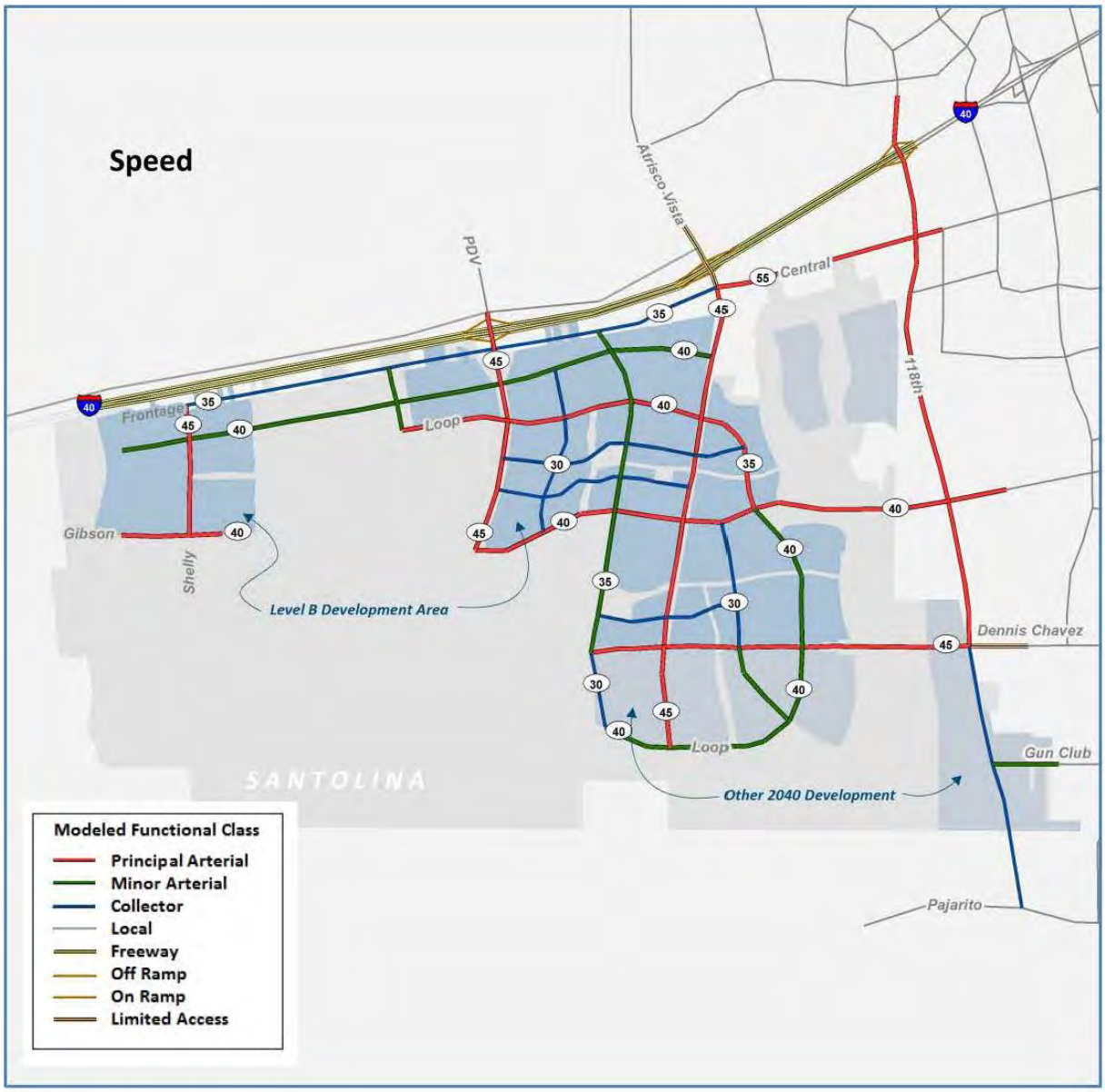


Figure 23 – Modeled Travel Speed – 2040

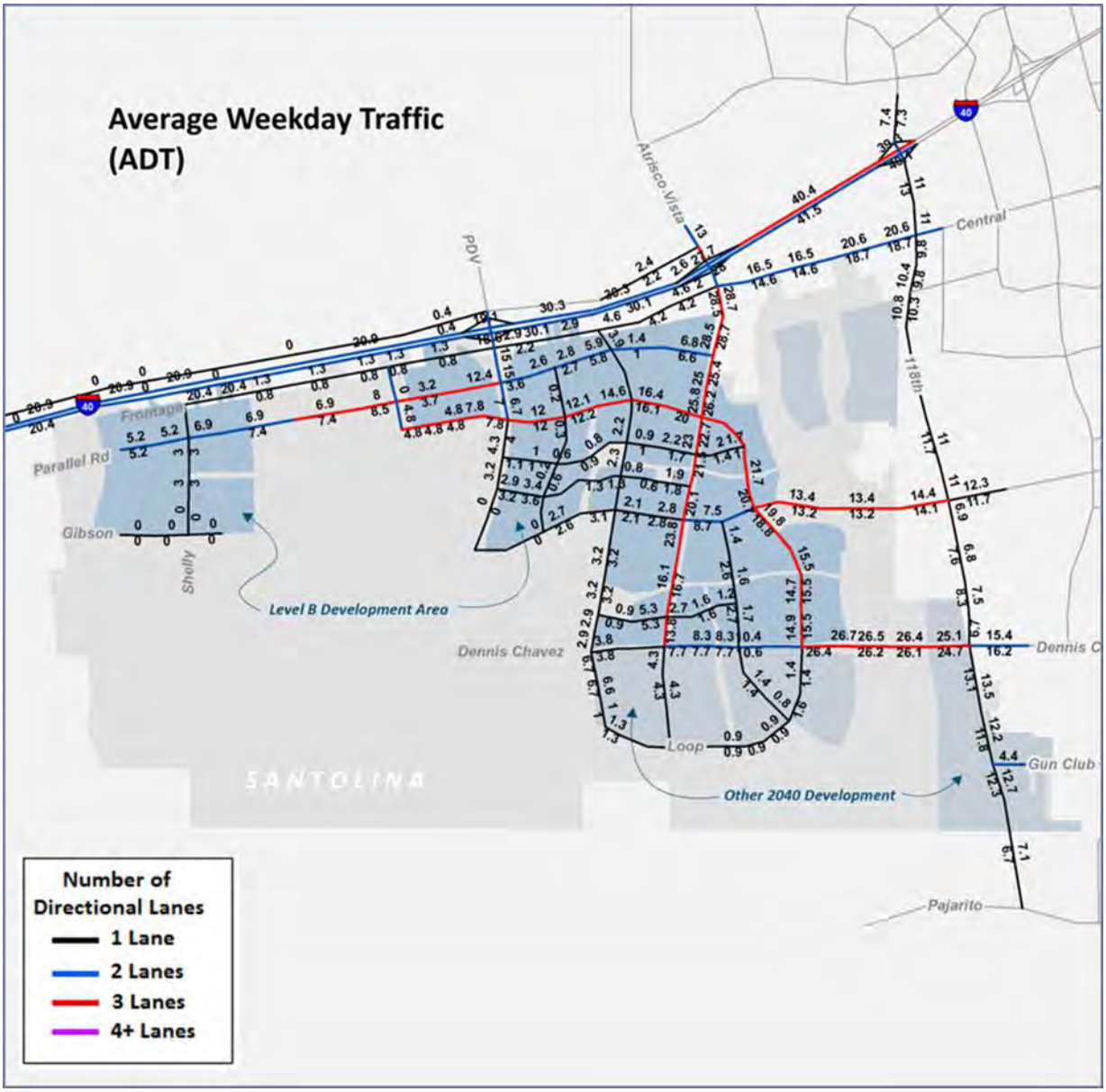


Figure 24 – Average Daily Traffic in 1,000's (Directional) – 2040

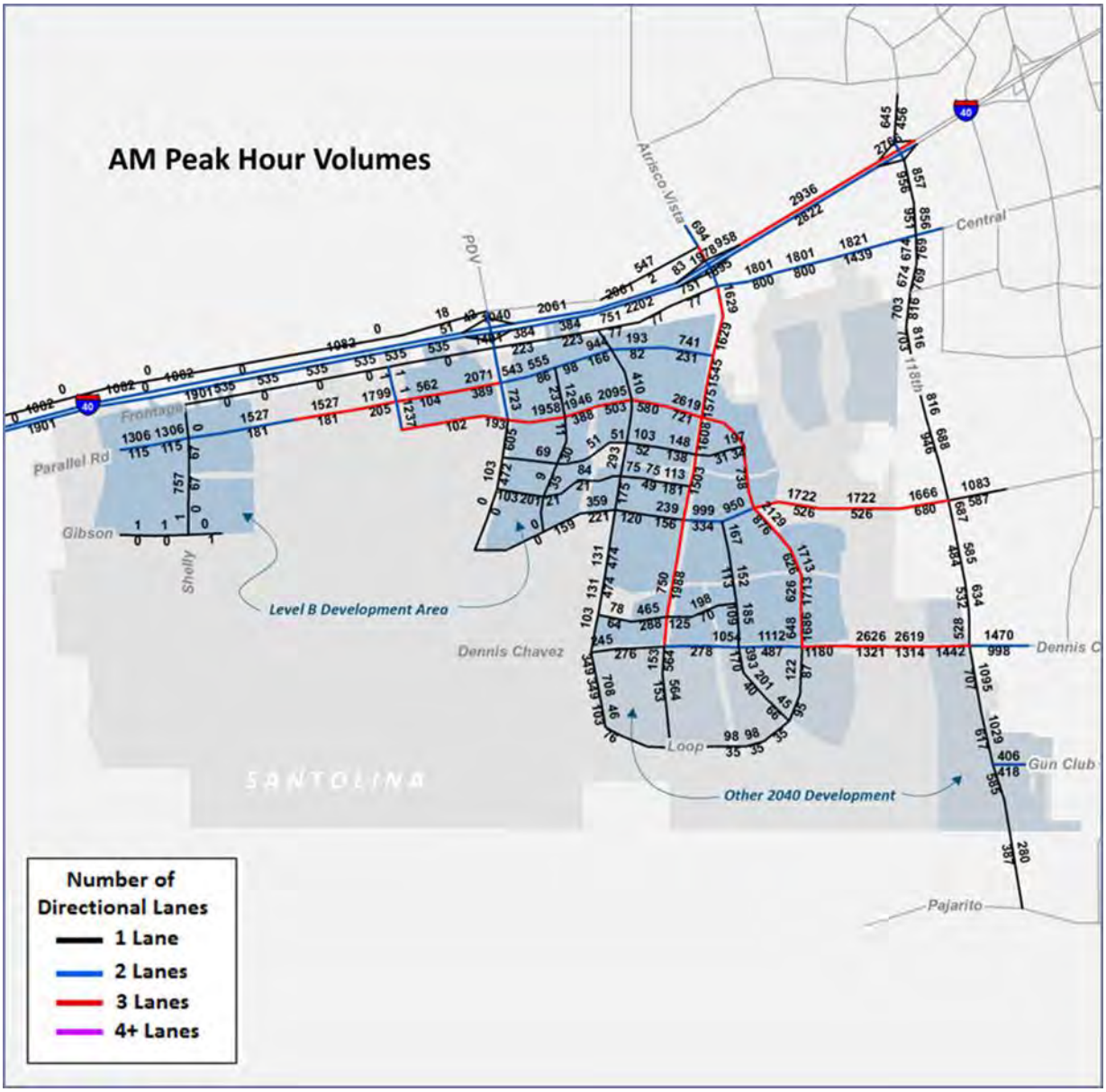


Figure 25 – Traffic Volume AM Peak Hour – 2040

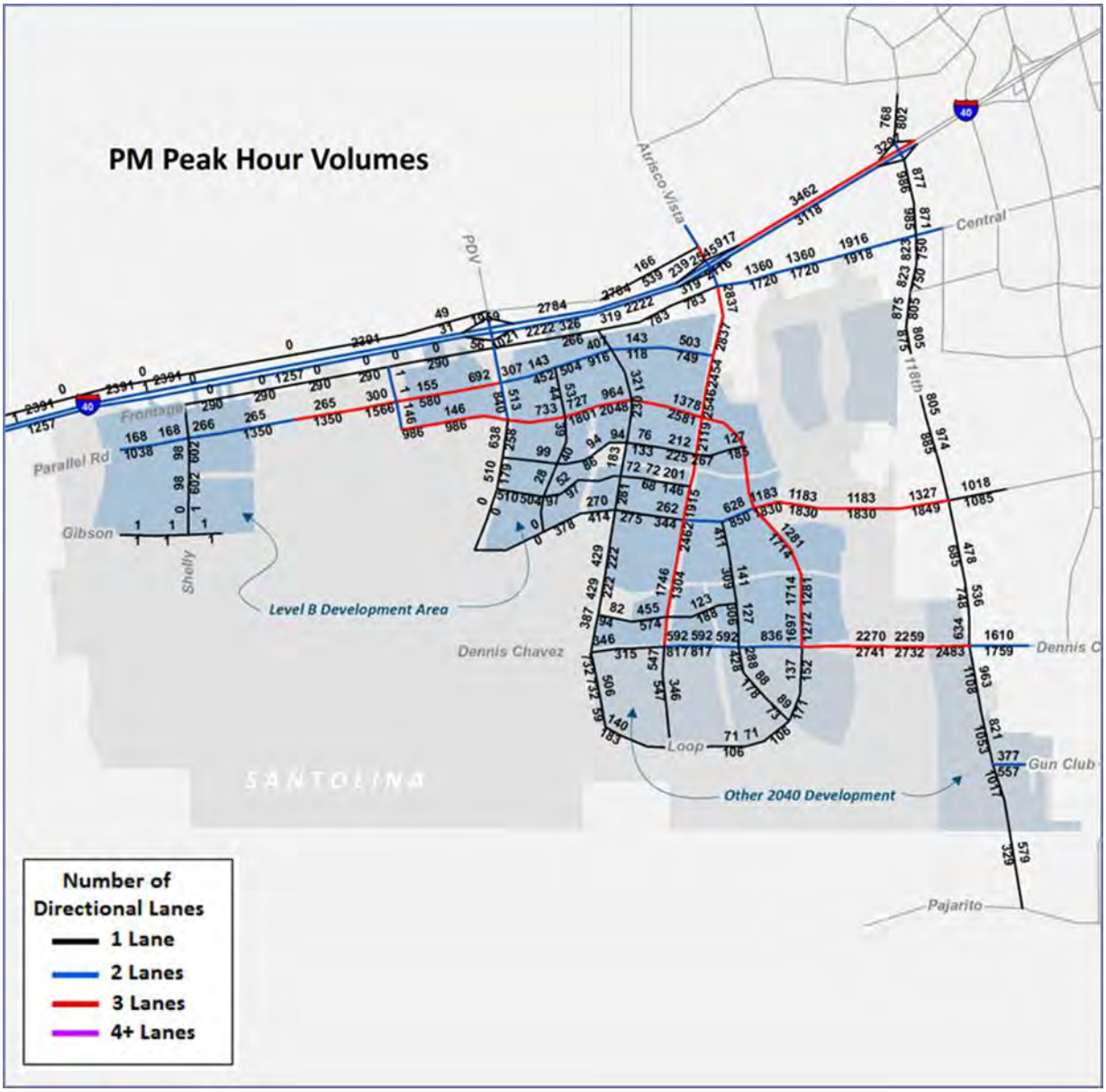


Figure 26 – Traffic Volume PM Peak Hour – 2040

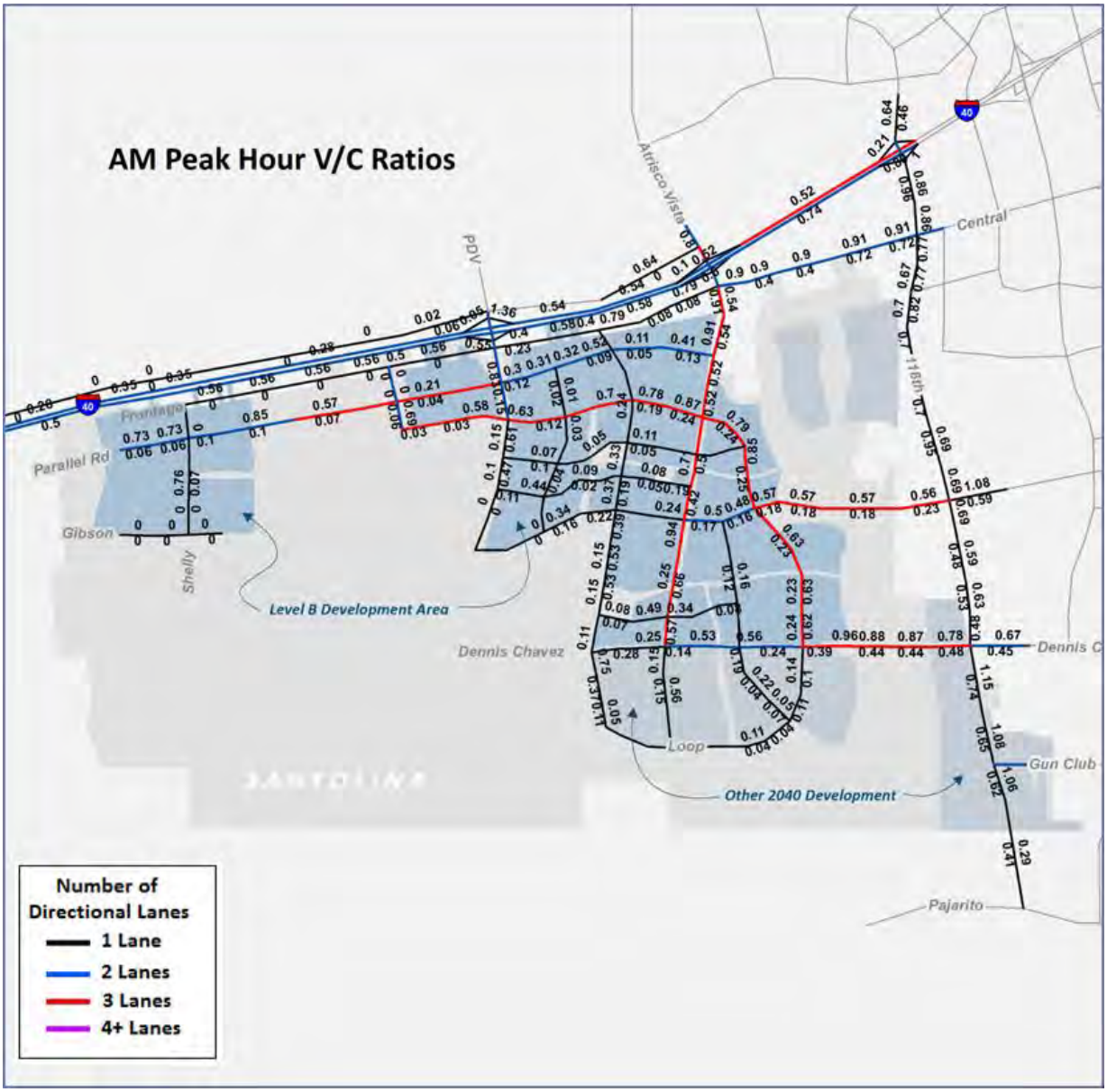


Figure 27 – Forecast Traffic Volume to Capacity Ratio AM Peak Hour – 2040

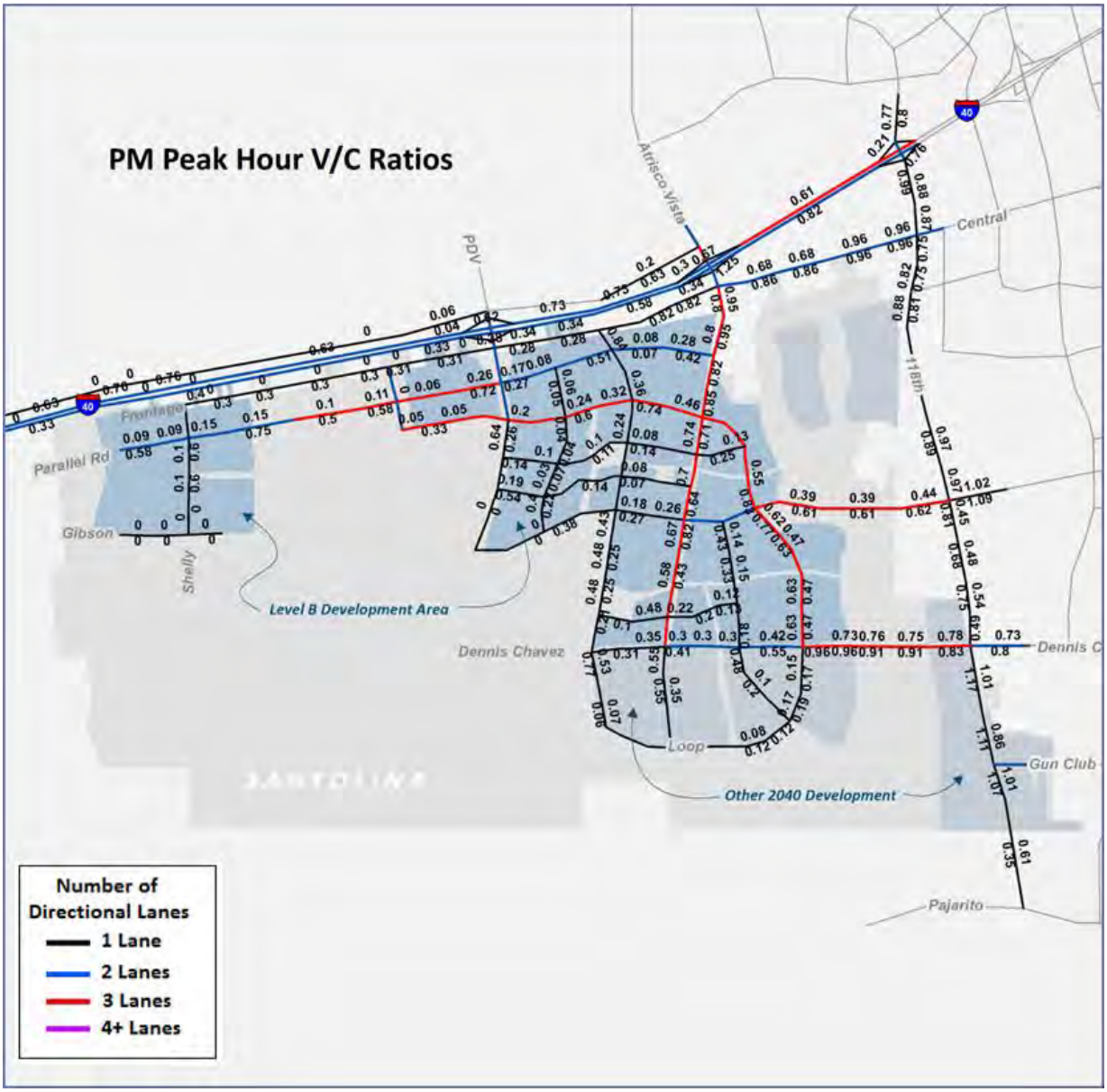


Figure 28 – Forecast Traffic Volume to Capacity Ratio PM Peak Hour – 2040

IV. OFF-SITE ROADWAY EFFECTS

With the development of the Santolina Master Plan, there will be roadway effects both on-site (within the boundary of the Santolina Master Plan area), and off-site. Due to the large size of Santolina, and the high level of employment anticipated to occur within Santolina, it becomes challenging to accurately reflect the transportation impacts resulting from development.

For instance, due to the large employment centers in Santolina, a large number of counter-commute trips will be generated, resulting in more traffic traveling from east-to-west across the river in the morning, and from west-to-east in the evening.

These additional counter-commute trips will by definition increase the volume-to-capacity ratio on these roadways, yet will more effectively utilize existing infrastructure designed for the typical river crossing traffic. This provides an overall benefit to the existing transportation system by using under-utilized infrastructure, yet does result in impacts to the roadway system.

Therefore, the off-site roadway effects will be presented qualitatively in a regional perspective, in order to consider both the change in volume-to-capacity ratio, but also the overall effect on travel characteristics on the west side of Albuquerque.

A. COMPARISON WITH MRCOG 2040 MTP RESULTS

The following sections will present the comparisons of the volume-to-capacity ratio resulting from the Santolina Level B plan area travel demand model to that resulting from the MRCOG 2040 MTP travel demand model results. Key points will be discussed relative to the changes in volume-to-capacity ratio, as well as the implications of those changes on regional travel behavior. These comparisons will focus on the southwest quadrant of Albuquerque, from the river on the east and I-40 on the north, the primary area of impact resulting from development of Santolina, based on the current expected development patterns.

1. 2025 COMPARISON TO MRCOG 2040 MTP RESULTS

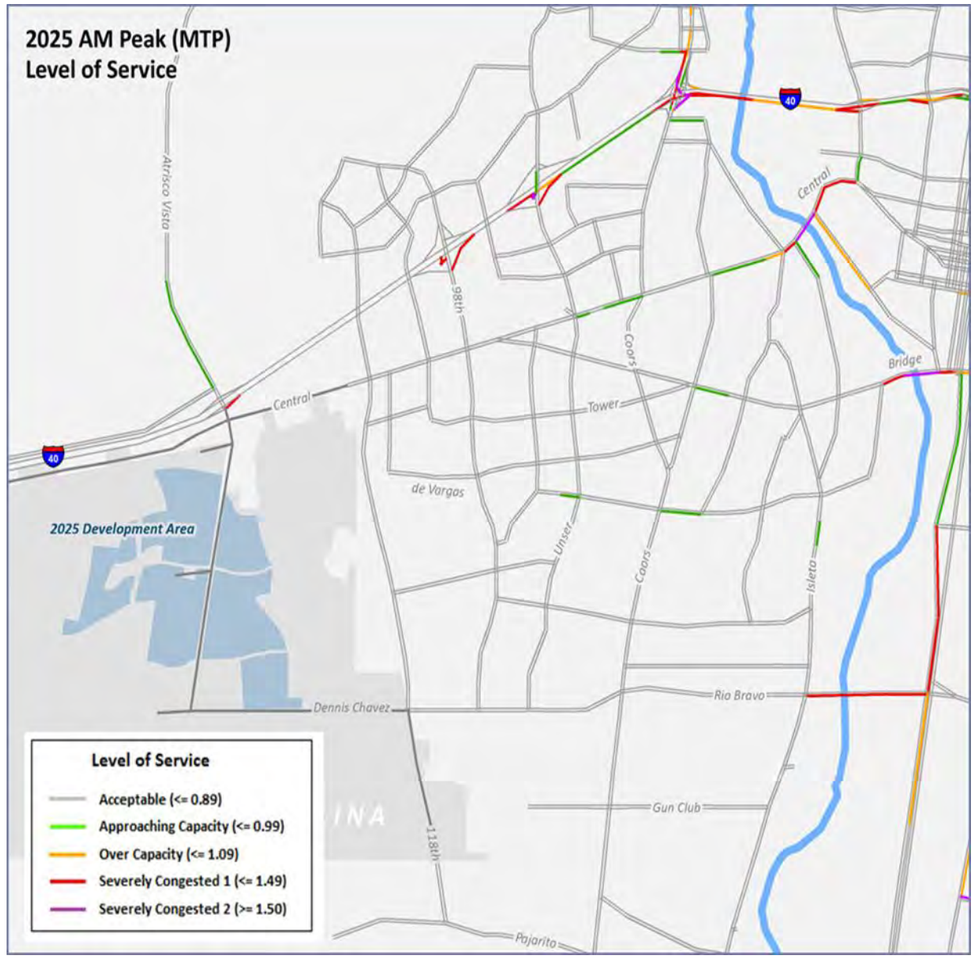
A side-by-side comparison of the volume-to-capacity ratio (a surrogate for level of service) for the 2025 AM peak hour is shown in Figure 29, with the change in level of service from the MRCOG volume-to-capacity shown in Figure 30. Similar graphics for the 2025 PM peak hour is shown in Figure 31 and Figure 32. These figures present the volume-to-capacity ratio similarly to how MRCOG presents their results, for direct comparison to the MTP findings. Locations where the volume-to-capacity ratio is less than 0.9 are not shown, as they are considered to represent acceptable level of service.

The side-by-side comparisons of the 2025 AM and PM volume-to-capacity ratios of the MTP and Santolina forecasts, show very little discernible difference between the two model runs.

Figure 30 and Figure 32, shows the difference in 2025 AM and PM volume-to-capacity ratio between the two scenarios, respectively. These figures show the locations where there is a difference in volume-to-capacity ratio and a 10% difference in traffic volume.

The 10% difference in volumes was used as differences less than 10% are considered nominal and also within the expected error of the model. These figures show a decline in level of service (increase in volume-to-capacity ratio) at the I-40 and Atrisco Vista ramps, but improvements at other locations, but generally very little difference.

Therefore, the off-site impact in 2025 is limited to the I-40 and Atrisco Vista interchange. Future Level C analyses as development submittals come forward will determine the level of improvements required. Figure 19 and Figure 20 on pages 30 and 31, show these volume-capacity ratios to be 1.4 or less, indicating adding a second lane to the ramps, with associated deceleration/acceleration and merge lanes on the interstate will be sufficient to accommodate this expected increase in traffic. Intersection analysis will also determine the required laneage at the signalized intersections. The recently reconstructed interchange has sufficient pavement width for a total of four (4) lanes at the westbound off-ramp intersection, and has two (2) entry lanes for the eastbound off-ramp.



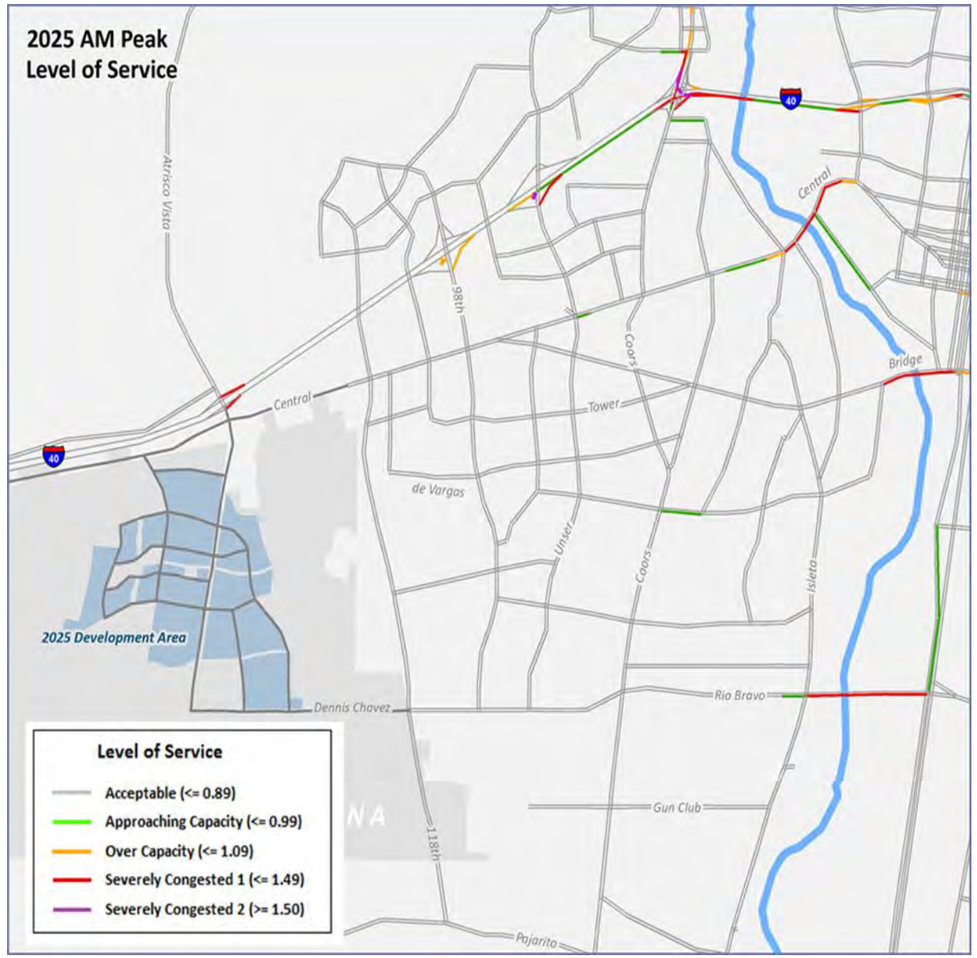


Figure 29 – Forecast Traffic Volume to Capacity Ratio Comparison to MRCOG MTP AM Peak Hour – 2025

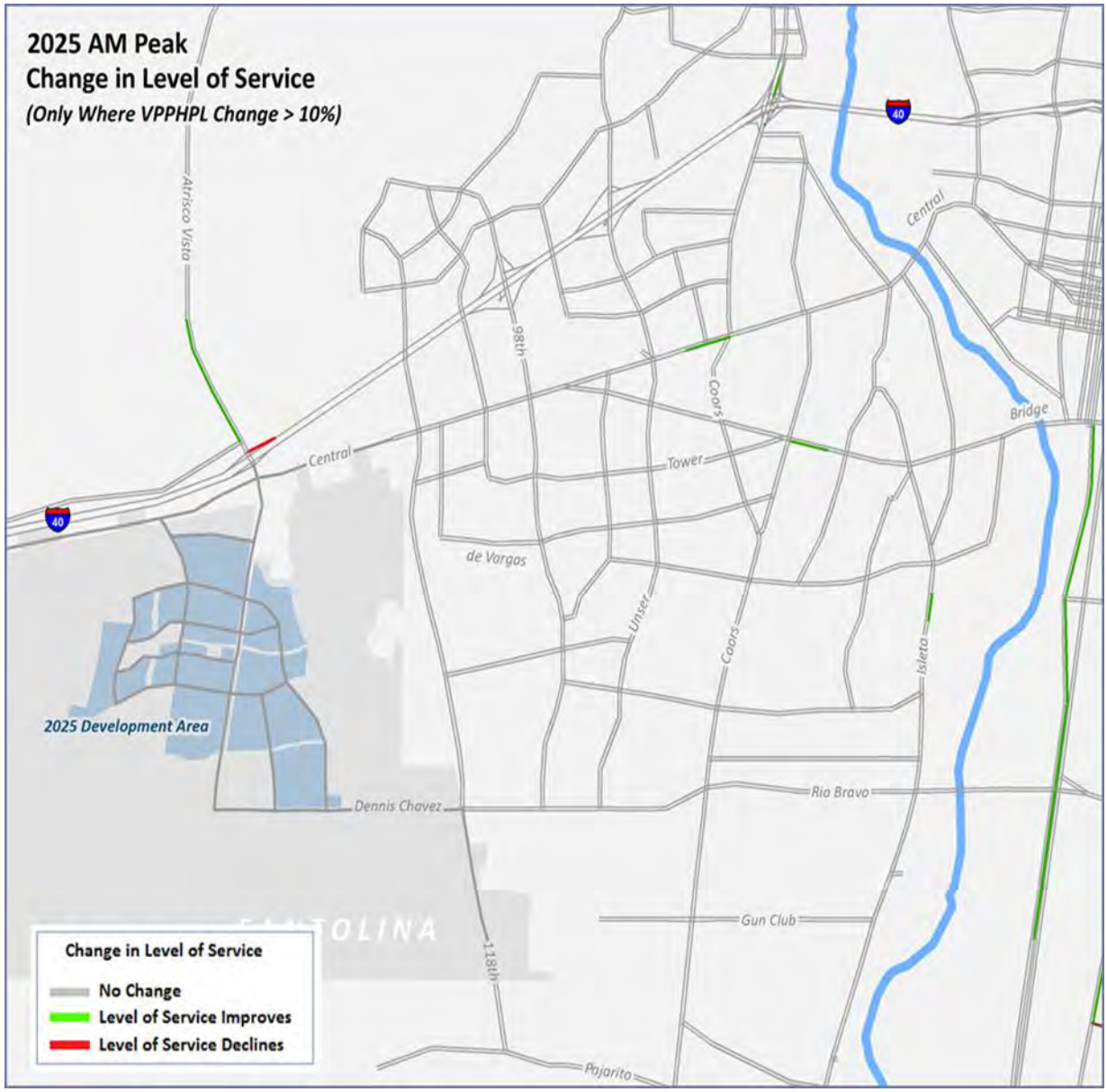
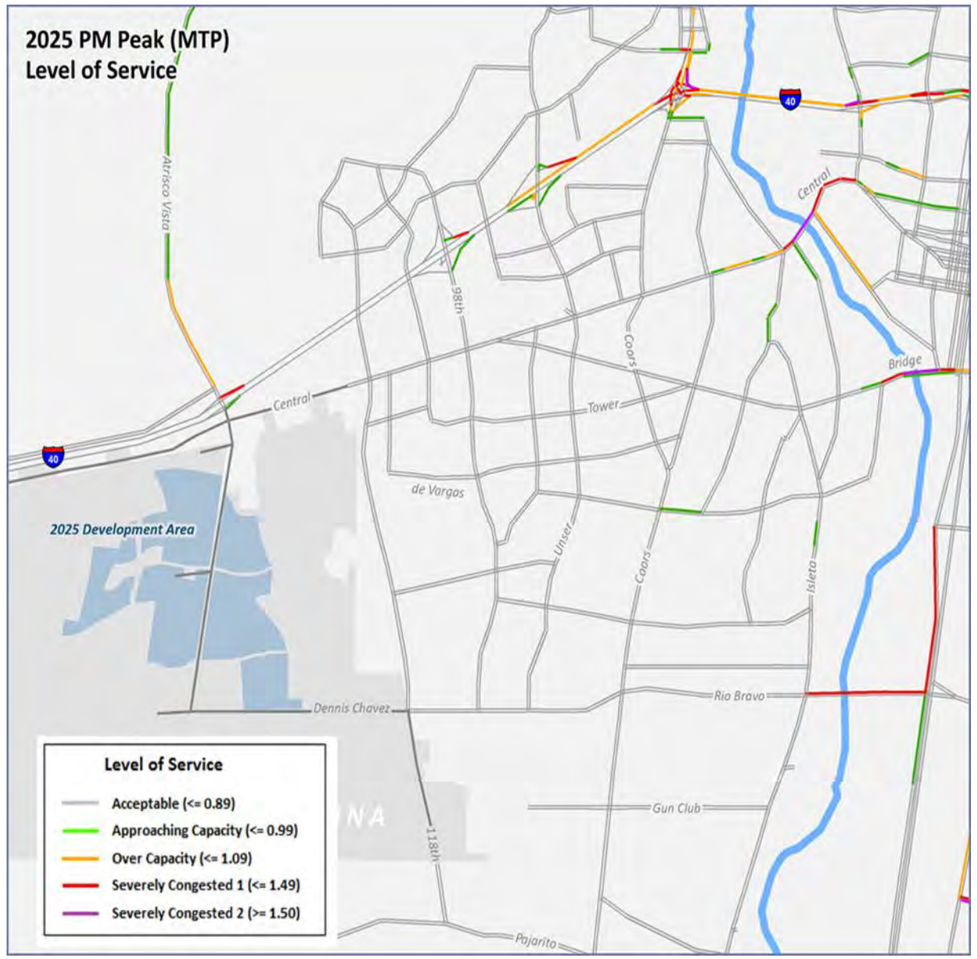


Figure 30 – Change in Volume-to-Capacity Ratio from MRCOG MTP AM Peak Hour – 2025



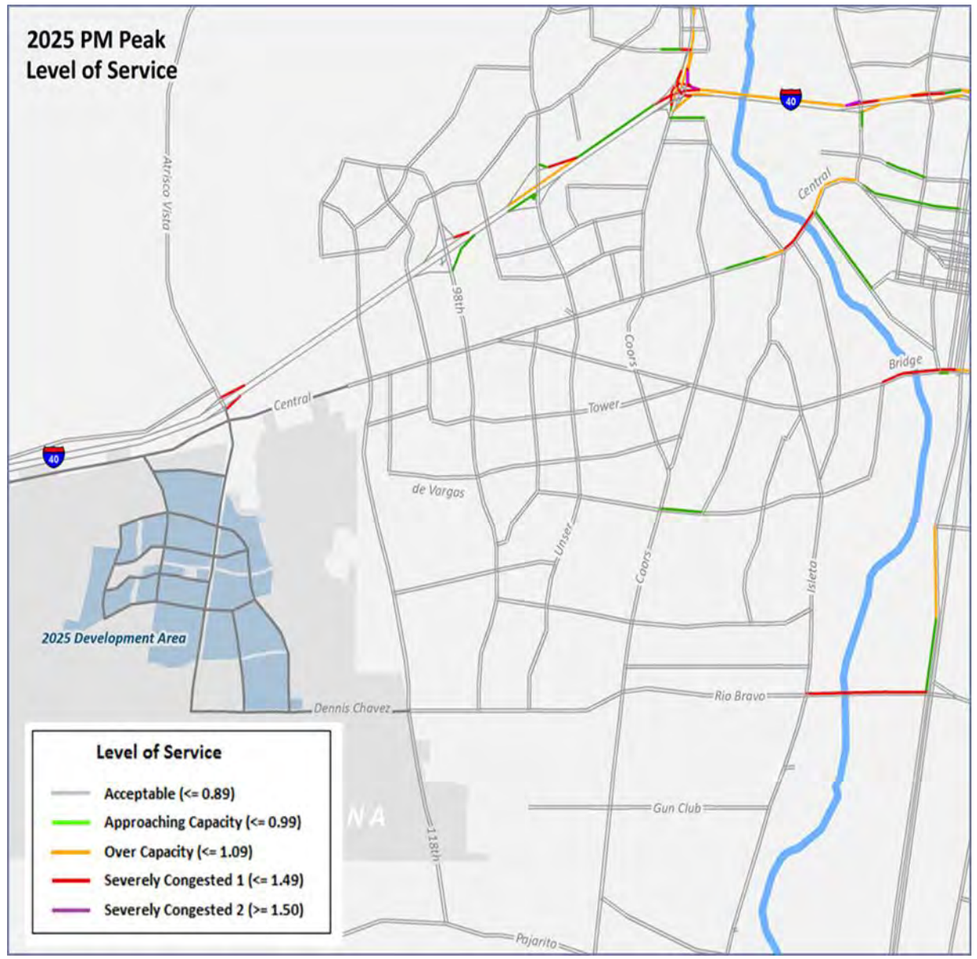


Figure 31 – Forecast Traffic Volume to Capacity Ratio Comparison to MRCOG MTP
PM Peak Hour – 2025

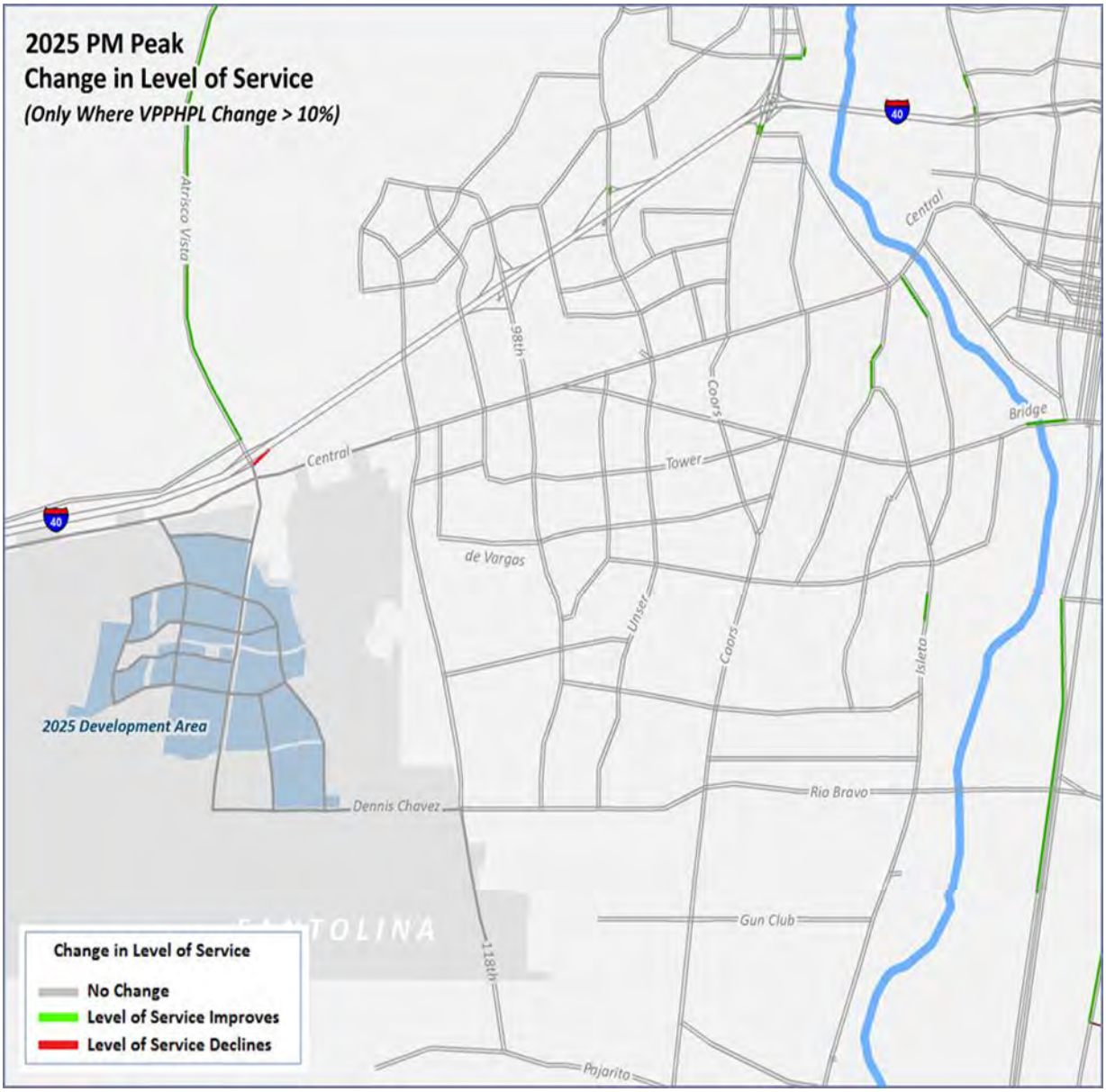
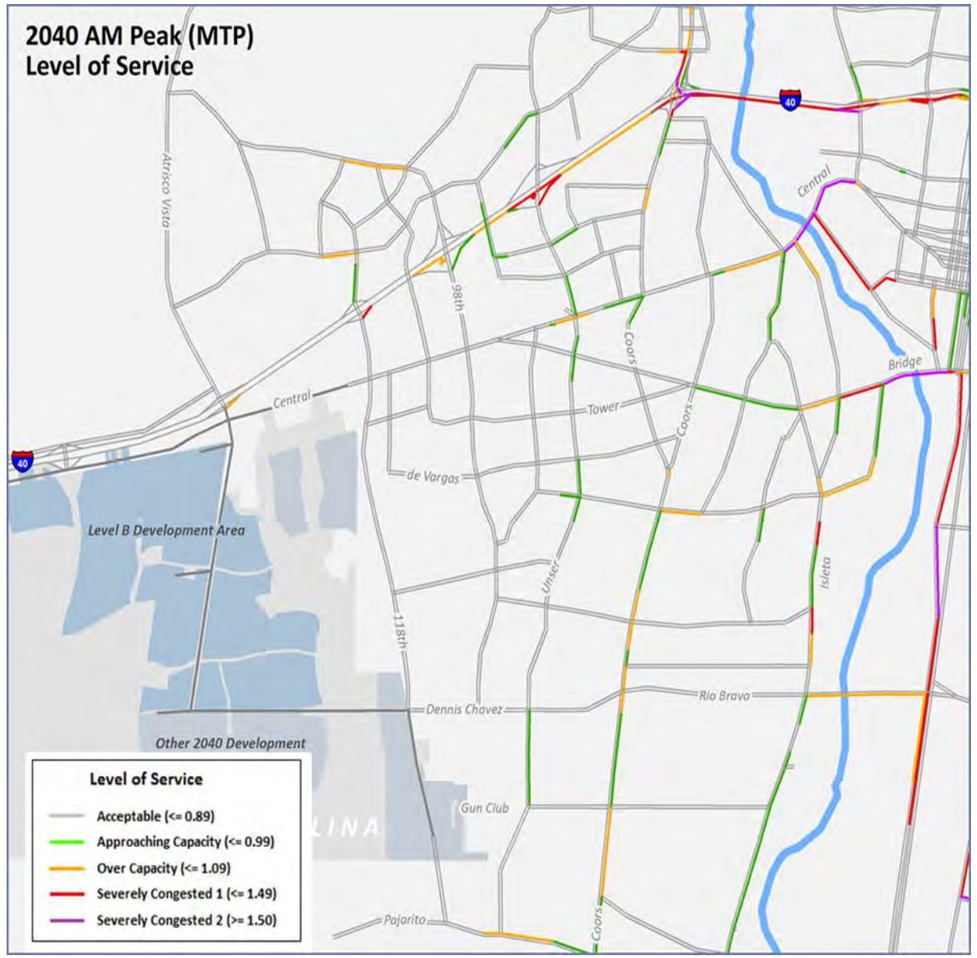


Figure 32 – Change in Volume-to-Capacity Ratio from MRCOG MTP PM Peak Hour – 2025

2. 2040 COMPARISON TO MRCOG 2040 MTP RESULTS

A side-by-side comparison of the volume-to-capacity ratio for the 2040 AM peak hour is shown in Figure 33, with the change in level of service from the MRCOG 2040 MTP volume-to-capacity shown in Figure 34. Similar graphics for the 2040 PM peak hour is shown in Figure 35 and Figure 36.



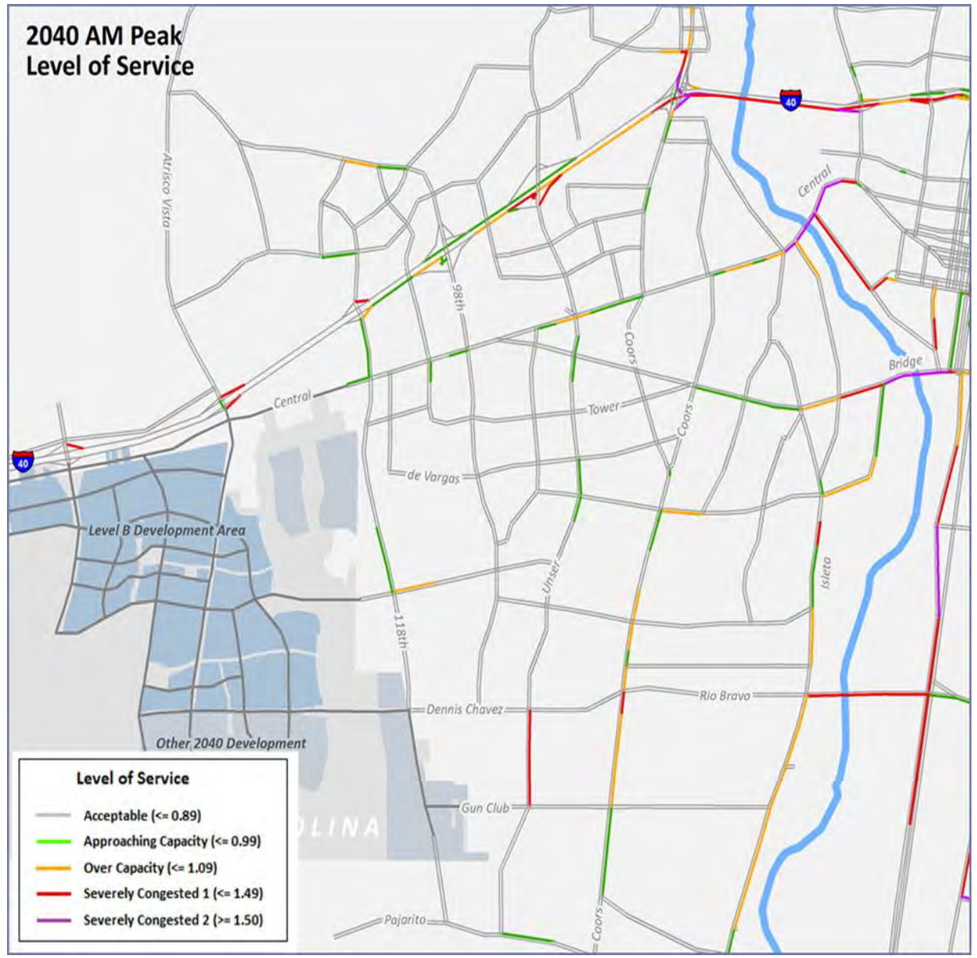


Figure 33 – Forecast Traffic Volume to Capacity Ratio Comparison to MRCOG MTP
AM Peak Hour – 2040

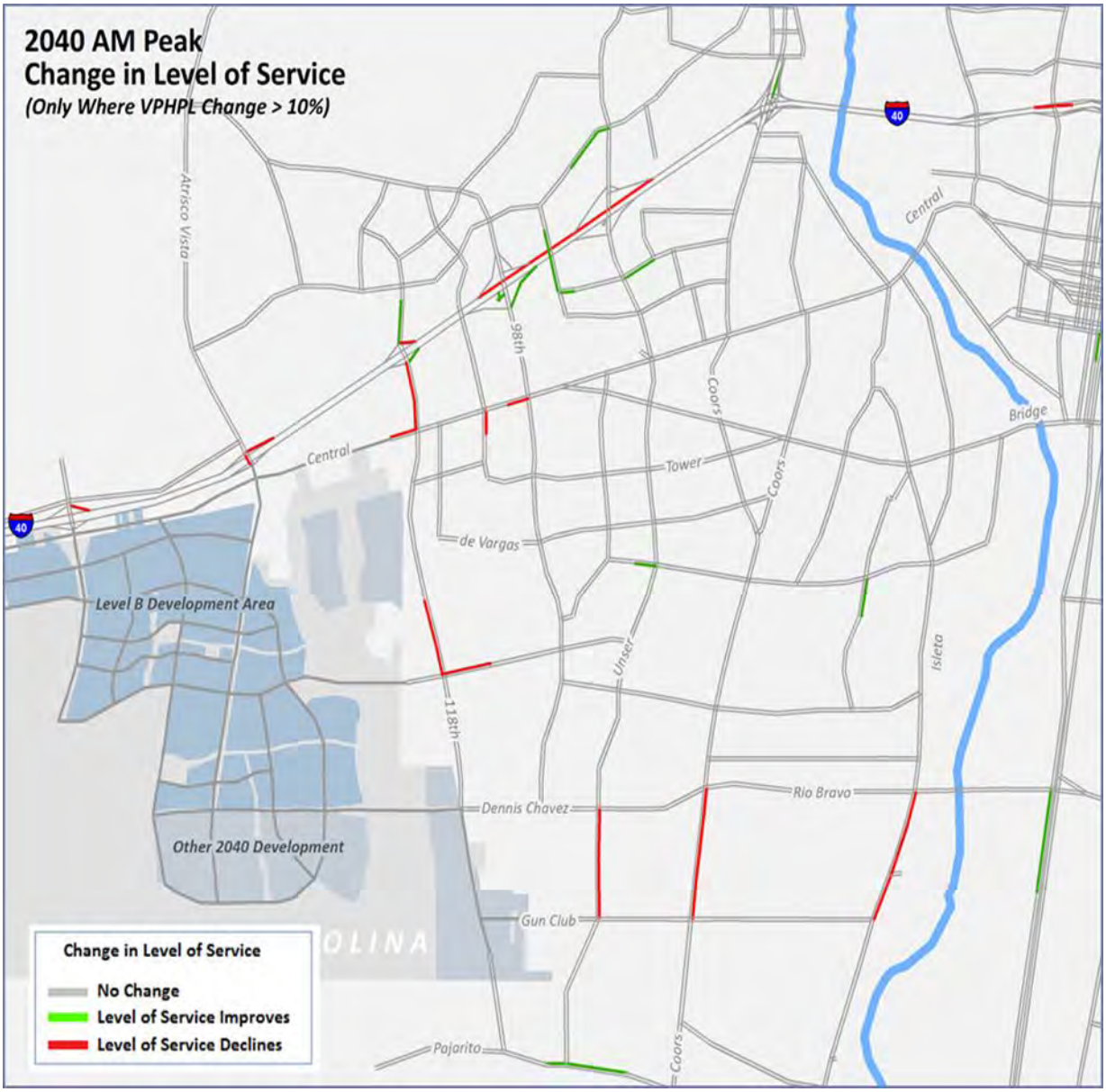
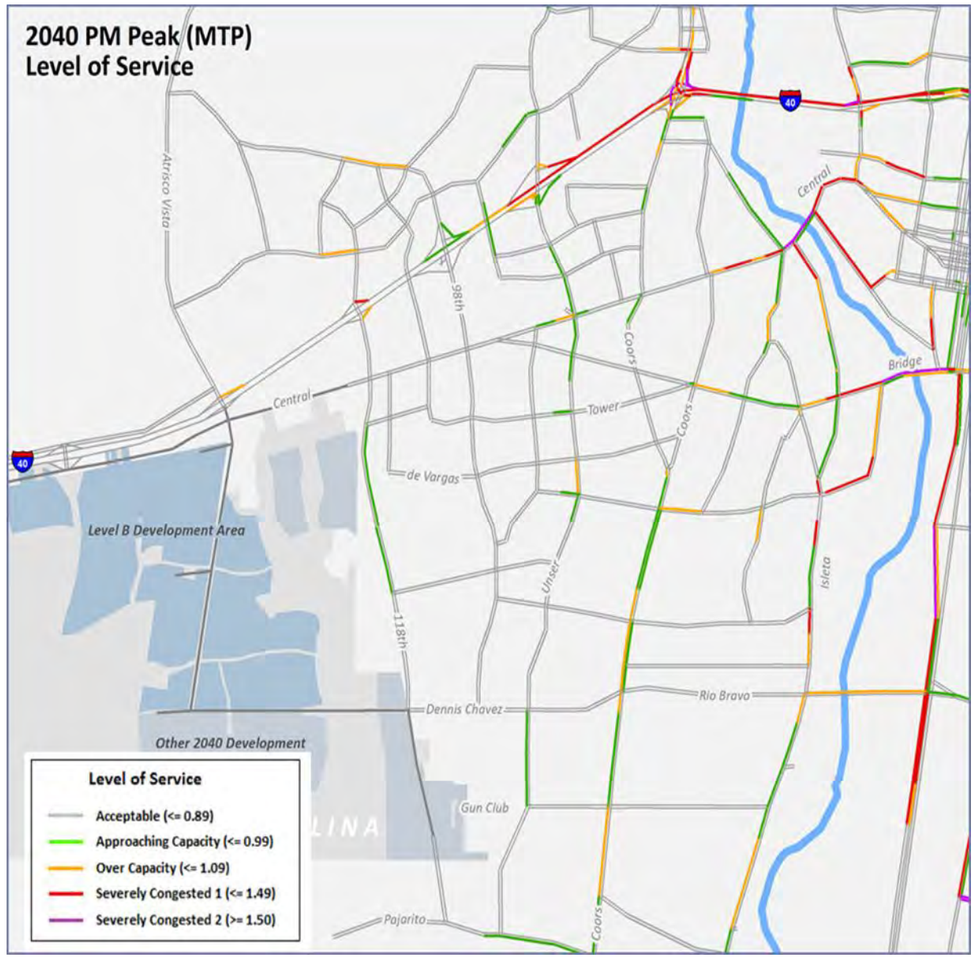


Figure 34 – Change in Volume-to-Capacity Ratio from MRCOG MTP AM Peak Hour – 2040



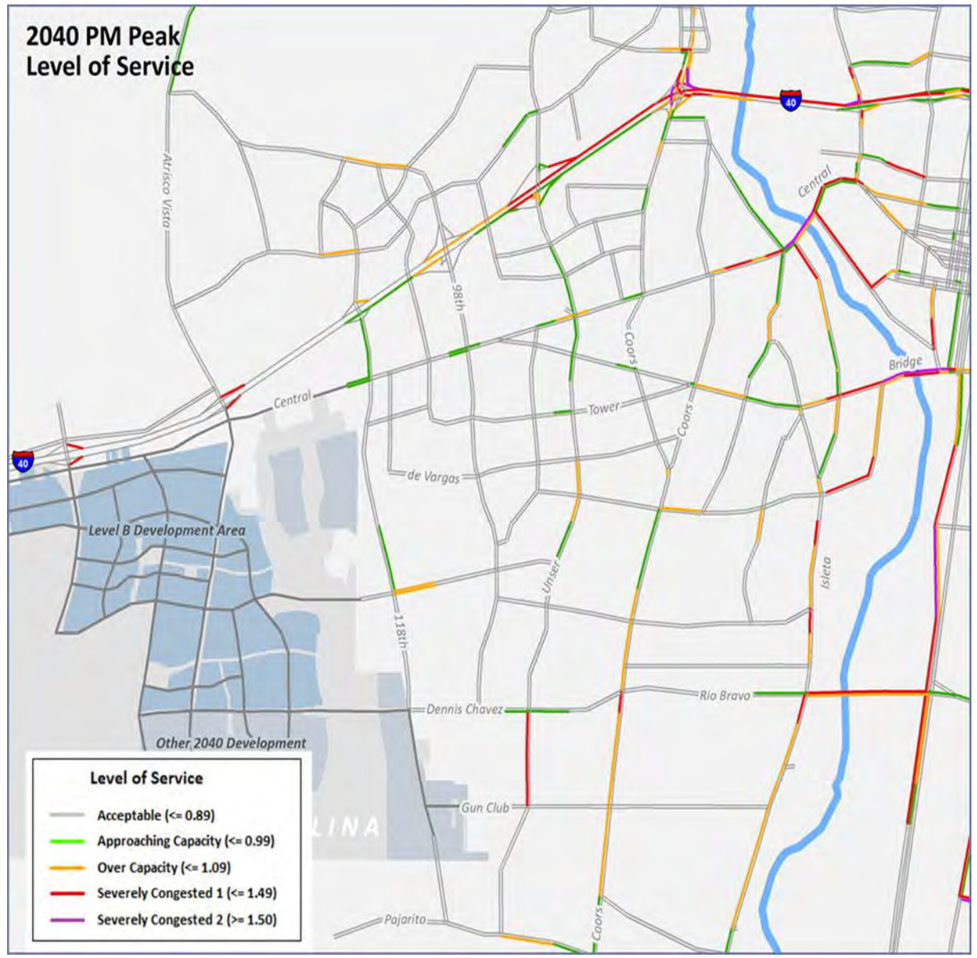


Figure 35 – Forecast Traffic Volume to Capacity Ratio Comparison to MRCOG MTP
PM Peak Hour – 2040

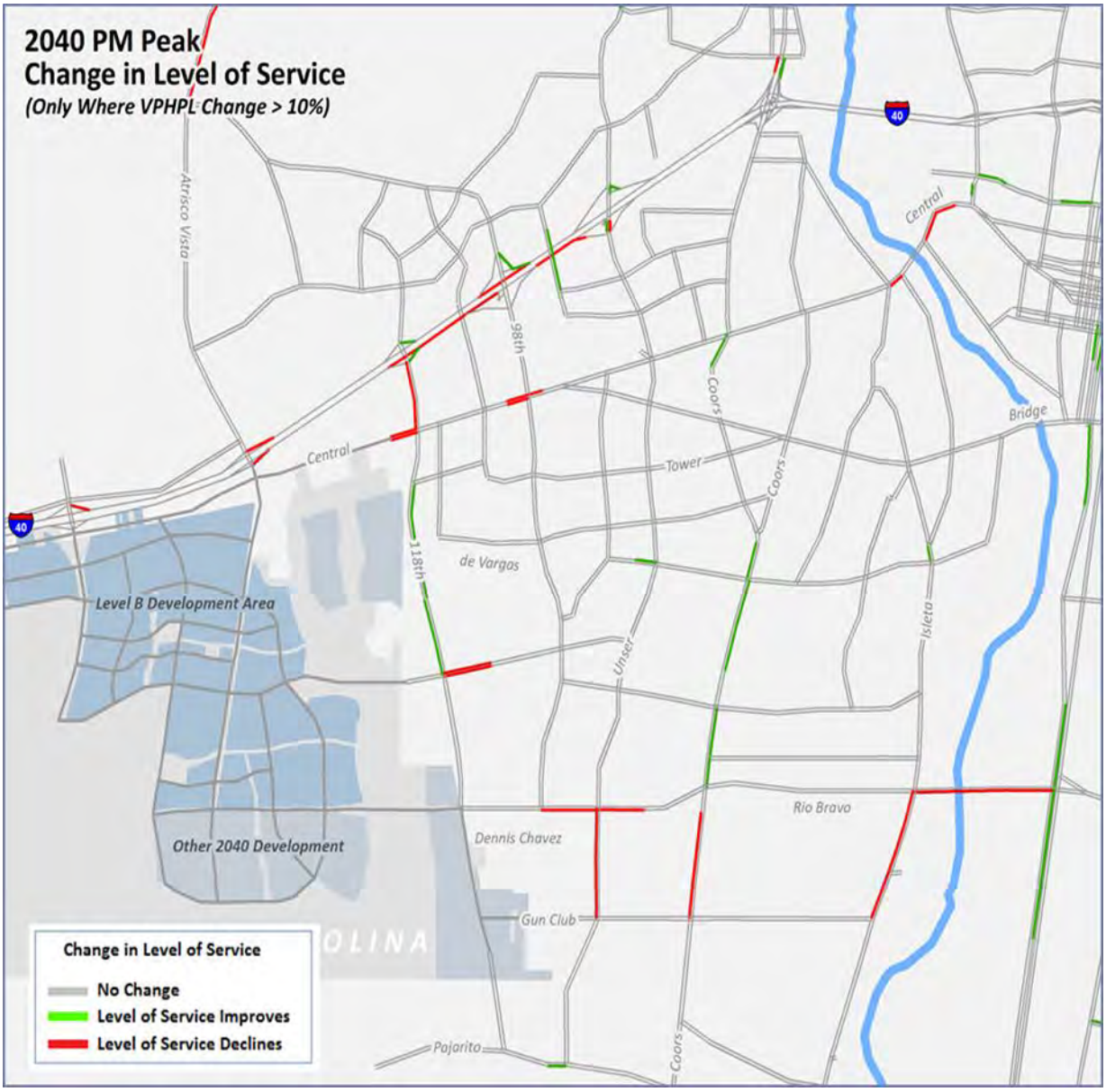


Figure 36 – Change in Volume-to-Capacity Ratio from MRCOG MTP PM Peak Hour – 2040

As with the 2025 comparison, the overall performance between the 2040 MTP and Santolina scenarios are similar, with congestion in many of the same locations, as shown in Figure 33 (AM) and Figure 35 (PM). The changes volume-to-capacity ration, shown in Figure 34 (AM) and Figure 36 (PM) show the impact of the additional employment trips of Santolina.

In the AM peak hour, roadways headed to Santolina, such as westbound I-40 and southbound 118th Street south of I-40, have decreases in level of service, as traffic is destined to Santolina for employment. However, a review of Figure 33 shows these roadways still have a v/c of under 1.0 with Santolina, indicating congestion, but not severe congestion, as the "excess" capacity is now more efficiently utilized by employment traffic going to Santolina. In the MTP scenario this capacity is not utilized. Other locations, such as along 118th Street and Gibson, the employment traffic to Santolina result in declines in level of service. These are primarily the result of laneage being insufficient in the MTP and widening will provide sufficient capacity. The Level A Development Agreement establishes criteria under which Santolina would be responsible for their proportionate impact with regard to the improvement of these roadways. Other, more distant locations, will also have declines in levels of service as the employment in Santolina attracts regional traffic.

The PM comparison, Figure 36, is substantially a mirror image of the AM, as employment trips leave Santolina and more efficiently utilize capacity available for eastbound trips. Again many of the locations where traffic increases in Figure 36 do not result in volume-to-capacity ratios greater than 1.0 in Figure 35. However again, some roadways that serve the exiting employment trips do have decreases in level of service.

3. RIVER CROSSINGS AND SYSTEM COMPARISONS

The use of the MRCOG travel demand model allows comparison of regional performance measures, such as river crossings, vehicle miles of travel, etc. The following tables compare the MTP and the Santolina scenarios for these regional performance measures.

As mentioned previously, the MRCOG did not publish an official 2025 travel demand forecast, however, they did prepare a 2025 socioeconomic forecast and roadway network. The 2025 MTP forecast presented herein was run using the MRCOG socioeconomic and roadway network forecasts and the MRCOG Cube model, but was not prepared by MRCOG.

Table 4 – 2025 AM Eastbound River Crossings		
	MTP*	**Santolina**
Bridge	**AM Peak Hour Volume**	**AM Peak Hour Volume**
NM 550	4,336	3,935
Alameda	3,094	2,905
Paseo del Norte	5,815	5,546
Montano	5,645	2,539
I-40	9,579	9,147
Central	4,545	4,265
Bridge	3,195	2,968
Rio Bravo	2,436	2,645
I-25	3,752	4,056
Total	**39,397**	**38,006**
Difference		**-3.53%**
*- 2025 MTP river crossings derived using MRCOG 2025 datasets		

Table 4 above forecasts there will be a 3.5% reduction in eastbound river crossings in the 2025 AM peak hour with development of Santolina.

Table 5 – 2025 PM Westbound River Crossings		
	MTP*	**Santolina**
Bridge	**AM Peak Hour Volume**	**AM Peak Hour Volume**
NM 550	4,424	3,917
Alameda	3,255	2,972
Paseo del Norte	6,026	5,698
Montano	2,716	2,563
I-40	9,936	9,498
Central	4,560	4,199
Bridge	3,238	2,906
Rio Bravo	2,467	2,610
I-25	3,875	4,125
Total	**40,497**	**38,488**
Difference		**-4.96%**
*- 2025 MTP river crossings derived using MRCOG 2025 datasets		

Table 5 above forecasts there will be an approximately 5% reduction in westbound river crossings in the 2025 PM peak hour with development of Santolina, when compared against the 2025 MTP.

Table 6 – 2040 AM Eastbound River Crossings		
	MTP*	**Santolina**
Bridge	**AM Peak Hour Volume**	**AM Peak Hour Volume**
NM 550	4,778	4,672
Alameda	3,656	3,547
Paseo del Norte	6,443	6,347
Montano	2,971	2,951
I-40	11,006	10,822
Central	4,372	4,242
Bridge	4,365	4,253
Rio Bravo	2,325	2,482
I-25	3,674	4,094
Total	**43,592**	**43,410**
Difference		**-0.41%**
*- 2040 MTP river crossings derived using MRCOG 2040 datasets		

Table 7 – 2040 PM Westbound River Crossings		
	MTP*	**Santolina**
Bridge	**AM Peak Hour Volume**	**AM Peak Hour Volume**
NM 550	4,946	4,863
Alameda	3,717	3,676
Paseo del Norte	6,666	6,545
Montano	3,008	3,022
I-40	11,311	11,225
Central	5,569	5,527
Bridge	4,291	4,279
Rio Bravo	2,402	2,535
I-25	4,015	4,234
Total	**45,925**	**45,906**
Difference		**-0.04%**
*- 2040 MTP river crossings derived using MRCOG 2040 datasets		

The 2040 river crossings with development of Santolina are essentially equal to those forecast in the 2040 MTP.

In the 2040 MTP, the MRCOG reported on a series of roadway performance summary statistics for the total region for the 2040 PM peak hour. The tables below compare the MTP and Santolina scenarios.

Table 8 – 2025 Total Region PM Peak Hour Roadway Performance Summary Statistics				
			Difference	
Parameter	**MTP***	**Santolina**	**Absolute**	**Percent**
VMT	2,330,307	2,292,628	-37,679	-1.6%
VHT	80,663	69,004	-11,659	-14.5%
VHD	33,002	22,686	-10,316	-31.3%
Average Speed	28.9	33.2	+4.3	+15.0%
% VHT in Delay	40.9%	32.9%	-8.0%	-19.6%
VMT Over Capacity	298,600	230,072	-68,528	-22.9%
% VMT Over Capacity	29,739	18,668	-11,070	-37.2%
Congested Lane Miles	223	170	-53	-23.8%
VMT per Capita	23.8	23.38	-0.4	-1.8%
*- 2025 roadway performance summaries derived using MRCOG 2025 datasets				

Table 8 shows that the roadway performance summary statistics for the 2025 PM peak hour, all of the roadway performance summaries improve with development of Santolina. In addition to the 1.5% reduction in vehicle-miles of travel (VMT), there was 14.5% reduction in the vehicle-hours of travel (VHT), the amount of time people travel in the PM peak hour. This reduction in travel time results in a 31% reduction in the amount of delay experienced (vehicle-hours of delay, VHD), and a 15% increase in travel speed during the PM peak hour in 2025. Additionally, the number of vehicle-hours of travel that was caused by delay reduces by almost 20%. Clearly showing the beneficial impact of the employment centers anticipated for Santolina, the vehicle-miles of travel that were traveled on congested roadways reduced by 22.9%, a 37% reduction in the amount of vehicle miles of travel on congested roadways during the 2025 PM peak hour. Given these results, it is not surprising the number of congested lane miles reduced by 23.8%.

Table 9 – 2040 Total Region PM Peak Hour Roadway Performance Summary Statistics				
			Difference	
Parameter	**MTP**	**Santolina**	**Absolute**	**Percent**
VMT	2,894,913	2,978,559	+75,646	+2.6%
VHT	132,932	129,354	-3,578	-2.7%
VHD	71,293	68,588	-2,705	-3.8%
Average Speed	21.8	23.0	+1.2	+5.5.%
% VHT in Delay	53.6%	,53.0%	-0.6%	-1.1%
VMT Over Capacity	644,967	585,917	-59,050	-9.2%
% VMT Over Capacity	22.3%	19.7%	-2.6%	-11.5%
Congested Lane Miles	429	418	-11	-2.4%
VMT per Capita	22.70	23.25	+0.6	+2.4%
*- 2040 MTP roadway performance summaries from Table 3-6, page 3-33, MRCOG 2040 Futures Metropolitan Transportation Plan, April 17, 2015				

The results for Santolina in 2040 are not as high compared to the MTP as found in 2025, however there are still reductions in VHT, VHD when compared to the 2040 MTP Trend scenario. The trend of utilizing "excess" capacity, as a result of the counter-commute resulting from the employment centers in Santolina continues, as there was 9.2% reduction in the amount of vehicle-mile of travel on congested roadways, or a 11.5% reduction in travel on congested roadways. The slight increase in VMT is likely due to the jobs located in Santolina leading to slightly longer commute trips, as resident on the east side of the metro area travel to the west side for employment. Although this does result in increased VMT, it more efficiently utilizes the existing transportation infrastructure that is underutilized in the current west-to-east morning commute, and the east-to-west afternoon commute.

V. TYPICAL SECTIONS

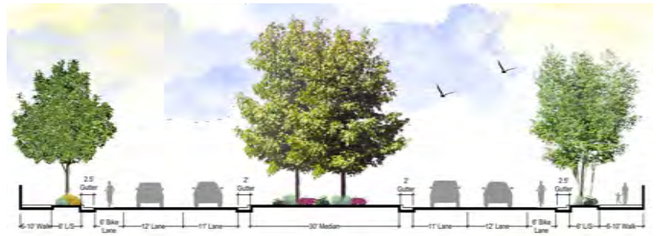
The typical sections proposed for Santolina for collector roadways and above, are shown in Figure 37 and Figure 38. These typical sections conform to the newly released MRCOG Long Range Transportation System Roadway Design Guidelines. These typical sections incorporate Complete Street features, such as buffers between the edge of roadway and sidewalk, buffers between general purpose traffic lanes and bicycle lanes on principal arterials, and right-of-way dedicated for on-street transit lanes, with provisions for median bus rapid transit on principal arterial. The cross-sections represent the number of directional lane, with added space for left turn lanes to meet future travel demand, and to provide multi-modal accommodation.

As the urban center is bounded on all sides by principal arterials, additional multi-way boulevard roadway typical sections were developed to provide additional access opportunities, as well as slower speeds adjacent to pedestrians and bicyclists in the vicinity of the urban center. These typical sections could also be used in other areas, such as the Village Centers, if considered appropriate.

The typical sections are also considered representative of what is anticipated to be constructed, and the elements that will be a part of the future roadways. It is expected that over the life of the development, these typical sections will be reviewed and revised periodically based on County standards and best practices. In addition, the specific geometry at intersections, i.e., number of turn lanes, will be evaluated in more detail in the specific traffic studies performed for Level C submittals.

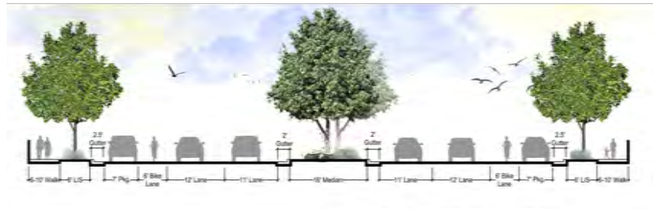
These roadway sections support the goals of providing opportunities for increased transit use, walking and biking, as they provide a more welcoming environment for those travel modes.

All roadway typical sections will, to the extent possible, incorporate green infrastructure approaches to reduce and treat stormwater runoff.

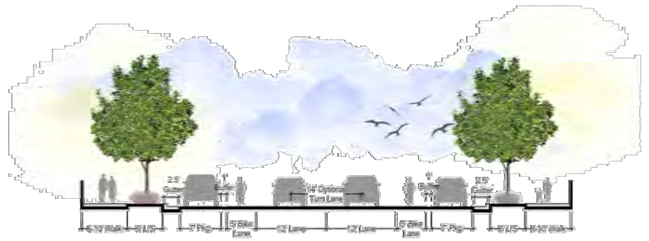


4-LANE MINOR ARTERIAL (136' R.O.W.)

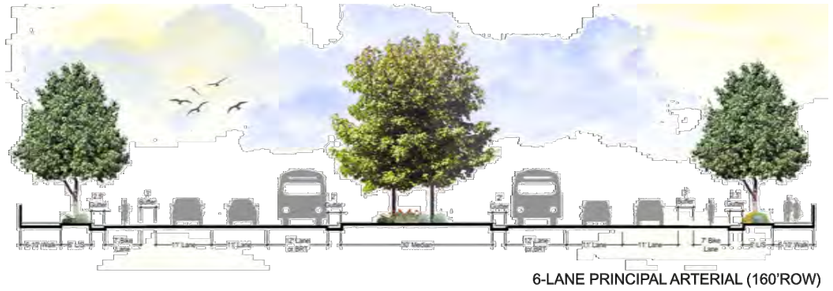
4-LANE COLLECTOR WITHOUT PARKING (115' R.O.W.)



4-LANE COLLECTOR WITH PARKING (129' R.O.W)



2-LANE COLLECTOR WITH PARKING (77'-99' R.O.W.)



6-LANE PRINCIPAL ARTERIAL (160'ROW)

4-LANE PRINCIPAL ARTERIAL (144' ROW)

SANTOLINA

LEVEL B

NORTH

TYPICAL SECTIONS

FIGURE 37

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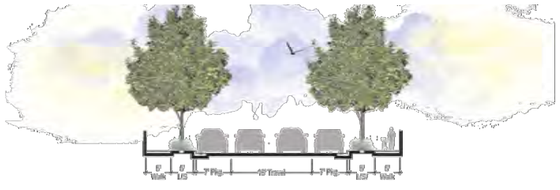
DENNIS CHAVEZ/ATRISCO VISTA @ URBAN CENTER *

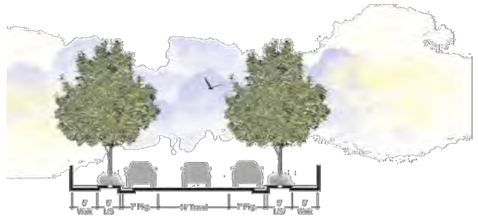
PASEO DEL VOLCAN @ URBAN CENTER *

* CYCLE TRACK/BIKE LANE ALLOWABLE ON
MULTI-WAY BOULEVARD ROADWAY

LOCAL STREET 1 (52' ROW)



LOCAL STREET 2 (50' ROW)



LOCAL STREET 3 (48' ROW)
TO BE USED ON LOW VOLUME ROADS ADT < 1,500,
PRIVATE ROADS, OR AS APPROVED BY COUNTY

MAJOR LOCAL STREET (60' ROW)

BERNALILLO COUNTY LOCAL ROAD SECTIONS
INCLUDED BY REFERENCE:
MINOR LOCAL RESIDENTIAL DWG 201008,
FEBRUARY 15, 2016
MAJOR LOCAL RESIDENTIAL DWG 201007,
FEBRUARY 15, 2016

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SANTOLINA

LEVEL B

NORTH

TYPICAL SECTIONS

FIGURE 38

VI. TRANSIT

The conceptual transit network for Santolina's Level B Plan Area is shown in Figure 39. The backbone of the network is the proposed commuter/bus rapid transit (BRT) system routes. As Santolina develops, the area will house residential areas and significant employment centers. As a result, transit has the opportunity to not only take people from Santolina to other regional employment centers throughout Albuquerque, but also to transport people from other parts of the metro area, to the employment centers in Santolina.

The transit network as shown initially extends RapidRide Route 766, the Green Line, from its current terminus at the Central and Unser Transit Center into the Town Center in Santolina. This route extends west on Central to Atrisco Vista, south to the road parallel to the Frontage Road, then west to Paseo del Volcan, to provide transit access to the major employment center in the Town Center and Business Park. A Transit Center is also proposed for the Town Center area, so as to serve as a park-and-ride facility, as well as a location for other, future commuter or local circulator bus lines to transfer passengers to other routes serving the area.

A second major transit route is along Dennis Chavez Boulevard, into the Urban Center. Dennis Chavez is identified as a Secondary Transit Route in the 2040 MTP, and with the Rio Bravo RailRunner Station just west of the river at 2nd Street, and is a prime candidate for use as a potential bus rapid transit or commuter route for Santolina. Additionally, as a principal arterial, Dennis Chavez has been identified as a roadway segment with a potential dedicated bus lane to remove the bus from general purpose traffic as it enters the Urban Center. A Transit Center, with park-and-ride and stops for other local or commuter bus routes is also proposed for the Urban Center, as well as other locations in the Santolina Master Plan area. A transit center will also be considered near post-secondary education institutions, such as planned for the Urban Center area.

A third potential transit route into Santolina is Gibson Boulevard, which would allow connection to the Bridge/Westgate Route 54 route.

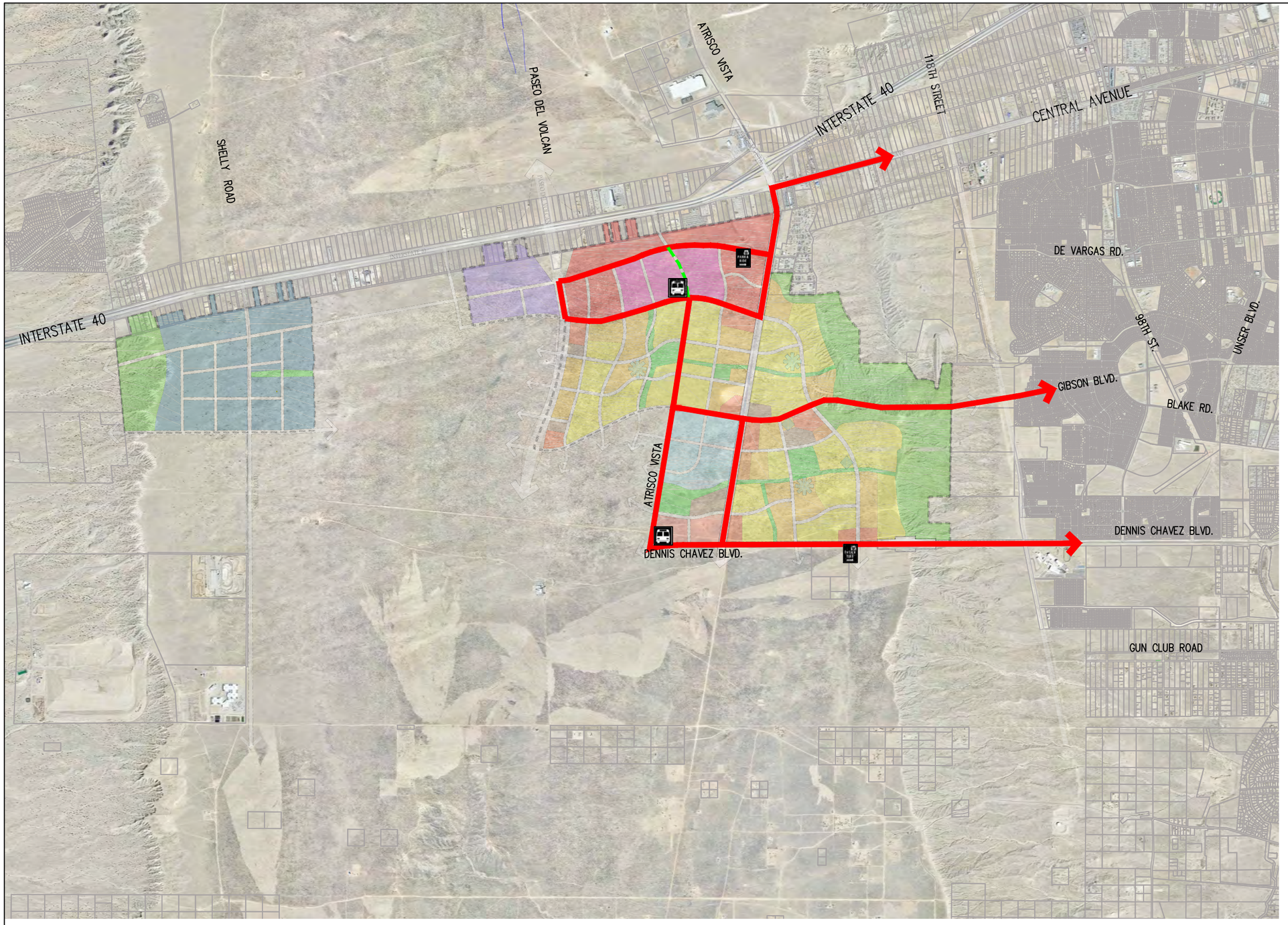
As a transit market grows, the Santolina Master Plan also shows possible future local circulator routes that will provide local bus service within the community that allow for use of transit for employment, shopping and recreational trips, without the use of the automobile. These routes will utilize the Loop Road, as well as other arterials in the Santolina Master Plan area, however it is not expected to occur with this first Level B development due to the lack of sufficient market for local bus service.

A goal for Village, Urban Center and Town Center design will be to locate transit stops and/or stations so as to maximize the number of residents and workers who can walk less than one-quarter mile to a stop or station. This last-mile connectivity between residences and bus stops, and employment or retail destinations with bus stop, is central in creating an effective transit system. Robust bicycle and pedestrian connectivity to bus stops is a key factor in effectively combining the origins and destination of neighborhoods and employment area via transit.

Focus will be made on these roadways and developments to ensure safe and easy pedestrian crossings and access to bus stops, such as the pedestrian and bike network proposed for Santolina. These will be a focus throughout the development of Santolina, so that when local bus service is available, existing neighborhoods will be able to take advantage of it.

The Santolina Transportation Master Plan envisions an extensive system of transit use for local circulation, as well as providing commuter or BRT service for regional travel. However, the Santolina transit centers and park-and-ride lots, combined with the regional service, provide the opportunity to connect other transit routes, such as those from the Central and Unser Transit Center, the Alvarado Transit Center and the NM Rail Runner Express. This will allow transit users in Santolina full access to the entire transit system available in the metro area.

As mentioned, Santolina proposes an extensive network of sidewalks and trails, along with on-street bike lanes, that results in extensive connectivity throughout the Master Plan area, promoting the use of alternate modes between residential neighborhoods and employment centers. Also critical to promoting transit is the provision of transit stop amenities, such as bus shelters, seating, safety lighting, etc., to make waiting for the bus a safe and secure experience.



SANTOLINA

LEVEL B

LEGEND

- VILLAGE
- INDUSTRIAL AND BUSINESS PARK
- OPEN SPACE
- URBAN CENTER
- BUSINESS PARK
- TOWN CENTER
- POSSIBLE FUTURE COMMUTER / BRT / PRIMARY ROUTE EXTENSION
- ALTERNATE
- PARK AND RIDE
- TRANSIT CENTER
- SCHOOL
- PUBLIC SAFETY FACILITY

NORTH

2040 LEVEL B TRANSIT MASTER PLAN

FIGURE 39

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VII. PEDESTRIAN AND BICYCLE FACILITIES

A. SIDEWALKS AND PEDESTRIAN ACCOMMODATIONS

The proposed Pedestrian and Bicycle Circulation Plan shown in Figure 40, combined with the typical roadway sections shown in Figure 37, provide complete pedestrian coverage throughout Santolina, with a sidewalk or multi-use trail on both sides of all streets, local, collector and arterial. In addition, the Open Space trail system provides opportunities for walking and biking separate from roadways and vehicular traffic, connecting the residential and commercial areas, allowing for commuting or recreational use. All typical sections include a buffer between the sidewalk and the travel lanes. Multi-modal and landscape improvements will be phased and it is expected that all roadways will include a reasonable portion of these elements at each stage of construction, as to provide adequate multi-modal infrastructure at each stage of development.

Supporting Santolina's goals of walkability requires making walking convenient, pleasant and safe. The interconnected sidewalks throughout Santolina enable short walking trips to bus stops, schools, parks and other neighborhood amenities, as well as to employment and commercial centers. Walking within Village Centers will be encouraged due to the land use and site layout combined with the pedestrian facilities, and will encourage a "park-once" concept in the areas.

Marked at-grade crosswalks should be provided at all signalized intersections, with pedestrian actuated phases for crossing the streets, and consideration of mid-block crossings where they can be located safely through the use of pedestrian hybrid beacons, such as a HAWK signal, or other devices.

Mid-block, unsignalized pedestrian/trial crossing treatments will be evaluated using the latest research, such as TCRP 112/NCHRP 562 "Improving Pedestrian Safety at Unsignalized Crossings."

B. BIKE LANES AND TRAILS

The proposed bicycle network shown in the Pedestrian and Bikeways Circulation Plan provides complete coverage of Santolina through the on-street bicycle lanes and proposed Open Space trails system. The bikeway network will be even more extensive than shown in the Bikeways Master Plan, as the proposed typical arterial roadway sections also include bike lanes on all future identified arterials and collector streets. This will allow recreational bicyclists the opportunity to bicycle out of travel lanes, and provides biking opportunities for a wide-range of abilities. The relatively flat topography of much of the area is well suited to bicycle travel, while the ample open space and trail network provides opportunities for recreational biking.

The proposed bicycle network conforms to, and is integrated into, the MRCOG Long Range Bikeways System Map that envisions extending bikeway facilities on Dennis Chavez, Atrisco Vista, 118th Street, Gun Club Road, Gibson, Paseo del Volcan, and Central Avenue. This will provide direct access to the extensive network of existing and proposed bikeways in the metro area, providing opportunities for long-range cycling or commuting for those so inclined.

The principal arterial typical sections shown in Figure 37 include a 7-foot bike lane and 3-foot buffer from the vehicular travel lane. These dimensions provide the separation needed for the speed and number of travel lanes on these roads. These dimensions also allow for cycle tracks to be included on these roadways. Bike lanes are also provided on the minor arterial and collector typical sections.

At the intersection of the trails and on-street network, the trails will enter at-grade with the sidewalk and provide access to the on-street bicycle and trail network, or proposed crossing. At locations where high traffic volume and high pedestrian or bicycle traffic volume are present, if a traffic signal is not present, a pedestrian traffic signal (such as a HAWK) will be evaluated as discussed above.

The open space network provides exceptional connectivity between neighborhoods, schools and activity centers. Where this network crosses arterials away from traffic signals, pedestrian beacons (such as the HAWK) will be evaluated as discussed above, and grade separated structures will be considered. Pedestrian hybrid beacons have been found to be effective for mid-block pedestrian crossing, however, given the priorities to improve free-flow traffic on many of the arterials, such as Paseo del Volcan, Dennis Chavez and Atrisco Vista, a grade separated crossing may be appropriate. The open space corridors provide a unique opportunity in the region to provide highly meaningful connections for walking and bicycling beyond just recreational trips, which adds to the quality of life residents, as well as provide alternatives to driving.

SANTOLINA

LEVEL B

LEGEND

- LEVEL A BOUNDARY
- FUTURE INTERCHANGE
- VILLAGE CENTER
- ON-STREET BIKE AND PED FACILITIES
- OPEN SPACE TRAILS

NORTH

PEDESTRIAN AND BICYCLE PLAN

FIGURE 40

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TECHNICAL APPENDIX T – 1 –
TRAVEL DEMAND MODEL SOCIOECONOMIC FORECAST

Transportation Analysis for the Master Planned Community at Santolina
Travel Demand Forecasting I: Socioeconomic Data

Planning Technologies, LLC
January 18, 2016
Revised February 4, 2016

Introduction

The transportation plan for the Level A Master Plan for the proposed planned community at Santolina was originally developed and submitted to Bernalillo County in January, 2013 and was subsequently adopted in June, 2015. Since that time, the Santolina Community Development Team, led by Western Albuquerque Land Holdings LLC (WAHL), Garrett Development Corporation, and its consultants, has refined elements of the land use plan and the proposed circulation system. The transportation analysis originally conducted on behalf of the Level A Master Plan has now been updated to reflect those refinements. In addition, the development team is submitting to the County a plan for the first phase of development. This first phase requires more detailed study in a "Level B" transportation analysis.

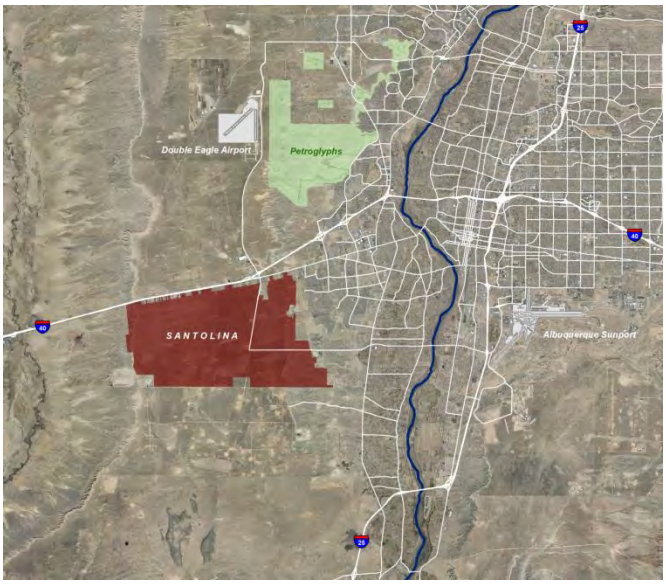

Figure 1: Santolina Study Area

The Santolina Master Planned community covers roughly 14,400 acres and is located on the southwest side of the Albuquerque metropolitan area, the center of which is about 10 miles west of the Albuquerque CBD. At build-out about 90,000 people will live in Santolina, and about 76,000 people will work there. Santolina is roughly equivalent to Albuquerque's "Northeast Heights" in both dimensions and density.

In this paper, we will describe the various methods and assumptions that relate to the traffic forecasting work performed on behalf of the Santolina proposals. This paper is Part I of 2 parts and focuses on the socioeconomic databases. Part II, a separate report, focuses on the travel model results. Salient points about the modeling approach include:

- Travel demand forecasts were once again developed through the application of the regional travel demand forecasting model hosted by the Mid-Region Council of Governments (MRCOG), as they were in the original Level A Plan. This model, called "Cube", is used for all travel demand forecasting in the region.
- As was done in the original Level A Plan, a more detailed traffic analysis zone system and socioeconomic database was designed to capture the proposed land uses for the travel model. The traffic analysis zone system in this update is even more detailed, and contains more zones in the project area, than the zone system developed for the original Level A Plan. This is intended to capture the additional detail associated with the land use and traffic proposals now known from developer's most recent refined plans.
- Since the modeling was done for the original Level A Plan, MRCOG has adopted a new update to the regional Metropolitan Transportation Plan (MTP). In so doing, MRCOG has changed the long-range time horizon for regional planning to the year 2040 (from 2035 addressed in the original plan) and developed new forecasts of demographics and jobs for the region for that date. These forecasts, lower than the original 2035 forecasts referenced several years ago, provide the backdrop for planning work performed specifically for the Santolina proposal.
- Additionally, MRCOG has also refined its plans for a future regional roadway network foreseen for the year 2040 horizon year.

All work connected with the MRCOG "Cube" travel demand model was performed by Planning Technologies on behalf of the developer, including the construction of the databases, operation of the model itself, as well as much of the subsequent analysis of results. The consultant's work with the travel model, the various assumptions and methodologies, were reviewed with MRCOG staff at key points along the process.

Analysis Scenarios

There are two planning objectives sought in this study:

- **Level A Update:** Update the traffic forecasts and analysis for the original Level A Transportation Analysis that was approved by the County last year.
- **Level B Proposal:** Prepare new traffic forecasts and analysis for a new Level B proposal that is being submitted to the County,

The updated Level A Transportation Analysis encompasses the additional detail available from the Level B proposal.

While these two objectives involve two separate submittals to the County, both share a common approach to traffic forecasting and analysis. The same traffic model was developed to support both, and they share the same network and socioeconomic databases. Consequently, this single technical report will address the work that was done on behalf of both submittals.

- **Level A Update:** The Level A Update requires two scenarios to be examined: (1) a 2040 scenario that represents phased development through 2040 and (2) a "build-out" scenario that the developer associates with the year 2065.
- **Level B Proposal:** The Level B proposal also requires two scenarios to be examined: (1) an intermediate phased development proposal through the year 2025 and (2) a "build-out" scenario for Level B which the developer anticipates will be in the year 2040.

The ***SAME*** 2040 scenario applies to both the Level A Update and the Level B proposal.

The MRCOG MTP scenarios for 2025 and 2040 will provide a basis for comparison for evaluating traffic impacts associated with Santolina development: it is the "baseline" condition, if you will. Note that the MRCOG did not actually report 2025 forecasts in the published MTP. The MRCOG staff did, however, develop a regional 2025 scenario (for both socioeconomic growth and network development) for use in this Santolina study, and we are appreciative of this assistance.

In addition, note that MRCOG does not forecast socioeconomics or transportation network development beyond the year 2040. Consequently, it is not possible to analyze off-site impacts associated with the 2065 (build-out) Santolina proposal. We did run a 2065 forecast for Santolina, but this forecast is based on 2040 conditions outside of Santolina. This scenario *cannot be used to evaluate off-site impacts* because, for one thing, there would be 25 years of regional highway development that would ostensibly occur but is not represented in the forecast. This 2065 scenario could be used, in our opinion, to at least evaluate the ability of the proposed circulation plan to accommodate build-out land uses *inside* of Santolina.

A summary of the various analysis scenarios and the study to which they pertain is shown here:

Table 1: Santolina Traffic Forecast Scenarios

Study	Intermediate Scenario	Long Term Scenario
Level A Update	*Santolina Scenario:* **2040 Santolina Network and Land Use**	*Santolina Scenario:* **2065 Santolina Network and Land Use**
	Base Scenario: **2040 MTP Network and Land Use**	***Base Scenario:*** **None**
Level B Submittal	*Santolina Scenario:* **2025 Santolina Network and Land Use**	*Santolina Scenario:* **2040 Santolina Network and Land Use**
	Base Scenario: **2025 MTP Network and Land Use**	*Base Scenario:* **2040 MTP Network and Land Use**

The Santolina Village Plan

The Land Use Plan for Santolina has been refined by the developers since the original adoption of the Level A Master Plan last year. These refinements have arisen, in part, to implement and capture various recommendations coming from the County's review of the original Level A work. For example:

- **Recommended Changes by the County:** The original Plan, as adopted, incorporated more arterial connections to the surrounding transportation network than was originally analyzed in the Plan's technical work.
- **Minor Alignment Shifts:** Also, the need to observe policies addressing intersection spacing and access control necessitated a slight shift in roadway alignments, compared with what was originally studied. The shift in roadway alignments somewhat reshaped some of the original village boundaries around which they border.
- **Level B Detail:** And finally, planning work for a new Level B plan supplies much greater detail about the plan than was previously available.

The sense of the original plan, however, remains essentially unchanged.

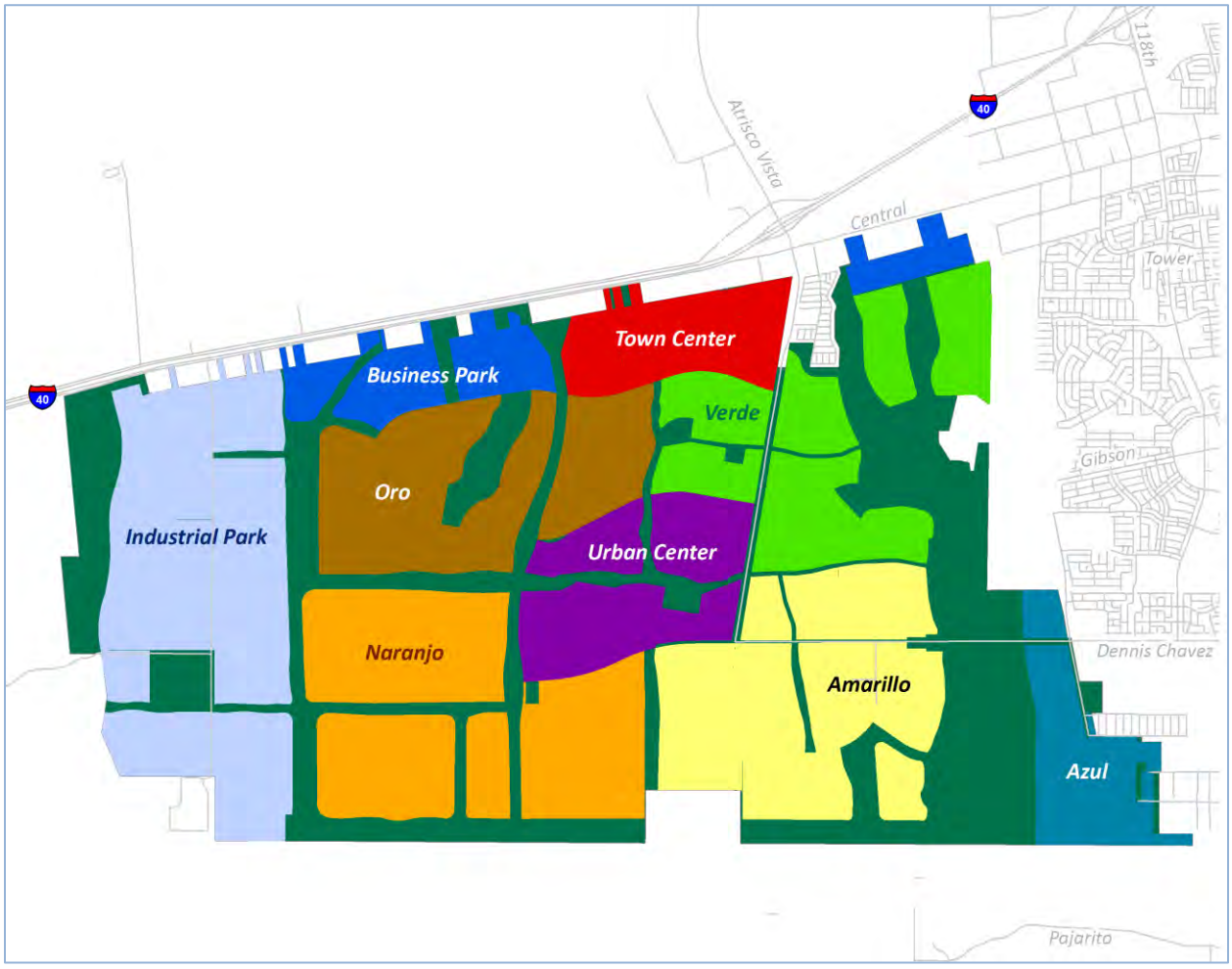

Figure 2: Santolina Village Plan

Land uses in Santolina are organized into several villages as shown in Figure 2. These include an Urban Center, a Town Center, and Industrial/Energy Park, a Business Park, and 5 residentially oriented villages (Verde, Azul, Amarillo, Oro, and Naranjo). The plan includes an ample amount of undeveloped open space.

A summary of residential and commercial development associated with the updated Level A Plan is shown in Table 2. Also shown is a comparison between the current proposal and the proposal that was analyzed in the original Level A Master Plan analysis that was reported in "Travel Demand Modeling Procedures and Databases" dated January 9, 2013.

Table 2: Residential and Commercial Development in Santolina

	Current Proposal at Build-Out				Original Level A Master Plan *			
			Dwelling				Dwelling	
Village	**Acres**	**Population**	**Units**	**Jobs**	**Acres**	**Population**	**Units**	**Jobs**
Amarillo	1,602	21,668	8,774	3,057	1,795	22,423	9,115	-
Azul	563	8,245	3,338	768	692	6,809	2,768	-
Business Park	631	-	-	20,870	741	-	-	22,373
Industrial/Energy Park	2,044	-	-	14,595	2,054	-	-	14,267
Naranjo	1,739	22,790	9,226	3,457	1,587	19,532	7,940	-
Oro	1,171	15,546	6,294	3,293	1,080	13,284	5,400	-
Town Center	570	-	-	12,423	508	-	-	13,830
Urban Center	772	10,142	4,106	14,821	771	7,262	2,952	19,235
Verde	1,244	16,413	6,643	3,176	1,963	22,472	14,576	-
Village Centers	-	-	-	-	375	3,690	1,500	7,596
Total	***10,336***	***94,804***	***38,381***	***76,460***	***11,566***	***95,472***	***44,251***	***77,301***

** Note: Original Level A Master Plan data from Table 5, Page 6, of "Travel Demand Modeling Procedures and Databases" dated 1/9/2013*

Open Space areas not shown in this table.

Altogether, roughly 95,000 people are expected to reside in 38,000 dwelling units at build-out. Total commercial development is expected to involve 30 million square feet of commercial and industrial space and will be the work-location for an estimated 76,000 workers. These totals are slightly less than originally analyzed in the original Level A plan.

Note that the accounting depicted in Table 2 is somewhat different than was reported in the original Level A Analysis. Open space areas are not reported. Also: "village centers" are no longer called out separately from the villages themselves. Instead, job totals associated with commercial uses in the village centers are included in the totals for the villages themselves. This is not a material change in the plans – planning for the development has now advanced to a point where the individual locations of specific land uses is now known, as will be shown next.

Detailed Land Uses in Santolina

The development team has developed a more detailed plan for land uses in Santolina than was presented in the original Level A submittal, especially within the Level B development area. Within the Level B development area, dedicated land uses (mostly) have been identified for individual polygons. Outside of the Level B area, the proposal continues to consist of several large mixed land use polygons.

Figure 2 shows the Level B proposal area. Note the greater land use detail in this area, where the extent and location of dedicated land uses is illustrated.

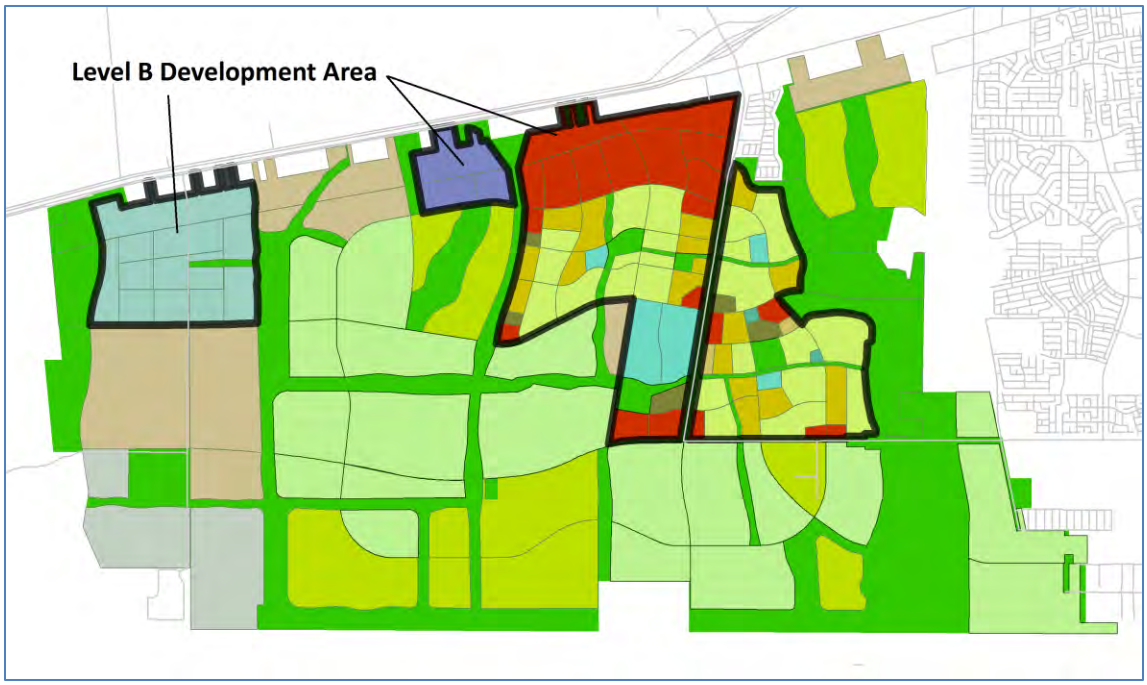

Figure 2: Level B Development Area is shown here. Note the greater detail illustrating the extent and location of dedicated land uses in the Level B area.

Specific land uses proposed for Santolina is shown in Figure 3.

The developers and their planners have quantified detailed estimates of land use and development for each of the polygons contained in the land use plan, by year. These estimates include

- Non-Residential Gross Square Feet (GSF) by building type
- Number of Jobs, by building type
- Residential Units (by residential building type)
- Population (by residential building type)
- Schedule of construction (annually) for each Land Use polygon through Buildout (2065)

These estimates provide the basis for creating the socioeconomic profile for Santolina zones in the MRCOG Cube traffic model.

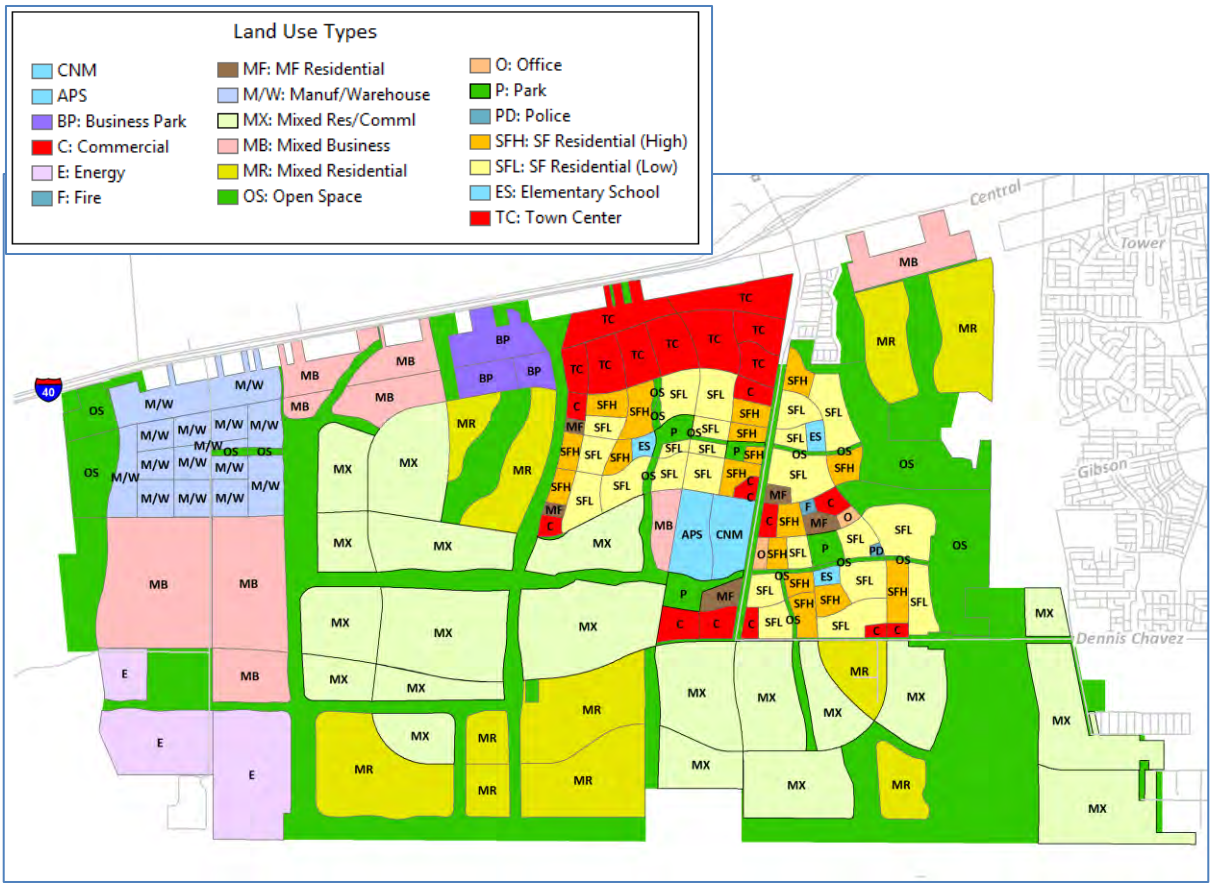

Figure 3: Detailed Land Uses in Santolina.

Note that land uses inside of the Level B development area have been broken down into more detailed dedicated uses. Outside of the Level B development area, land uses continue to be defined to be "mixed use" of various sorts:

- **Mixed Use Residential:** Includes both single-family (SF) and multi-family residential developments
- **Mixed Use Commercial**: Includes a combination of non-residential (commercial) land uses of various types
- **Mixed Use Both:** Includes both residential and non-residential uses

Santolina Socioeconomics at Build-Out

Estimates of residential and non-residential development were generated via a set of assumptions relating to each type of development.

Residential estimates are based on:

- Assumed densities (Units/Acre) associated with residential development to estimate the number of residential units

Table 3: Residential Assumptions

Land Use	Density Units/Acre	Vacancy Rate	HH Size Persons/HH
SF Residential (Low)	5.0	5%	2.6
SF Residential (Medium)	8.0	5%	2.6
MF Residential	20.0	5%	2.6

- Household estimates are based on an assumed 5% vacancy rate for all residential units (95% occupancy)
- Population estimates are based on an overall average household size of 2.6 persons per household. This reflects the same assumption of 2.46 persons per dwelling unit that was used in the original Level A submittal

Non-residential estimates are based on:

- Assumed floor-area-ratios (FARs) for the various non-residential land uses to estimate total building space (gross square footage)
- Assumed spatial requirements per job, varying by type of building

Table 4: Non-Residential Assumptions

Land Use	FAR	SqFt/Employee
Industrial	0.16	
...Manufacturing		559
...Warehouse		781
Office	0.18	223
Town Center	0.20	400
Commercial	0.18	400
Business park	0.24	316
Institutional	0.12	173

The demographic assumptions were applied to each land use polygon that appears in the plan (shown in Figure 3). Table 5, then summarizes residential development proposed for Santolina at build-out:

- Roughly 38,400 residential units
- 36,400 households
- 94,800 population

Table 5: Residential Development for Santolina at Build-Out (2065)

Land Use Type	Acres	Residential Units SF	MF	Total	Households	Household Population
APS	91.3	0	0	**0**	0	0
Business Park	194.8	0	0	**0**	0	0
CNM	86.6	0	0	**0**	0	0
Commercial	198.2	0	0	**0**	0	0
Energy	556.0	0	0	**0**	0	0
Fire	6.1	0	0	**0**	0	0
MF Residential	74.7	0	1,494	**1,494**	1,420	3,689
Mfg/Warehouse	670.9	0	0	**0**	0	0
Mixed Use	3,427.0	13,842	5,700	**19,542**	18,564	48,270
Mixed Use (Business)	1,297.0	0	0	**0**	0	0
Mixed Use (Residential)	1,758.0	9,196	200	**9,396**	8,925	23,209
Office	20.6	0	0	**0**	0	0
Open Space	0.0	0	0	**0**	0	0
Park	0.0	0	0	**0**	0	0
Police	4.7	0	0	**0**	0	0
School	43.3	0	0	**0**	0	0
SF Res (H Density)	422.4	3,378	0	**3,378**	3,210	8,348
SF Res (Low Density)	914.0	4,571	0	**4,571**	4,341	11,288
Town Center	570.4	0	0	**0**	0	0
Total	**10,336.0**	**30,987**	**7,394**	**38,381**	**36,460**	**94,804**

Note: Acres listed at total build-out

On the non-residential side, Table 6 summarizes GSF estimates for buildings by land use type:

Table 6: Non-Residential Building Space at Build-Out (2065)

Land Use Type	Acres	Gross Square Footage (000) by Building Type Industrial	Office	Twn Ctr	Comm'l	Bns Park	Inst	Total
APS	91.3	--	0.0	0.0	0.0	0.0	477.2	**477.2**
Business Park	194.8	0.0	0.0	0.0	0.0	2,036.5	0.0	**2,036.5**
CNM	86.6	0.0	0.0	0.0	0.0	0.0	452.7	**452.7**
Commercial	198.2	0.0	260.3	0.0	1,293.7	0.0	0.0	**1,554.0**
Energy	556.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Fire	6.1	0.0	0.0	0.0	0.0	0.0	31.9	**31.9**
MF Residential	74.7	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mfg/Warehouse	670.9	4,675.9	0.0	0.0	0.0	0.0	0.0	**4,675.9**
Mixed Use	3,427.0	0.0	431.2	0.0	3,426.4	0.0	899.1	**4,756.8**
Mixed Use (Business)	1,297.0	5,694.2	86.2	0.0	258.7	4,558.1	0.0	**10,597.3**
Mixed Use (Residential)	1,758.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Office	20.6	0.0	161.5	0.0	0.0	0.0	0.0	**161.5**
Open Space	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Park	0.0	0.0	0.0	0.0	0.0	0.0	41.8	**41.8**
Police	4.7	0.0	0.0	0.0	0.0	0.0	24.6	**24.6**
School	43.3	0.0	0.0	0.0	0.0	0.0	226.3	**226.3**
SF Res (H Density)	422.4	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
SF Res (Low Density)	914.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Town Center	570.4	0.0	0.0	4,969.3	0.0	0.0	0.0	**4,969.3**
Total	**10,336.0**	**10,370.1**	**939.3**	**4,969.3**	**4,978.9**	**6,594.6**	**2,153.6**	**30,005.9**

Note: Acres listed at total build-out

And, finally, estimates of employment for buildings in Santolina, at build-out (2065), are shown in Table 7. At build-out in 2065, non-residential development in Santolina is projected to be:

- About 30 million square feet of commercial space
- Roughly 76,000 jobs

Table 7: Employment Estimates for Santolina at Build-Out (2065)

Land Use		Jobs by Building Type						
Type	Acres	Industrial	Office	Twn Ctr	Comm'l	Bns Park	Inst	Total
APS	91.3	0	0	0	0	0	2,759	**2,759**
Business Park	194.8	0	0	0	0	6,445	0	**6,445**
CNM	86.6	0	0	0	0	0	2,617	**2,617**
Commercial	198.2	0	1,166	0	3,235	0	0	**4,401**
Energy	556.0	0	0	0	0	0	0	**0**
Fire	6.1	0	0	0	0	0	25	**25**
MF Residential	74.7	0	0	0	0	0	0	**0**
Mfg/Warehouse	670.9	6,580	0	0	0	0	0	**6,580**
Mixed Use	3,427.0	0	1,932	0	8,568	0	4,819	**15,319**
Mixed Use (Business)	1,297.0	8,015	387	0	647	14,425	0	**23,474**
Mixed Use (Residential)	1,758.0	0	0	0	0	0	0	**0**
Office	20.6	0	724	0	0	0	0	**724**
Open Space	0.0	0	0	0	0	0	0	**0**
Park	0.0	0	0	0	0	0	242	**242**
Police	4.7	0	0	0	0	0	142	**142**
School	43.3	0	0	0	0	0	1,308	**1,308**
SF Res (H Density)	422.4	0	0	0	0	0	0	**0**
SF Res (Low Density)	914.0	0	0	0	0	0	0	**0**
Town Center	570.4	0	0	12,423	0	0	0	**12,423**
Total	**10,336.0**	**14,595**	**4,209**	**12,423**	**12,450**	**20,870**	**11,912**	**76,459**

Note: Acres listed at total build-out

The MRCOG traffic model characterizes employment according to 3 econometric sectors: "basic", "retail", and "service", and so the job estimates characterized in Table 7 have to be so classified for the traffic model. MRCOG classifications are based on NAICS codes; for Santolina we relied on a breakdown of job sectors that varies according to the type of land use. This is indicated in Table 8.

Table 8: Employment Classifications for Santolina Land Uses

Land Use	Basic	Retail	Service
Industrial	100%	0%	0%
Office	15%	0%	85%
Town Center	0%	40%	60%
Commercial	0%	30%	70%
Bus Park	50%	0%	50%
Institution	0%	0%	100%

These assumptions give rise to job estimates for Santolina land uses as summarized in Table 9.

Table 9: Employment Estimates by MRCOG Model Sector at Build-Out (2065)

Land Use Type	Acres	Jobs by Sector Basic	Retail	Service	Total
APS	91.3	0	0	2,758	**2,758**
Business Park	194.8	3,222	0	3,222	**6,444**
CNM	86.6	0	0	2,616	**2,616**
Commercial	198.2	176	972	3,256	**4,404**
Energy	556.0	0	0	0	**0**
Fire	6.1	0	0	25	**25**
MF Residential	74.7	0	0	0	**0**
Mfg/Warehouse	670.9	6,580	0	0	**6,580**
Mixed Use	3,427.0	292	2,571	12,461	**15,324**
Mixed Use (Business)	1,297.0	15,284	194	7,994	**23,472**
Mixed Use (Residential)	1,758.0	0	0	0	**0**
Office	20.6	109	0	616	**725**
Open Space	0.0	0	0	0	**0**
Park	0.0	0	0	242	**242**
Police	4.7	0	0	142	**142**
School	43.3	0	0	1,308	**1,308**
SF Res (H Density)	422.4	0	0	0	**0**
SF Res (Low Density)	914.0	0	0	0	**0**
Town Center	570.4	0	4,972	7,452	**12,424**
Total	**10,336.0**	**25,663**	**8,709**	**42,092**	**76,464**

Note: Acres listed at total build-out

Phased Development in Santolina (2025 and 2040)

The previous section describes how socioeconomic estimates for population and employment were generated for the Santolina development at "build-out" (2065). As we mentioned earlier, the developers have prepared a schedule that details, for each year, the amount of development foreseen for each land use polygon. This schedule makes it possible for us to create land use estimates for the intermediate years 2025 and 2040.

Note:

- **2025**: The 2025 scenario will involve partial development of the Level B area. See Figure 4.
- **2040**: The 2040 scenario involves complete 100% development of the Level B area. In addition, the 2040 scenario includes additional development outside of the Level B development area. These developments would be undertaken as approved in other Level B proposals that have not yet been submitted. See Figure 5.

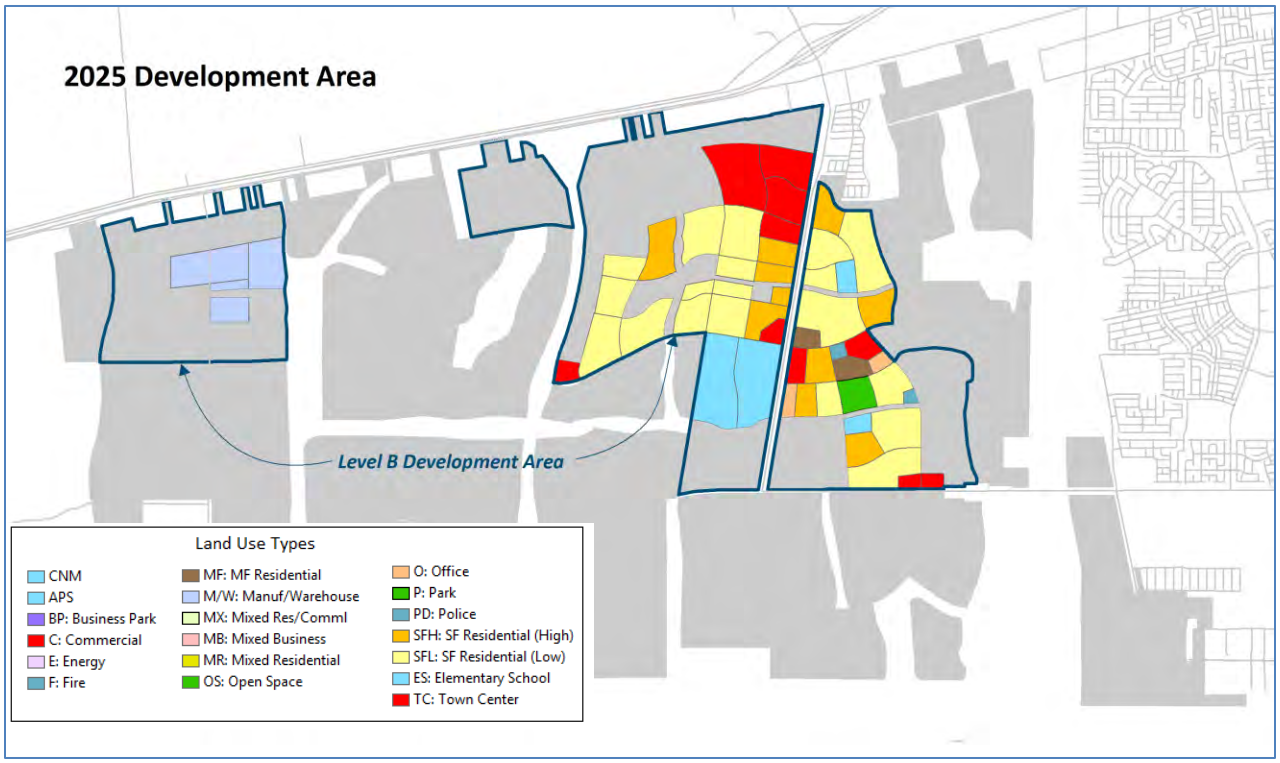

Figure 4: Development included in the 2025 scenario is shown here. The 2025 scenario depicts partial development of the Level B Development Area.

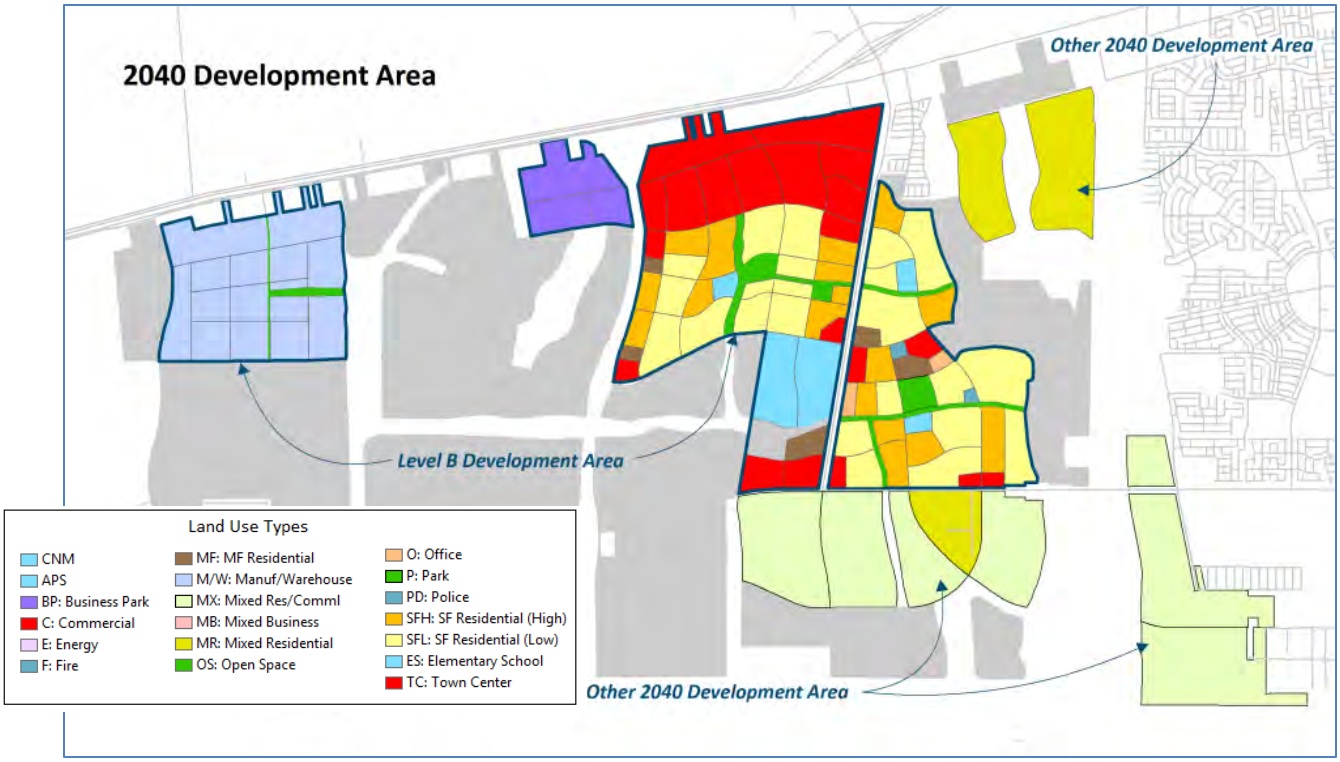

Figure 5: Development included in the 2040 scenario is shown here. The 2040 scenario depicts 100% development of the Level B Development Area. In addition, it includes partial development of other land uses outside of the Level B Development area.

Demographic and employment statistics associated with phased development for 2025 and 2040 were estimated according to the same methods as indicated above for "build-out". In essence, each phase of development reflects the set of land use parcels that will be built by that time. A full summary, by land use, is available. But for the sake of brevity, we will include only a summary of land uses for 2025 and 2040 as shown in Table 10.

Table 10: Development Summary

Sector	Statistic	2025	Level B 2040	2040	(Build-Out) 2065
Residential	Population	15,321	23,325	48,119	94,804
	Households	5,893	8,971	18,506	36,460
	SF Units	5,547	7,949	16,427	30,987
	MF Units	654	1,494	3,054	7,394
	Total Units	**6,201**	**9,443**	**19,481**	**38,381**
	% Buildout	*16%*	*25%*	*51%*	*100%*
Non-Residential	Basic	1,632	10,087	10,087	25,663
	Retail	1,248	3,458	3,865	8,709
	Service	5,797	17,911	18,858	42,092
	Total Jobs	**8,677**	**31,456**	**32,810**	**76,464**
	% Buildout	*11%*	*41%*	*43%*	*100%*
	Jobs/HH	1.47	3.51	1.77	2.10

Table 10 summarizes statistics for the Level B area for 2040 for reference, but as a reminder recall that the actual 2040 scenario also includes development outside of the Level B area. These other areas to be developed by 2040 outside of the Level B area will presumably be addressed in other Level B proposals, and consist mostly of residential housing.

- **By 2025**, Santolina is expected to be developed to a 10% to 15% level overall. Roughly two-thirds of the Level B housing would be developed; roughly one-third of Level B non-residential would be developed.
- **By 2040**, Santolina is expected to be 50% developed. This will include 100% of the Level B area as well as additional development outside of the Level B area.

Zone System for the MRCOG Traffic Model

The scope of the MRCOG travel demand model covers all or parts of 5 counties: all of Bernalillo and Valencia Counties and parts of Sandoval, Santa Fe, and Torrance Counties, as shown in Figure 6.

The regional traffic analysis zone (TAZ) system was revised in 2011 for the most recent MTP, and therefore is somewhat different than it was when the original Level A study was conducted. The zone system now consists of 907 TAZs (vs. 852 prior to 2011)

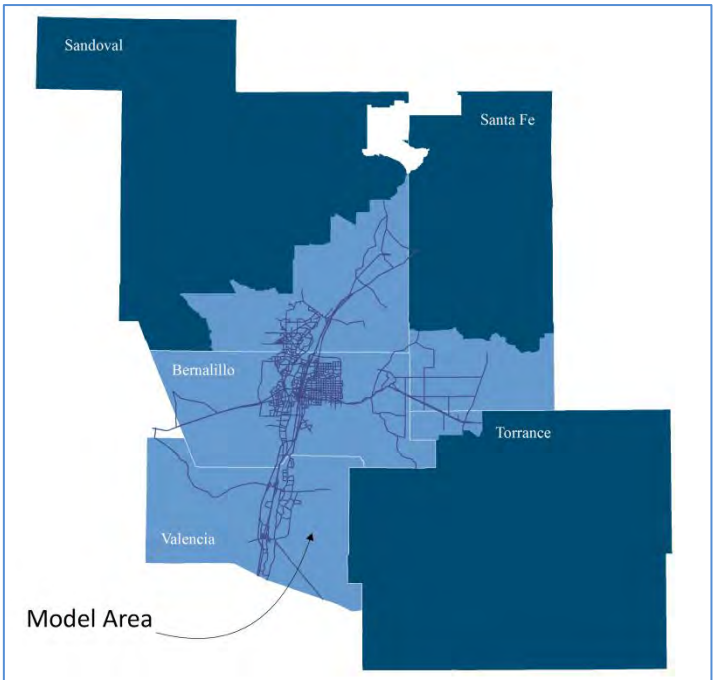

Figure 6: MRCOG Travel Model Area

The regional model, however, provides very little detail in the Santolina project area. The entire development area, for example, is covered by only 5 MRCOG zones. This is because the regional model focuses zone detail in urbanized areas where the street system is already developed. Remote and rural areas in the region with only sparsely developed roads tend to be covered with little zone detail.

This is illustrated in Figure 7.

Traffic loads on the Santolina circulation system cannot be properly modeled with the MRCOG model as it presently stands. Greater zone detail is required. The Cube model does not model trips that remain internal to a zone, and inasmuch as most of Santolina lies within a single zone, the model would be unable to produce a reasonable forecast.

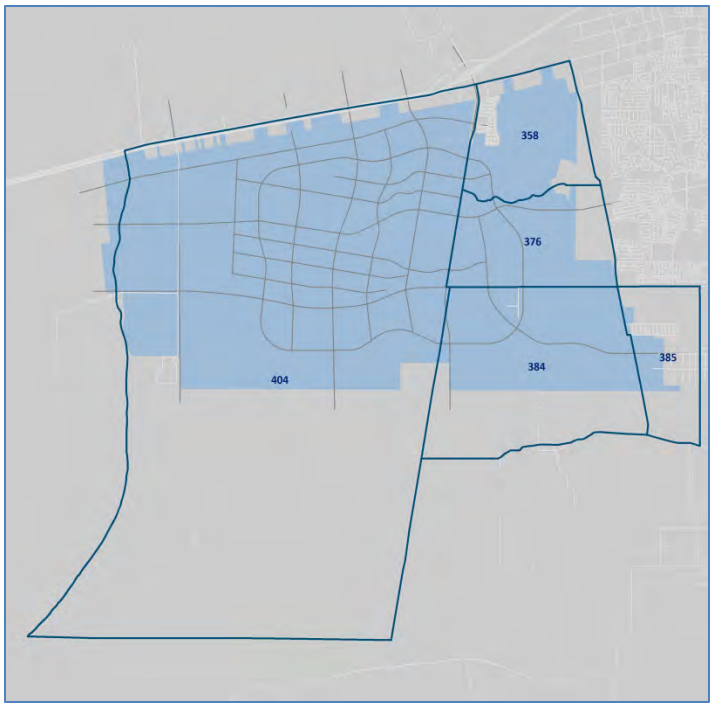

Figure 7: MRCOG Model Zones Near Santolina

Consequently, as was done in the original Level A analysis, a revised zone system was developed for this study. See Figure 8.

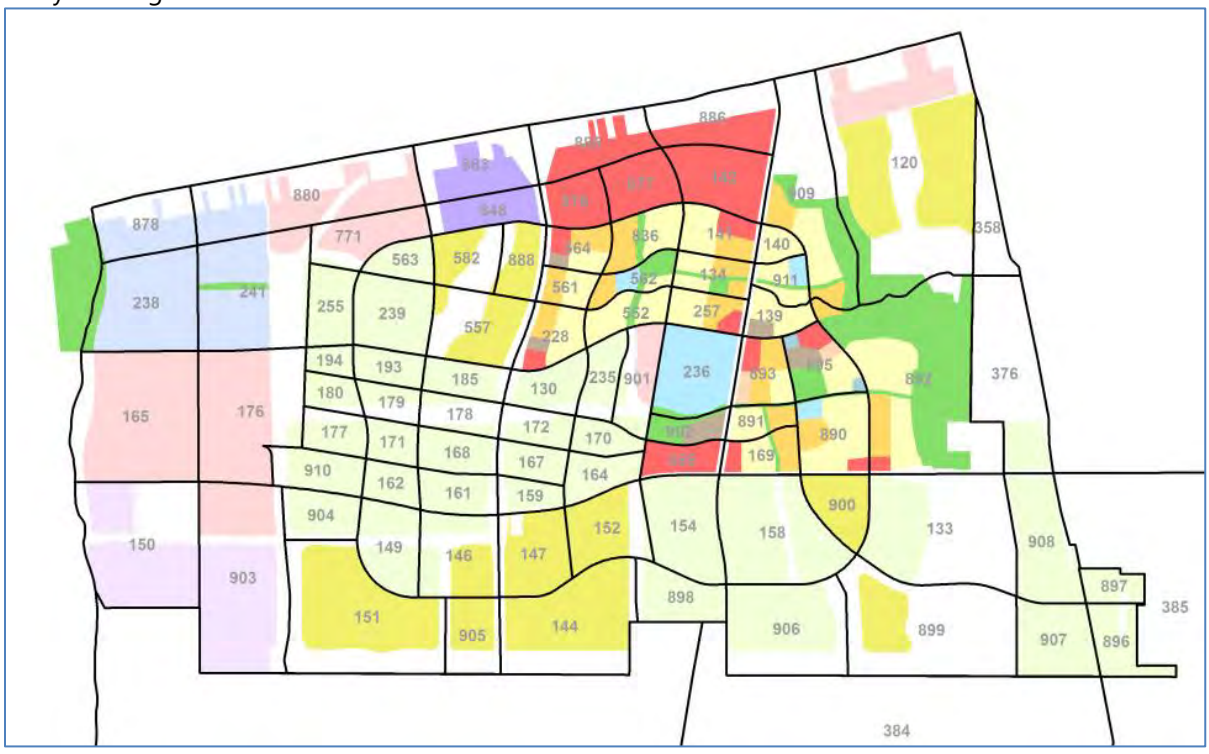

Figure 8: Santolina Zone System

The revised zone system for Santolina encompasses 89 TAZs for the Santolina area (including the 5 original MRCOG zones from the MTP). For the most part, the zone boundaries come from the circulation plan – roadways for which traffic forecasts are required are best modeled if they do not reside entirely internal to a zone. Our goal was to provide traffic forecasts for roadways in the circulation plan classified as "Collectors" and above, and therefore these roadways provide the spatial geography of the zone system.

Preparing socioeconomic forecasts for this zone system for any given year (e.g., 2025, 2040, and 2065) is a rather trivial matter accomplished by overlaying the zone system shown in Figure 8 on top of the land use geography. Summaries of housing, population, non-residential development, and jobs can be generated through GIS (Geographic Information Systems) from the data associated with the land use plan.

MTP Projections for Santolina

Traffic impacts associated with the Santolina development will be identified through a comparison of the Santolina traffic model simulations with the MTP. It therefore is worthwhile to report what level of development the MTP foresees for Santolina. This is especially important because the MTP forecasts for Santolina have changed radically from what the once were when the original Level A study was performed.

Table 11 summarizes regional projections of socioeconomics, comparing the current MTP ("Futures 2040") with the MTP for 2035. Overall growth in the Albuquerque metropolitan area has been significantly down-played in the most recent MTP:

- Population is 11% lower
- Employment is 7.5% lower

Table 11: Regional Socioeconomic Projections

MTP	Year	Household Population	Employment
Futures 2040	2012	882,385	392,565
	2025	1,032,633	437,842
	2040	1,330,355	576,971
2035 MTP	2035	1,485,839	622,546

Despite the fact that the horizon year for the MTP has been advanced by 5 years (2040 vs. 2035), overall population and employment forecasts are lower. MRCOG (and the UNM Bureau of Geospatial and Population Studies who furnishes regional forecasts) report that the recession and economic downturn that started in 2008 and for which the metro area has not yet fully recovered is responsible for this more pessimistic long-term outlook.

Table 12 compares how MTP projections for Santolina itself have changed. As noted in that table, MTP representation of Santolina is radically different than it once was:

- 2040 Population in Santolina is 20% of the original 2035 estimate
- 2040 Employment in Santolina is 40% of the original 2035 estimate

So, while the current Santolina development proposal is quite similar in extent and density to that analyzed in the original Level A submittal, the MTP to which it is compared is very different. Differences in the level of impacts that are evident in this current study will likely have more to do with the change in the regional outlook for Santolina than it does with any differences in the way that Santolina itself is depicted.

Table 12: Changes in MTP Forecasts for Santolina Zones

		Household Population		Employment	
Zone	DASZ	2035 MTP	2040 MTP	2035 MTP	2040 MTP
358 (343)	5701	2,998	3,972	437	130
376 (360)	5741	3,349	2,716	549	56
384 (367)	5761	16,091	3,150	388	71
385 (368)	5762	5,058	2,055	276	293
404 (387)	5911	41,009	2,139	2,326	1,068
Total		**68,505**	**14,032**	**3,976**	**1,618**

Note: MRCOG Zone numbering scheme has changed from the 2035 MTP. 2035 MTP zone numbers shown in parentheses.

Table 13 compares Santolina projections for each year with those depicted in the MTP.

Table 13: Comparing Santolina Projections with the MTP

			Household Population		Employment	
Year	Zone	DASZ	MTP	Santolina	MTP	Santolina
2025	358	5701	2,161	2,574	70	486
	376	5741	711	5,826	15	2,667
	384	5761	126	0	10	0
	385	5762	1,396	0	292	0
	404	5911	387	6,920	830	5,525
		Total	**4,781**	**15,320**	**1,217**	**8,678**
		Ratio		**3.2**		**7.1**
2040	358	5701	3,972	7,057	130	486
	376	5741	2,716	10,768	56	3,171
	384	5761	3,150	13,284	71	651
	385	5762	2,055	2,395	293	135
	404	5911	2,139	14,612	1,068	28,367
		Total	**14,032**	**48,116**	**1,618**	**32,810**
		Ratio		**3.4**		**20.3**
2065 *	358	5701	--	7,057	--	5,150
	376	5741	--	10,768	--	3,171
	384	5761	--	16,891	--	1,651
	385	5762	--	2,395	--	181
	404	5911	--	57,694	--	66,313
		Total	--	**94,805**	--	**76,466**
		Ratio		**N/A**		**N/A**

** MRCOG does not forecast for 2065; We used 2040 forecasts for this scenario.*

As indicated in Table 13, proposed level of development in Santolina is now much greater than currently depicted in the MTP. Note that there are no MTP projections for 2065 so the comparison being shown is between 2065 Santolina (build-out) and the 2040 MTP. Specifically:

- **For 2025:**
  - Population proposed for Santolina is **3.2 times greater** than indicated in the MTP
  - Employment proposed for Santolina is **7 times greater** than indicated in the MTP
- **For 2040:**
  - Population proposed for Santolina is **3.4 times greater** than indicated in the MTP
  - Employment proposed for Santolina is **20 times greater** than indicated in the MTP
- **For 2065:**
  - Population proposed for Santolina is **7 times greater** than indicated in the MTP for 2040
  - Employment proposed for Santolina is **47 times greater** than indicated in the MTP for 2040

So, unlike the original Level A study, Santolina in this current MTP is depicted to be comparatively vacant.

Socioeconomic Forecasts for the Traffic Model

In addition to estimates of basic socioeconomic variables such as population and employment, the MRCOG traffic model also requires estimates of a number of other variables related to socioeconomics (and derived from them in some way). Table 14 summarizes the various socioeconomic variables that need to be estimated and expressed in the traffic model database.

Table 14: Estimation Methods for Socioeconomic Variables in MRCOG Traffic Model

Traffic Model Variable	Treatment
Population in Households	Assumes HH Size of 2.6; ~ 2.46 persons per DU as in Original Level A
Dormitory Population	None
Households	Assumes 5% vacancy rate applied to SF & MF residential units
SF Dwelling Units	Directly from the Master Plan
MF Dwelling Units	Directly from the Master Plan
Income Group	Randomly Assigned to Residential TAZs, as follows: ...Exclusive SF Polygons: Quintiles 4,5 ...Exclusive MF Polygons: Quintiles 2,3 ...Mixed SF/MF polygons: Quintiles 2,3,4
School Enrollment (Elem/Mid)	Based on MRCOG regional averages: See detail
School Enrollment (High School)	Based on MRCOG regional averages: See detail
UNM Campus Enrollment	None
CNM Campus Enrollment	Per average space requirements for CNM students (CNM Factbook)
Elementary School Sites & Districts	Master Plan identifies APS school sites and year of development
Middle School Sites & Districts	Districts formed around sites
High School Sites & Districts	Same
Basic Employment	From Master Plan
Service Employment	From Master Plan
Retail Employment	From Master Plan

As indicated earlier, estimates for basic demographic variables (dwelling units, households, and population) for any given year came directly from the demographic estimates prepared for the land use plan itself via a GIS overlay operation. The totals, therefore, are exactly the same as they were reported earlier except they are expressed spatially for traffic model TAZs, rather than land use polygons.

The MRCOG traffic model requires incomes for residential TAZs to be characterized as well. The model's income measure is NOT median income, however. Instead, the model requires users to characterize the income level of the TAZ according to any one of 5 quintiles (1=low income; 5=high income). Naturally, following the definition of "quintiles", 20% of all residential zones in the modeling area belong to one of the income quintiles. As indicated in Table 14, we assumed that zones that were exclusively single family would belong to one of the two highest income quintiles (4, 5). Zones that were exclusively multi-family would belong to medium income quintiles (2, 3). And mixed residential zones, containing both single-family and multi-family housing, would also be medium income zones (2, 3, 4). The actual income quintile was assigned randomly, since there is no information available in the plan that distinguishes the prices of homes (and therefore the income level of their occupants). This methodology is similar to that followed in the original Level A study.

School sites, enrollments, and the districts which serve them also need to be designated in the MRCOG traffic model. Unlike the original Level A study, the current refined land use plan does, in fact, designate school sites (by school level: elementary, middle, high school), along with their anticipated year of development. School district boundaries around each site were essentially eye-balled (basically all zones bordering on a school site were assumed to belong to the district hosted by the school). Enrollments were estimated according to per-capita (actually, "per-household" rates) that were deduced from the existing MRCOG dataset for the region. These rates are shown in Table 15.

Table 15: School Enrollment Rates
Per Household

Level	2025	2040
Elementary	0.1659	0.1553
Middle	0.0718	0.0673
High School	0.0869	0.0814
Overall CNM Enrollment:		
CNM	2,400	10,400

The Santolina development team has been negotiating with CNM for a site in the center part of the Level B development area. Enrollments associated with the CNM campus were based the projection of building space supplied by the planners and an estimate of square foot per student exhibited by existing CNM facilities from the *CNM Factbook* for 2014-2015.

Collapsing Remote and Empty Zones

Theoretically, the MRCOG traffic model can accommodate up to 1,000 zones to represent the region. However, during the course of developing the model for Santolina, we discovered that its true practical limit is 923 zones. This is due to the model's continued reliance on an old EMME/2 database for mode choice. The database is zone-specific. While theoretically a new database can be constructed with the EMME/2 system, the software involved will not run on contemporary Win7 machines (only XP). We therefore had to rely on an existing EMME/2 database, built for 923 zones, to implement the Santolina model for this study.

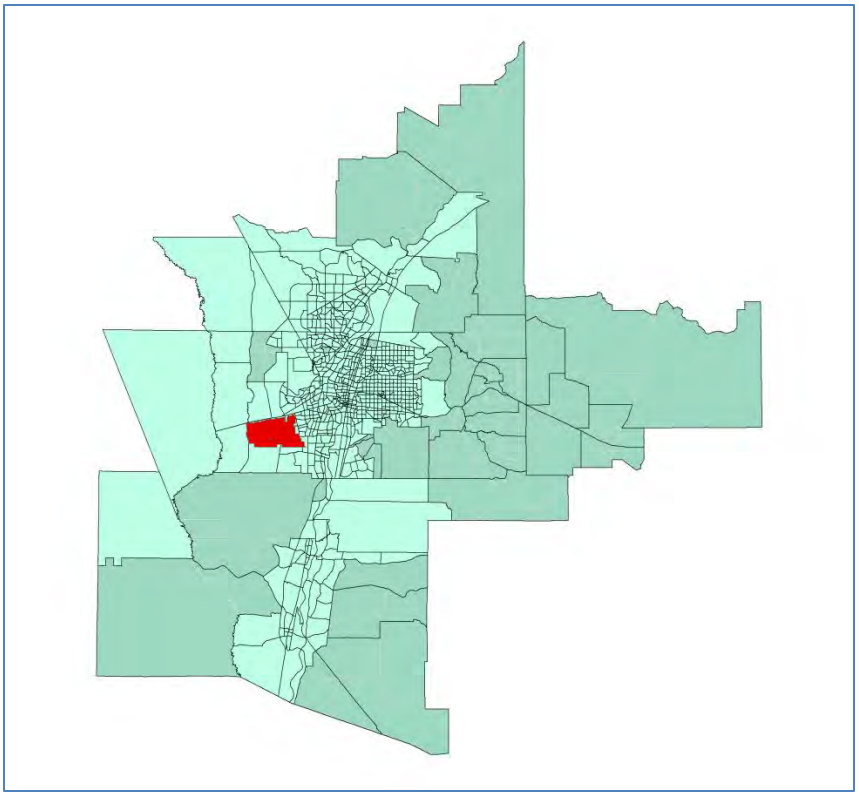

Figure 9: Remote and Rural Zones: Zones indicated here (dark colors) were aggregated, usually 2 to 4 at a time, to reduce the overall zone count in the model.

In order to do this, a number of zones had to be aggregated so as to reduce the overall zone count for the region. Zones that were distant from Santolina, or were empty, were selected to do this. In general, 2-4 zones that were empty (in 2040) or were in remote areas, were so aggregated so as to minimize any impact on the model or the results that it delivered for the project area.

This procedure was reviewed and approved by the MRCOG model team.

Normalization To Match Regional Control Totals

MRCOG projections for population and employment for the region for any given year (e.g., 2025 or 2040) must be maintained. Otherwise, a comparison of Santolina modeling results with those from the MTP (for example) would be skewed by different regional totals for population and employment. Consequently, the need to maintain the same regional control totals for all model scenarios gives rise to the need to "normalize" population and employment. This is to say, any increases in population and employment in the project study area (i.e., Santolina) must be offset by similar reductions elsewhere in the region.

The regional control totals for population and employment that were maintained in each Santolina model scenario are shown in Table 16.

Table 16: Regional Control Totals

Statistic	2025	2040
Population	1,032,633	1,330,355
Jobs:		
Basic	114,397	140,940
Retail	79,425	85,663
Service	244,020	350,368
Total	**437,842**	**576,971**

The "normalization" procedure followed in this study was performed in consultation with MRCOG staff. Specifics include:

- MRCOG requires that 4 socioeconomic variables be "normalized": population and each job classification (basic, retail, and service)
- "Normalization" must be achieved by factoring growth in other areas to offset growth in Santolina: I.e., it is not the absolute totals for population and employment to be normalized but the growth values. This method enforces the basic idea that development in Santolina is in competition with other developments that are active in the region over the same forecasting period (rather than say, static and unchanging neighborhoods).
- Naturally, demographic variables related to population (e.g., "households", "dwelling units") should be adjusted when population is reduced due to normalization.

The question is, over what area should population and employment growth be reduced to offset growth in Santolina? The MRCOG's point of view is that the areas selected should be those that are thought (at least loosely) to be in competition with similar development in Santolina. Specifically:

- For Population and Population-Serving Job Categories (e.g., Service and Retail Jobs): Under direction from MRCOG staff, Santolina was deemed to be in competition primarily with the Albuquerque west side, Rio Rancho, and Mesa del Sol. Therefore, it is from these areas that growth for Santolina should be offset.
- For Basic Jobs: Basic jobs are seen to be a fully regional market: growth in basic jobs in Santolina is seen to be achieved in competition with basic jobs elsewhere throughout the region.

The areas over which population and employment should be normalized is shown in Figure 10.

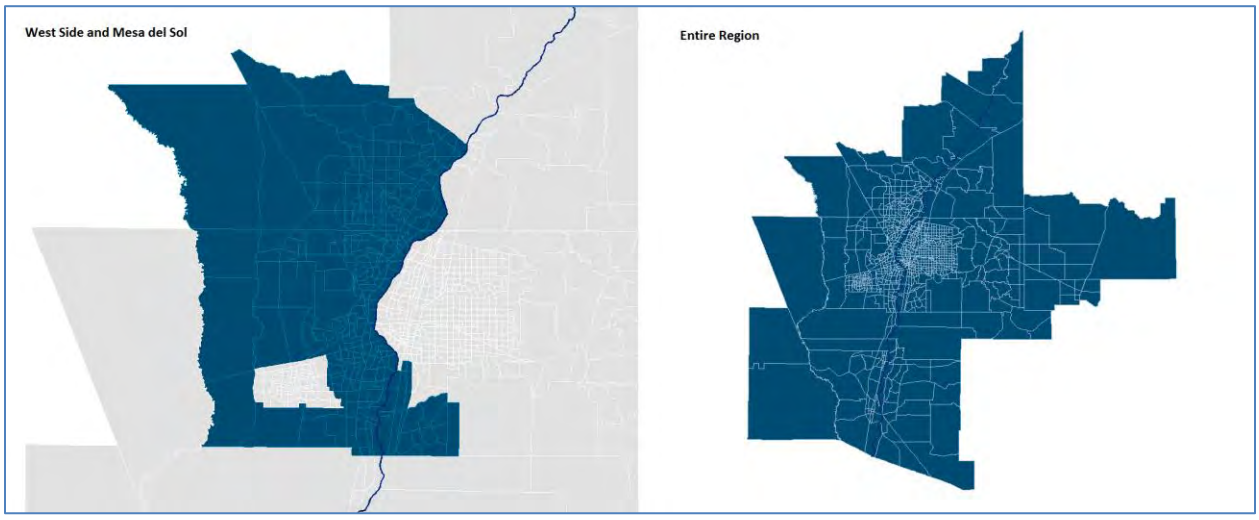

Figure 10: Normalization areas are shown here. The map to the left, highlighting Albuquerque's west side, Rio Rancho, and Mesa del Sol, was used for normalizing population and retail and service jobs. The area to the right, the entire region, was used for normalizing basic jobs

Table 17 indicates the amount of growth that was reduced in these competitive "normalization" areas to offset growth in Santolina.

For example, the MTP indicates an overall population growth of 72,090 the Albuquerque west side and Mesa del Sol. It is this growth that would have to be reduced to accommodate a growth in population of 15,320 residents in Santolina – or 21.3%.

Table 17: Percent Reduction in Growth to Accommodate Santolina Projections

Year	Area	Household Population	Basic	Service	Retail
2025	Santolina	15,320	1,633	5,798	1,247
	West Side & MDS	72,090	--	13,432	3,695
	Entire Region	--	12,382	--	--
	% Reduction	**21.3%**	**13.2%**	**43.2%**	**33.7%**
2040	Santolina	48,116	10,088	18,858	3,863
	West Side & MDS	251,934	--	55,880	7,513
	Entire Region	--	38,925	--	--
	% Reduction	**19.1%**	**25.9%**	**33.7%**	**51.4%**

For 2025, the following reductions in growth in competitive areas would need to be affected so as to maintain regional control totals:

- 21% reduction in population growth (West Side and Mesa del Sol)
- 13% reduction in basic jobs (over the entire region)
- 43% reduction in service jobs (West Side and Mesa del Sol)
- 34% reduction in retail jobs (West Side and Mea del Sol)

For 2040:

- 19% reduction in population growth (West Side and Mesa del Sol)
- 26% reduction in basic jobs (over the entire region)
- 34% reduction in service jobs (West Side and Mesa del Sol)
- 51% reduction in retail jobs (West Side and Mea del Sol)

The net result of implementing these adjustments is that the population and job control totals for the Santolina modeled scenarios all match the MTP scenarios precisely.

Note that NO normalization procedure was applied to the 2065 Build-Out scenario. As indicated before, there are no MTP projections available for the year 2065 and therefore no regional control totals to match. For the 2065 Build-Out Scenario, Santolina socioeconomic projections were merely added to MTP forecasts for the rest of the region (for 2040).

Adjustments for "Partial" Zones

Finally, note in Figure 11 that there are several original MRCOG zones that exist in the traffic model that are partially occupied by the Santolina development. We are calling these "partial" zones. It is therefore necessary to understand to what degree the MTP projections of population and employment for these zones fall outside of the Santolina development, and therefore should be retained in the socioeconomic database.

Note that in our Santolina zone numbering scheme, remnants of these zones retained their original MRCOG model zone identifier.

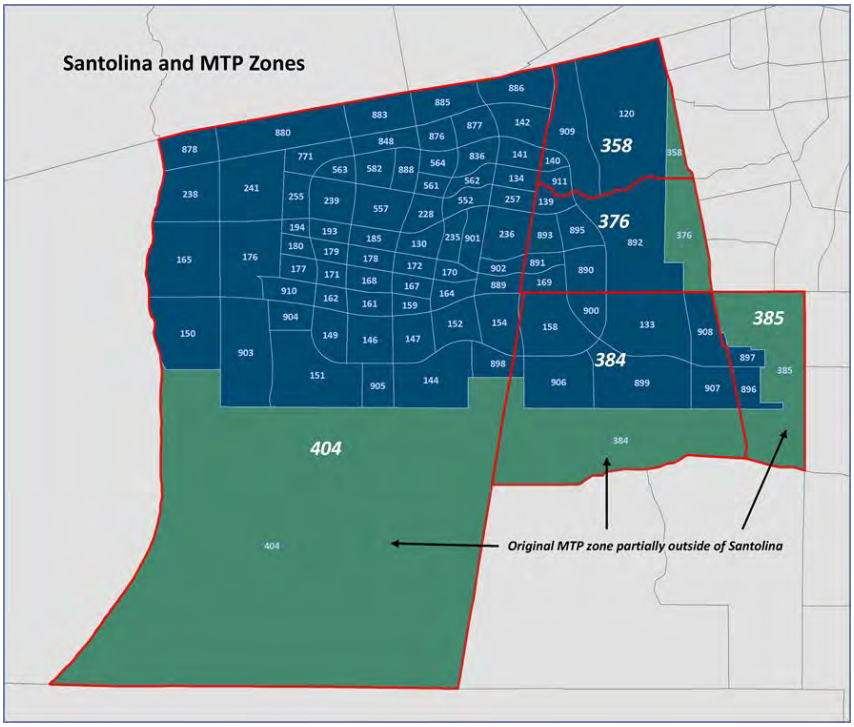

Figure 11: MRCOG MTP zones "partially" covered by the Santolina development.

MRCOG staff supplied the project team with estimates of the proportion of population and job growth represented in the MTP that should be retained because it falls outside of the Santolina project boundary. These proportions are shown in Table 18.

Table 18: Percentage of MTP Zone Growth OUTSIDE of Santolina

Zone	DASZ	Population	Jobs
358	5701	29.8%	2.8%
376	5741	39.5%	28.6%
384	5761	1.1%	3.0%
385	5762	89.2%	100.0%
404	5911	4.6%	1.5%

TECHNICAL APPENDIX T – 2 –
ANALYSIS OF TRAVEL DEMAND FORECASTS

Transportation Analysis for the Master Planned Community at Santolina Travel Demand Forecasting II: Travel Model Results

Planning Technologies, LLC
January 18, 2016
Revised March 4, 2016
Revised May 25, 2016

Introduction

The transportation plan for the Level A Master Plan for the proposed planned community at Santolina was originally developed and submitted to Bernalillo County in January, 2013 and was subsequently adopted in June, 2015. Since that time, the Santolina Community Development Team, led by Western Albuquerque Land Holdings LLC (WAHL), Garrett Development Corporation, and its consultants, has refined elements of the land use plan and the proposed circulation system. The transportation analysis originally conducted on behalf of the Level A Master Plan has now been updated to reflect those refinements. In addition, the development team is submitting to the County a plan for the first phase of development. This first phase requires more detailed study in a "Level B" transportation analysis.

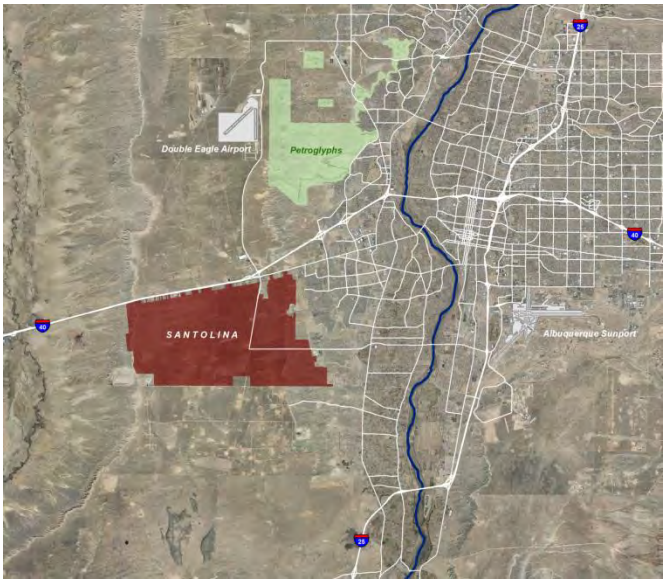

Figure 1: Santolina Study Area

The Santolina Master Planned community covers roughly 14,400 acres and is located on the southwest side of the Albuquerque metropolitan area, the center of which is about 10 miles west of the Albuquerque CBD. At build-out about 90,000 people will live in Santolina, and about 76,000 people will work there. Santolina is roughly equivalent to Albuquerque's "Northeast Heights" in both dimensions and density.

This paper also presents the results of traffic forecasting work performed on behalf of the Santolina proposals as they relate to the performance of the proposed circulation system. It also provides information on off-site impacts that can be anticipated. This paper is Part II of 2 parts: see Part I for information about the development of the land use and socioeconomic databases. Salient points include:

- Travel demand forecasts were once again developed through the application of the regional travel demand forecasting model hosted by the Mid-Region Council of Governments (MRCOG),

as they were in the original Level A Plan. This model, called "Cube", is used for all travel demand forecasting in the region.

- As was done in the original Level A Plan, a more detailed traffic analysis zone system and socioeconomic database was designed to capture the proposed land uses for the travel model. The traffic analysis zone system in this update is even more detailed, and contains more zones in the project area, than the zone system developed for the original Level A Plan. This is intended to capture the additional detail associated with the land use and traffic proposals now known from developer's most recent refined plans.
- Since the modeling was done for the original Level A Plan, MRCOG has adopted a new update to the regional Metropolitan Transportation Plan (MTP). In so doing, MRCOG has changed the long-range time horizon for regional planning to the year 2040 (from 2035 addressed in the original plan) and developed new forecasts of demographics and jobs for the region for that date. These forecasts, lower than the original 2035 forecasts referenced several years ago, provide the backdrop for planning work performed specifically for the Santolina proposal.
- Additionally, MRCOG has also refined its plans for a future regional roadway network foreseen for the year 2040 horizon year.

All work connected with the MRCOG "Cube" travel demand model was performed by Planning Technologies on behalf of the developer, including the construction of the databases, operation of the model itself, as well as much of the subsequent analysis of results. The consultant's work with the travel model, the various assumptions and methodologies, were reviewed with MRCOG staff at key points along the process.

Analysis Scenarios

There are two planning objectives sought in this study:

- **Level A Update:** Update the traffic forecasts and analysis for the original Level A Transportation Analysis that was approved by the County last year.
- **Level B Proposal:** Prepare new traffic forecasts and analysis for a new Level B proposal that is being submitted to the County,

The updated Level A Transportation Analysis encompasses the additional detail available from the Level B proposal.

While these two objectives involve two separate submittals to the County, both share a common approach to traffic forecasting and analysis. The same traffic model was developed to support both, and they share the same network and socioeconomic databases. Consequently, this single technical report will address the work that was done on behalf of both submittals.

- **Level A Update:** The Level A Update requires two scenarios to be examined: (1) a 2040 scenario that represents phased development through 2040 and (2) a "build-out" scenario that the developer associates with the year 2065.
- **Level B Proposal:** The Level B proposal also requires two scenarios to be examined: (1) an intermediate phased development proposal through the year 2025 and (2) a "build-out" scenario for Level B which the developer anticipates will be in the year 2040.

The ***SAME*** 2040 scenario applies to both the Level A Update and the Level B proposal.

The MRCOG MTP scenarios for 2025 and 2040 will provide a basis for comparison for evaluating traffic impacts associated with Santolina development: it is the "baseline" condition, if you will. Note that the MRCOG did not actually report 2025 forecasts in the published MTP. The MRCOG staff did, however, develop a regional 2025 scenario (for both socioeconomic growth and network development) for use in this Santolina study, and we are appreciative of this assistance.

In addition, note that MRCOG does not forecast socioeconomics or transportation network development beyond the year 2040. Consequently, it is not possible to analyze off-site impacts associated with the 2065 (build-out) Santolina proposal. We did run a 2065 forecast for Santolina, but this forecast is based on 2040 conditions outside of Santolina. This scenario *cannot be used to evaluate off-site impacts* because, for one thing, there would be 25 years of regional highway development that would ostensibly occur but is not represented in the forecast. This 2065 scenario could be used, in our opinion, to at least evaluate the ability of the proposed circulation plan to accommodate build-out land uses *inside* of Santolina.

A summary of the various analysis scenarios and the study to which they pertain is shown here:

Table 1: Santolina Traffic Forecast Scenarios

Study	Intermediate Scenario	Long Term Scenario
Level A Update	*Santolina Scenario:* **2040 Santolina Network and Land Use**	*Santolina Scenario:* **2065 Santolina Network and Land Use**
	Base Scenario: **2040 MTP Network and Land Use**	***Base Scenario:*** **None**
Level B Submittal	*Santolina Scenario:* **2025 Santolina Network and Land Use**	*Santolina Scenario:* **2040 Santolina Network and Land Use**
	Base Scenario: **2025 MTP Network and Land Use**	*Base Scenario:* **2040 MTP Network and Land Use**

Network Improvements in the MTP

Before getting started, we will review improvements that the MRCOG has already included in the MTP as they relate to Santolina.

The MRCOG MTP does not provide for any significant extensions of the regional highway network into Santolina itself. Dennis Chavez Blvd. is the most significant capacity expansion within the project area: widened to 4 lanes in 2025. Also relevant to Santolina, the MTP calls for a new I-40 interchange at Paseo de Volcan (PDV). PDV itself, however, does not appear in the 2040 network and is therefore considered within the context of the plan to be a post-2040 improvement.

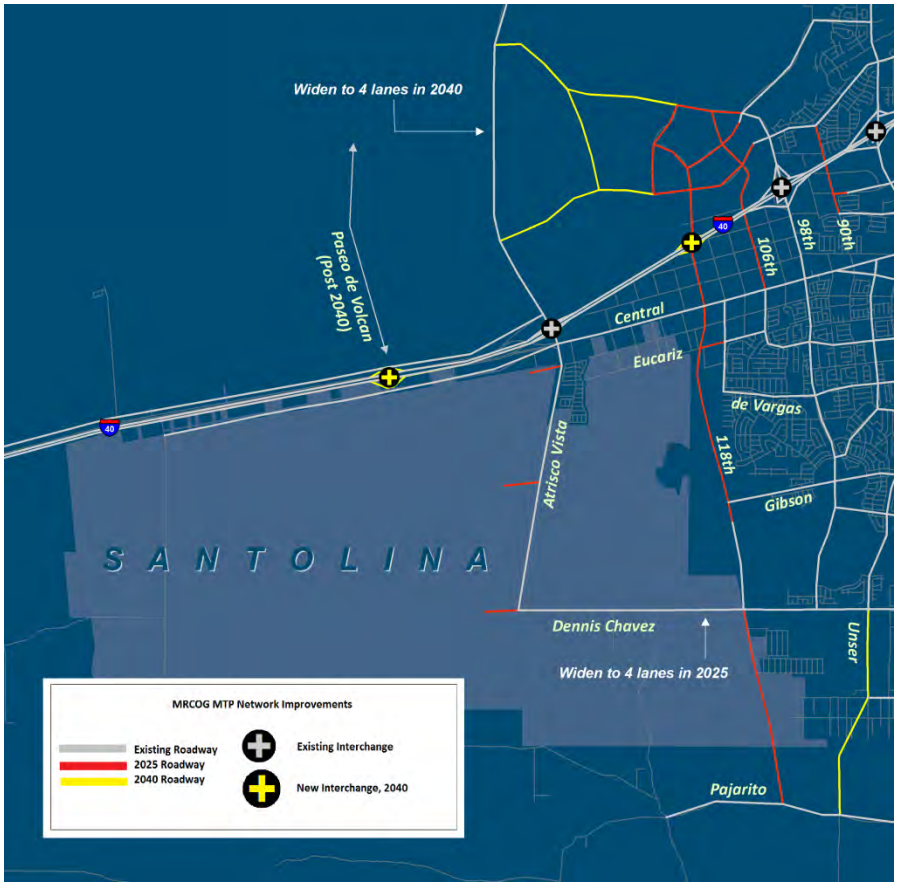

Figure 2: Roadway improvements in the vicinity of Santolina in the MTP networks for 2025 and 2040 are illustrated here.

The MTP networks do show expansion of the roadway network in the general vicinity and east (and north) of Santolina, however, as indicated in Figure 2. The most significant elements shown include:

- By 2025:
  - New I-40 overpasses at 90th and 106th Streets
  - Construction and completion of 118th Street from I-40 south to Pajarito
  - Expansion of the circulation system serving the Petroglyphs development north of I-40
- By 2040:
  - New I-40 Interchange at 118th Street.
  - New I-40 Interchange at Paseo de Volcan (but Paseo de Volcan itself is considered post-2040).
  - Widening of Atrisco Vista to 4 lanes, north of I-40
  - Further expansion of the circulation system for the Petroglyphs development

Functional Class and Capacity

The primary measure of performance reported in the analysis that follows is the volume-to-capacity (V/C) ratio and the resulting level of service to which it relates. Both statistics: the volume projected on a roadway by the model and the capacity associated with the roadway, are drawn from the MRCOG traffic model database. Table 2 reports the capacities associated with roadways represented in the model.

Capacities in Table 2 are expressed in terms of "Vehicles per Hour per Lane" of traffic (VPHPL).

These are the same capacities that MRCOG uses to evaluate the performance of roadways in studies such as the MTP. The method described here is the same as MRCOG uses.

Table 2: VPHPL Capacities by Functional Class

Category	Functional Class	VPHPL
2	*Principal Arterial*	1,000
3	*Minor Arterial*	900
4	*Collector*	950
5	*Local*	850
6	*Frontage Road*	1,300
7	*Freeway*	1,900
8	*Off Ramp*	750
9	*On Ramp*	800
10	*Limited Access*	1,100

From: "MRG Regional Travel Model Recalibration and Validation Report": March 22, 2010; Page 66

Note: Freeway capacities are heavily attenuated to reflect merge lane lengths

Capacities in the model were last adjusted in the validation of the traffic model performed by MRCOG and its consultants in 2009. Roadway capacities are meant to reflect the capacities of roadways as affected by the controls ("traffic signals") assumed to exist at intersections. They are not mid-block or continuous flow capacities. Also: the capacities are meant to reflect the added capacities offered by turn lanes commonly associated with streets of each respective functional class. Intersection controls ("traffic signals"), signal splits associated with traffic signals ("G/C ratio"), and turn-lanes are NOT explicitly coded in the network database. So these capacities represent the implicit intersection conditions one would typically find on roadways of each functional class.

Finally, note that the MRCOG traffic model adjusts freeway capacities for weaving sections. The base capacity cited in the model for freeways is 1,900 VPHPL. however the capacity is reduced along sections where ramps merge. The algorithm employed by the traffic model is overly simplistic (in our opinion), often yielding overly conservative expressions of capacity. Be that as it may, be aware that freeway capacities that come from the model can appear to change sporadically along freeway segments.

Level of Service

In this study we have identified the "Level of Service" (LOS) for which roadways perform in the same way as the MRCOG does in their studies, for example the MTP.

Table 3: Level of Service Definitions

V/C Ratio	Description
< 0.9	Acceptable
< 1.0	Approaching Capacity
< 1.1	Over Capacity
< 1.5	Severely Congested (Level 1)
1.5+	Severely Congested (Level 2)

MRCOG does not use the traditional traffic engineering method for associating level of service with a graded letter ("A", "B", "C", etc.). Instead, MRCOG uses the V/C ratio reported by the model to identify a level of service as indicated in Table 3.

To be consistent with the practices in the region that MRCOG has established, we will do the same in this report.

Note that the colors displayed in Table 3 match those used by MRCOG in their network plots.

Build-Out Scenario (2065)

The objective sought by an examination of the "Build-Out" scenario is to look at traffic conditions after the entire Santolina project has been developed. The developer associates the "Build-Out" scenario with the year 2065.

Note that MRCOG does not forecast either socioeconomics or highway network plans beyond the year 2040. There is no MTP scenario for that year. We therefore cannot identify impacts associated with build-out development because there is no basis by which to compare results outside of Santolina itself.

Our opinion is that the main objective sought by a "Build-Out" scenario is to verify that the circulation plan proposed internally for Santolina, including its connections to roadways regionally, is sufficient to accommodate traffic generated by the development. To accomplish this test,, we built a "2065 Build-Out" model database, with these properties:

- Internally, we represented 2065 "Build-Out" land use in Santolina. This scenario also depicts the internal circulation system in its full build-out extent.
- Externally, we represented the rest of the region with 2040 MTP data, both in terms of socioeconomics and network. 2040 is the most distant "out-year:" that MRCOG prepares.

Roadways in the circulation plan classified as "collectors" and above were explicitly represented in the modeled network. All roadways, including the "locals", could not be modeled directly (this would have exceeded the restrictions on the number of zones that can be represented in the MRCOG's model. Note, therefore, that the actual street density proposed for Santolina is greater than was actually represented in the model.

We made NO changes to the MTP network (for 2040) outside of Santolina. Any demands for additional capacity that traffic generated in Santolina requires can therefore be readily identified and not hidden by

capacity changes that we made. This sometimes leads to incongruities between the number of lanes provided by roadways as they cross into Santolina. The exceptions to this rule are (1) Pajarito and (2) Gun Club. Both of these roadways were extended from their current termini to reach Santolina across the escarpment so as to implement the regional connection for which they were intended.

Functional Class (Build-Out)

Figure 3 illustrates the circulation plan proposed for Santolina in its ultimate configuration, at build-out. Elements of the circulation plan include:

- 2 interchanges with I-40, at Paseo de Volcan and at Atrisco Vista; Also, a 3rd interchange at 118th Street would serve Santolina development as well, although it is off-site
- 2 additional overpasses over I-40, providing 4 roadway connections to the north. The MRCOG traffic model currently shows these zones to be essentially empty and therefore future roadways to the north do not exist
- 5 connections to regional roadways to the east, most of them crossing the escarpment. 2 of these roadways (Central and Dennis Chavez) currently exist.

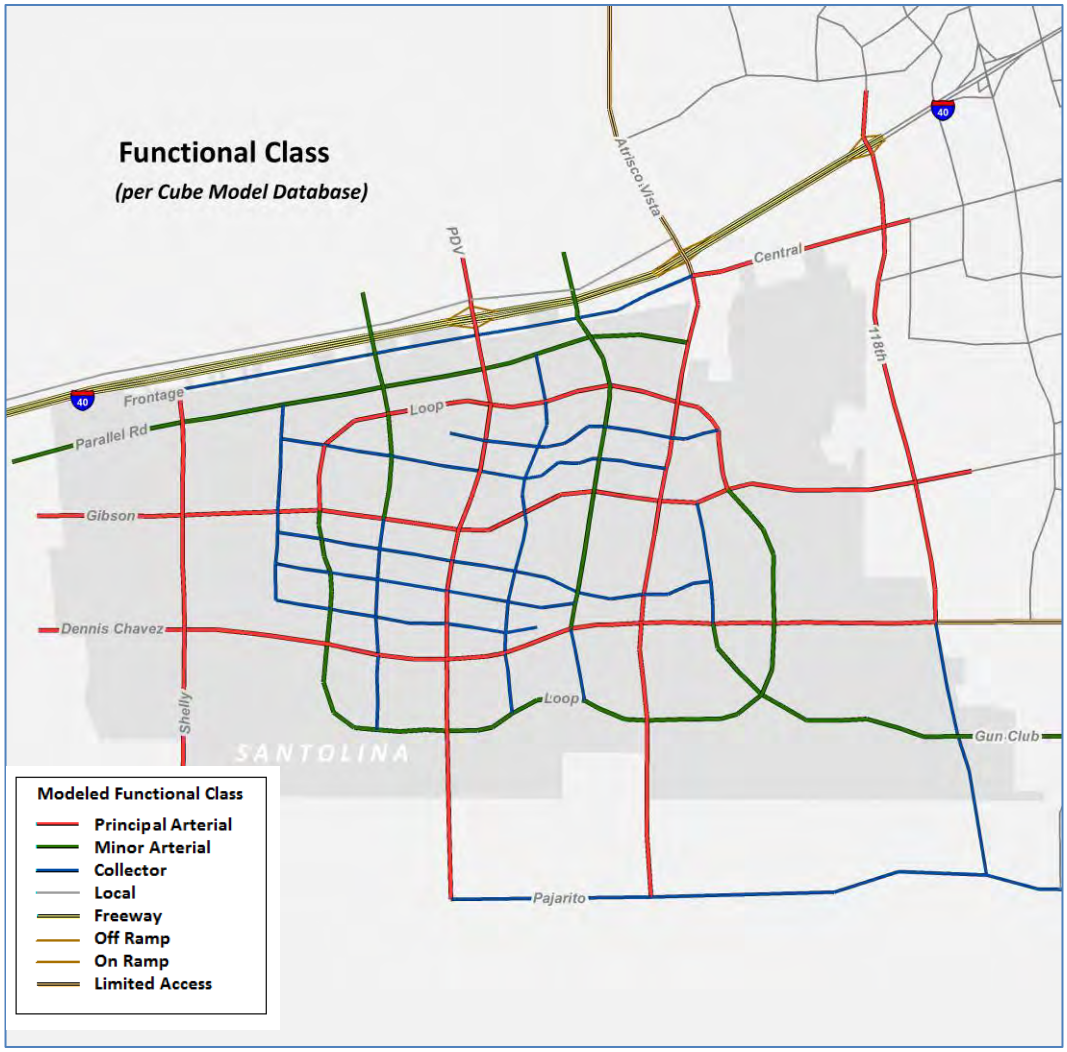

Figure 3: Santolina Circulation Plan

The circulation plan involves 561.8 lane-miles on 76.6 centerline miles of roadway. Several of these roadways already exist (e.g., Atrisco Vista, Dennis Chavez). Note that these are not official estimates, but are instead drawn from the traffic model's network database.

Here are some important observations that we would like to highlight:

- The MRCOG 2040 network declares both Atrisco Vista and Dennis Chavez to be "Limited Access" arterials as they enter the Santolina project area, whereas within Santolina we have identified them to be "Principal Arterials". "Limited Access" arterials, such as Tramway, typically offer higher capacities and often higher speeds than do "Principals".
- The MRCOG 2040 network does not extend Gun Club or Pajarito to Santolina. We have done so to implement the connection across the escarpment, even though such improvements would be "off-site".
- The MRCOG 2040 network has Central declared to be a "Principal" arterial entering the Santolina development area, whereas we have it declared as a "Collector". Furthermore, NMDOT has requested that no local parcel access to Central be provided within the project. (NMDOT's objective is to reserve the right of way for future use as an I-40 frontage road).

MRCOG Long-Range Roadway System (LRRS)

The proposed circulation plan is mostly consistent with network development illustrated in the MRCOG "Long Range Roadway System Plan" (LRRS). The LRRS is presented in the MTP (Appendix H) and outlines future and long-range roadway network development, unconstrained by funding limitations as is required of the MTP network. An excerpt is shown in Figure 4.

Figure 4: The MRCOG LRRS in the vicinity of Santolina is shown here. Graphic is drawn from the Focus 2040 MTP (Appendix H)

The main differences between the Santolina circulation plan proposed here and that depicted in the LRRS are:

- The MRCOG LRRS shows Central to be a Principal arterial, whereas NMDOT (as already pointed out) has downgraded its function and requires property access to be precluded. The Santolina circulation plan accounts for this by proposing a second parallel road (called, ironically, the "Parallel Road") to serve this function.
- The MRCOG LRRS calls for a 6th roadway across the escarpment, connecting 118th with Shelly Road. The proposed circulation plan does not provide for this.
- The MRCOG LRRS suggests another I-40 overpass, at Shelly Road, although this is somewhat unclear. An I-40 overpass at Shelly is not proposed as part of the Santolina circulation system plan.
- Finally, there is some variation in the functional classes suggested by the LRRS, however this is somewhat ambiguous since the classifications defined for the LRRS are not quite the same as used in MRCOG's network coding for the traffic model.

Beyond these observations, however, most of the circulation plan is consistent with network development depicted for Santolina in the LRRS.

What follows now is a review of the network assumptions and modeled results for the Build-Out circulation plan.

Lanes and Capacity (Build-Out)

The number of lanes ("directional" lanes) proposed for the "build-out" circulation plan is shown in Figure 5. Generally, all roadways proposed to be "collectors" will be 2 lane roadways (1 directional lane). Other roadways, "Principals" and "Minors" will be multi-lane roadways. Their actual cross-section depends on the traffic requirements foreseen for "build-out".

Key features of the plan are:

- 5 roadways providing 12 directional lanes of capacity connecting Santolina to the east, through the escarpment.
- 4 roadways, providing 9 directional lanes of capacity, connecting Santolina to the north, over I-40
- 3 interchanges with I-40 (including 118th); note that these interchanges are shown to be conventional diamond interchanges with 1 lane ramps for modeling purposes and per the MTP. In reality, these interchanges will require a much more robust design treatment

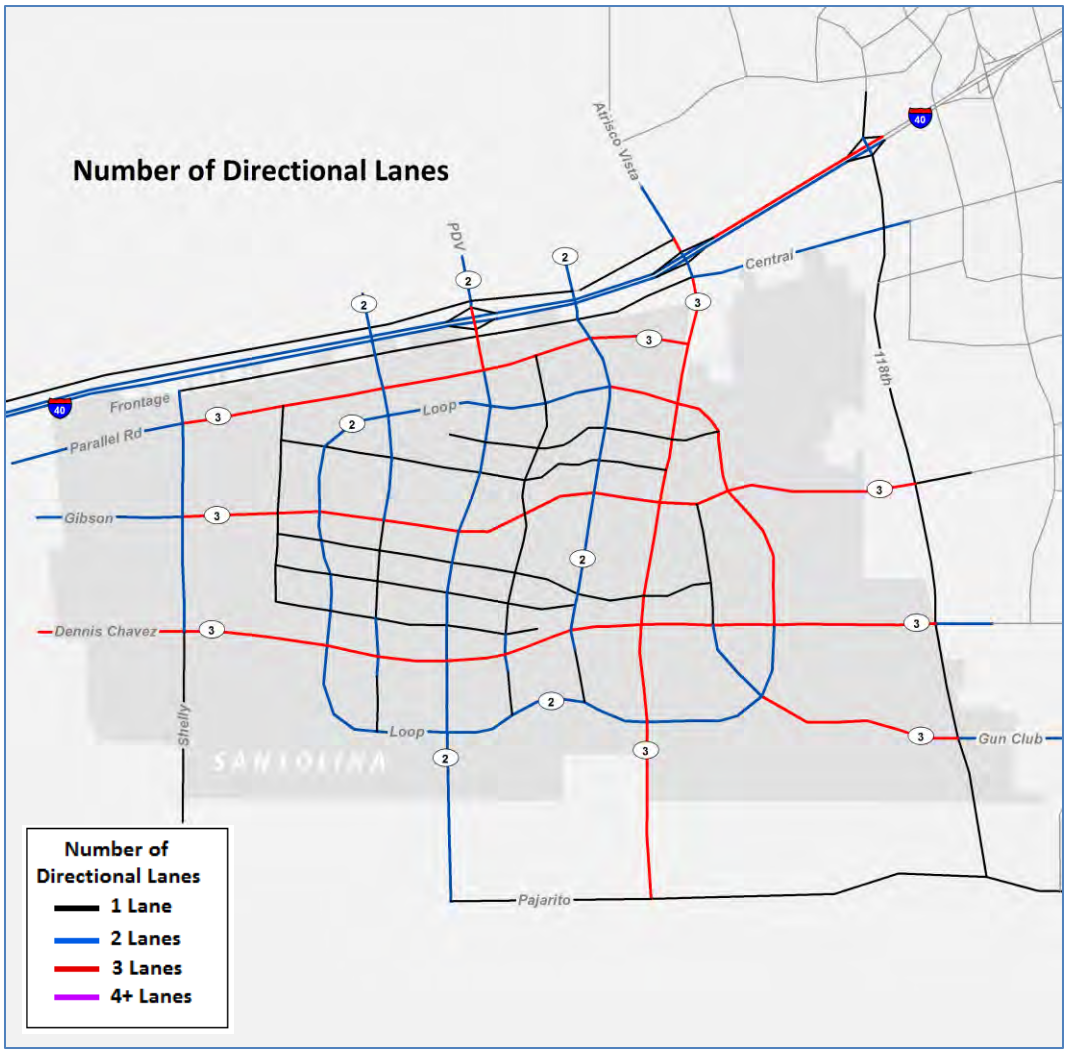

Figure 5: Number of Directional Lanes (Build-Out)

The amount of network added in the full build-out scenario (and in phases for the intermediate forecast years) is shown by functional class in Table 4. Note that the functional class definitions shown in Table 4 are as they are defined in the Cube travel model. Also note that the functional class of several roadways shown in the MRCOG's 2012 network changes in the Santolina scenarios. For example, both Atrisco Vista and Dennis Chavez are defined in the 2012 network to be Limited Access arterials, where as in the Santolina network scenarios we have changed the designation to Principal Arterial. Similarly, Central Avenue west of Atrisco Vista is defined in the 2012 network to be a "rural" collector, whereas this designation was changed to "urban" collector for the Santolina scenarios.

All values in Table 4 indicate the number of lane-miles of network **added** to the 2012 existing network.

Table 4: Lane Miles Added by Year and Functional Class (In comparison with 2012 Existing)

Functional Class Code	Description	2025	2040	2065
2	Principal Arterial	17.36	61.32	140.10
3	Minor Arterial	10.27	41.32	90.02
4	Collector	12.84	18.33	46.71
	Total	**40.47**	**120.97**	**276.83**

Notes:
1. Includes Central, West of 118th
2. Includes 118th, South of Dennis Chavez to Pajarito
3. Includes Gun Club, West of Santolina Boundary
4. Includes Gibson, West of Santolina Boundary
5. Lanes Added by Year is in Relation to 2012 Existing
6. Functional Classes as defined in the Santolina forecast network

Speed (Build-Out)

Speed assumptions made for roadways in the circulation plan (Figure 6) generally are similar to those that were made in the original Level A transportation plan. Generally, speeds were set according to functional class as follows:

- Principal Arterials: 40 or 45 mph
- Secondary Arterials: 35 or 40 mph
- Collectors: All coded at 30 mph, except for the frontage road along I-40
- Loop road: Generally coded at 40 mph except in the northeast quadrant where the roadway runs along the top of the escarpment (35 mph)

Note that MRCOG has Central Ave coded at 55 mph, which was left unchanged since this part of Central is officially outside of the Santolina boundary.

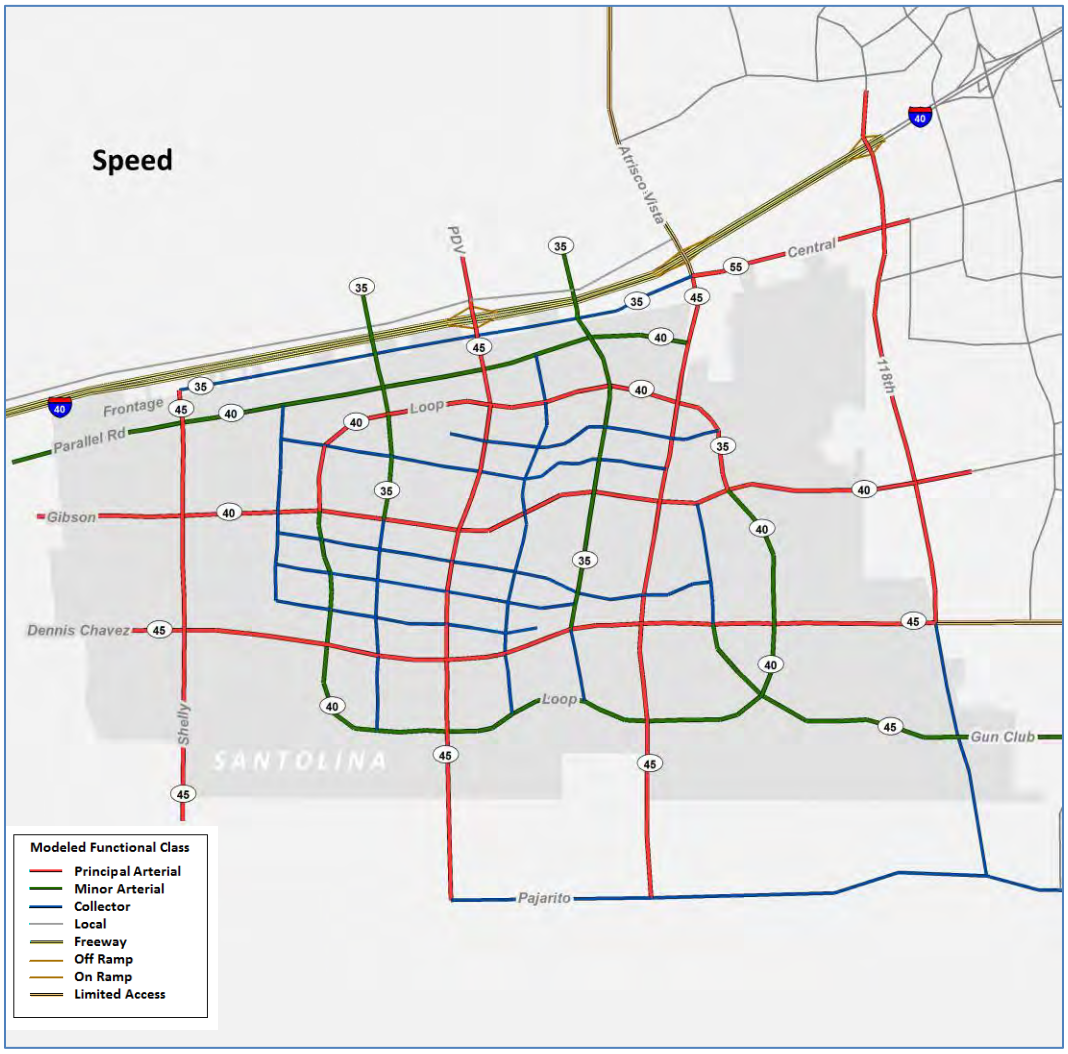

Figure 6: Speed on Santolina Roads (Build-Out)

Average Daily (Weekday) Traffic (Build-Out)

Average daily traffic volumes on Santolina roads, at Build-out, is shown in Figure 7.

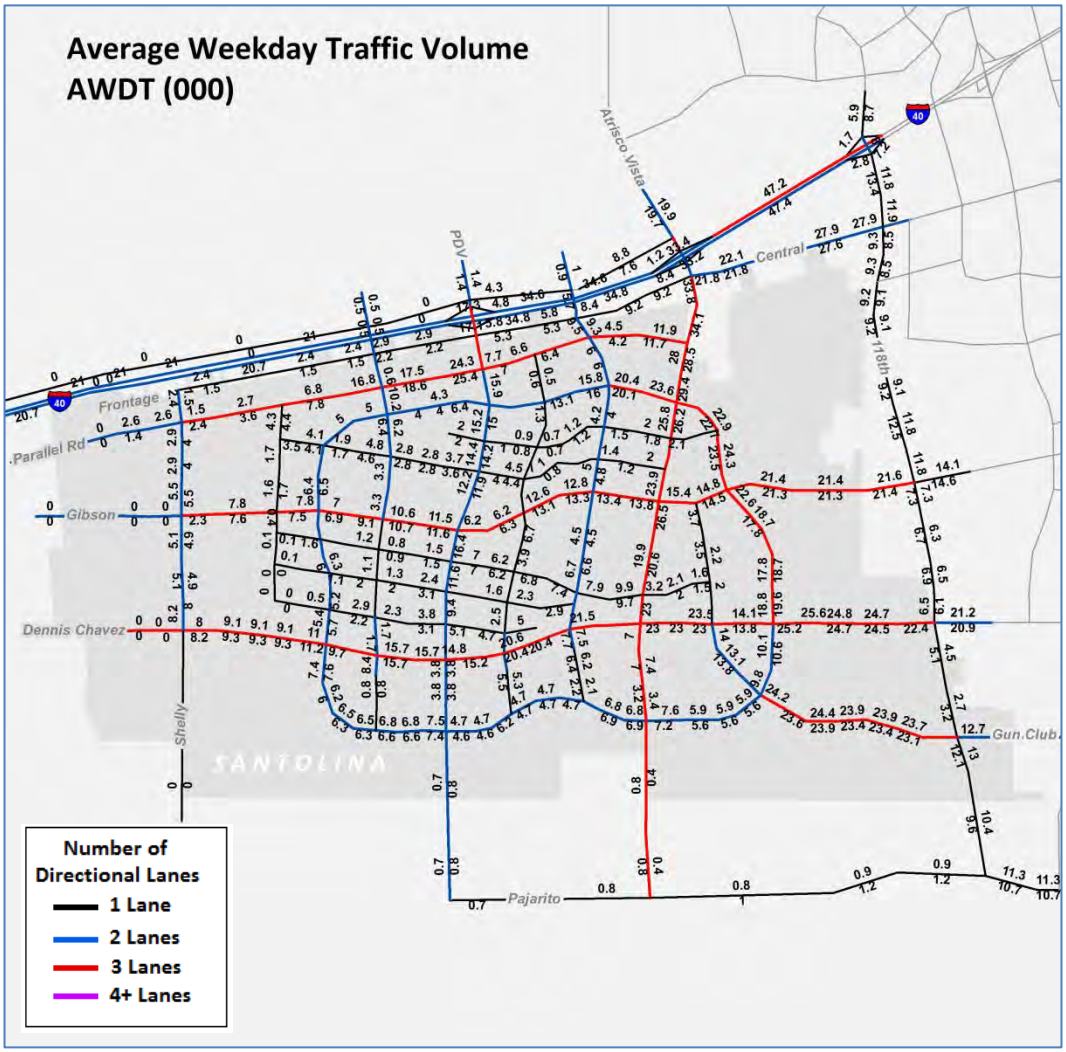

Figure 7: AWDT on Santolina Roads (Build-Out) in thousands (000).

AM Peak Hour Traffic Volumes (Build-Out)

AM Peak Hour traffic volumes on Santolina roads, at Build-out, are shown in Figure 8.

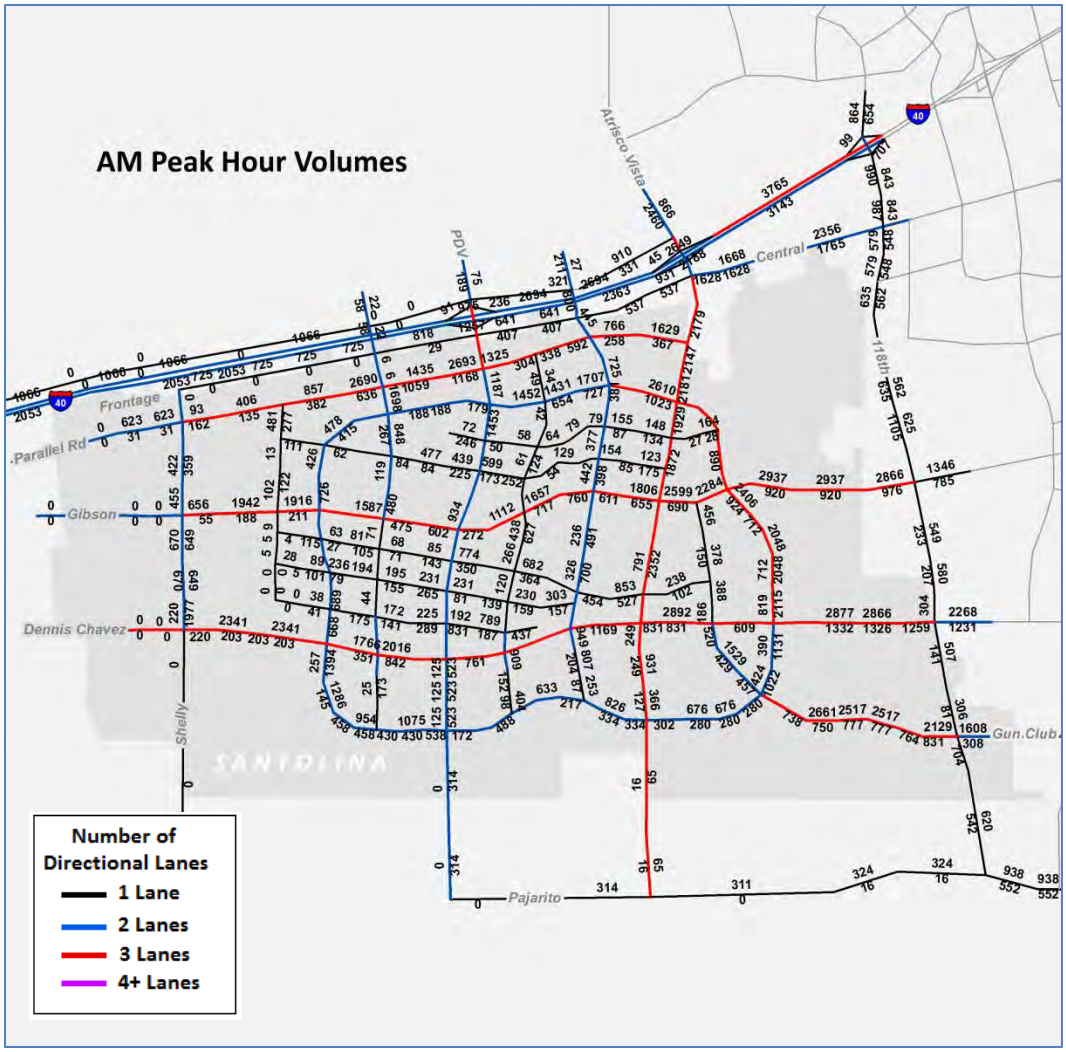

Figure 8: AM Peak Hour Volumes (Build-Out)

PM Peak Hour Volumes (Build-Out)

PM Peak Hour traffic volumes on Santolina roads, at Build-out, are shown in Figure 9.

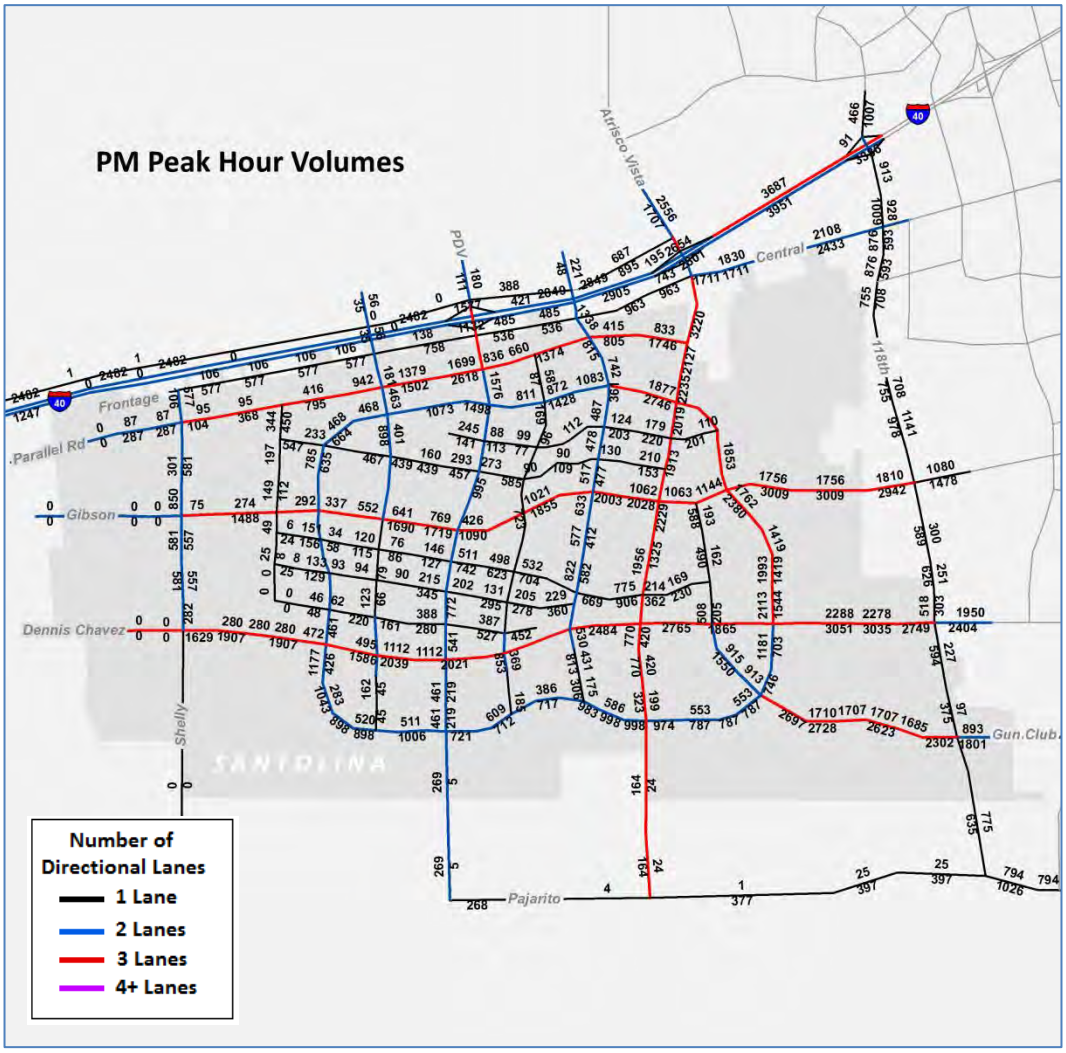

Figure 9: PM Peak Hour Volumes (Build-Out)

Screenline Volumes (Build-Out)

Table 5 summarizes screenline volumes entering and exiting Santolina. The two screenlines are:

- Northerly traffic crossing a screenline along and immediately south of I-40
- Easterly traffic crossing the escarpment along and immediately west of 118th

Note the strong directional orientation of peak hour traffic – inbound into Santolina during the AM and outbound from Santolina during the PM. This directional orientation is actually counter-flow to the prevailing peak directions on the west side and reflects the job-rich development that is attracting commuters to the site.

Table 5: Screenline Volumes (Build-Out)

			AM Peak Hour		PM Peak Hour	
Screenline	**Roadway**	**AWDT (000)**	**NB**	**SB**	**NB**	**SB**
Along I-40	*118th*	25.2	843	990	913	1,009
…Between I-40	*Atrisco Vista*	49.3	1,379	2,685	2,799	1,950
and Central	*Unnamed Overpass 1*	9.9	123	800	802	454
	Paseo de Volcan	53.1	1,489	3,007	3,148	1,755
	Unnamed Overpass 2	1.0	22	58	56	35
	Total	**138.5**	**3,856**	**7,540**	**7,718**	**5,203**
	Directional Split		33.8%	66.2%	59.7%	40.3%
	V/C Ratio		0.35	0.69	0.70	0.47
			AM Peak Hour		**PM Peak Hour**	
Screenline	**Roadway**	**AWDT (000)**	**EB**	**WB**	**EB**	**WB**
Along Escarpment	*Central*	55.5	1,765	2,356	2,433	2,108
…Just West of						
118th	*Gibson*	43.0	976	2,866	2,942	1,810
	Dennis Chavez	45.0	1,259	2,544	2,749	2,143
	Gun Club	43.9	831	2,129	2,302	1,684
	Pajarito	2.1	16	324	397	25
	Total	**189.5**	**4,847**	**10,219**	**10,823**	**7,770**
	Directional Split		32.2%	67.8%	58.2%	41.8%
	V/C Ratio		0.42	0.88	0.93	0.67

AM Volume-to-Capacity Ratios (Build-Out)

Volume-to-capacity ratios for the AM peak hour are shown for Santolina roads, at Build-Out, in Figure 10.

Recall that according to MRCOG practices, volume-to-capacity ratios exceeding 0.9 are considered to be "approaching capacity".

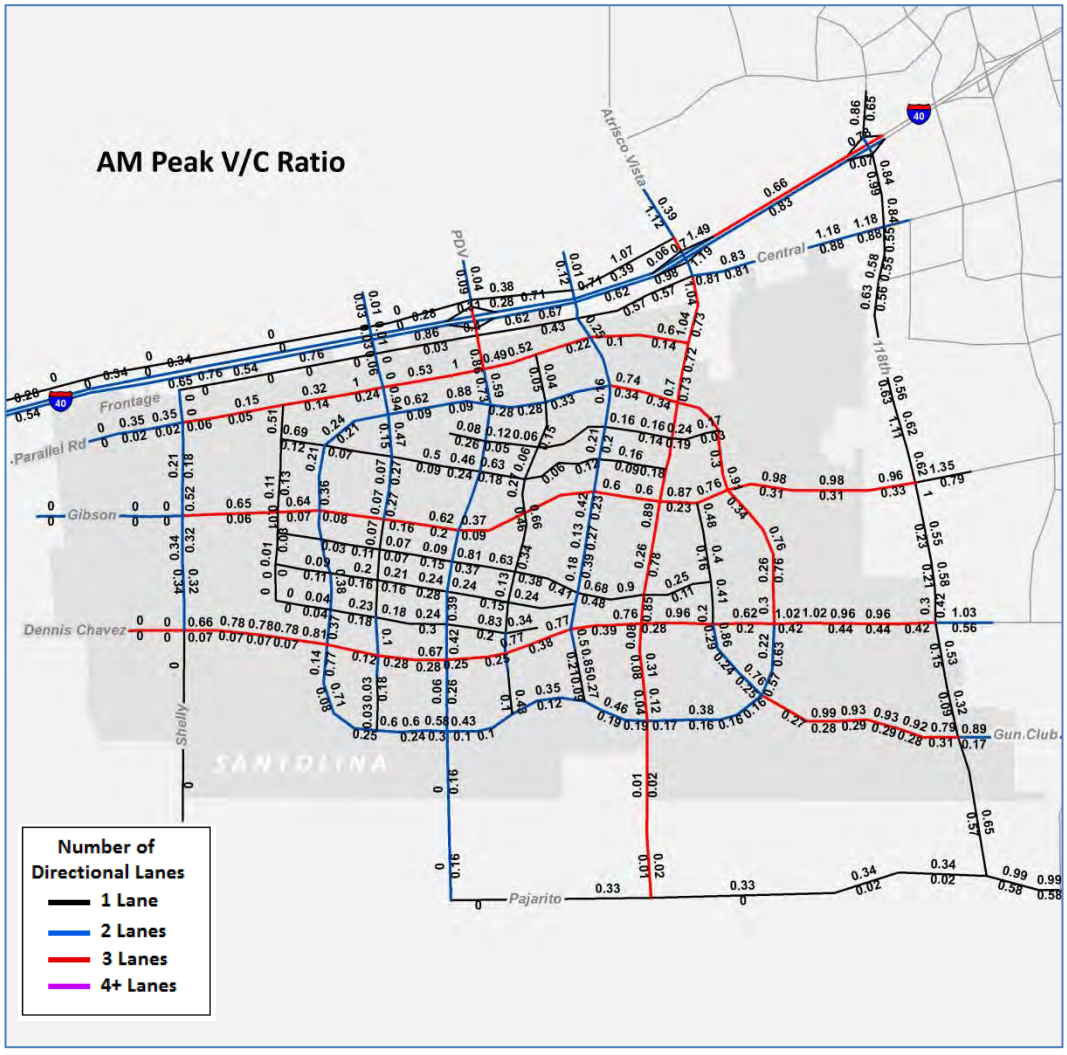

Figure 10: AM V/C Ratios (Build-Out)

PM Volume-to-Capacity Ratios

Volume-to-capacity ratios for the PM peak hour are shown for Santolina roads, at Build-Out, in Figure 11.

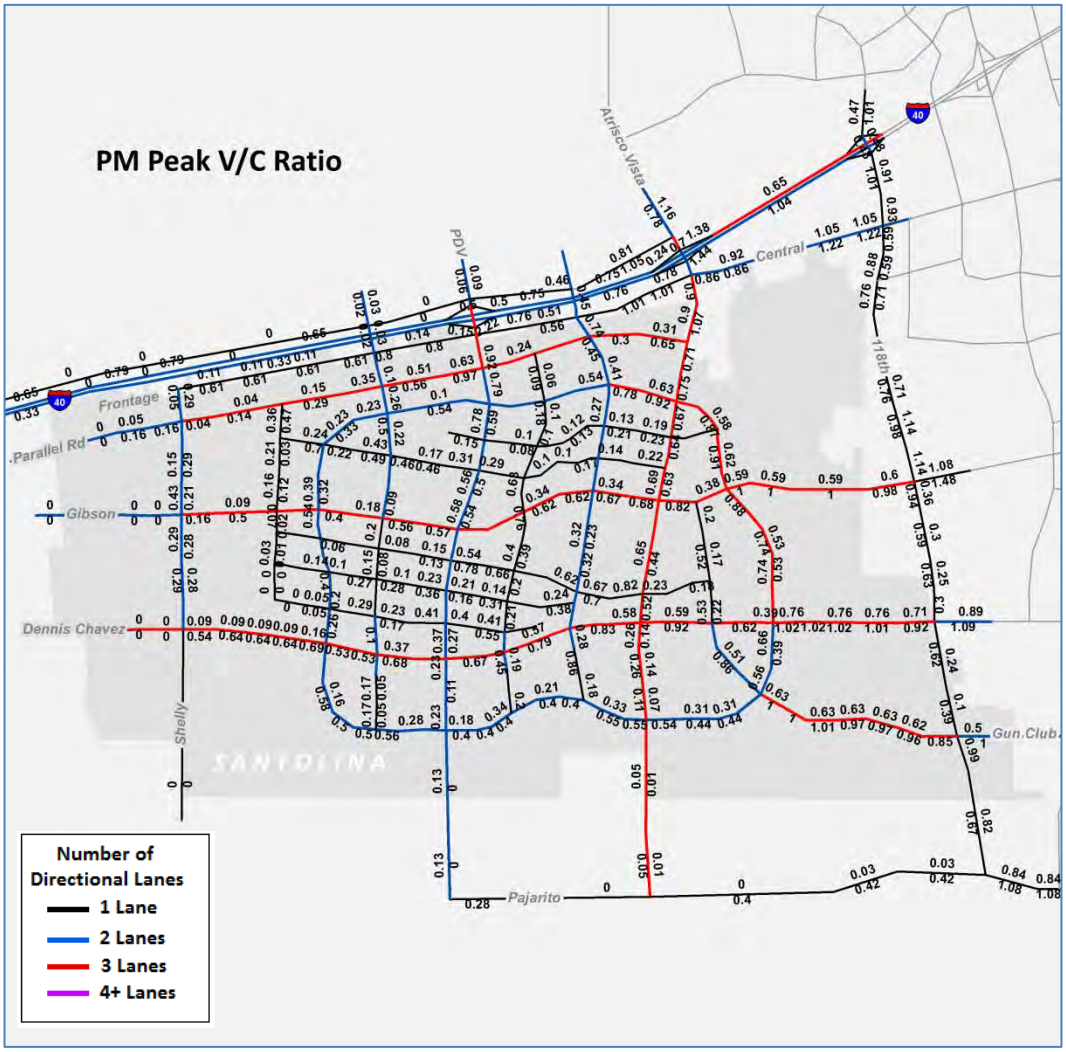

Figure 11: PM V/C Ratios (Build-Out)

AM Level of Service (Build-Out)

Level of Service on Santolina roads according to MRCOG criteria for level of service is shown for the AM peak hour in Figure 12.

Most of the circulation plan performs well however there are indicators of some capacity issues that require attention. These locations are easily apparent in Figure 12, and include:

- Westbound traffic entering the development, crossing the escarpment
- A couple of spot locations, for example on the Frontage Road and the Parallel Road in the vicinity of the Town Center
- Interchange ramps; Recall that the interchanges were modeled as simple diamond interchanges with single lane ramps. It is apparent that more robust designs will be required

The affected intersections will require greater attention (i.e., intersection capacity analysis that can more carefully incorporate consideration of turn lanes and signal timing).

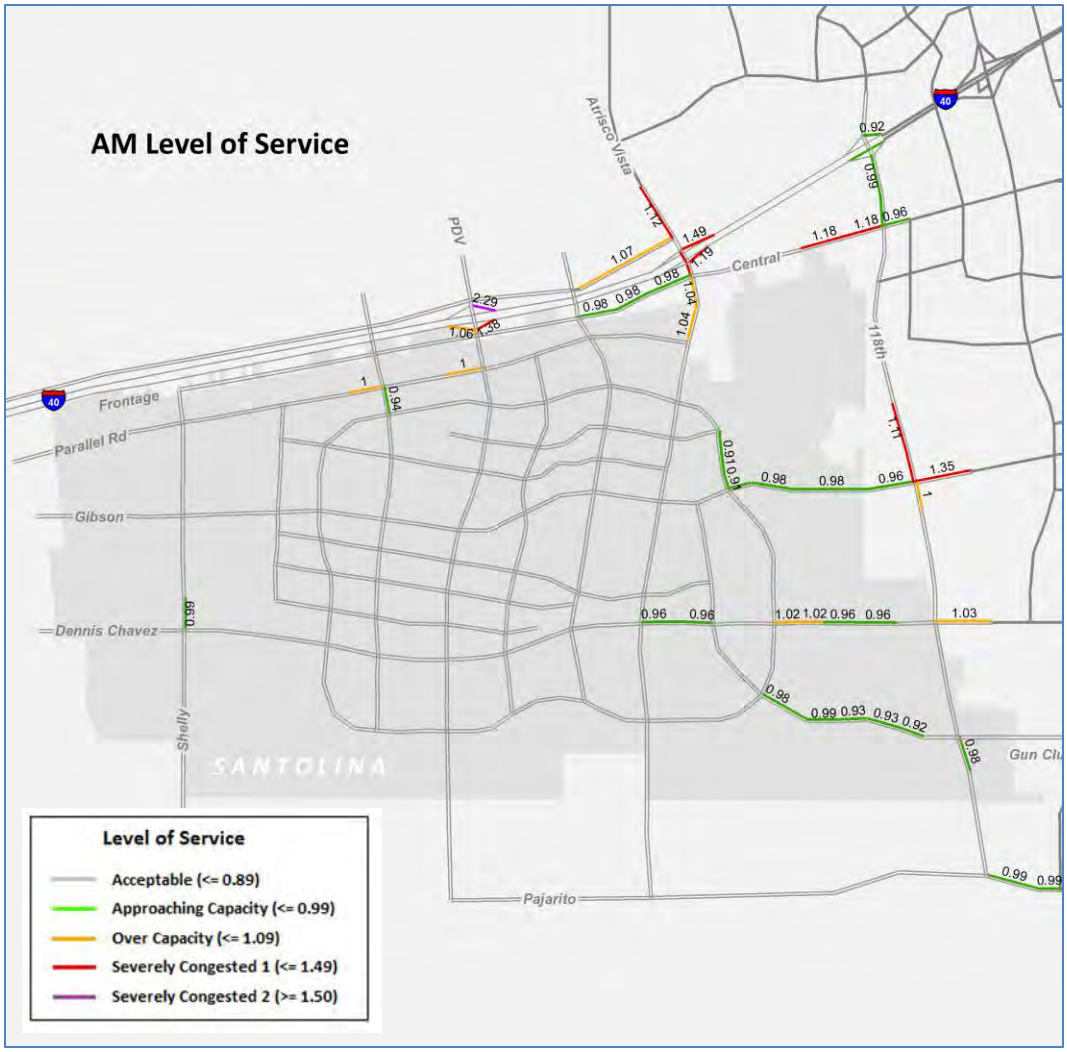

Figure 12: AM Level of Service (Build-Out)

PM Level of Service (Build-Out)

The PM peak period exhibits similar characteristics to the AM period but of course in the reverse direction. See Figure 13. Issues are easily spotted in Figure 13 include:

- Eastbound traffic exiting the development across the escarpment
- On the Frontage Road and the Parallel Road in the vicinity of the Town Center
- I-40 Interchanges: recall once again that these interchanges were modeled in their simplest form as diamond interchanges with single lane ramps. It is apparent that more substantial treatments will be required to serve Build-Out conditions.

As in the case of the AM, more detailed capacity analyses of affected intersections will be required to determine the degree to which the issues identified in the model runs are problems.

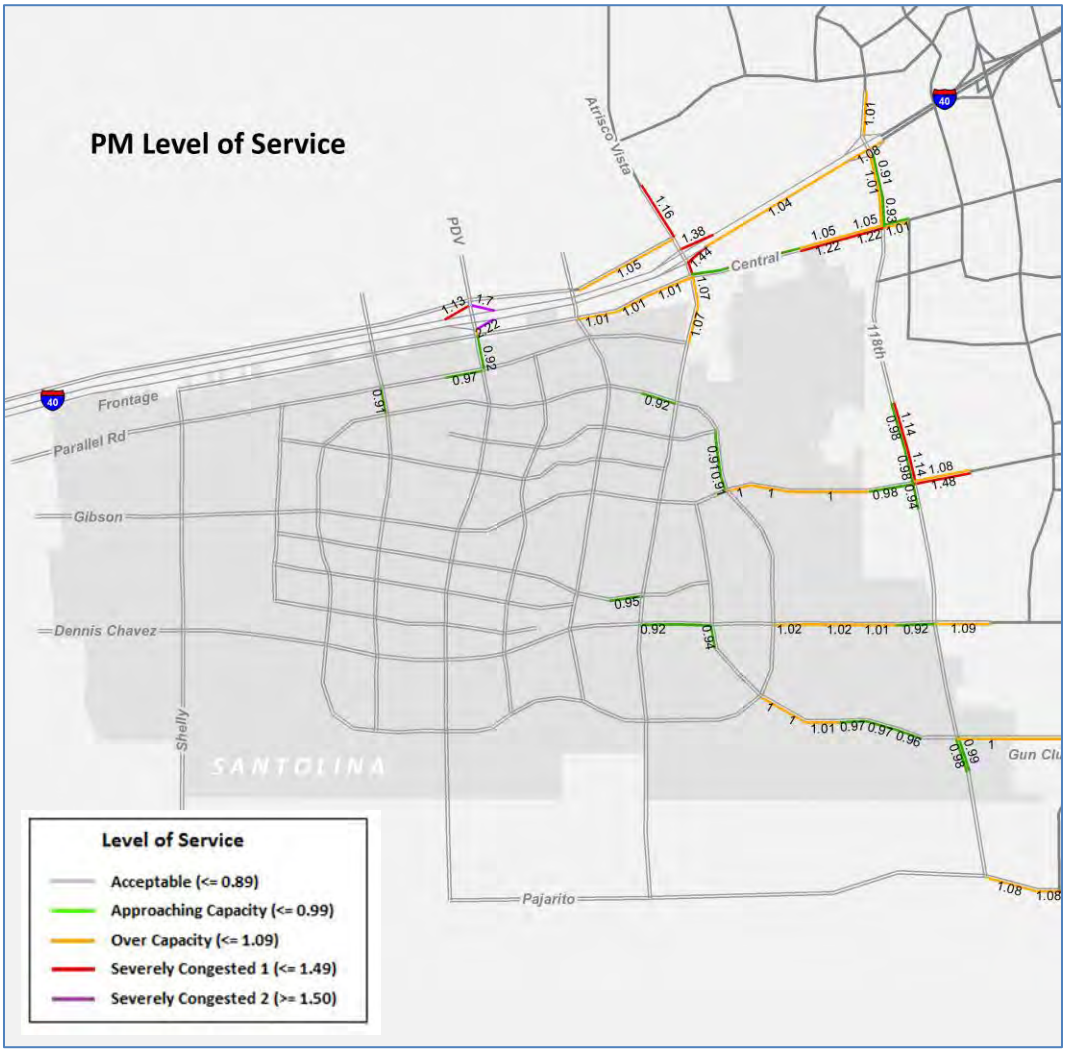

Figure 13: PM Level of Service (Build-Out)

2025 Circulation Plan

The circulation plan for 2025 represents a phased development of the full build-out plan presented in the previous section of the report. The plan consists of the subset of roadways needed to provide access to the lands proposed to be developed by 2025 and has been sized (in terms of number of lanes) to provide sufficient capacity to accommodate traffic expected by that time. The development of this plan was an iterative process involving a series of tests to properly phase the roadway system.

Note that the functional class and speeds associated with roadways described in the Master Plan above are not changed for any of the phasing plans. Only the extent of roadways needed have been changed, and the number of lanes required.

The objectives of the analysis are to:

- Specify the requirements for phased construction of roadways in the Master Plan and to demonstrate that roadway capacities are sufficient to accommodate traffic expected by 2025
- Provide a basis for evaluating the extent of off-site traffic impacts on roadways in the general vicinity of Santolina.

Off-site traffic impacts were identified through a comparison to the performance of the 2025 MTP network. Bear in mind that differences in volumes and level of service seen in this comparison are not ONLY a result of growth in Santolina, but also due to changes to land use outside of Santolina that arose as a result of the "normalization" of socioeconomic control totals to maintain regional control totals. For more on that subject, see the accompanying report "Santolina Transportation Analysis: Traffic Forecasting I".

First, we will describe the extent of roadways that comprise the 2025 plan for the circulation system. Then we will describe how this system performs on-site, with respect to level of service. Finally, we will describe potential off-site impacts on traffic conditions in the general vicinity of Santolina (namely: the Southwest side of Albuquerque).

Functional Class (2025)

Figure 14 describes the circulation plan for the year 2025. The plan calls for 60.3 lane miles of capacity on 23.5 centerline miles of roadway. Note that these are not official values, but were tabulated from the network database from the traffic model. These values also include several roadways that actually already exist within the project boundaries: namely Atrisco Vista and Dennis Chavez.

In 2025, access to the development is via:

- An existing Atrisco Vista interchange with I-40
- From the east via Central Ave and Dennis Chavez, both of which already exist

Note that access to the industrial uses in the western part of the development is proposed to be accommodated via Central Ave.

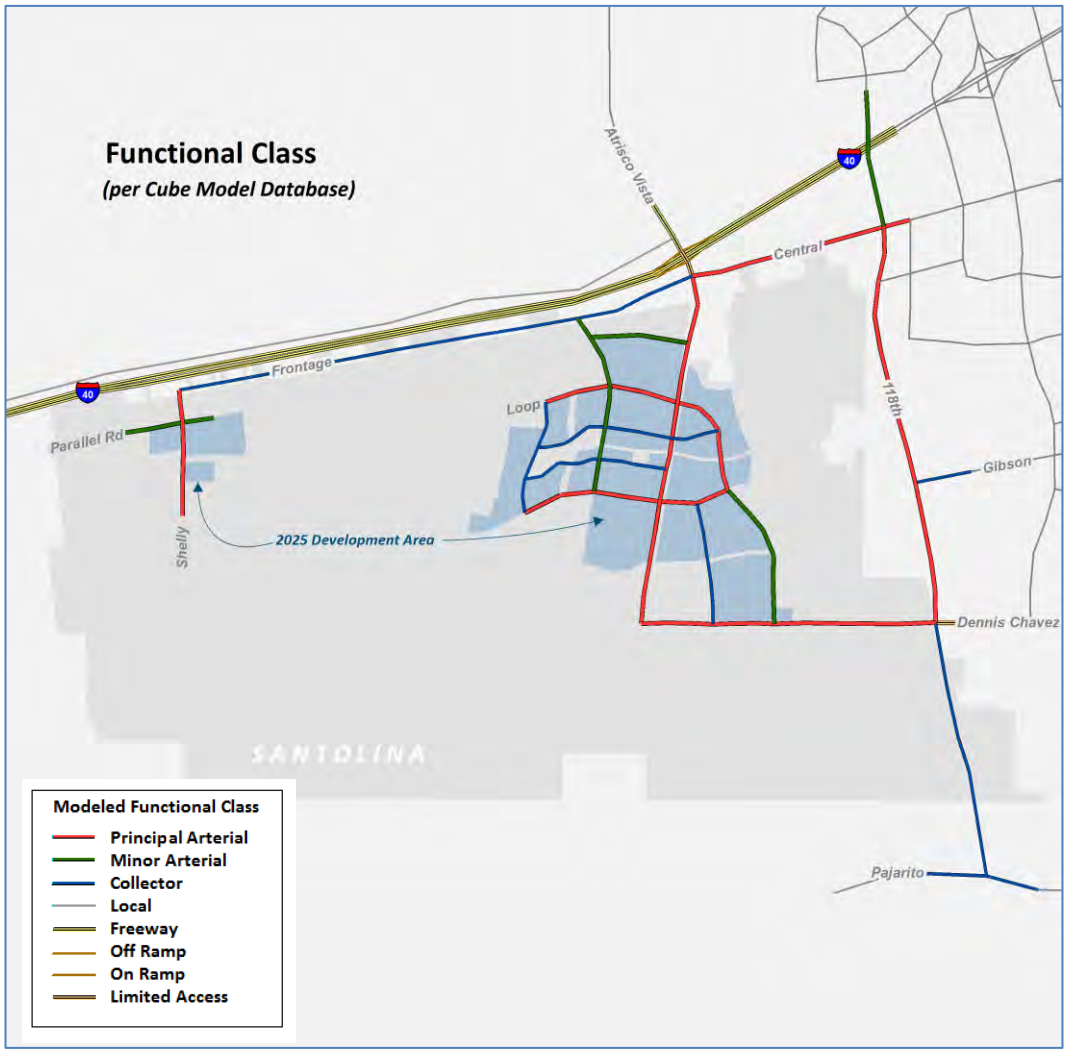

Figure 14: Functional Class (2025): Note the extent of development expected in Santolina by 2025.

Lanes and Capacity (2025)

Figure 15 describes the lane configuration of roadways that are part of the circulation plan for 2025.

Key features of the plan are:

- 2 roadways providing 4 directional lanes of capacity connecting Santolina to the east, through the escarpment. Both of these roads (Central and Dennis Chavez) already exist, although they will have to be widened in this plan.
- 1 roadway, providing 2 directional lanes of capacity, connecting Santolina to the north, over I-40. This is at Atrisco Vista, which already exists and provides 2 lanes of capacity at least in the immediate vicinity of the interchange
- 1 interchanges with I-40 (Atrisco Vista), which already exists and tested in this model run as a diamond interchange with 1 lane ramps

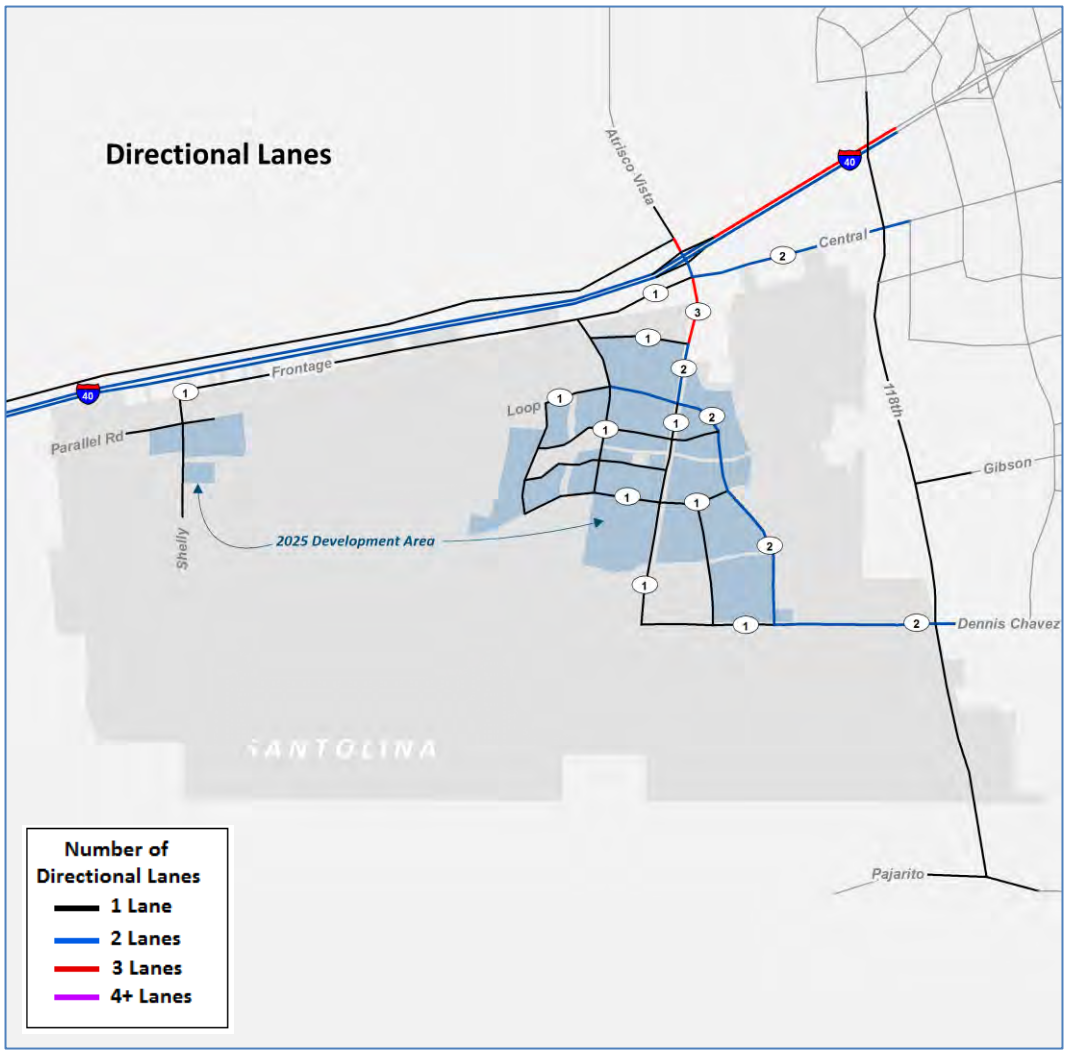

Figure 15: Number of Directional Lanes (2025)

Speed (2025)

Speed assumptions for roadways in the 2025 plan are the same as they have been assumed to be in the Master Plan at Build-Out.

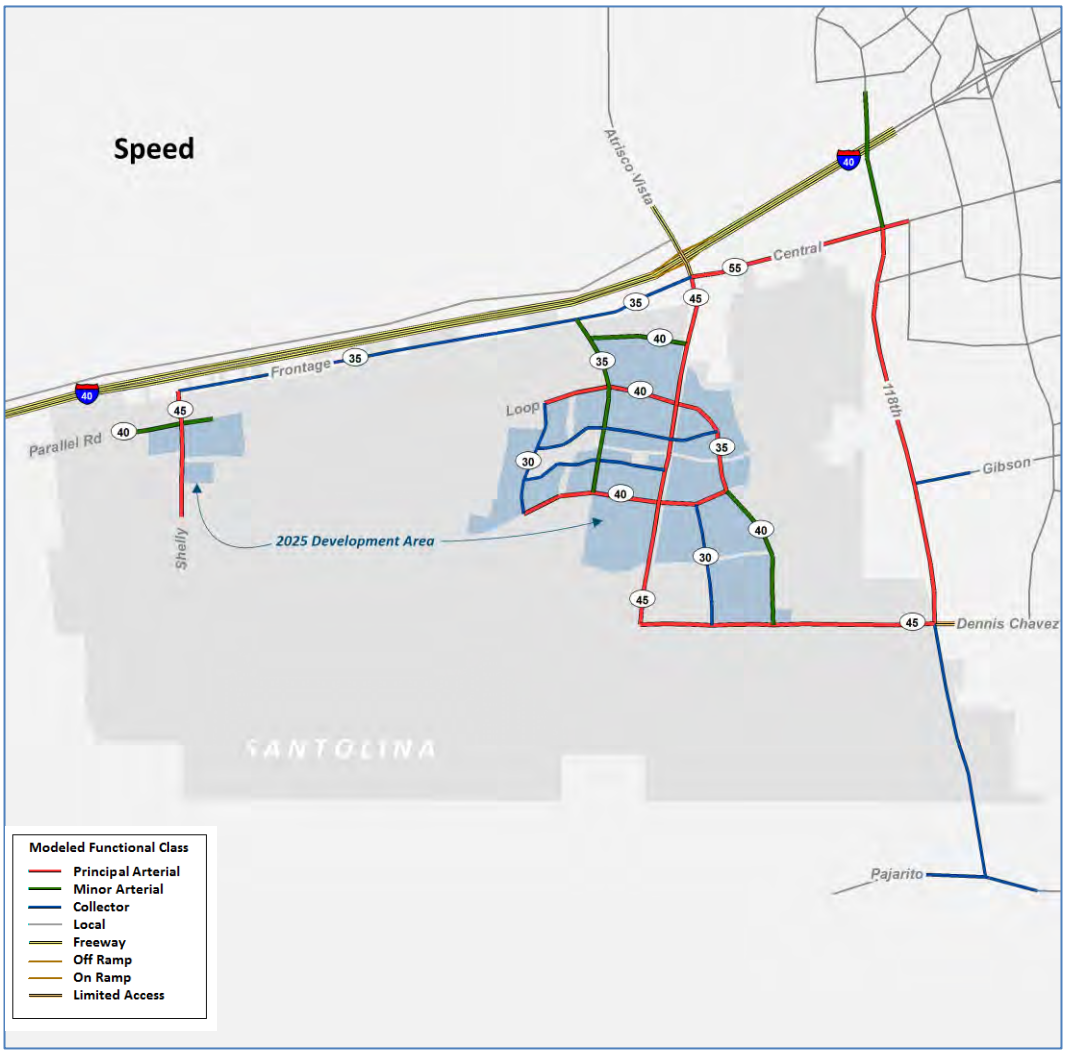

Figure 16: Speed on Santolina Roads (2025)

Average Daily (Weekday) Traffic (2025)

Average daily traffic volumes on Santolina roads in 2025 are shown in Figure 17.

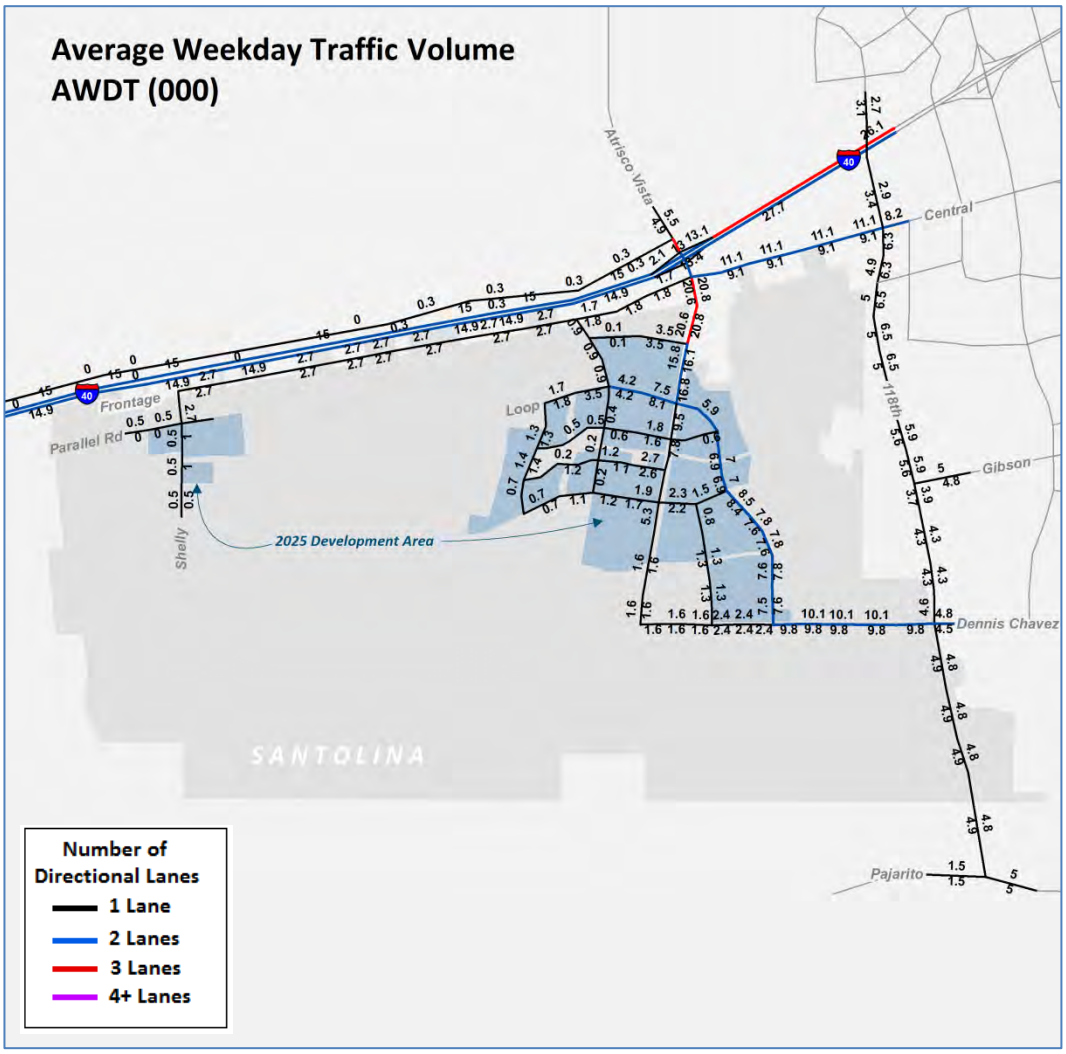

Figure 17: AWDT on Santolina Roads (2025), in thousands

AM Peak Hour Traffic Volumes (2025)

AM peak hour traffic volumes on Santolina roads in 2025 are shown in Figure 18.

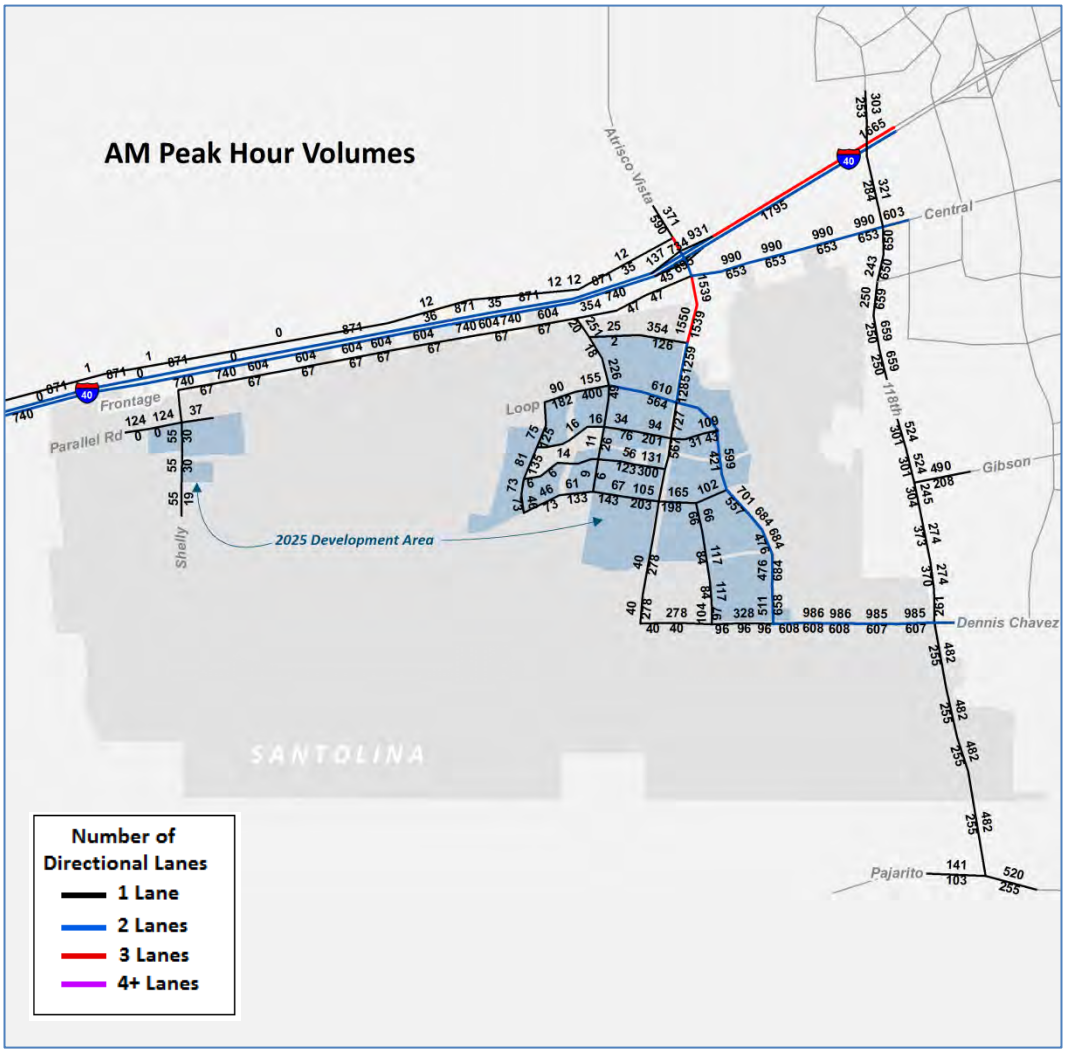

Figure 18: AM Peak Hour Volumes (2025)

PM Peak Hour Volumes (2025)

PM peak hour traffic volumes on Santolina roads in 2025 are shown in Figure 19.

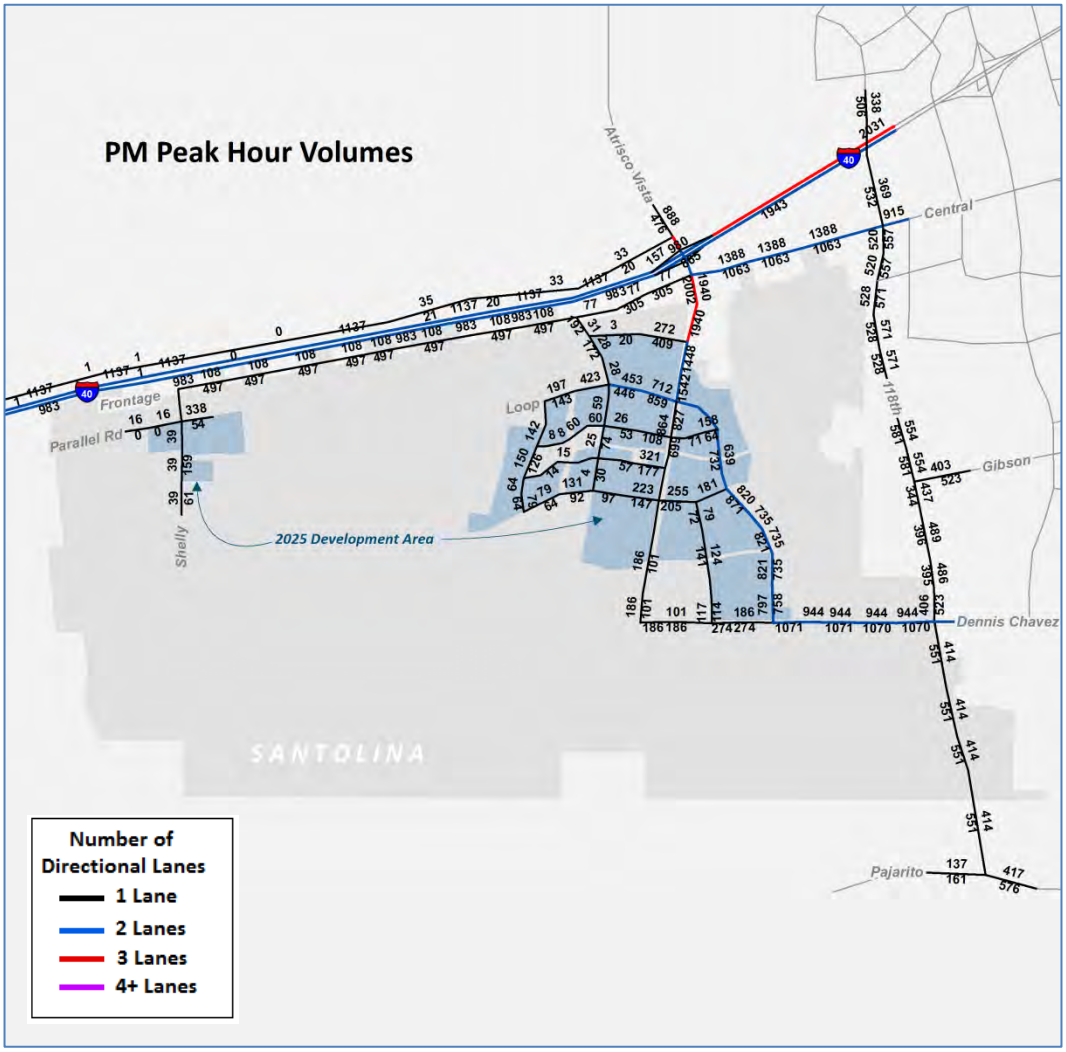

Figure 19: PM Peak Hour Volumes (2025)

Screenline Volumes (2025)

Table 6 summarizes screenline volumes entering and exiting Santolina. The two screenlines are:

- Northerly traffic crossing a screenline along and immediately south of I-40
- Easterly traffic crossing the escarpment along and immediately west of 118th

Job/housing balance for Santolina in 2025 is 1.47 (the lowest of any of the scenarios examined in this study) reflecting a balanced community that is slightly "job rich". The directional splits for traffic seem to reflect that. Directional splits tend to be more-or-less balanced in the AM and PM peak hours except for AM traffic crossing the escarpment that heavily favors commuters to Santolina jobs.

Table 6: Screenline Volumes (2025)

			AM Peak Hour		PM Peak Hour	
Screenline	**Roadway**	**AWDT (000)**	**NB**	**SB**	**NB**	**SB**
Along I-40	*118th*	6.3	321	284	369	532
…Between I-40	*Atrisco Vista*	36.2	1,335	1,317	1,824	1,333
	Total	**42.5**	**1,656**	**1,601**	**2,193**	**1,865**
	Directional Split		50.8%	49.2%	54.0%	46.0%
	V/C Ratio		0.53	0.52	0.71	0.60
			AM Peak Hour		**PM Peak Hour**	
Screenline	**Roadway**	**AWDT (000)**	**EB**	**WB**	**EB**	**WB**
Along Escarpment	*Central*	20.2	653	990	1,063	1,388
…Just West of 118th	*Dennis Chavez*	19.9	607	985	1,070	944
	Total	**40.1**	**1,260**	**1,975**	**2,133**	**2,332**
	Directional Split		38.9%	61.1%	47.8%	52.2%
	V/C Ratio		0.32	0.49	0.53	0.58

AM Volume-to-Capacity Ratios (2025)

Volume-to-capacity ratios for the AM peak hour are shown for Santolina road for 2025 in Figure 20.

Recall that according to MRCOG practices, volume-to-capacity ratios exceeding 0.9 are considered to be "approaching capacity".

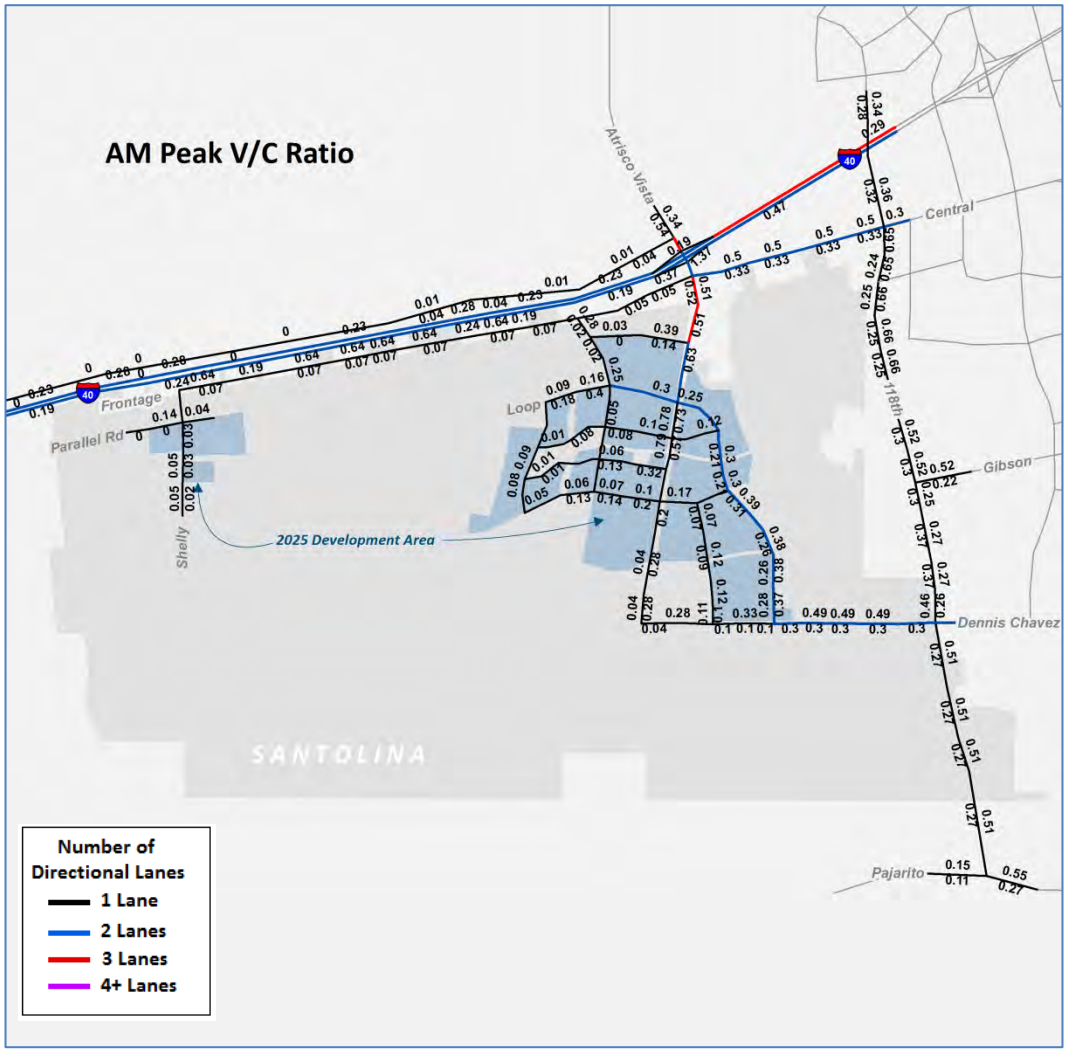

Figure 20: AM V/C Ratios (2025)

PM Volume-to-Capacity Ratios (2025)

Volume-to-capacity ratios for the PM peak hour are shown for Santolina roads for2025 in Figure 21.

Recall that according to MRCOG practices, volume-to-capacity ratios exceeding 0.9 are considered to be "approaching capacity".

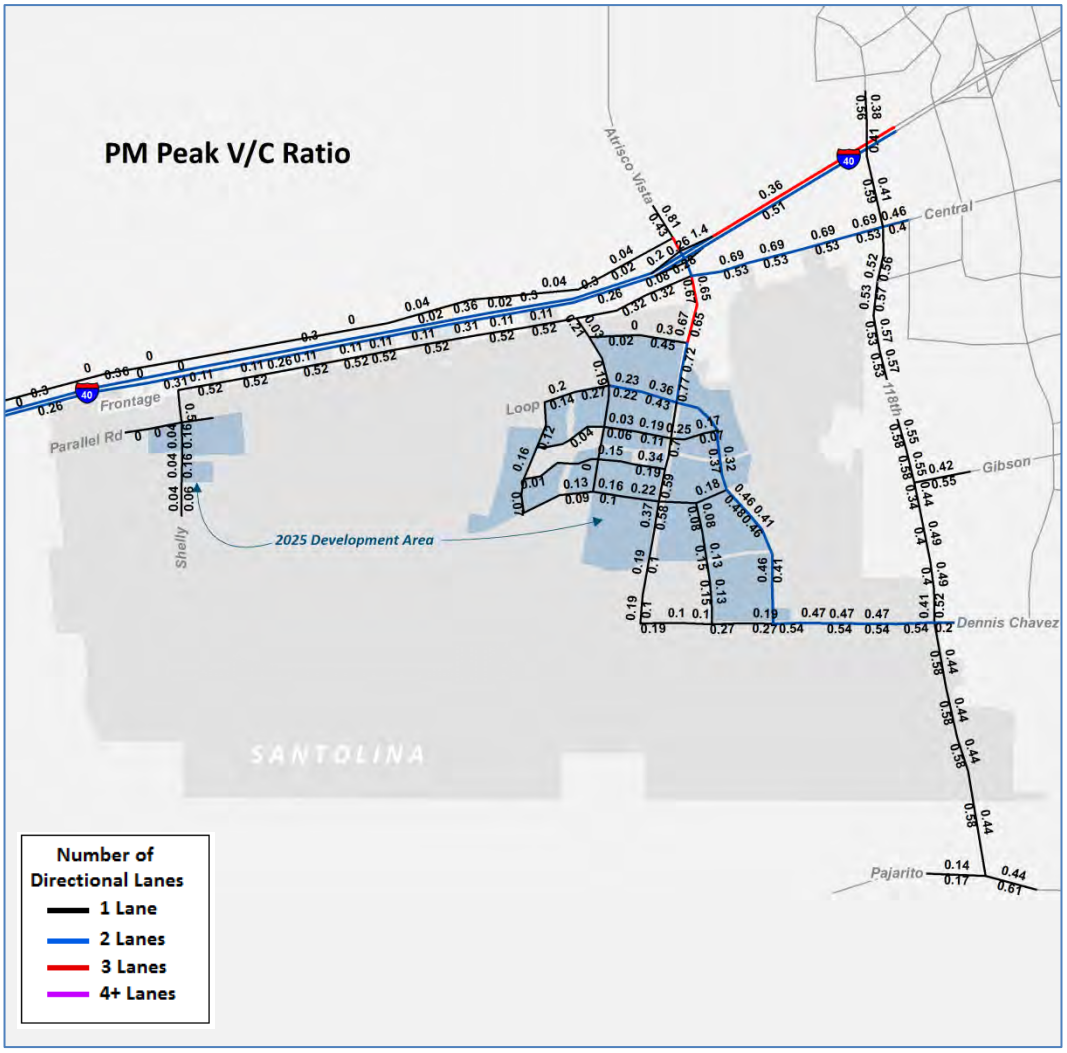

Figure 21: PM V/C Ratios (2025)

AM Level of Service (2025)

Level of Service on Santolina roads according to MRCOG criteria for level of service is shown for the AM peak hour in Figure 22.

On-site, the circulation plan appears to accommodate peak hour traffic quite well, at acceptable levels of service.

The only congestion issue that is expected in 2025 will be at the Atrisco Vista interchange, specifically on the easterly oriented ramps. These are currently 1-lane ramps. They will warrant additional attention for 2025.

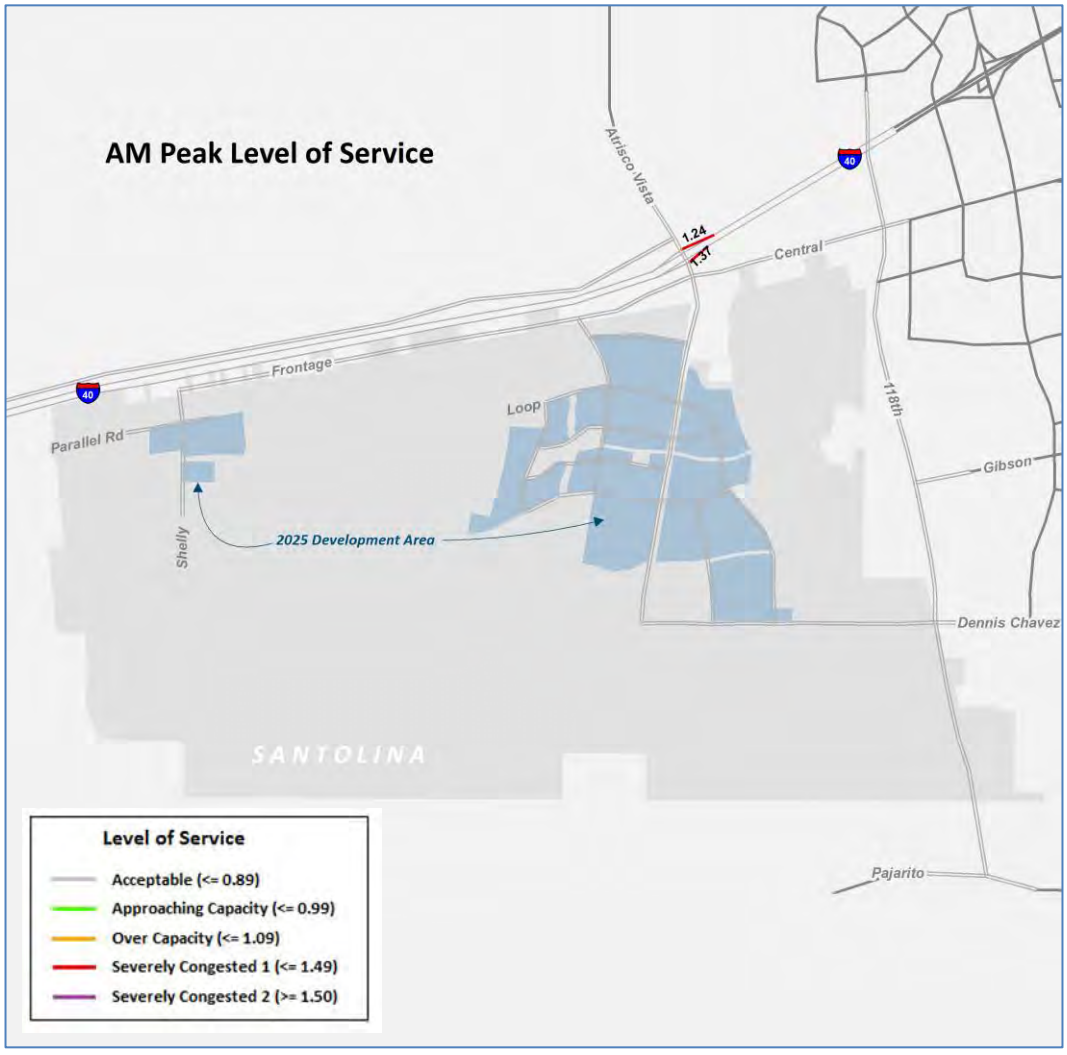

Figure 22: AM Level of Service (2025)

PM Level of Service (2025)

Level of Service on Santolina roads according to MRCOG criteria for level of service is shown for the PM peak hour in Figure 23.

On-site, the circulation plan appears to accommodate peak hour traffic quite well, at acceptable levels of service.

As was the case in the AM peak hour, the only congestion issue that is expected in 2025 will be at the Atrisco Vista interchange, specifically on the easterly oriented ramps. These are currently 1-lane ramps. They will warrant additional attention for 2025.

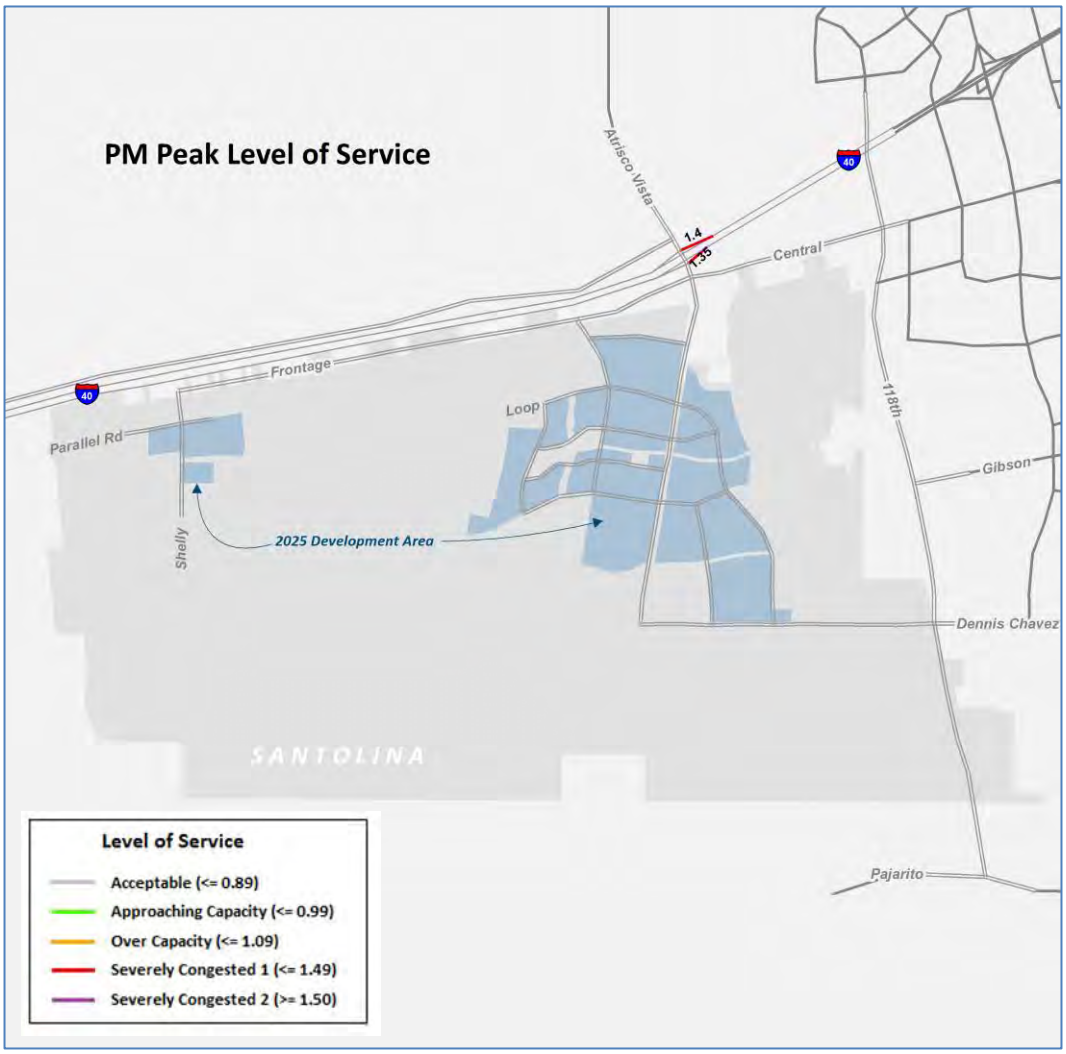

Figure 23: PM Level of Service (2025)

Off-Site AM Peak Level of Service for the MTP (2025)

In this section we will begin to look at traffic impacts related to Santolina development on off-site roadways in the southwest part of the metropolitan area. We will do so by comparing traffic volumes and levels of service with those indicated in the MTP. It is through this comparison that impact areas can be identified.

Before doing so, however, bear in mind that the MTP already indicates some level of service and congestion issues on the Southwest side. These are illustrated in Figure 32. As indicated in this figure, the prevalent capacity issues for the southwest side involve I-40 and river crossings. The issues in the AM peak typically affect eastbound traffic inbound to Albuquerque.

(Note: Recall that MRCOG did not actually run or publish forecasts for 2025 as part of the MTP. MRCOG did, however, prepare 2025 socioeconomic forecasts and a 2025 "MTP" network to serve as a baseline for this study. We ran the model based on these datasets and are reporting this information here as "2025 MTP" data.)

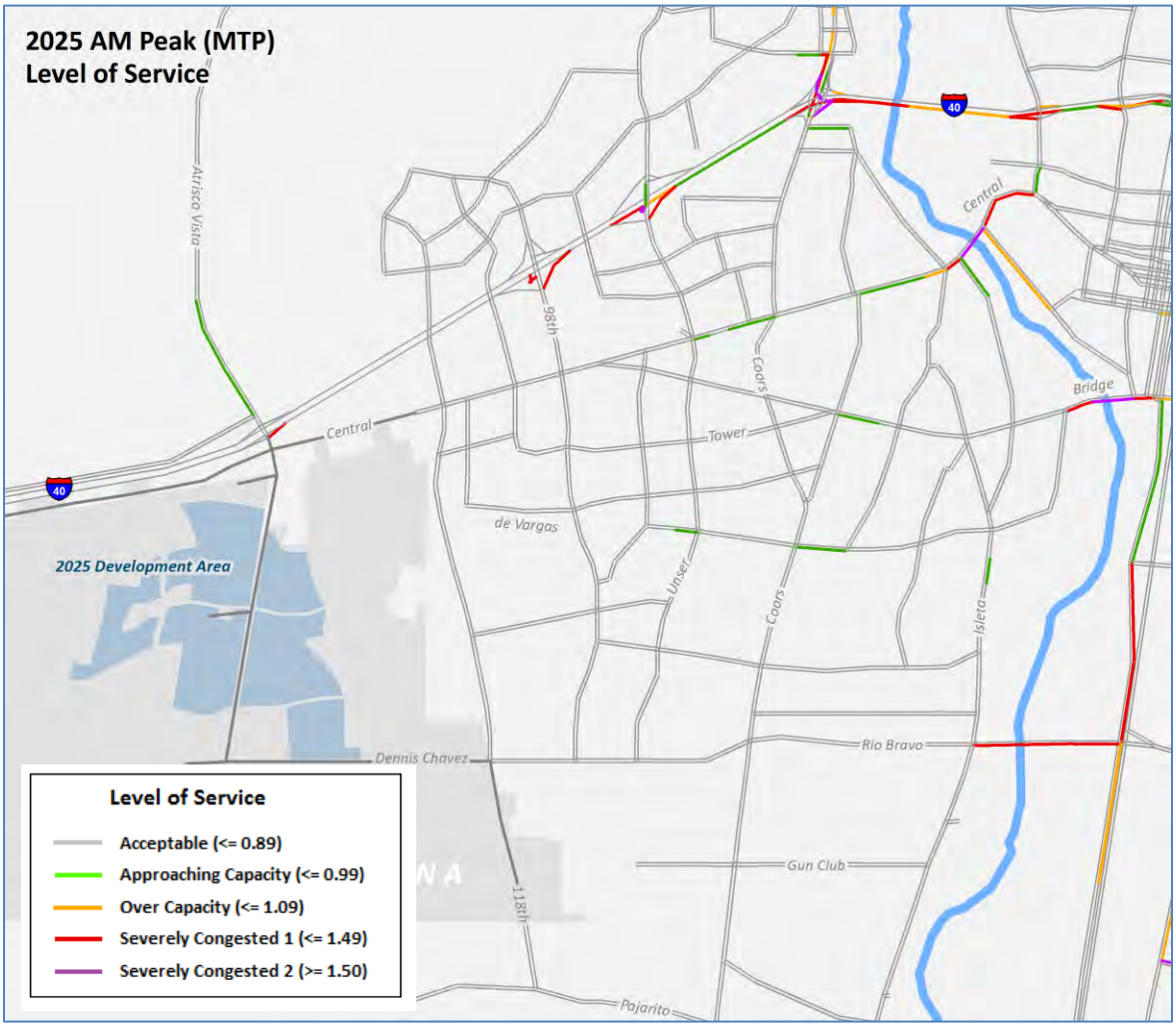

Figure 24: AM Peak Level of Service for the MTP, Off-site (2025)

Off-Site AM Peak Level of Service for Santolina (2025)

Level of service on highways on the southwest side is shown here (Figure 25) for the 2025 Santolina "phased development" scenario. The same types of problems that were seen previously for the MTP itself continue to be evident here – the most prominent of which are I-40 and river crossings.

A side by side comparison of the two maps – Figure 24 for the MTP and Figure 25 for the Santolina scenario – would reveal any differences in the performance of the 2 networks to the extent that they are different. Or, instead, see the next map Figure 26 which illustrates the outcome of the comparison for you.

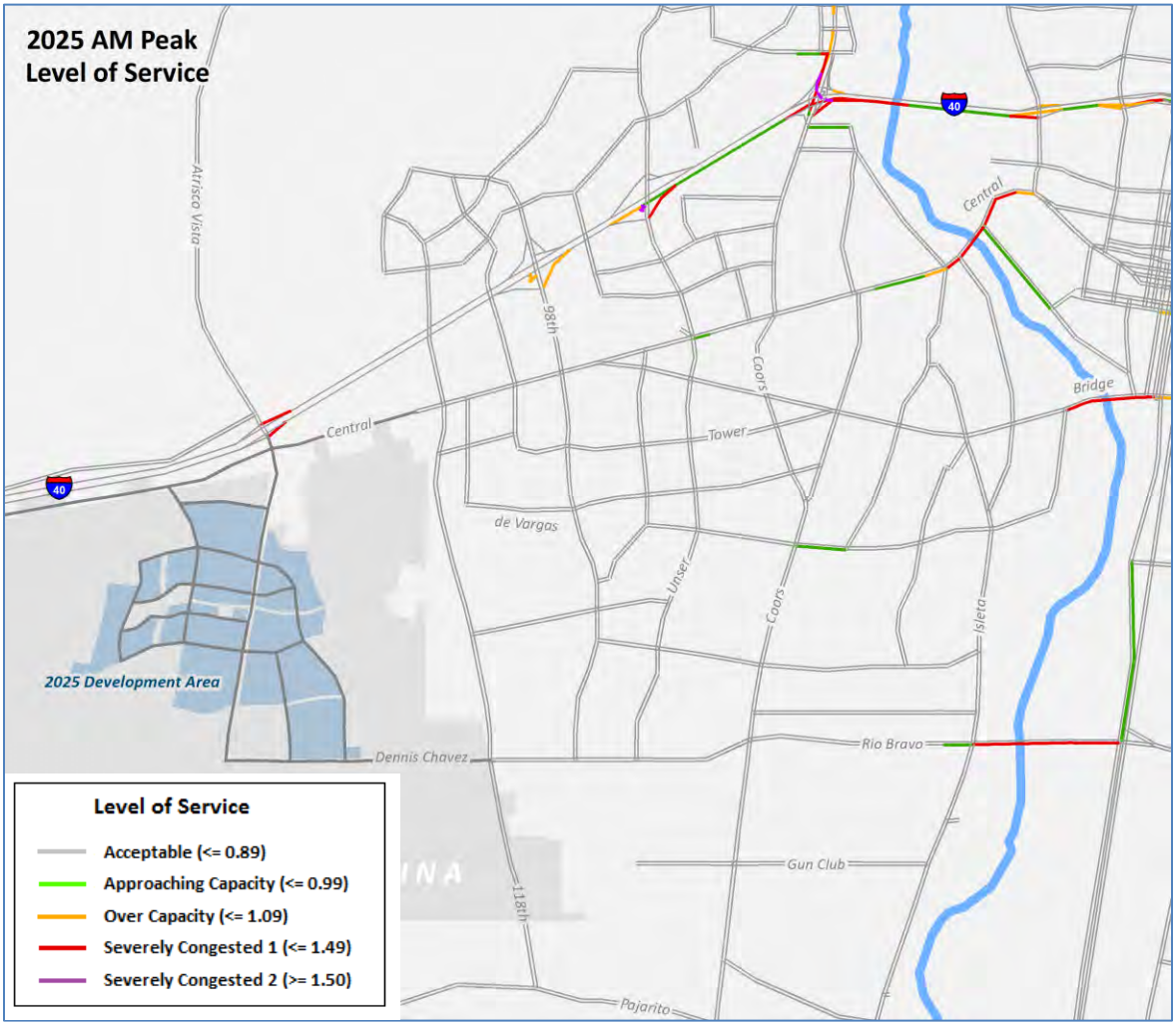

Figure 25: AM Peak Level of Service, Offsite (2025)

Change in Off-Site Level of Service in the AM Peak Hour (2025)

Figure 26 illustrates roadways on the southwest side that undergo a change in level of service (LOS) as a result of Santolina development – either for the better or for the worse. Here a "change of level of service:" is as defined by MRCOG, for example a roadway segment changing from "Approaching capacity" (v/c > 0.9) to "Over Capacity" (v/c > 1.0).

In this map, note also that we are *only* displaying roadways where the number of "vehicles per hour per lane" (VPHPL) has changed by more than 10%. This is to say, we are excluding road segments where there were only small and insignificant changes in traffic volumes.

As indicated in Figure 26, Santolina development in 2025 will have a negligible impact on traffic levels of service on the southwest side – and, in fact, the few changes in LOS that are evident are for the better.

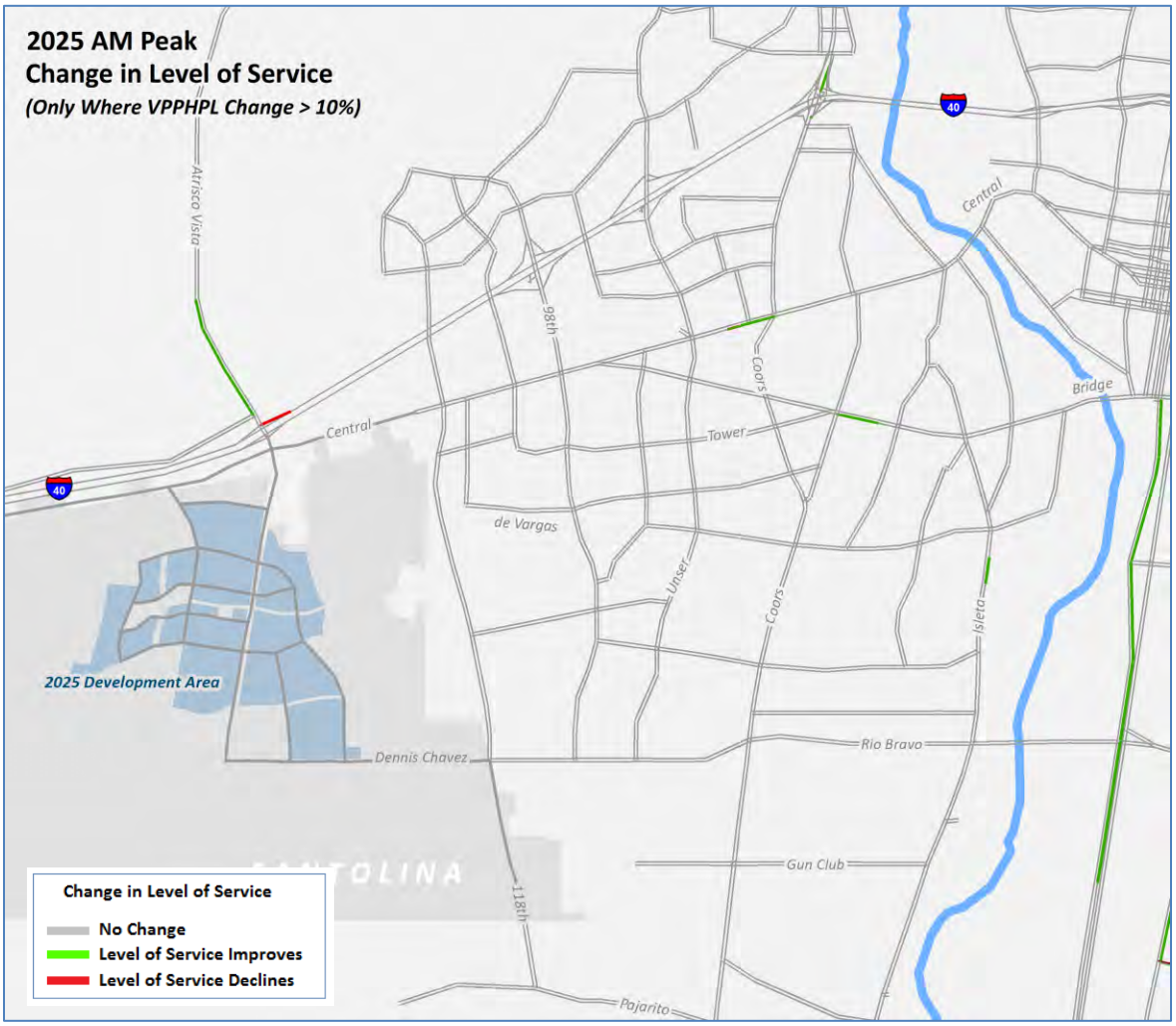

Figure 26: AM Peak Hour: Change in Offsite Level of Service (2025)

Change in Vehicles per Hour per Lane in the AM Peak Hour, Offsite (2025)

Figure 27 indicates the actual changes in VPHPL (vehicles per hour per lane) when comparing the Santolina simulation for 2025 with the MTP base case. Both increases and decreases in VPHPL are shown. Once again note that we are excluding road segments where the change was less than 10%.

Perhaps it should be no surprise: in the AM period, Santolina can be expected to increase westbound traffic volumes but will decrease eastbound traffic volumes. This might be considered by some to be beneficial, inasmuch as the prevailing traffic congestion issue in the AM period revolves around eastbound traffic crossing the river. As we saw previously in Figure 26, the increases in westbound traffic volumes to Santolina do not appear to be impacting level of service: because these increases are counter-flow to the prevailing peak, they are taking advantage of excess capacity in that direction.

Recall also that the impacts that are being observed in the simulation not only arise from Santolina development – they also arise from the redistribution (and lowering) of growth depicted in the scenario outside of Santolina (so as to hold population and job control totals constant).

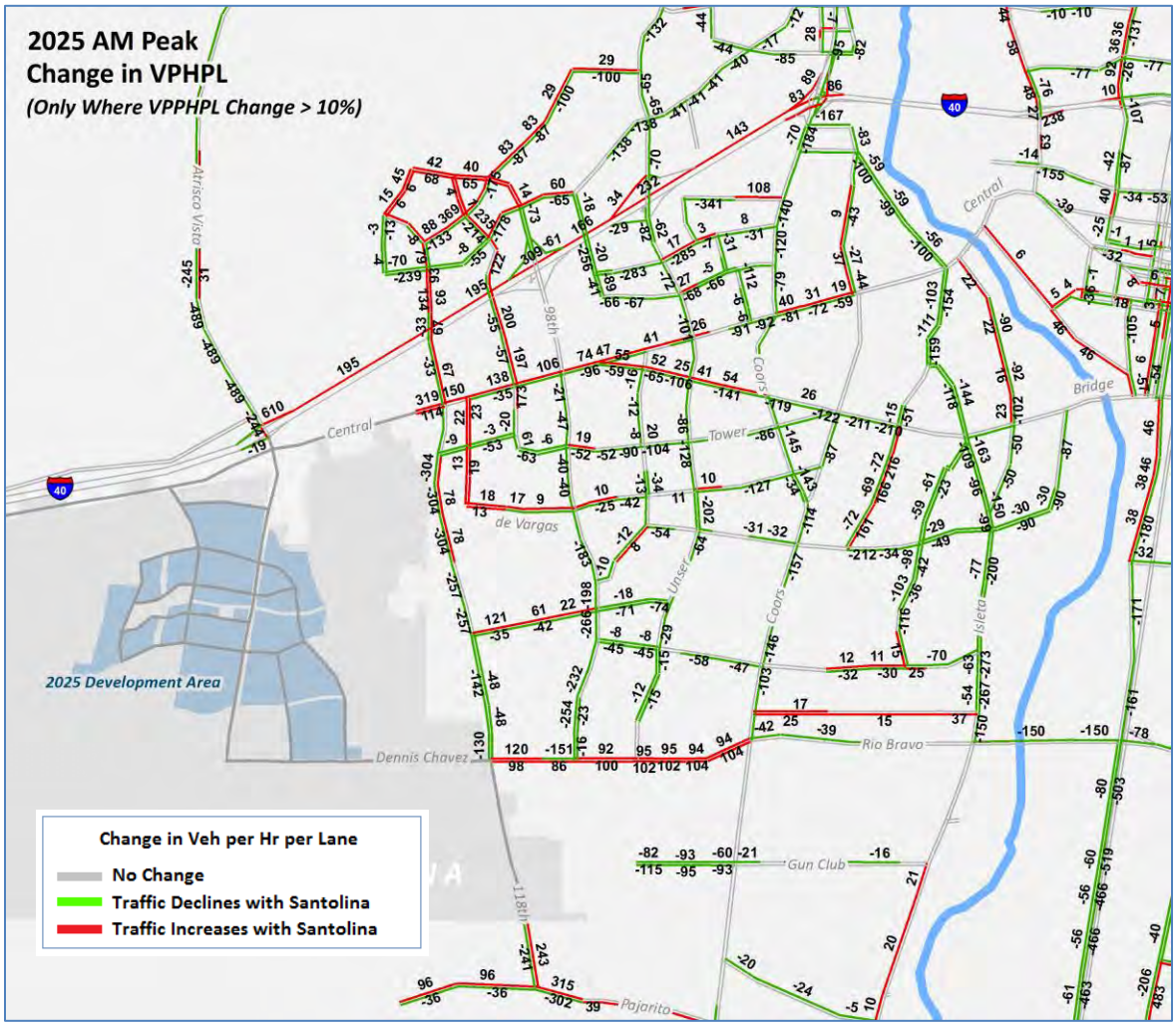

Figure 27: AM Peak Hour Change in VPHPL, Compared with the MTP (2025)

Percent Change in Vehicles per Hour per Lane in the AM Peak Hour, Offsite (2025)

Figure 28 illustrates the same changes in VPHPL that was shown previously in Figure 27, except now on a percentage basis. Once again, only roadways where that percentage change exceeded 10% are shown, thereby excluding the relatively minor differences.

It should be no surprise to see that the impact of Santolina on traffic volumes tends to dissipate with greater distances away from Santolina.

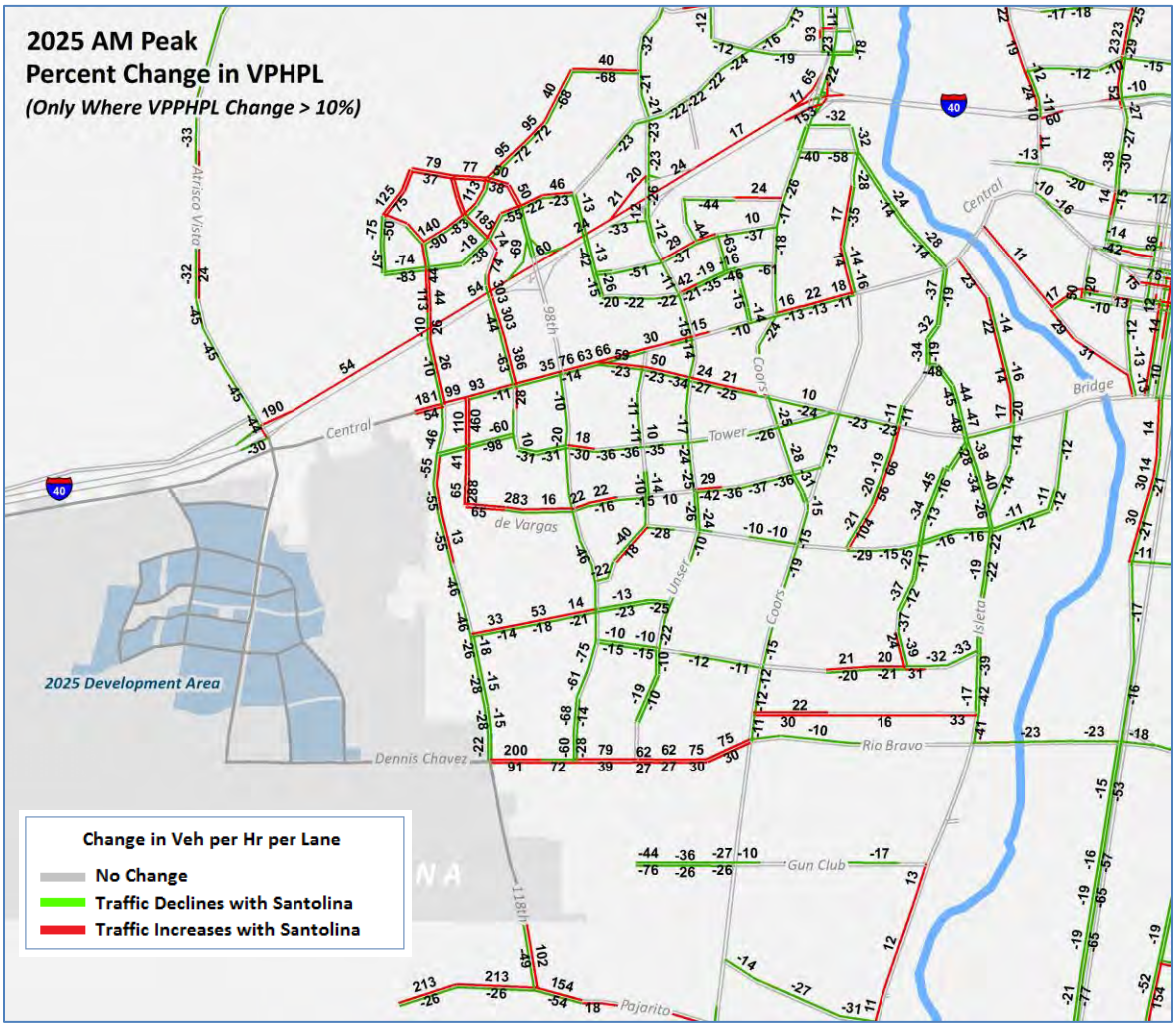

Figure 28: AM Peak Hour Percent Change in VPHPL, Compared with the MTP (2025)

Off-Site PM Peak Level of Service for the MTP (2025)

The outlook for the PM peak as depicted by 2025 MTP projections generally mirrors the AM peak shown earlier, except in the opposing direction. See Figure 29. The predominant direction of travel on the Southwest side is westbound as commuters return home. The most prominent congestion and capacity problems concern I-40 and the river crossings.

(Note: Recall point of clarification: MRCOG did not actually run or publish forecasts for 2025 as part of the MTP. MRCOG did, however, prepare 2025 socioeconomic forecasts and a 2025 "MTP" network to serve as a baseline for this study. We ran the model based on these datasets and are reporting this information here as "2025 MTP" data.)

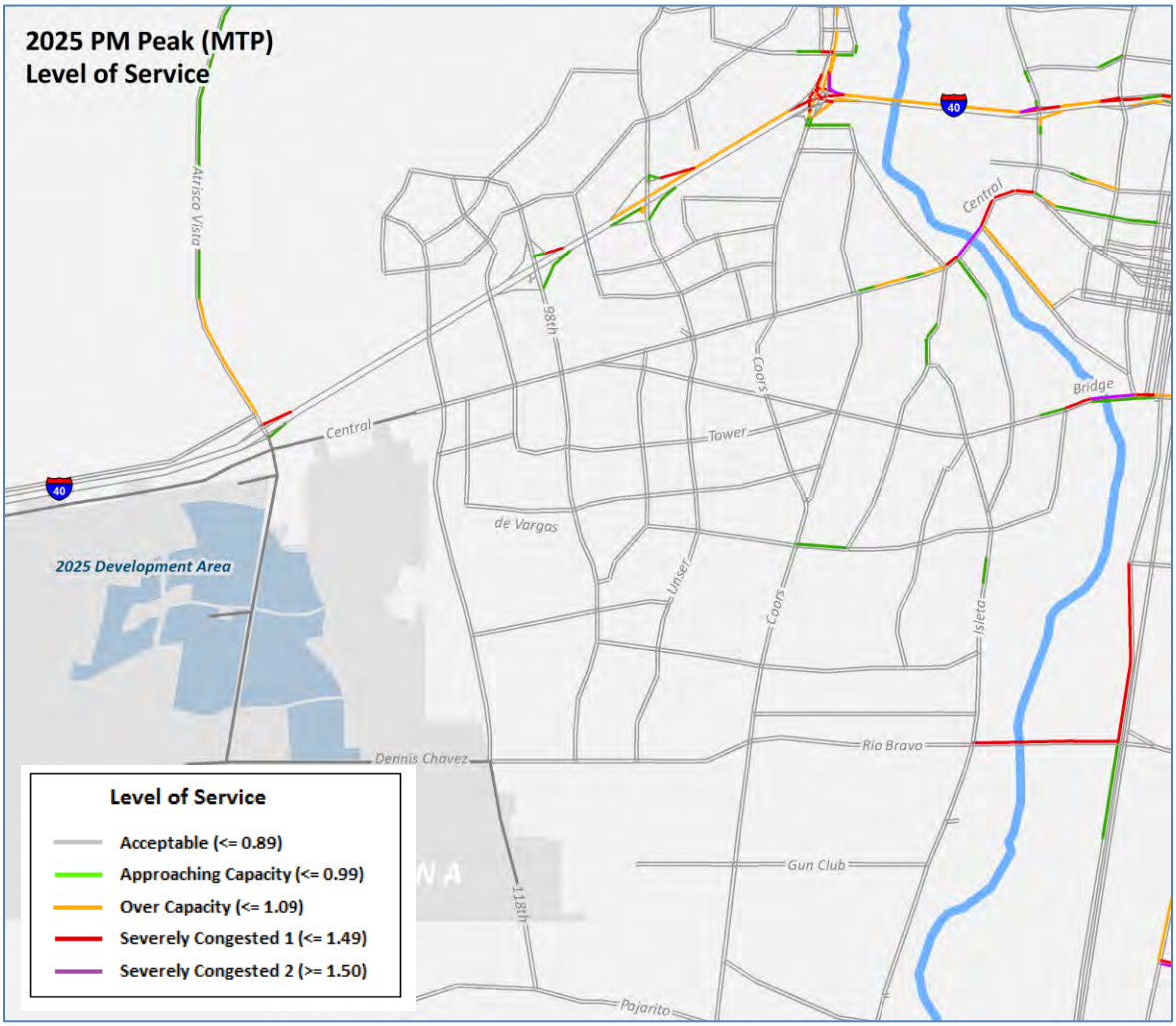

Figure 299: PM Peak Level of Service for the MTP, Off-site (2025)

Off-Site PM Peak Level of Service for Santolina (2025)

Level of service on highways on the southwest side is shown here (Figure 30) for the 2025 Santolina "phased development" scenario. The same types of problems that were seen previously for the MTP itself continue to be evident here – the most prominent of which are I-40 and river crossings.

A side by side comparison of the two maps – Figure 29 for the MTP and Figure 30 for the Santolina scenario – would reveal any differences in the performance of the 2 networks to the extent that they are different. Or, instead, see the next map Figure 31 which illustrates the outcome of the comparison for you.

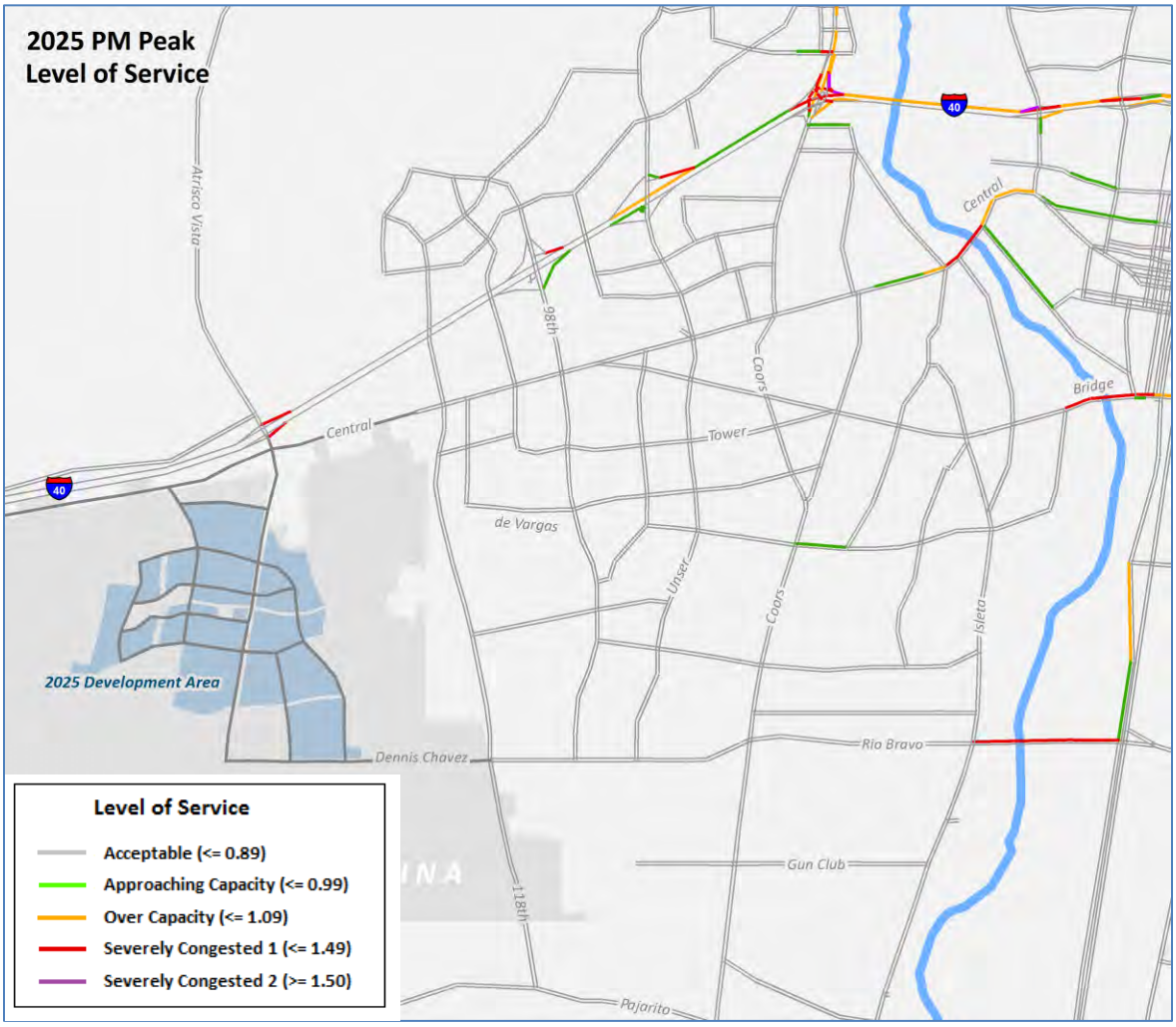

Figure 30: PM Peak Level of Service, Offsite (2025)

Change in Off-Site Level of Service in the PM Peak Hour (2025)

Figure 31 illustrates roadways on the southwest side that undergo a change in level of service (LOS) as a result of Santolina development – either for the better or for the worse. Here a "change of level of service:" is as defined by MRCOG, for example a roadway segment changing from "Approaching capacity" (v/c > 0.9) to "Over Capacity" (v/c > 1.0).

In this map, note also that we are *only* displaying roadways where the number of "vehicles per hour per lane" (VPHPL) has changed by more than 10%. This is to say, we are excluding road segments where there were only small and insignificant changes in traffic volumes.

As indicated in Figure 31, Santolina development in 2025 will have a negligible impact on traffic levels of service on the southwest side – and, in fact, the few changes in LOS that are evident are for the better.

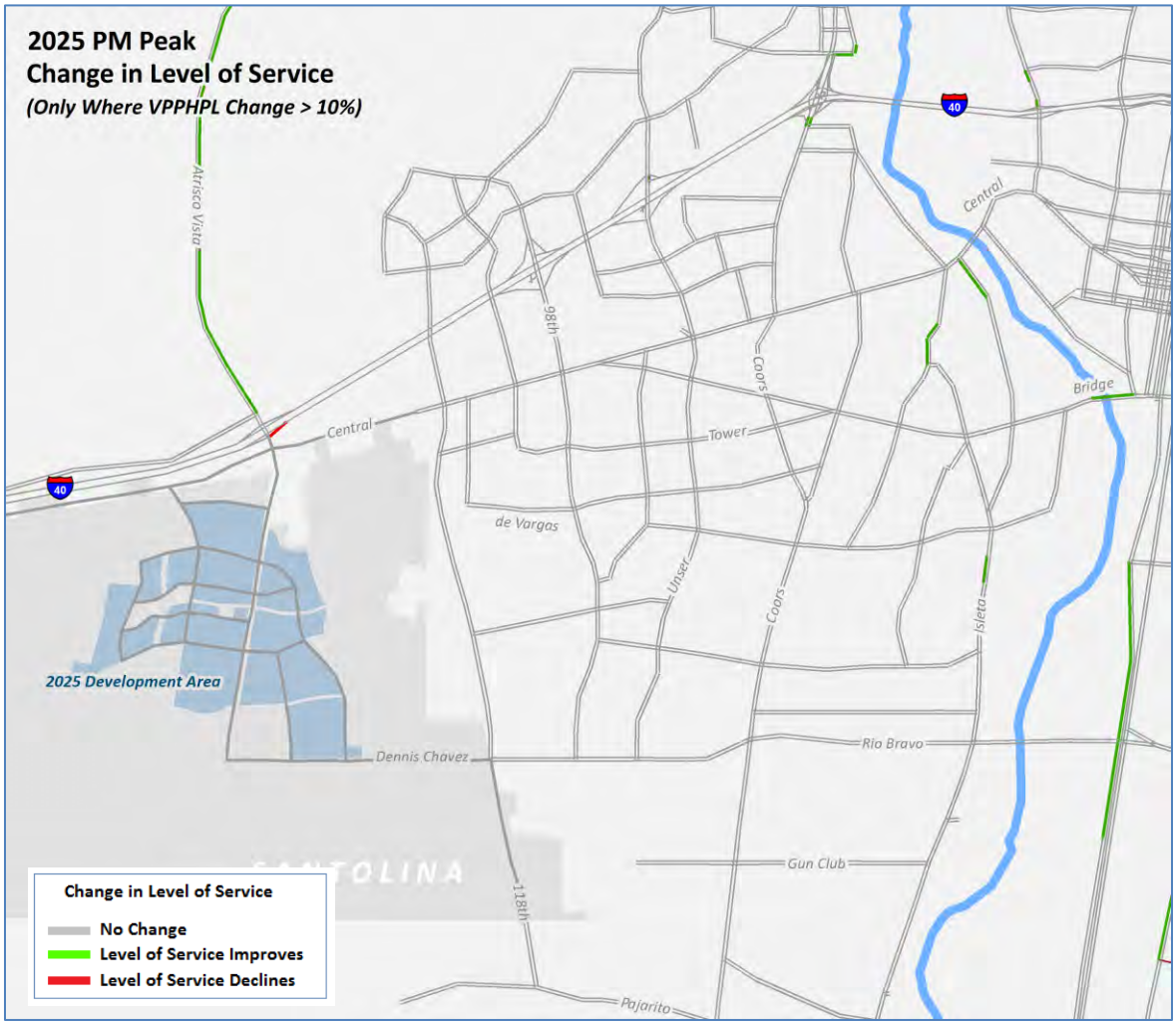

Figure 31: PM Peak Hour: Change in Offsite Level of Service (2025)

Change in Vehicles per Hour per Lane in the PM Peak Hour, Offsite (2025)

Figure 32 indicates the actual changes in VPHPL (vehicles per hour per lane) when comparing the Santolina simulation for 2025 with the MTP base case. Both increases and decreases in VPHPL are shown. Once again note that we are excluding road segments where the change was less than 10%.

Perhaps it should be no surprise: in the PM period, Santolina can be expected to increase traffic volumes on the major arterials serving the Southwest side in the immediate vicinity of the development. Further away, Santolina appears to have a beneficial impact on traffic indicating that the development is somewhat changing the overall traffic pattern, compared with the MTP. As we saw previously in Figure 31, these increases in traffic volumes around Santolina do not appear to be impacting level of service.

Recall also that the impacts that are being observed in the simulation not only arise from Santolina development – they also arise from the redistribution (and lowering) of growth depicted in the scenario outside of Santolina (so as to hold population and job control totals constant).

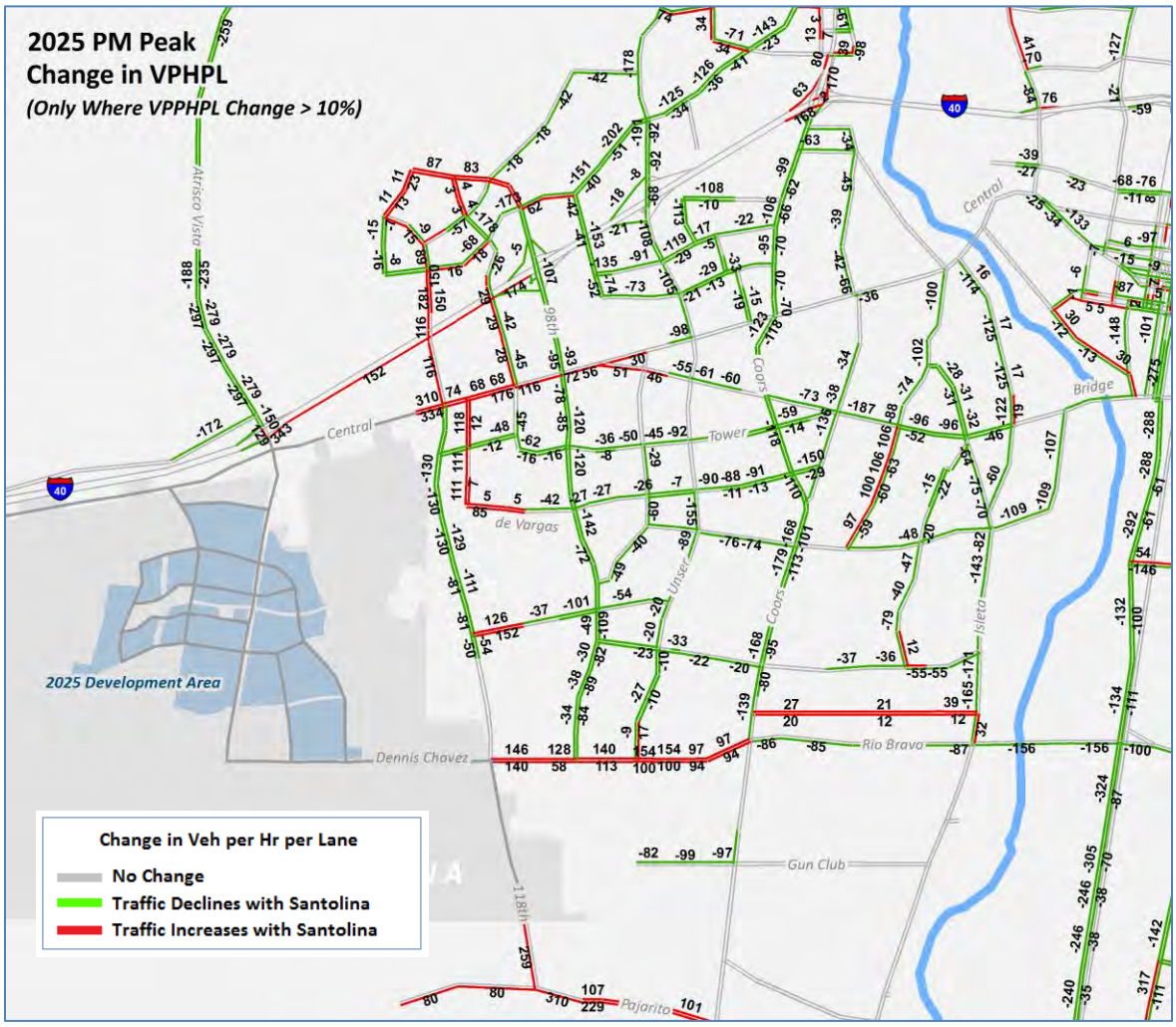

Figure 32: PM Peak Hour Change in VPHPL, Compared with the MTP (2025)

Percent Change in Vehicles per Hour per Lane in the PM Peak Hour, Offsite (2025)

Figure 33 illustrates the same changes in VPHPL that was shown previously in Figure 32, except now on a percentage basis. Once again, only roadways where that percentage change exceeded 10% are shown, thereby excluding the relatively minor differences.

It should be no surprise to see that the impact of Santolina on traffic volumes tends to dissipate with greater distances away from Santolina.

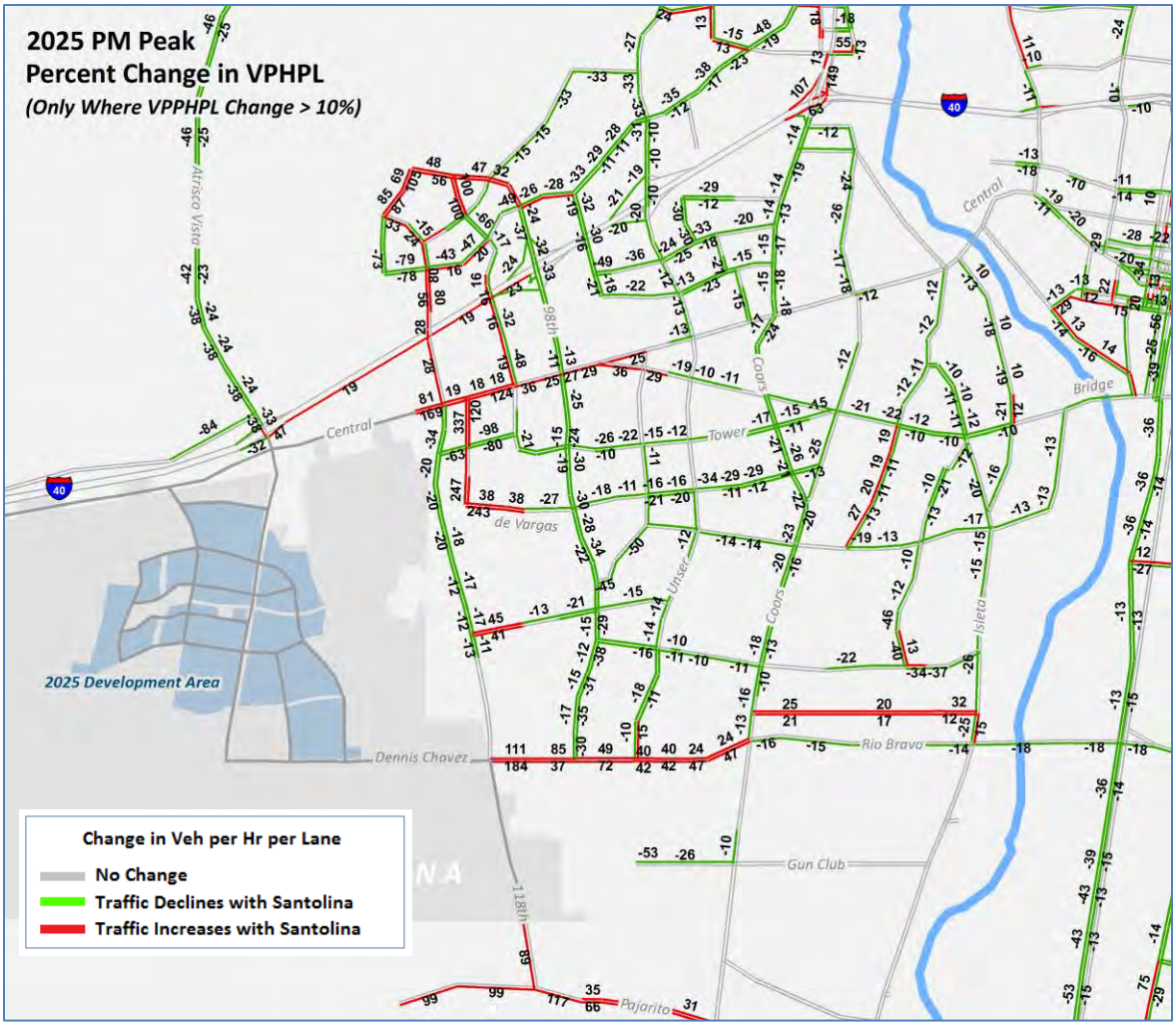

Figure 33: PM Peak Hour Percent Change in VPHPL, Compared with the MTP (2025)

Impact on River Crossings (2025)

One of the most vulnerable system issues in the region concerns river crossings, where commuting demand to cross the Rio Grande has historically exceeded the capacity of the 9 bridges in Sandoval and Bernalillo Counties.

The predominant direction of travel (and the prominent capacity problem) in the AM peak is eastbound; in the PM peak it is westbound. Table 7 below summarizes how the Santolina development will impact those flows. Note that colors designating the level of service used by MRCOG are shown.

Because Santolina in 2025 is a job center and net importer of workers from other areas of the city, the simulations suggest that development in Santolina will actually have an overall favorable impact on the region's river crossing problem. Overall traffic volumes crossing the river will actually decrease in the critical directions, and in some cases LOS will improve.

Table 7: Peak Hour River Crossing Volumes (2025)

		EASTBOUND				
		MTP		**Santolina**		
	Bridge	**AM Peak Hr Vol**	**AM V/C Ratio**	**AM Peak Hr Vol**	**AM V/C Ratio**	**Change**
2025	**NM 550**	**4,336**	**1.31**	**3,935**	**1.19**	
	Alameda	**3,094**	**1.55**	**2,905**	**1.45**	**Improves**
	PDN	**5,815**	**1.02**	**5,546**	**0.97**	**Improves**
	Montano	**2,645**	**1.20**	**2,539**	**1.15**	
	I-40	**9,579**	**1.22**	**9,147**	**1.17**	
	Central	**4,545**	**1.51**	**4,265**	**1.42**	**Improves**
	Bridge	**3,195**	**1.60**	**2,968**	**1.48**	**Improves**
	Rio Bravo	**2,436**	**1.11**	**2,645**	**1.20**	
	I-25	**3,752**	**0.99**	**4,056**	**1.07**	**Declines**
	Total	**39,397**	**1.23**	**38,006**	**1.19**	

		WESTBOUND				
		MTP		**Santolina**		
	Bridge	**PM Peak Hr Vol**	**PM V/C Ratio**	**PM Peak Hr Vol**	**PM V/C Ratio**	**Change**
2025	**NM 550**	**4,424**	**1.34**	**3,917**	**1.19**	
	Alameda	**3,255**	**1.63**	**2,972**	**1.49**	**Improves**
	PDN	**6,026**	**1.06**	**5,698**	**1.00**	
	Montano	**2,716**	**1.23**	**2,563**	**1.16**	
	I-40	**9,936**	**1.05**	**9,498**	**1.00**	
	Central	**4,560**	**1.52**	**4,199**	**1.40**	**Improves**
	Bridge	**3,238**	**1.62**	**2,906**	**1.45**	**Improves**
	Rio Bravo	**2,467**	**1.12**	**2,610**	**1.19**	
	I-25	**3,875**	**1.02**	**4,125**	**1.09**	
	Total	**40,497**	**1.20**	**38,488**	**1.14**	

Overall System Indicators for the PM Peak Hour (2025)

Table 8 provides a breakdown of systemwide indicators of transportation mobility, including vehicle-miles-travelled (VMT), vehicle-hours-travelled (VHT), and vehicle-hours-of-delay (VHD), comparing the Santolina scenario for 2025 with the MTP for the same year. VMT is a common performance measure since it typically is used to relate to air quality (e.g., vehicle emissions), however VHT and VHD are also important measures since they more accurately capture the overall level of mobility offered by the system.

Statistics reported in Table 8 are for the PM peak hour, as they are so reported in the actual MTP report document.

Remarkably, all of the performance indicators in this comparison between the 2 scenarios are favorable, and in some cases the magnitude of improvement is significant.

- VMT is down
- VHT is down
- VHD (delay) is down
- Average system speeds are better
- Fewer congested highway lane-miles

Table 8: Systemwide Performance Indicators for the PM Peak Hour (2025)

				Difference	
Year	**Statistic**	**MTP**	**Santolina**	**Absolute**	**Percent**
2025	VMT	2,330,307	2,292,628	-37,679	-1.6%
	VHT	80,663	69,004	-11,659	-14.5%
	VHD	33,002	22,686	-10,316	-31.3%
	Average Speed	28.9	33.2	+4.3	+15.0%
	% VHT in Delay	40.9%	32.9%	-8.0%	-19.6%
	VMT Over Capacity	298,600	230,072	-68,528	-22.9%
	% VMT Over Capacity	12.8%	10.0%	-2.8%	-21.7%
	Congested Lane Miles	223	170	-53	-23.8%
	Daily VMT per Capita	23.80	23.38	-0.42	-1.8%

MTP data from a 2025 run performed for this study

2040 Circulation Plan

The circulation plan for 2040 represents a phased development of the full build-out plan presented in the previous section of the report. Recall from Part I of this report (*Santolina Transportation Analysis: Traffic Forecasting I"*) that the year 2040 represents a full 100% build of the Level B development area, PLUS the development of several other land uses outside of the Level B area. For reference, the extent of these areas is shown on the following maps.

The plan consists of the subset of roadways needed to provide access to the lands proposed to be developed by 2040 and has been sized (in terms of number of lanes) to provide sufficient capacity to accommodate traffic expected by that time. The development of this plan was an iterative process involving a series of tests to properly phase the roadway system.

Note that the functional class and speeds associated with roadways described in the Master Plan above are not changed for any of the phasing plans. Only the extent of roadways needed have been changed, and the number of lanes required.

The objectives of the analysis are to:

- Specify the requirements for phased construction of roadways in the Master Plan and to demonstrate that roadway capacities are sufficient to accommodate traffic expected by 2040
- Provide a basis for evaluating the extent of off-site traffic impacts on roadways in the general vicinity of Santolina.

Off-site traffic impacts were identified through a comparison to the performance of the 2040 MTP network. Bear in mind that differences in volumes and level of service seen in this comparison are not ONLY a result of growth in Santolina, but also due to changes to land use outside of Santolina that arose as a result of the "normalization" of socioeconomic control totals to maintain regional control totals. For more on that subject, see the accompanying report *"Santolina Transportation Analysis: Traffic Forecasting I"*.

First, we will describe the extent of roadways that comprise the 2040 plan for the circulation system. Then we will describe how this system performs on-site, with respect to level of service. Finally, we will describe potential off-site impacts on traffic conditions in the general vicinity of Santolina (namely: the Southwest side of Albuquerque).

Functional Class (2040)

Figure 34 describes the circulation plan for the year 2040. The plan calls for 141.7 lane miles of capacity on 41.6 centerline miles of roadway. Note that these are not official values, but were tabulated from the network database from the traffic model. These values also include several roadways that actually already exist within the project boundaries: namely Atrisco Vista and Dennis Chavez.

In 2040, access to the development is via:

- An existing Atrisco Vista interchange with I-40 along with new interchanges at 118th and Paseo de Volcan (PDV). Note that a northward extension of PDV is **not** included in the MRCOG MTP
- From the east via Central Ave and Dennis Chavez, both of which already exist along with a roadway crossing the escarpment at Gibson

Note that access to the industrial uses in the western part of the development will be accommodated by an extension to the Parallel Road.

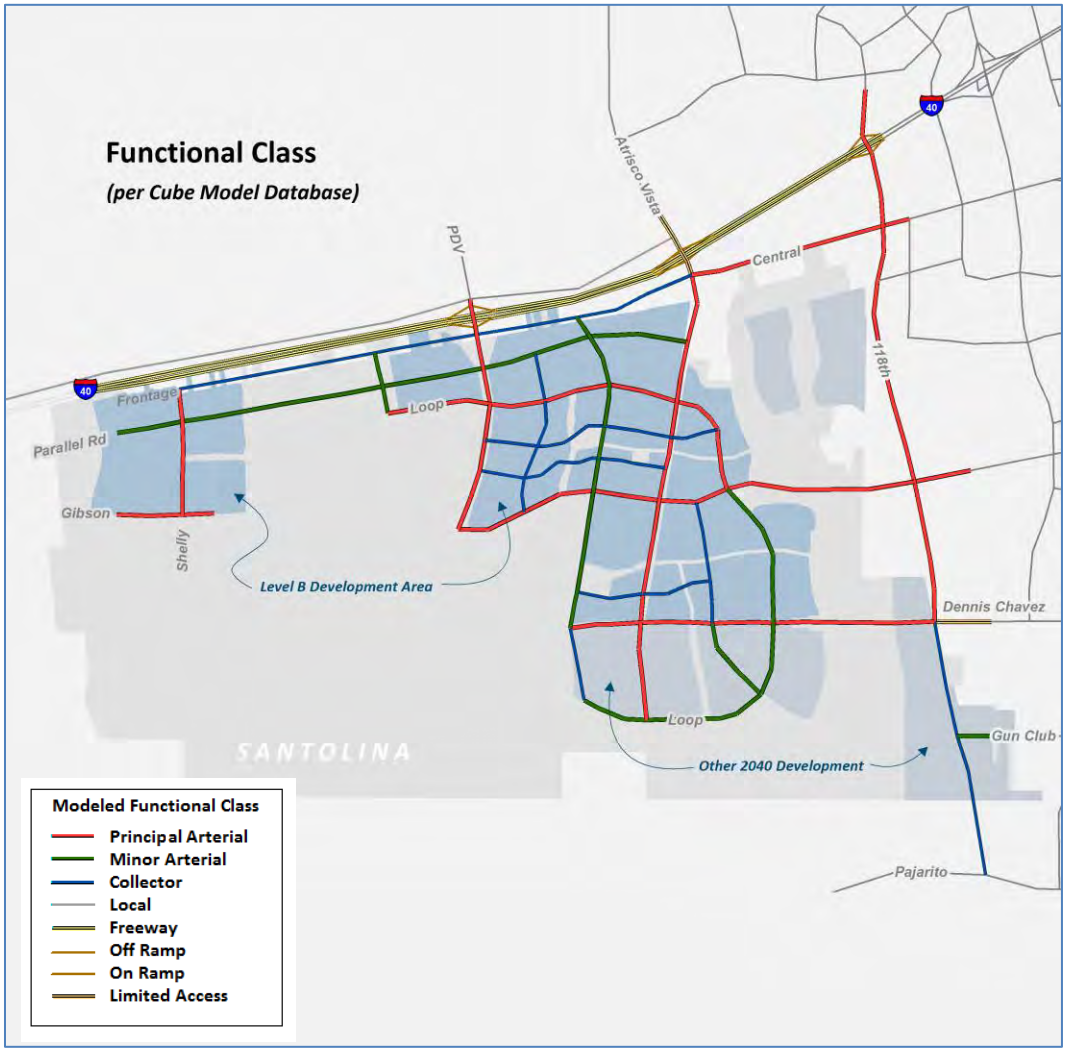

Figure 34: Functional Class (2040): Note the extent of development expected in Santolina by 2040.

Lanes and Capacity (2040)

Figure 35 describes the lane configuration of roadways that are part of the circulation plan for 2040.

Key features of the plan are:

- 3 roadways providing 8 directional lanes of capacity connecting Santolina to the east, through the escarpment. 2 of these roads (Central and Dennis Chavez) already exist (although Dennis Chavez will have to be widened) in this plan. Gibson is new.
- 2 roadways, providing 4 directional lanes of capacity, connecting Santolina to the north, over I-40. This is at Atrisco Vista, which already exists and provides 2 lanes of capacity and at the new interchange with Paseo de Volcan (PDV).
- 3 interchanges with I-40: The existing Atrisco Vista interchange plus 2 new interchanges that appear in the MTP at 118th and at PDV. All interchanges tested in this model run were represented as diamond interchanges with 1 lane ramps

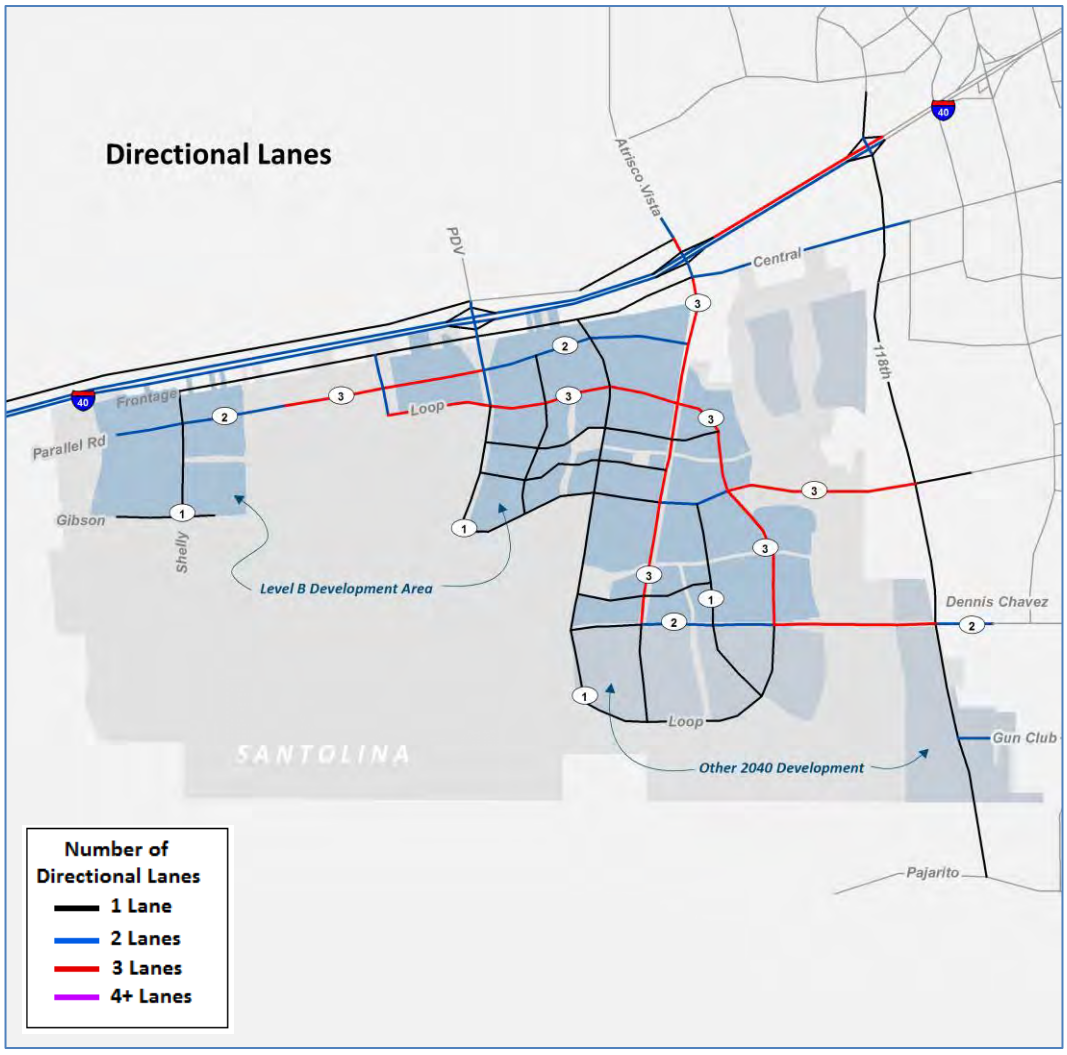

Figure 35: Number of Directional Lanes (2040)

Speed (2040)

Speed assumptions for roadways in the 2040 plan are the same as they have been assumed to be in the Master Plan at Build-Out.

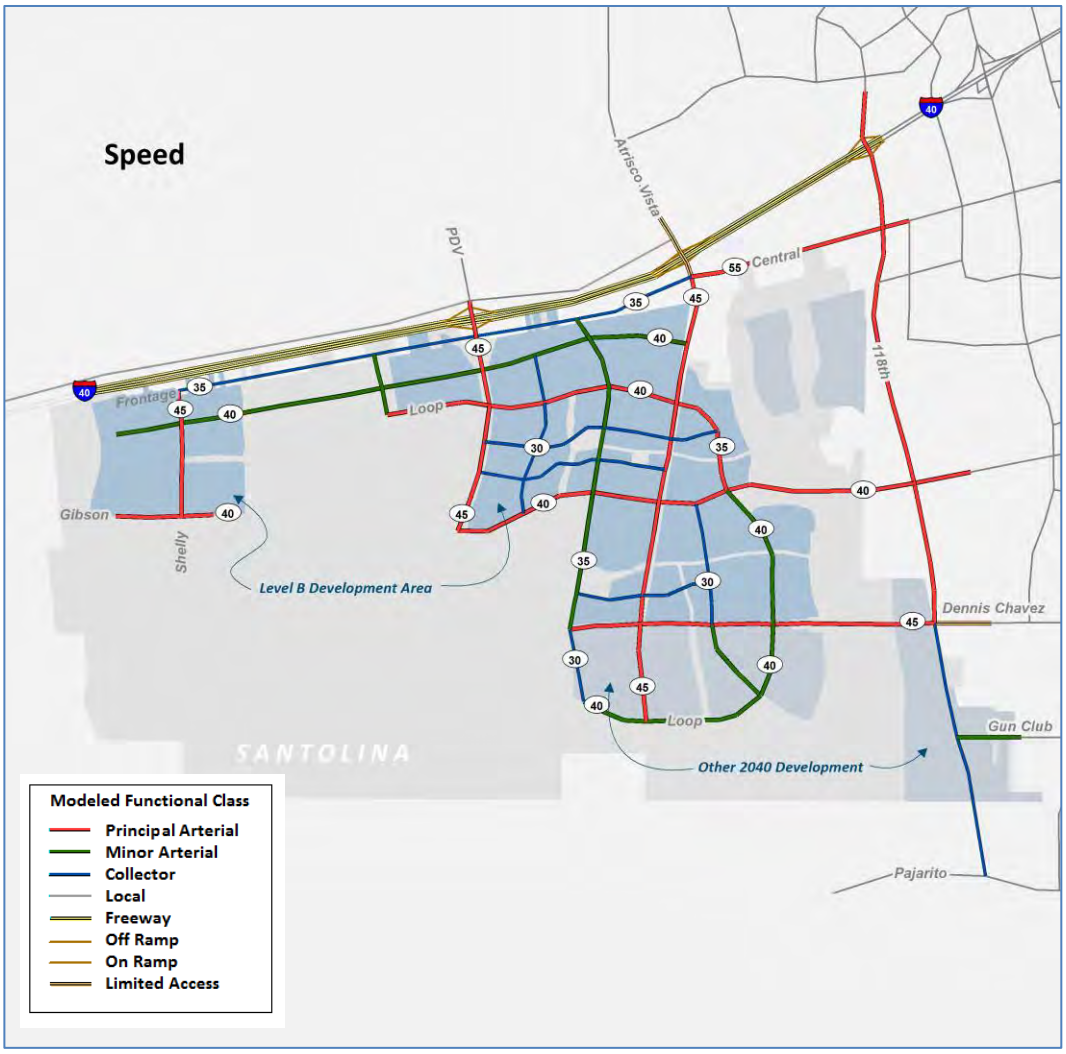

Figure 36: Speed on Santolina Roads (2040)

Average Daily (Weekday) Traffic (2040)

Average daily traffic volumes on Santolina roads in 2040 are shown in Figure 37.

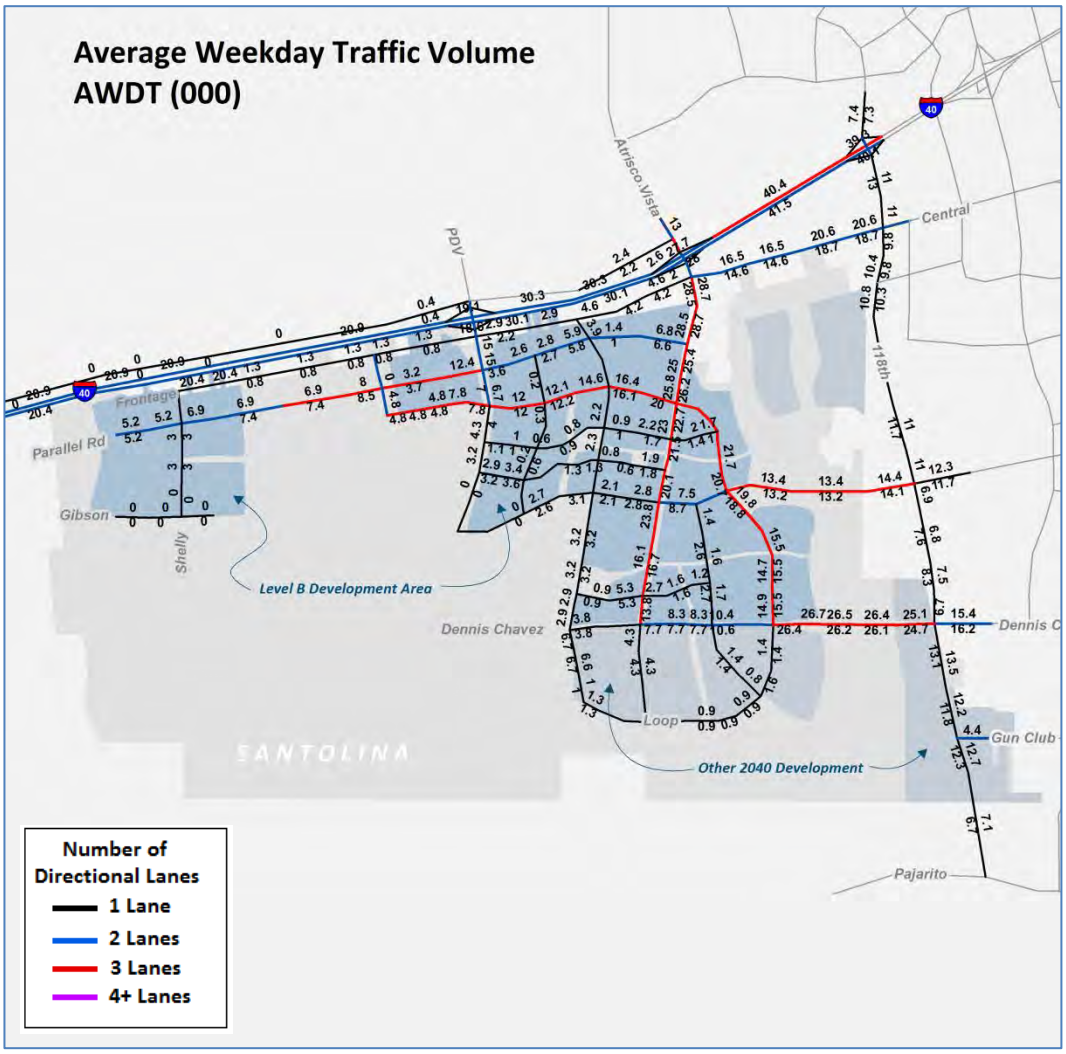

Figure 37: AWDT on Santolina Roads (2040), in thousands

AM Peak Hour Traffic Volumes (2040)

AM peak hour traffic volumes on Santolina roads in 2040 are shown in Figure 38.

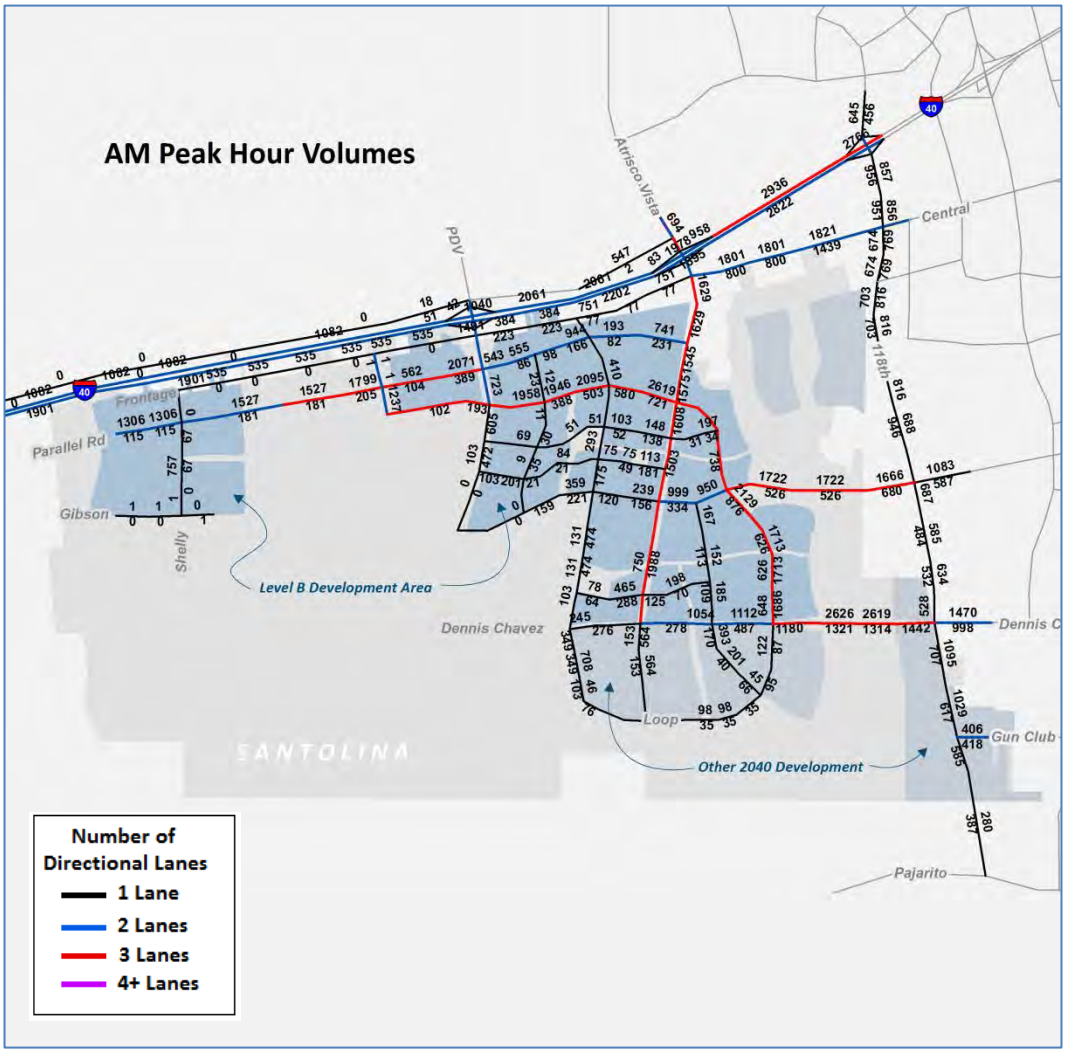

Figure 38: AM Peak Hour Volumes (2040)

PM Peak Hour Volumes (2040)

PM peak hour traffic volumes on Santolina roads in 2040 are shown in Figure 39.

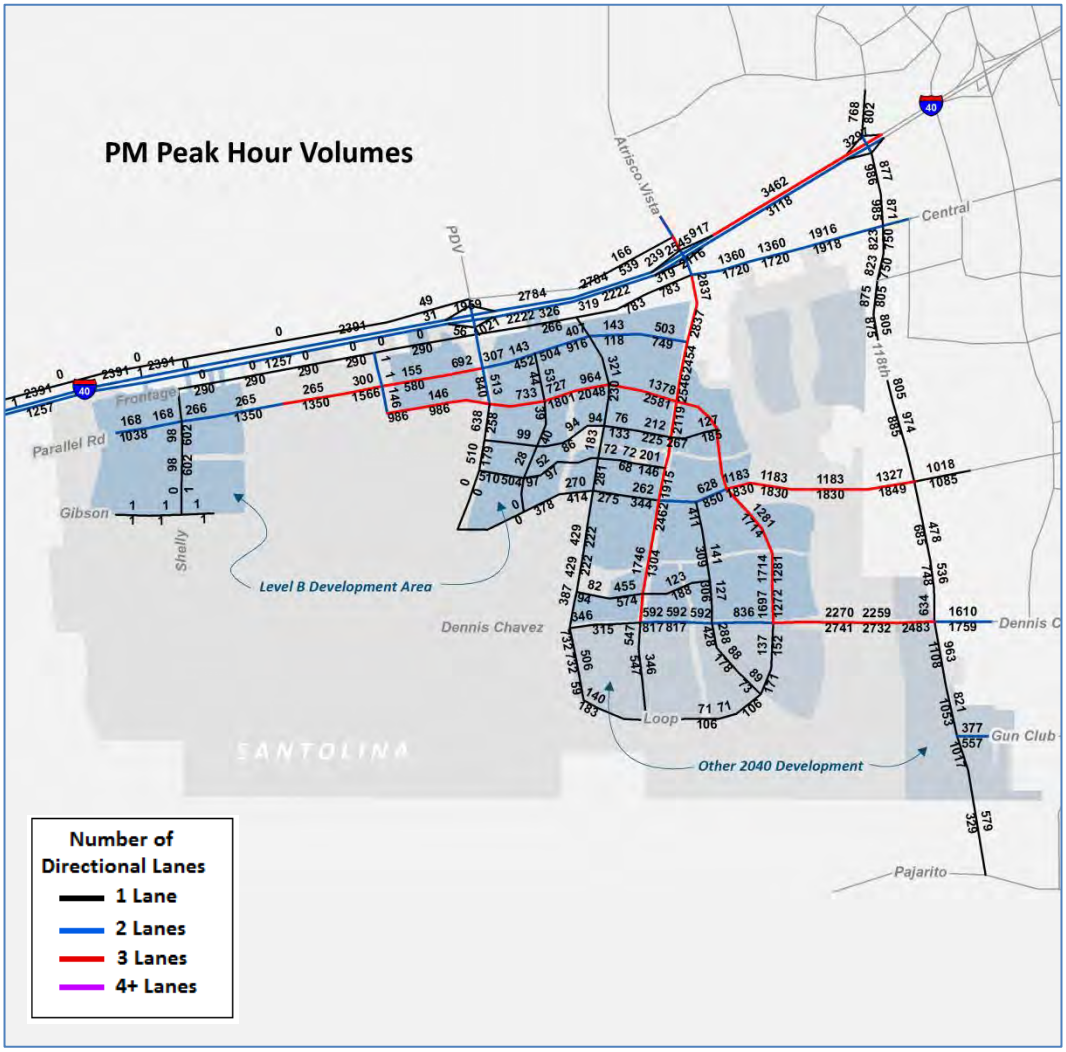

Figure 39: PM Peak Hour Volumes (2040)

Screenline Volumes (2040)

Table 9 summarizes screenline volumes entering and exiting Santolina. The two screenlines are:

- Northerly traffic crossing a screenline along and immediately south of I-40
- Easterly traffic crossing the escarpment along and immediately west of 118th

Job/housing balance for Santolina in 2040 is 1.77 (higher than in 2025) reflecting a "job rich" community that will be a net importer of workers from outside the development. The directional splits for traffic reflect that. Directional splits run roughly 60% inbound to Santolina in the AM and the reverse in the PM, indicating a strong commuting traffic pattern to Santolina.

Table 9: Screenline Volumes (2040)

			AM Peak Hour		PM Peak Hour	
Screenline	**Roadway**	**AWDT (000)**	**NB**	**SB**	**NB**	**SB**
Along I-40	*118th*	24.0	857	951	877	966
…Between I-40	*Atrisco Vista*	47.1	1,348	2,133	2,335	1,802
and Central	*Paseo de Volcan*	30.1	751	2,058	2,061	964
	Total	**101.2**	**2,956**	**5,142**	**5,273**	**3,732**
	Directional Split		36.5%	63.5%	58.6%	41.4%
	V/C Ratio		0.57	0.99	1.01	0.72
			AM Peak Hour		**PM Peak Hour**	
Screenline	**Roadway**	**AWDT (000)**	**EB**	**WB**	**EB**	**WB**
Along Escarpment	*Central*	39.3	1,439	1,821	1,918	1,916
…Just West of 118th	*Gibson*	28.5	680	1,666	1,849	1,327
	Dennis Chavez	49.8	1,442	2,346	2,483	2,330
	Total	**117.6**	**3,561**	**5,833**	**6,250**	**5,573**
	Directional Split		37.9%	62.1%	52.9%	47.1%
	V/C Ratio		0.45	0.73	0.78	0.70

AM Volume-to-Capacity Ratios (2040)

Volume-to-capacity ratios for the AM peak hour are shown for Santolina road for 2040 in Figure 40.

Recall that according to MRCOG practices, volume-to-capacity ratios exceeding 0.9 are considered to be "approaching capacity".

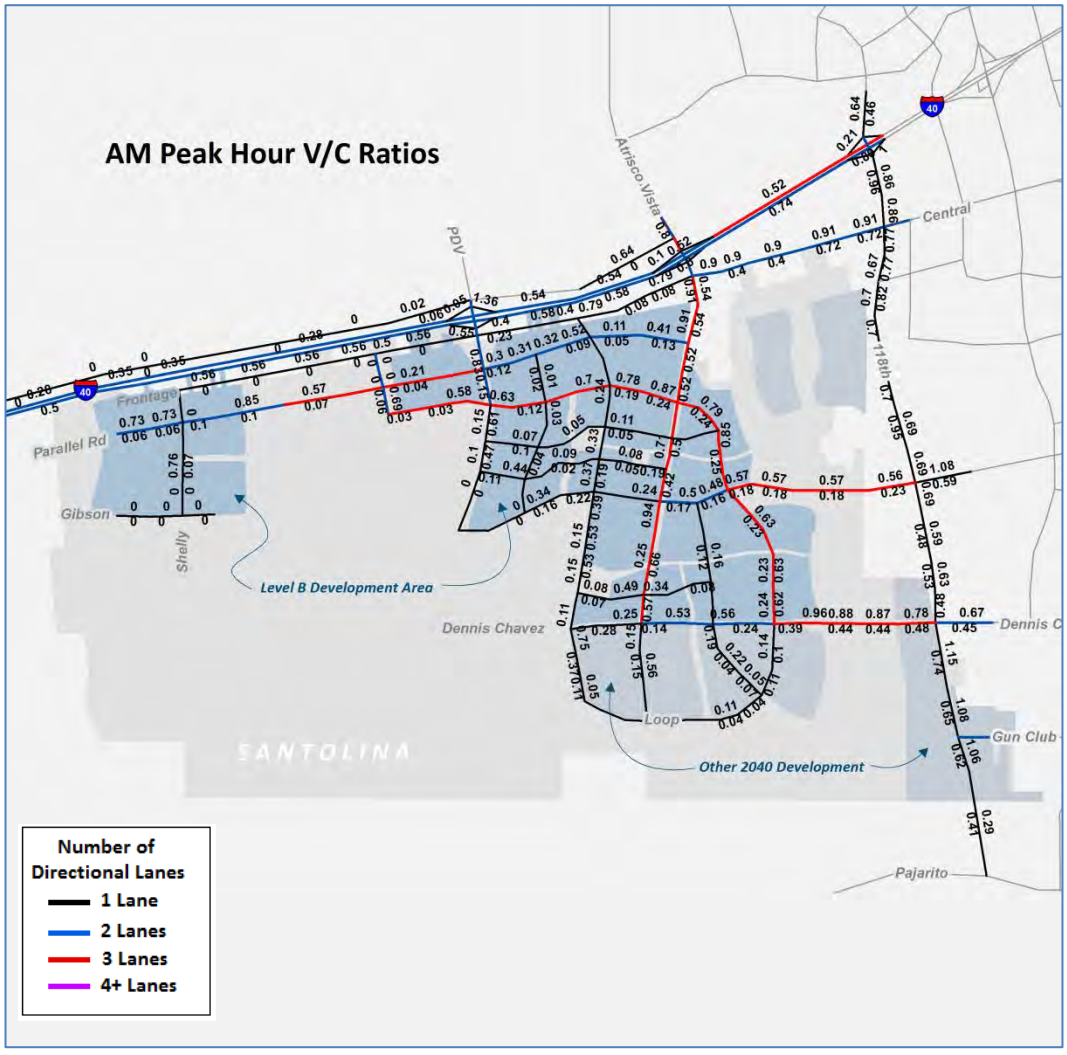

Figure 40: AM V/C Ratios (2040)

PM Volume-to-Capacity Ratios (2040)

Volume-to-capacity ratios for the PM peak hour are shown for Santolina roads for 2040 in Figure 41.

Recall that according to MRCOG practices, volume-to-capacity ratios exceeding 0.9 are considered to be "approaching capacity".

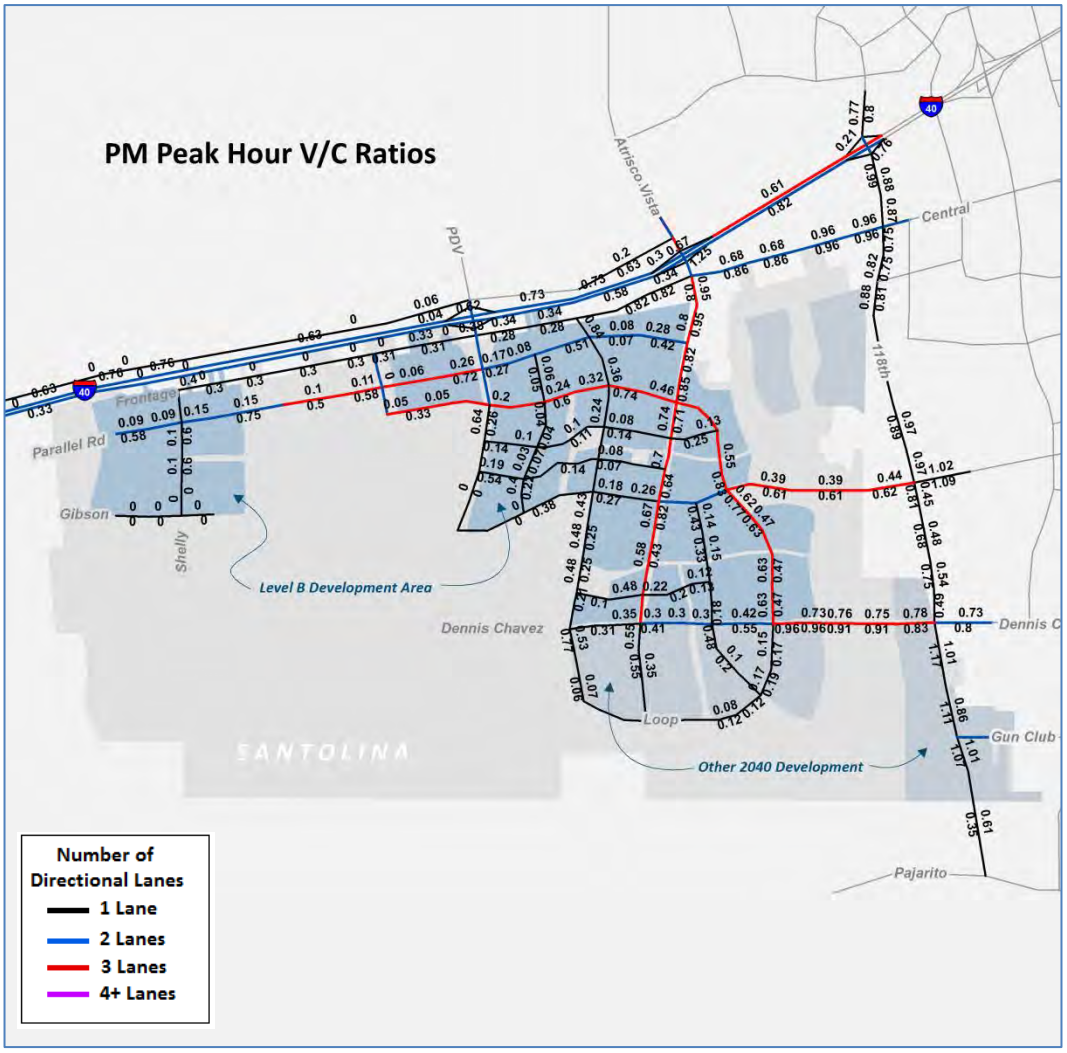

Figure 41: PM V/C Ratios (2040)

AM Level of Service (2040)

Level of Service on Santolina roads according to MRCOG criteria for level of service is shown for the AM peak hour in Figure 42.

On-site, the circulation plan appears to accommodate peak hour traffic at acceptable levels of service for the most part, however there are a number of spot locations approaching intersections that suggest potential capacity issues. These locations, at Central/Atrisco Vista, Dennis Chavez/Loop Road, and at several locations along 118th off-site, require more detailed attention via intersection capacity analysis.

In addition, further attention should be devoted to all 3 interchanges. Recall that each interchange was represented in the traffic model as simple diamond interchanges with 1-lane ramps: clearly something more substantial will be required to serve 2040 traffic loads.

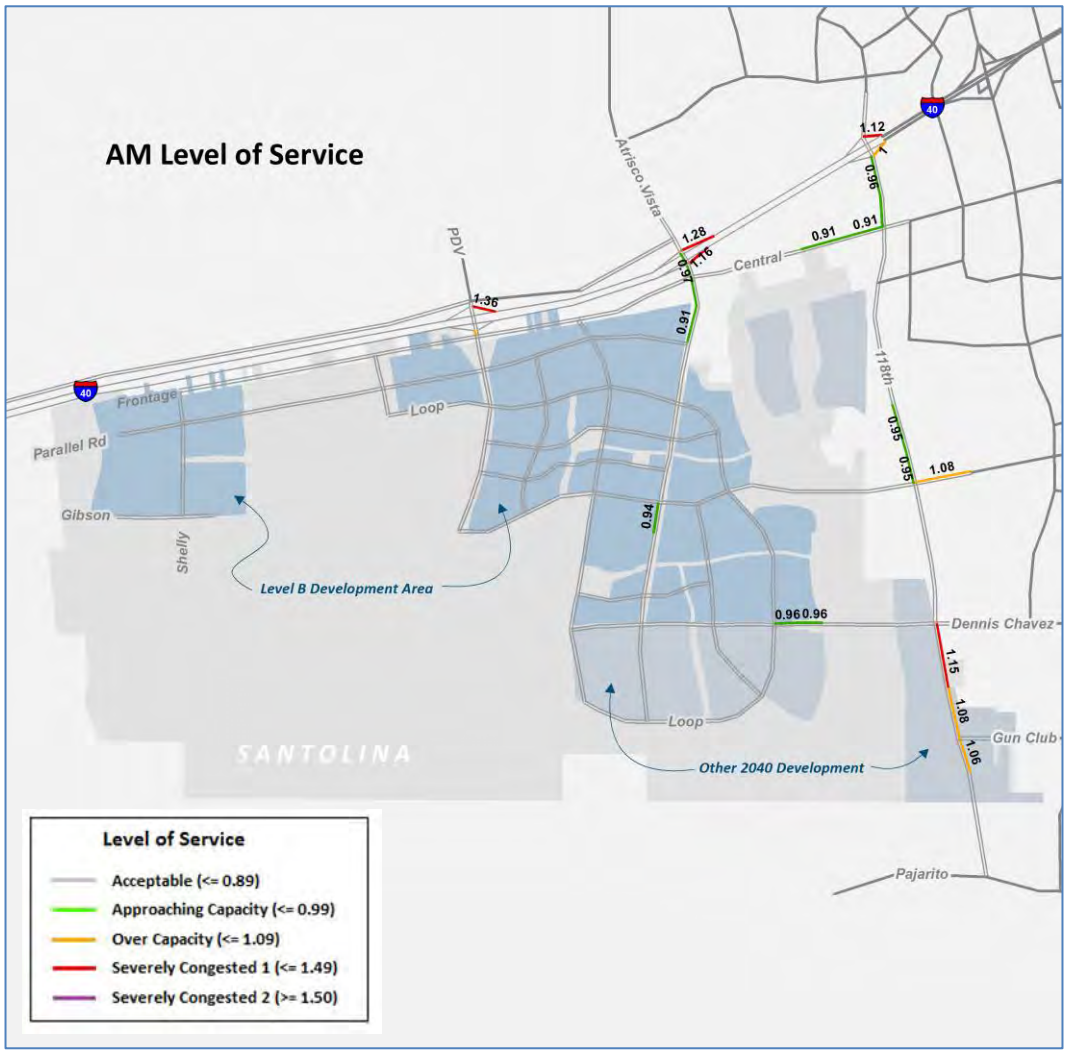

Figure 42: AM Level of Service (2040)

PM Level of Service (2040)

Level of Service on Santolina roads according to MRCOG criteria for level of service is shown for the PM peak hour in Figure 43.

On-site, the circulation plan seems to operate at acceptable levels of service for the most part. However, we also see the same set of potential intersection capacity issues that were identified for the AM peak hour. These locations, along with the 3 interchanges, will require additional more detailed study to confirm their successful operation.

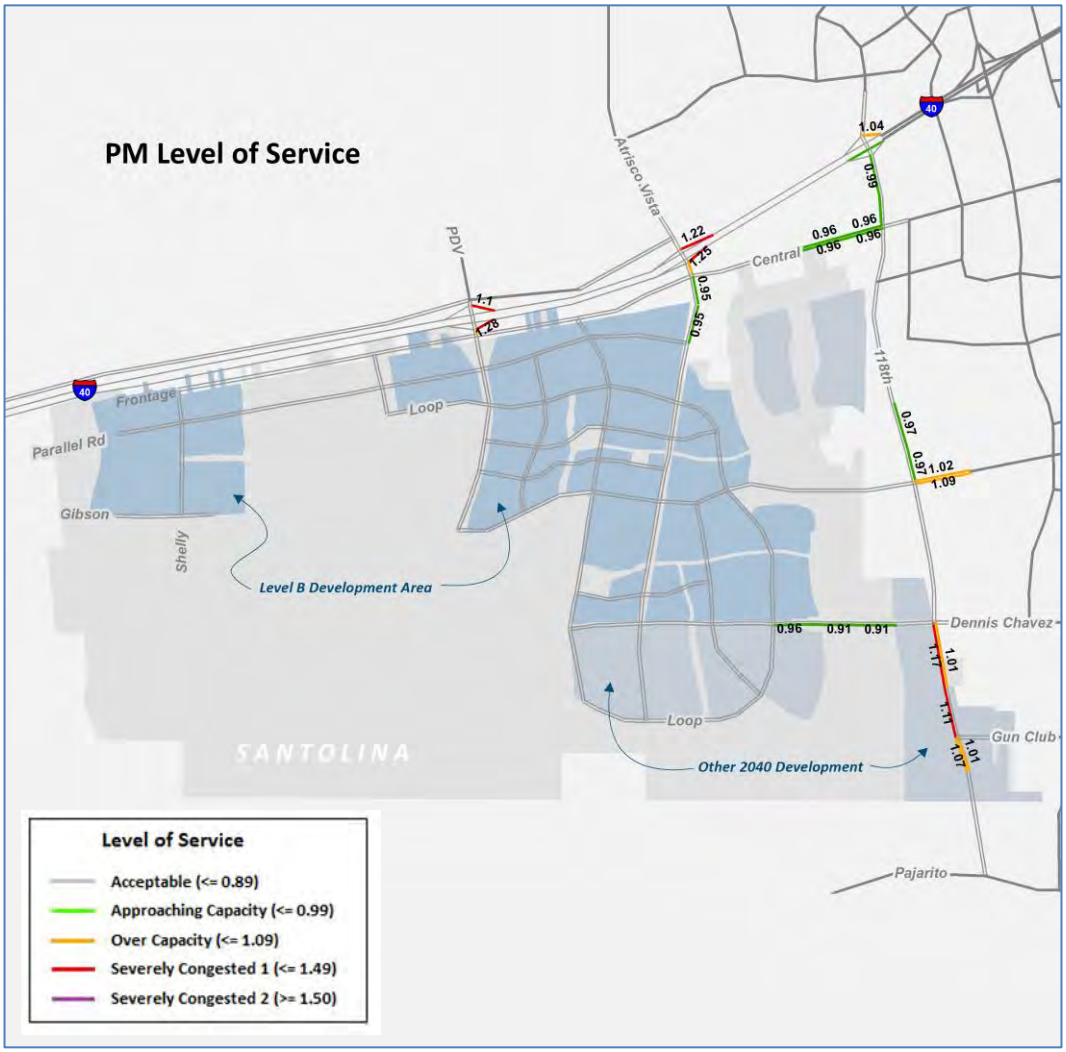

Figure 43: PM Level of Service (2040)

Off-Site AM Peak Level of Service for the MTP (2040)

In this section we will begin to look at traffic impacts related to Santolina development on off-site roadways in the southwest part of the metropolitan area. We will do so by comparing traffic volumes and levels of service with those indicated in the MTP. It is through this comparison that impact areas can be identified.

Before doing so, however, bear in mind that the MTP already indicates some level of service and congestion issues on the Southwest side. These are illustrated in Figure 44. As indicated in this figure, the prevalent capacity issues for the southwest side are growing more extensive than were seen in the 2025 scenario. Congestion and level of service issues will affect eastbound traffic, the prevailing direction of travel in the AM peak hour. The most severe problems revolve around the river crossings themselves as well as roads leading to the river crossings.

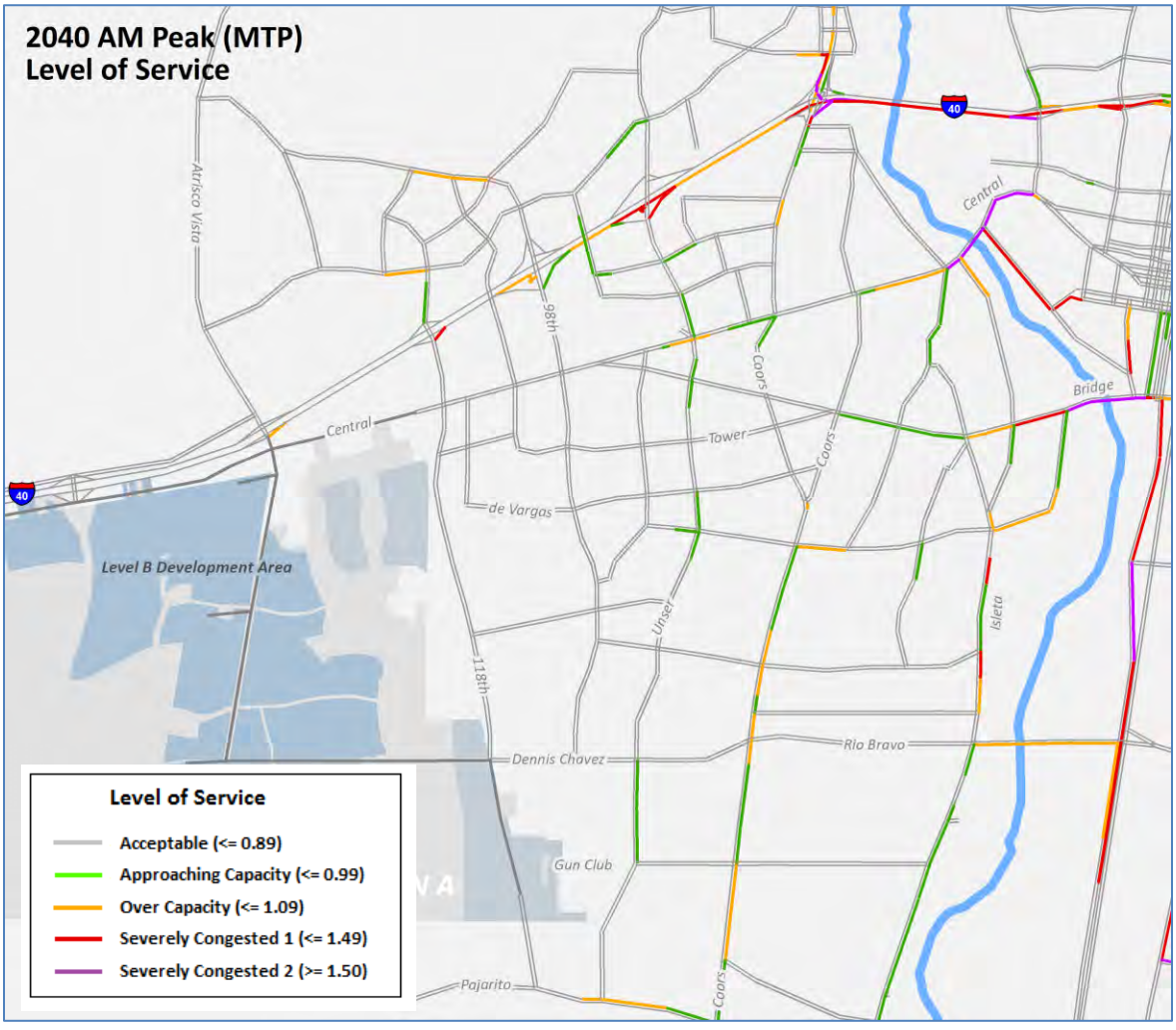

Figure 44: AM Peak Level of Service for the MTP, Off-site (2040)

Off-Site AM Peak Level of Service for Santolina (2040)

Level of service on highways on the southwest side is shown here (Figure 45) for the 2040 Santolina "phased development" scenario. The same types of problems that were seen previously for the MTP itself continue to be evident here – the most prominent of which are I-40 and river crossings.

A side by side comparison of the two maps – Figure 44 for the MTP and Figure 45 for the Santolina scenario – would reveal any differences in the performance of the 2 networks to the extent that they are different. Or, instead, see the next map Figure 46 which illustrates the outcome of the comparison for you.

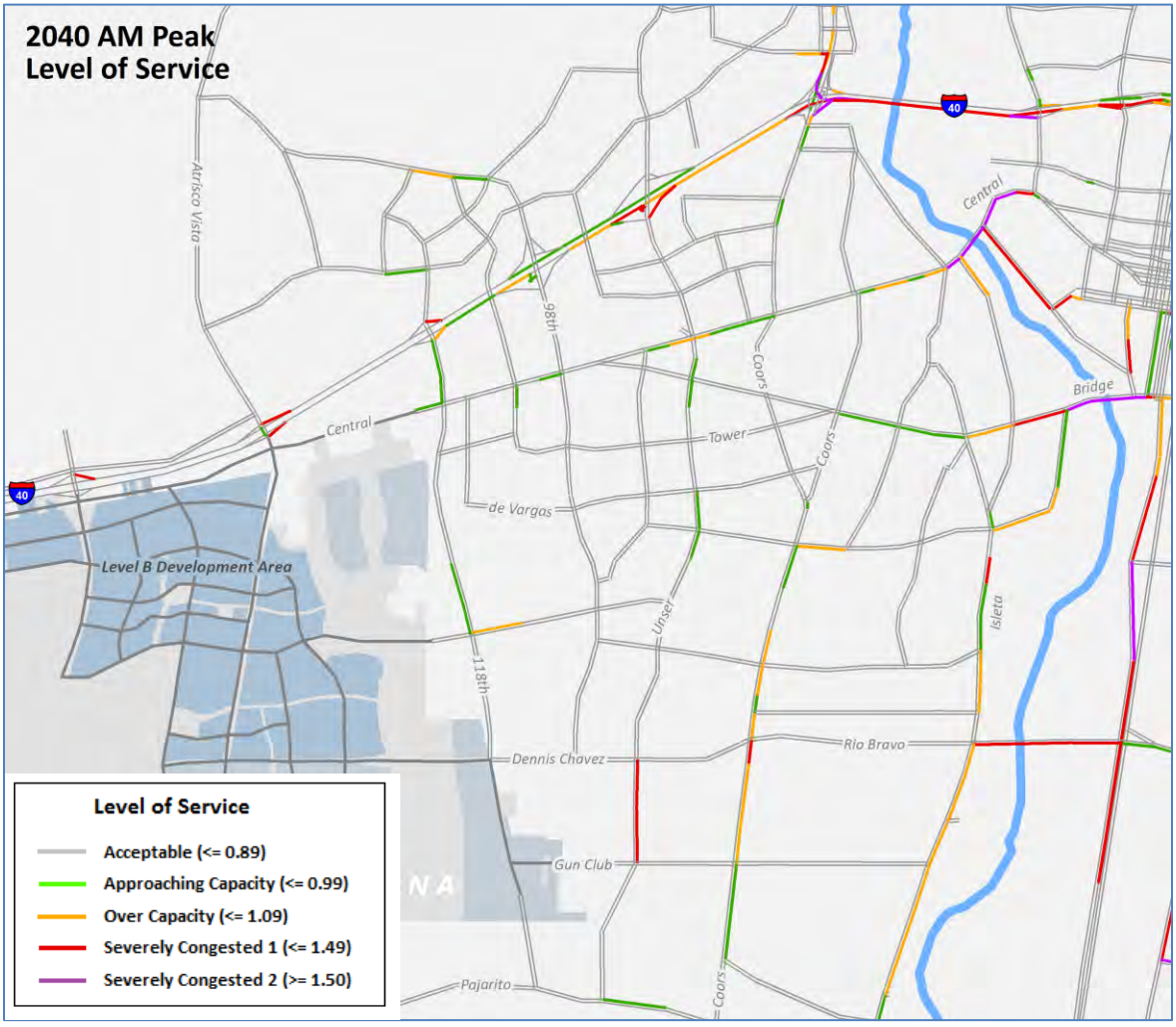

Figure 45: AM Peak Level of Service, Offsite (2040)

Change in Off-Site Level of Service in the AM Peak Hour (2040)

Figure 46 illustrates roadways on the southwest side that undergo a change in level of service (LOS) as a result of Santolina development – either for the better or for the worse. Here a "change of level of service:" is as defined by MRCOG, for example a roadway segment changing from "Approaching capacity" (v/c > 0.9) to "Over Capacity" (v/c > 1.0).

In this map, note also that we are *only* displaying roadways where the number of "vehicles per hour per lane" (VPHPL) has changed by more than 10%. This is to say, we are excluding road segments where there were only small and insignificant changes in traffic volumes.

As indicated in Figure 46, Santolina development in 2040 will have impacts on traffic levels of service on several roadways serving the southwest side. Figure 46 can be used to identify affected intersections requiring more detailed analysis (e.g., intersection capacity analysis).

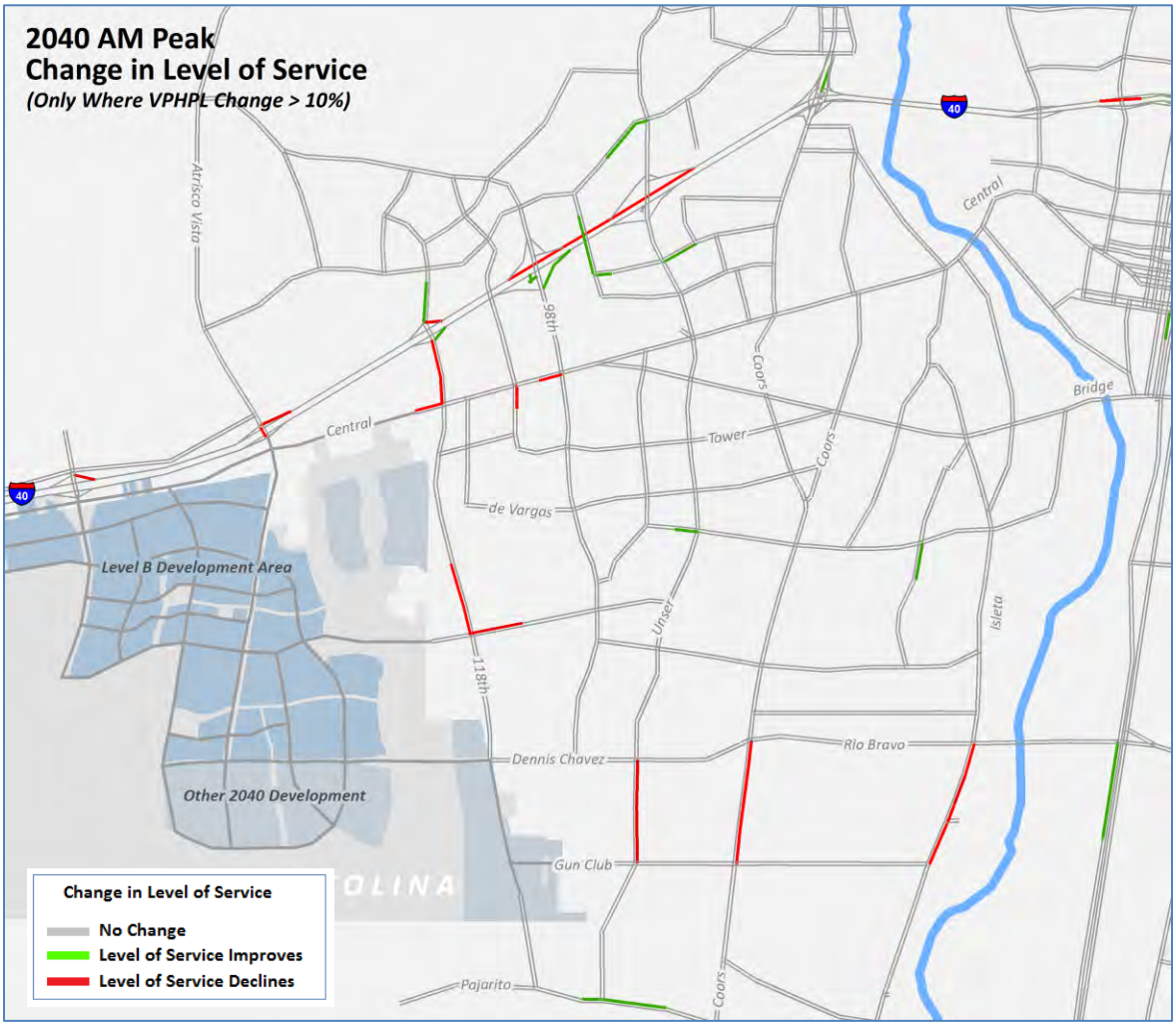

Figure 46: AM Peak Hour: Change in Offsite Level of Service (2040)

Change in Vehicles per Hour per Lane in the AM Peak Hour, Offsite (2040)

Figure 47 indicates the actual changes in VPHPL (vehicles per hour per lane) when comparing the Santolina simulation for 2040 with the MTP base case. Both increases and decreases in VPHPL are shown. Once again note that we are excluding road segments where the change was less than 10%.

In the AM period, Santolina will increase traffic on a number of roadways in the general vicinity of the development – the closer the road segment is to Santolina, the more the impact. Increases tend to impact westbound traffic to Santolina in the AM more than eastbound, but eastbound volumes increase on some roadways as well. Note finally that the traffic model simulation indicates that traffic volumes, in some locations farther away from Santolina, will actually decline.

Recall also that the impacts that are being observed in the simulation not only arise from Santolina development – they also arise from the redistribution (and lowering) of growth depicted in the scenario outside of Santolina (so as to hold population and job control totals constant).

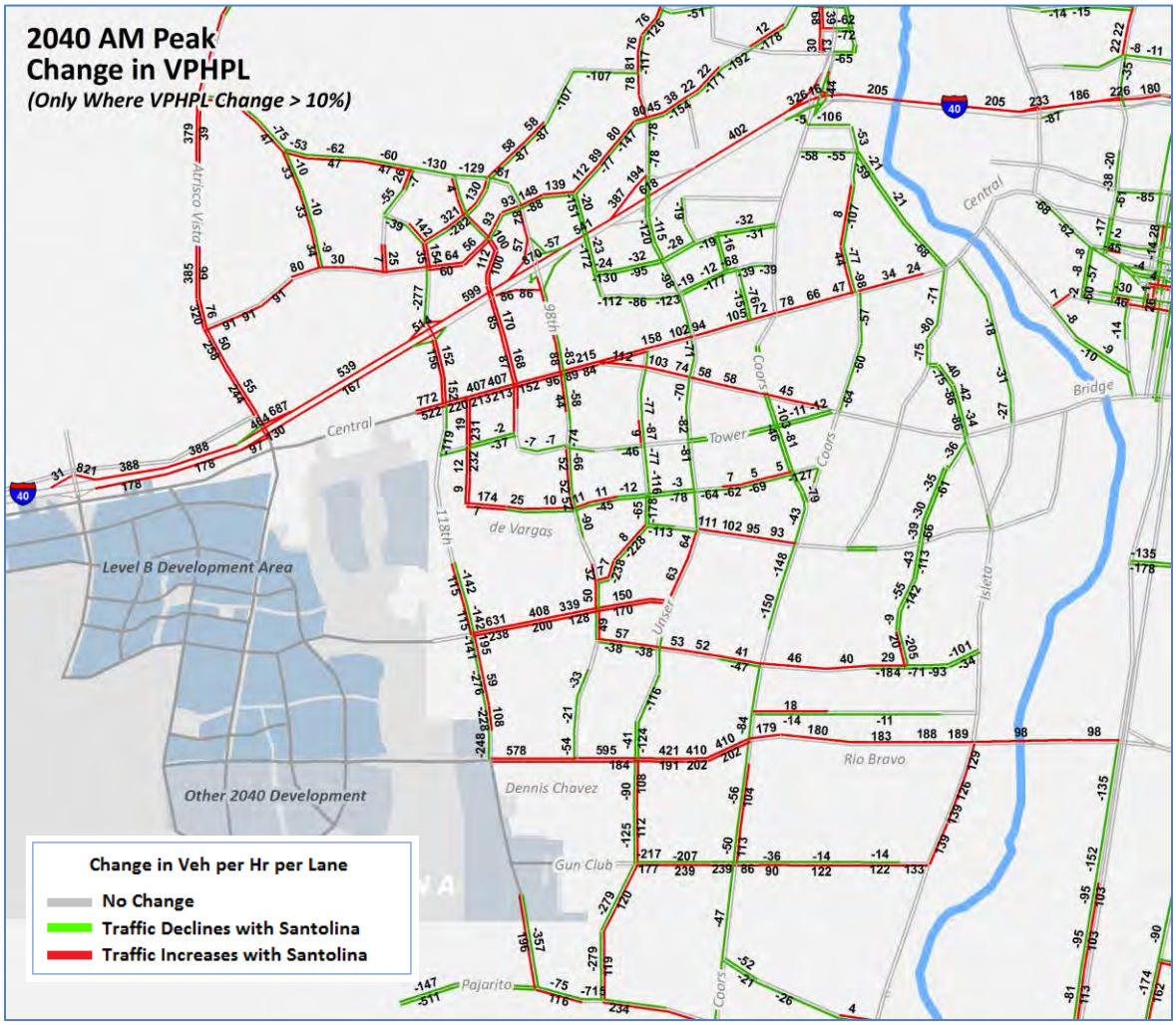

Figure 47: AM Peak Hour Change in VPHPL, Compared with the MTP (2040)

Percent Change in Vehicles per Hour per Lane in the AM Peak Hour, Offsite (2040)

Figure 48 illustrates the same changes in VPHPL that was shown previously in Figure 47, except now on a percentage basis. Once again, only roadways where that percentage change exceeded 10% are shown, thereby excluding the relatively minor differences.

It should be no surprise to see that the impact of Santolina on traffic volumes tends to dissipate with greater distances away from Santolina.

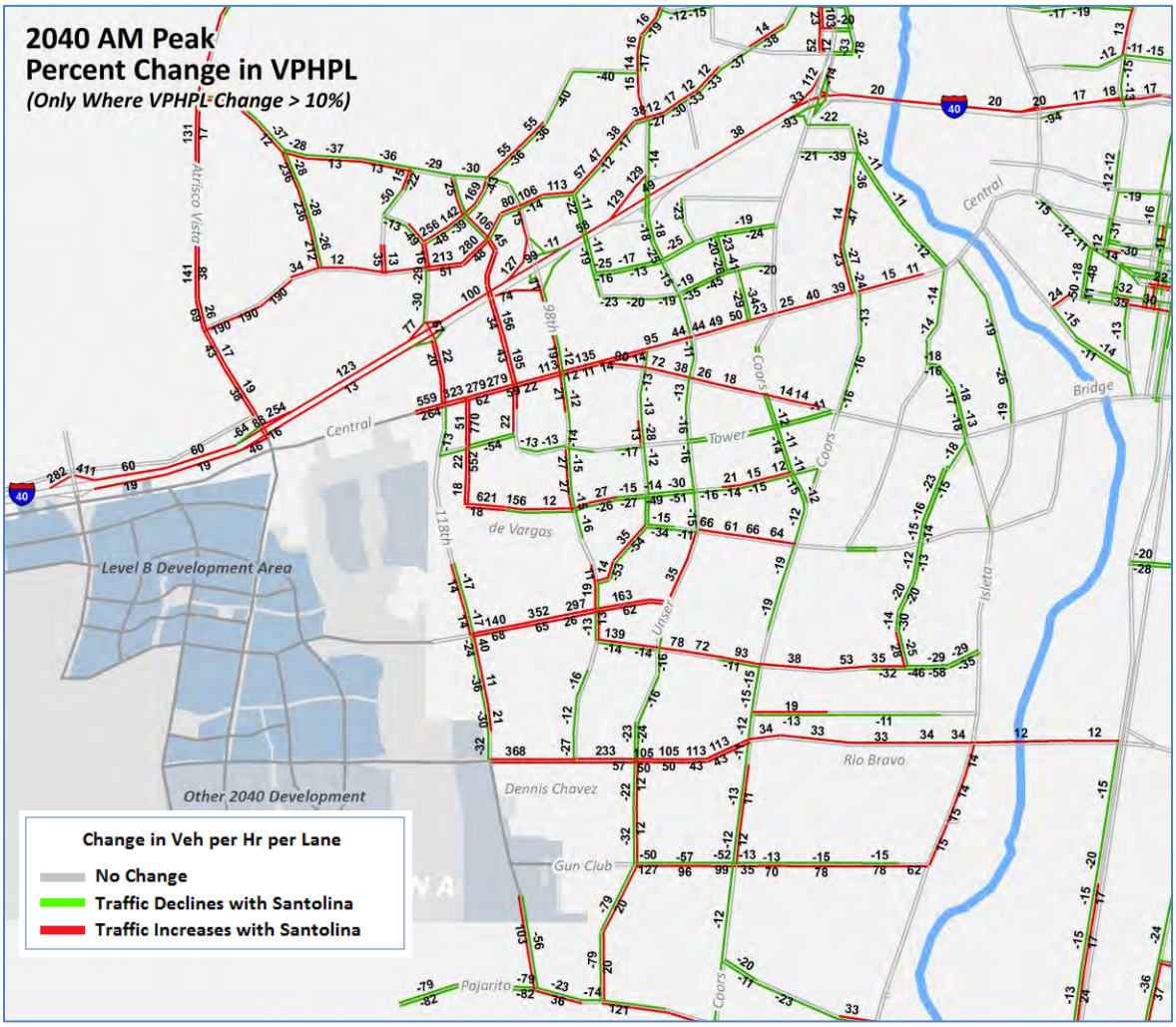

Figure 48: AM Peak Hour Percent Change in VPHPL, Compared with the MTP (2040)

Off-Site PM Peak Level of Service for the MTP (2040)

The outlook for the PM peak as depicted by 2040 MTP projections generally mirrors the AM peak shown earlier, except in the opposing direction. See Figure 49. The predominant direction of travel on the Southwest side is westbound as commuters return home. As before, the most prominent congestion and capacity problems concern I-40 and the river crossings.

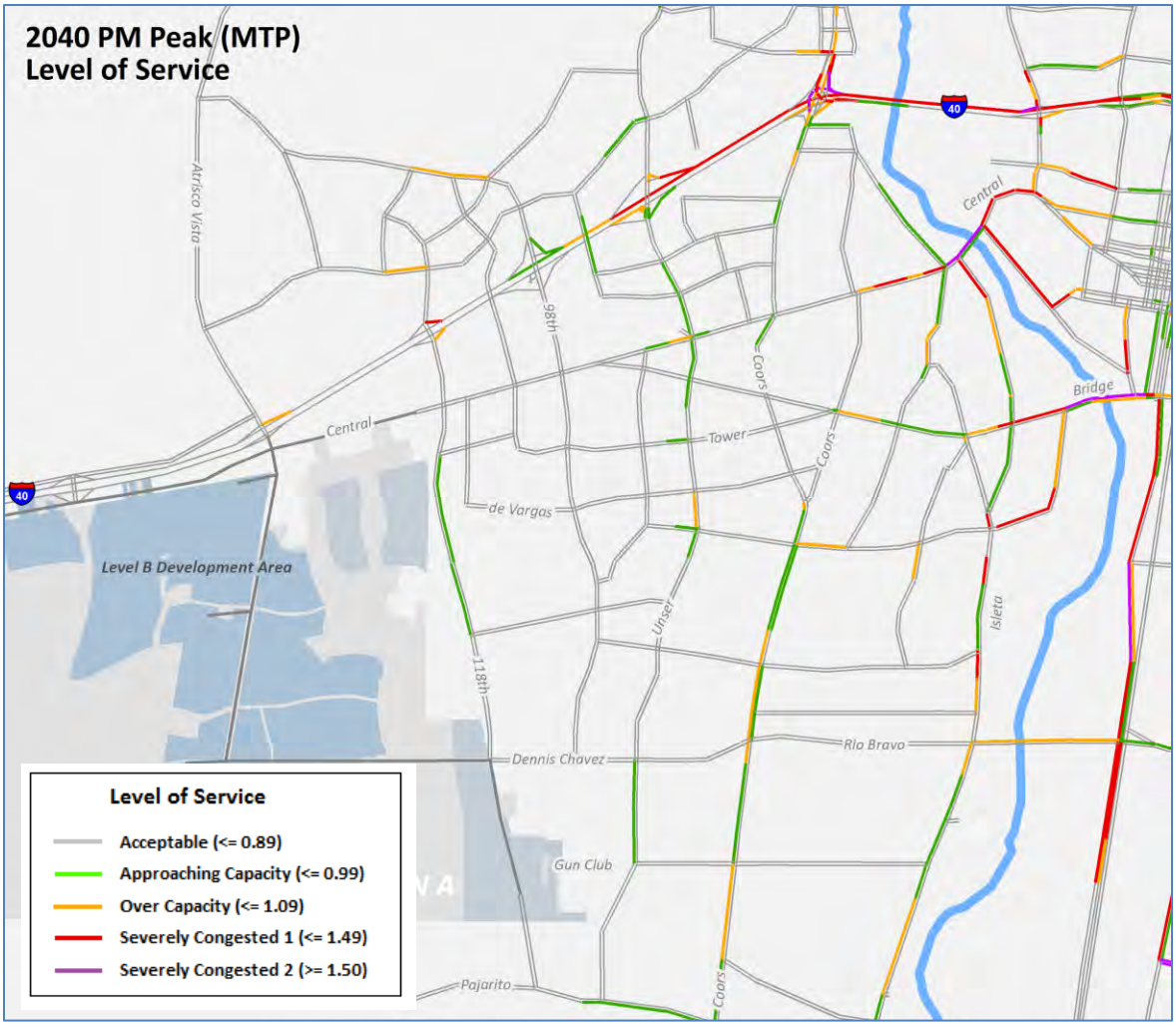

Figure 49: PM Peak Level of Service for the MTP, Off-site (2040)

Off-Site PM Peak Level of Service for Santolina (2040)

Level of service on highways on the southwest side is shown here (Figure 50) for the 2040 Santolina "phased development" scenario. The same types of problems that were seen previously for the MTP itself continue to be evident here – the most prominent of which are I-40 and river crossings.

A side by side comparison of the two maps – Figure 49 for the MTP and Figure 50 for the Santolina scenario – would reveal any differences in the performance of the 2 networks to the extent that they are different. Or, instead, see the next map Figure 51 which illustrates the outcome of the comparison for you.

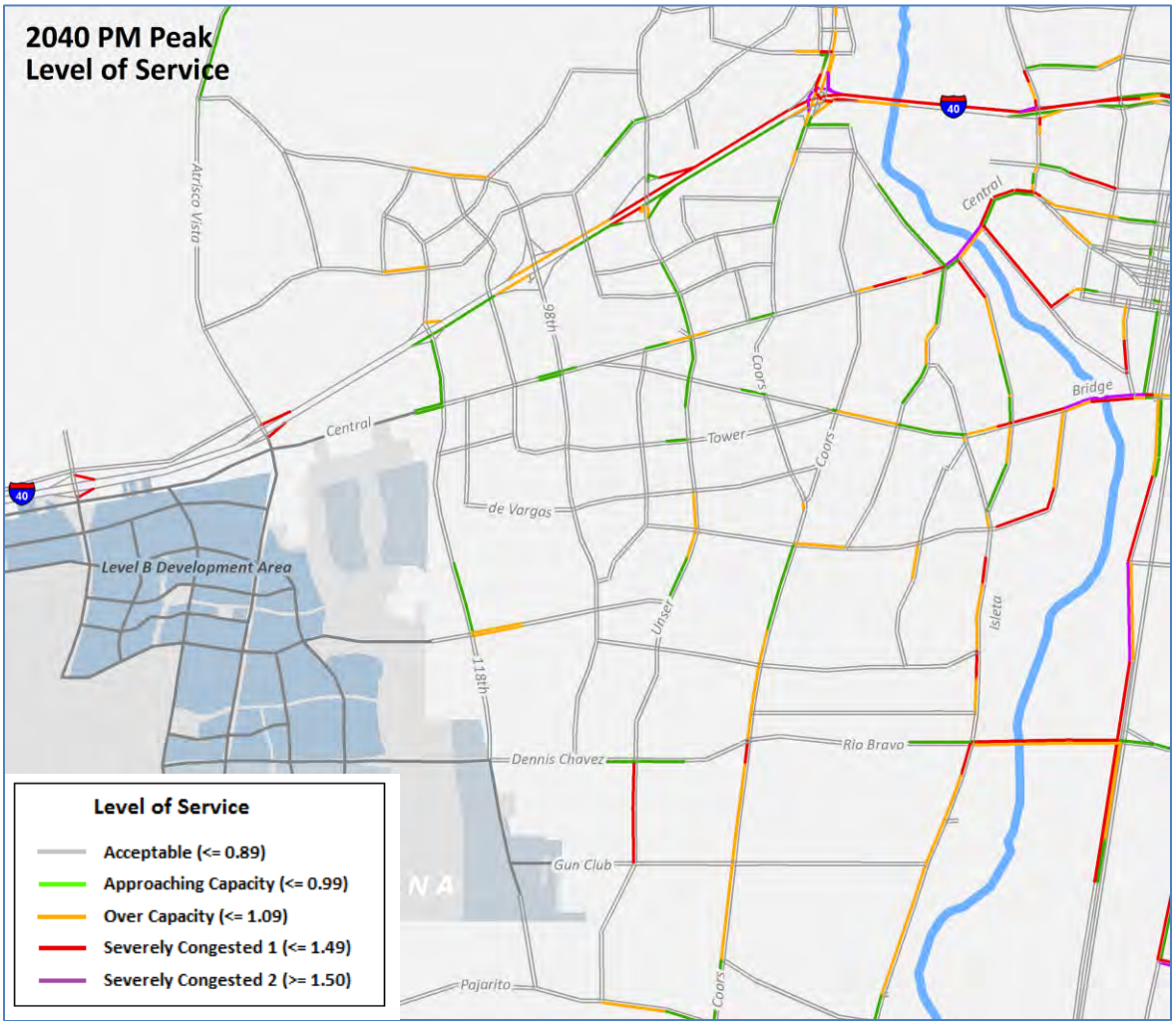

Figure 50: PM Peak Level of Service, Offsite (2040)

Change in Off-Site Level of Service in the PM Peak Hour (2040)

Figure 51 illustrates roadways on the southwest side that undergo a change in level of service (LOS) as a result of Santolina development – either for the better or for the worse. Here a "change of level of service:" is as defined by MRCOG, for example a roadway segment changing from "Approaching capacity" (v/c > 0.9) to "Over Capacity" (v/c > 1.0).

In this map, note also that we are *only* displaying roadways where the number of "vehicles per hour per lane" (VPHPL) has changed by more than 10%. This is to say, we are excluding road segments where there were only small and insignificant changes in traffic volumes.

As indicated in Figure 51, Santolina development in 2040 will have impacts on the performance of several intersections on the Southwest side. The severity of these issues, and potential solutions to them, can be determined through more detailed studies of intersection capacity.

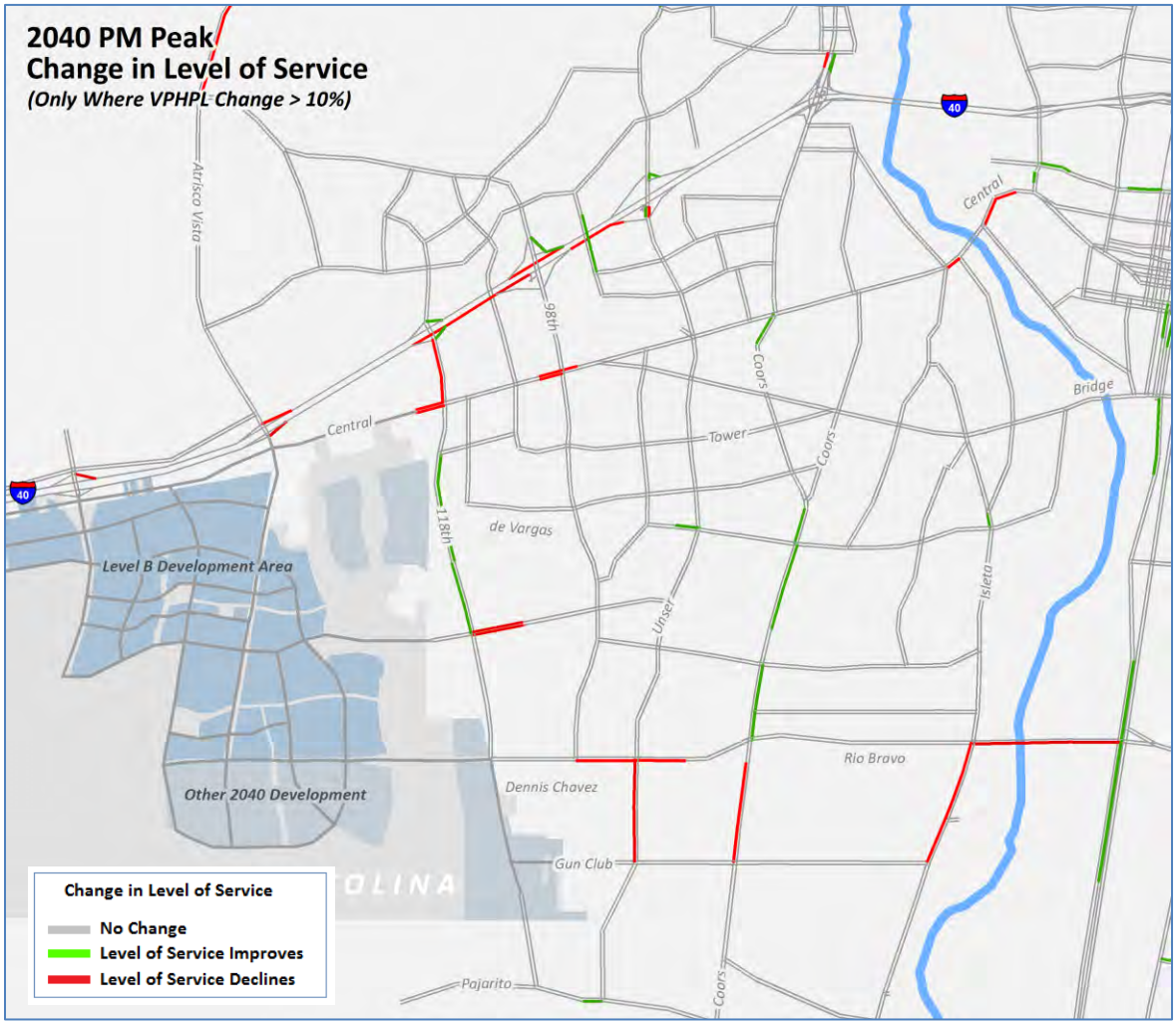

Figure 51: PM Peak Hour: Change in Offsite Level of Service (2040)

Change in Vehicles per Hour per Lane in the PM Peak Hour, Offsite (2040)

Figure 52 indicates the actual changes in VPHPL (vehicles per hour per lane) when comparing the Santolina simulation for 2040 with the MTP base case. Both increases and decreases in VPHPL are shown. Once again note that we are excluding road segments where the change was less than 10%.

Figure 52 seems to indicate that the same traffic patterns seen for the AM peak hour are more-or-less repeated for the PM period.

Recall also that the impacts that are being observed in the simulation not only arise from Santolina development – they also arise from the redistribution (and lowering) of growth depicted in the scenario outside of Santolina (so as to hold population and job control totals constant).

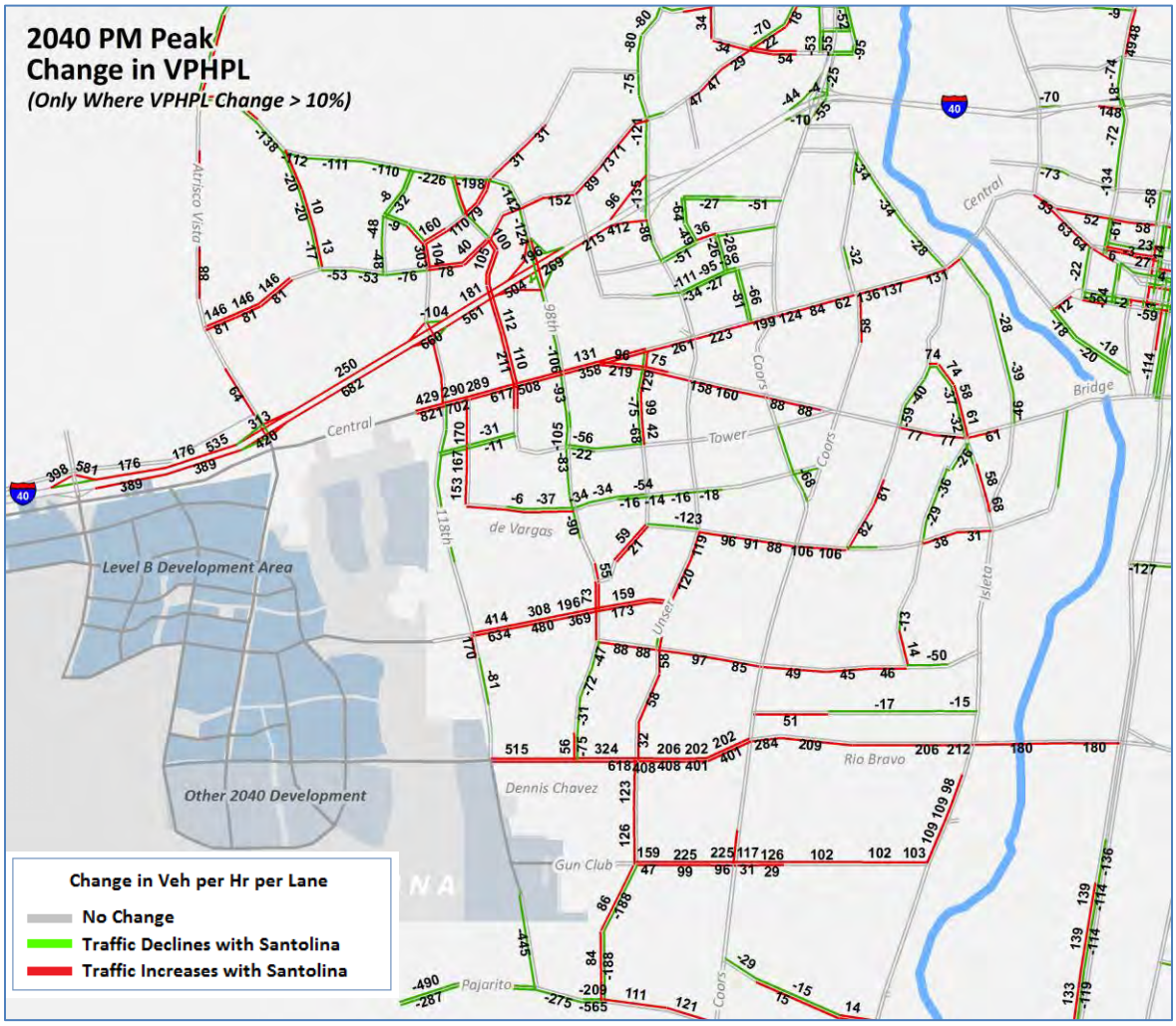

Figure 52: PM Peak Hour Change in VPHPL, Compared with the MTP (2040)

Percent Change in Vehicles per Hour per Lane in the PM Peak Hour, Offsite (2040)

Figure 53 illustrates the same changes in VPHPL that was shown previously in Figure 52, except now on a percentage basis. Once again, only roadways where that percentage change exceeded 10% are shown, thereby excluding the relatively minor differences.

It should be no surprise to see that the impact of Santolina on traffic volumes tends to dissipate with greater distances away from Santolina.

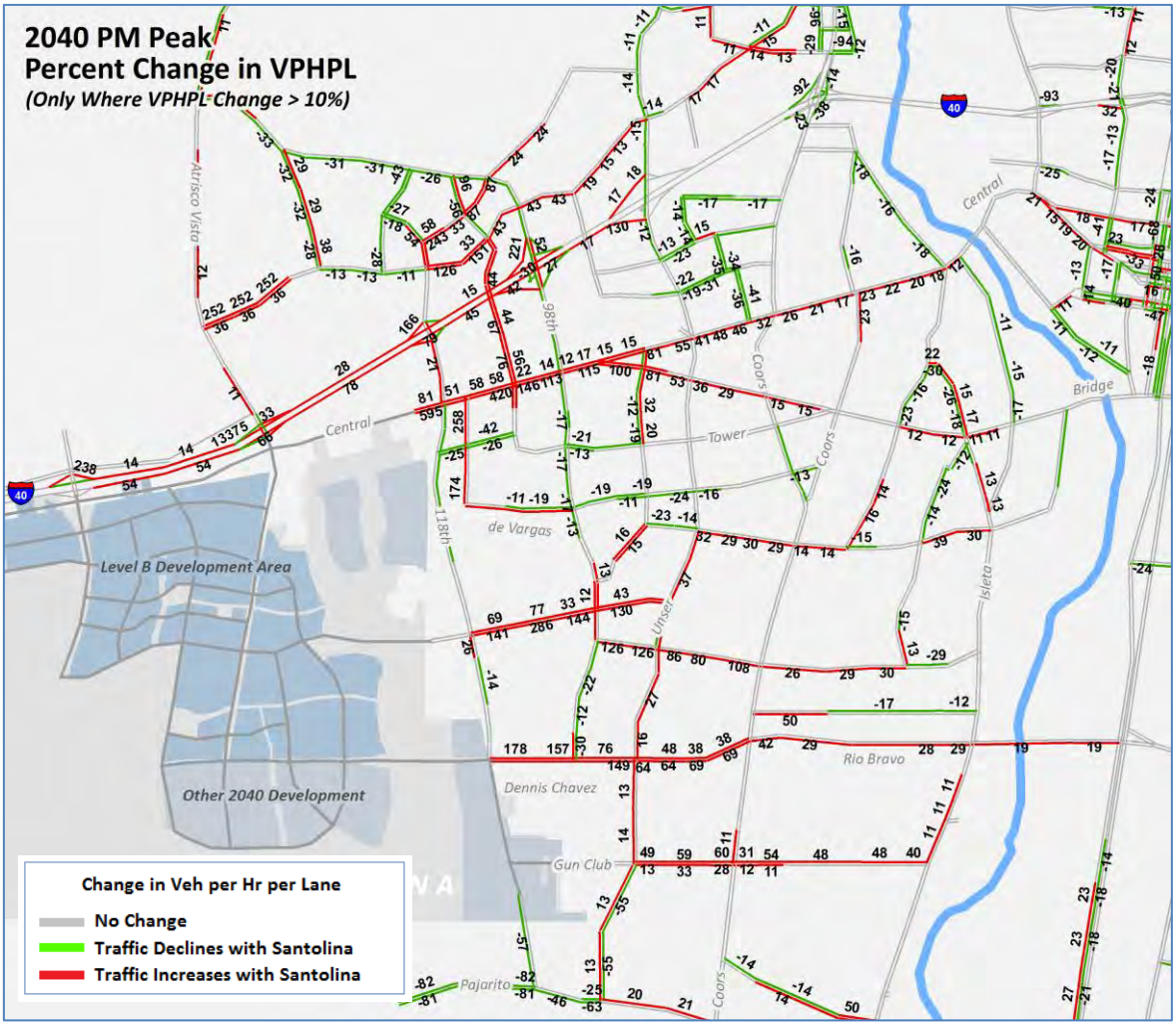

Figure 53: PM Peak Hour Percent Change in VPHPL, Compared with the MTP (2040)

Impact on River Crossings (2040)

One of the most vulnerable system issues in the region concerns river crossings, where commuting demand to cross the Rio Grande has historically exceeded the capacity of the 9 bridges in Sandoval and Bernalillo Counties.

The predominant direction of travel (and the prominent capacity problem) in the AM peak is eastbound; in the PM peak it is westbound. Table 10 below summarizes how the Santolina development will impact those flows. Note that colors designating the level of service used by MRCOG are shown.

Because Santolina in 2040 is a job center and net importer of workers from other areas of the city, the simulations suggest that development in Santolina will actually have negligible impacts on overall river crossing volumes. Bridges crossing the Rio Grande will operate at the same LOS as they do in the MTP, except for Rio Bravo and I-25.

Table 10: Traffic Volumes at River Crossings (2040)

		EASTBOUND				
		MTP		**Santolina**		
		AM Peak Hr Vol	**AM V/C Ratio**	**AM Peak Hr Vol**	**AM V/C Ratio**	**Change**
2040	**NM 550**	**4,778**	**1.45**	**4,672**	**1.42**	
	Alameda	**3,656**	**1.83**	**3,547**	**1.77**	
	PDN	**6,443**	**1.13**	**6,347**	**1.11**	
	Montano	**2,971**	**1.35**	**2,951**	**1.34**	
	I-40	**11,006**	**1.40**	**10,822**	**1.38**	
	Central	**4,372**	**2.19**	**4,242**	**2.12**	
	Bridge	**4,365**	**2.18**	**4,253**	**2.13**	
	Rio Bravo	**2,325**	**1.06**	**2,482**	**1.13**	**Declines**
	I-25	**3,674**	**0.97**	**4,094**	**1.08**	**Declines**
	Total	**43,590**	**1.36**	**43,410**	**1.35**	

		WESTBOUND				
		MTP		**Santolina**		
		PM Peak Hr Vol	**PM V/C Ratio**	**PM Peak Hr Vol**	**PM V/C Ratio**	**Change**
2040	**NM 550**	4,946	1.50	4,863	1.47	**Improves**
	Alameda	3,717	1.86	3,676	1.84	
	PDN	6,666	1.17	6,545	1.15	
	Montano	3,008	1.37	3,022	1.37	
	I-40	11,311	1.19	11,225	1.18	
	Central	5,569	1.86	5,527	1.84	
	Bridge	4,291	2.15	4,279	2.14	
	Rio Bravo	2,402	1.09	2,535	1.15	**Declines**
	I-25	4,015	1.06	4,234	1.11	**Declines**
	Total	45,925	1.36	45,906	1.36	

Overall System Indicators for the PM Peak Hour (2040)

Table 11 provides a breakdown of systemwide indicators of transportation mobility, including vehicle-miles-travelled (VMT), vehicle-hours-travelled (VHT), and vehicle-hours-of-delay (VHD), comparing the Santolina scenario for 2040 with the MTP for the same year. VMT is a common performance measure since it typically is used to relate to air quality (e.g., vehicle emissions), however VHT and VHD are also important measures since they more accurately capture the overall level of mobility offered by the system.

Statistics reported in Table 11 are for the PM peak hour, as they are so reported in the actual MTP report document.

The indicators show that overall VMT for the region increases for the year 2040, although remarkably overall VHT and VHD decrease, so overall travel times are somewhat better. The number of lane miles of congested roadways is reduced, and average systemwide speeds increase.

Table 11: Systemwide Performance Indicators (2040)

				Difference	
Year	**Statistic**	**MTP**	**Santolina**	**Absolute**	**Percent**
2040	VMT	2,894,913	2,970,559	+75,646	+2.6%
	VHT	132,932	129,354	-3,578	-2.7%
	VHD	71,293	68,588	-2,705	-3.8%
	Average Speed	21.8	23.0	+1.2	+5.5%
	% VHT in Delay	53.6%	53.0%	-0.6%	-1.1%
	VMT Over Capacity	644,967	585,917	-59,050	-9.2%
	% VMT Over Capacity	22.3%	19.7%	-2.6%	-11.5%
	Congested Lane Miles	429	418	-11	-2.4%
	Daily VMT per Capita	22.70	23.25	+0.6	+2.4%

MTP Statistics from MTP Report Table 3-6, Page 3-33)