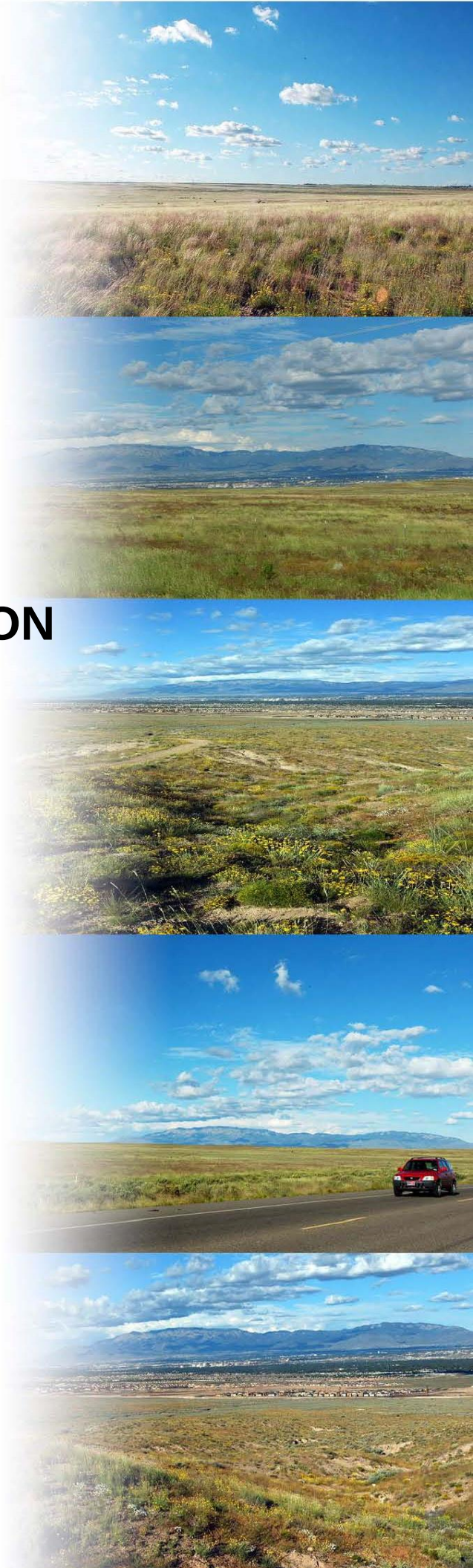
LEVEL 'A' PLANNED COMMUNITY TECHNICAL REPORT

FOR

SANTOLINA LEVEL 'A' MASTER PLAN

UPDATED TRANSPORTATION MASTER PLAN

JANUARY 22, 2016 UPDATED SUBMITTAL



Prepared For:

Western Albuquerque Land Holdings, LLC
P.O. Box 56790
Albuquerque, NM 87187

Bohannan Huston

Engineering
Spatial Data
Advanced Technologies

LEVEL 'A' PLANNED COMMUNITY
TECHNICAL REPORT

FOR

SANTOLINA LEVEL 'A' MASTER PLAN

UPDATED TRANSPORTATION MASTER PLAN

COUNTY OF BERNALILLO, NEW MEXICO

JANUARY 22, 2016

PREPARED FOR:

WESTERN ALBUQUERQUE LAND HOLDINGS (WALH)

PREPARED BY:

BOHANNAN HUSTON, INC.
7500 JEFFERSON ST NE
COURTYARD ONE
ALBUQUERQUE, NM 87109

Prepared By:

Eric J. Wrage 1/22/16

Eric J. Wrage, P.E., P.T.O.E Date

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I. TRANSPORTATION ANALYSIS

A. INTRODUCTION

This updated Level A Transportation Master Plan has been prepared to comply with the Level A Master Plan approval.

The Santolina Master Plan area is approximately 13,700 acres in west Bernalillo County shown in Figure 1. Transportation access to and from Santolina is critical to the success of the community. As shown in the Master Plan, Santolina is served by a roadway network made up of Atrisco Vista, Dennis Chavez, 118th Street, Central Avenue, Gun Club and Shelly Drive, as well as Interstate 40 from the Atrisco Vista/West Central interchange, and the future Paseo del Volcan interchange.

The 2040 Metropolitan Transportation Plan (MTP) anticipates several projects that will improve access to Santolina, to be discussed later, and shown in Figure 8. The MTP has projects (public and private) to widen Atrisco Vista from Dennis Chavez to north of Interstate 40, construct 118th Street from Pajarito Road to I-40, and construct Paseo del Volcan south of Interstate 40. In addition, future interchanges with Interstate 40 are identified at 118th Street and Paseo del Volcan. The 2040 MTP, Appendix A Project Listing, also identifies funding for internal arterials and collectors for both 2025 and 2040. All of these planned improvements will serve to improve access to Santolina.

Transportation infrastructure will be phased as needed to serve Santolina development, as demonstrated and substantiated in future Level B studies and Level C traffic impact analyses.

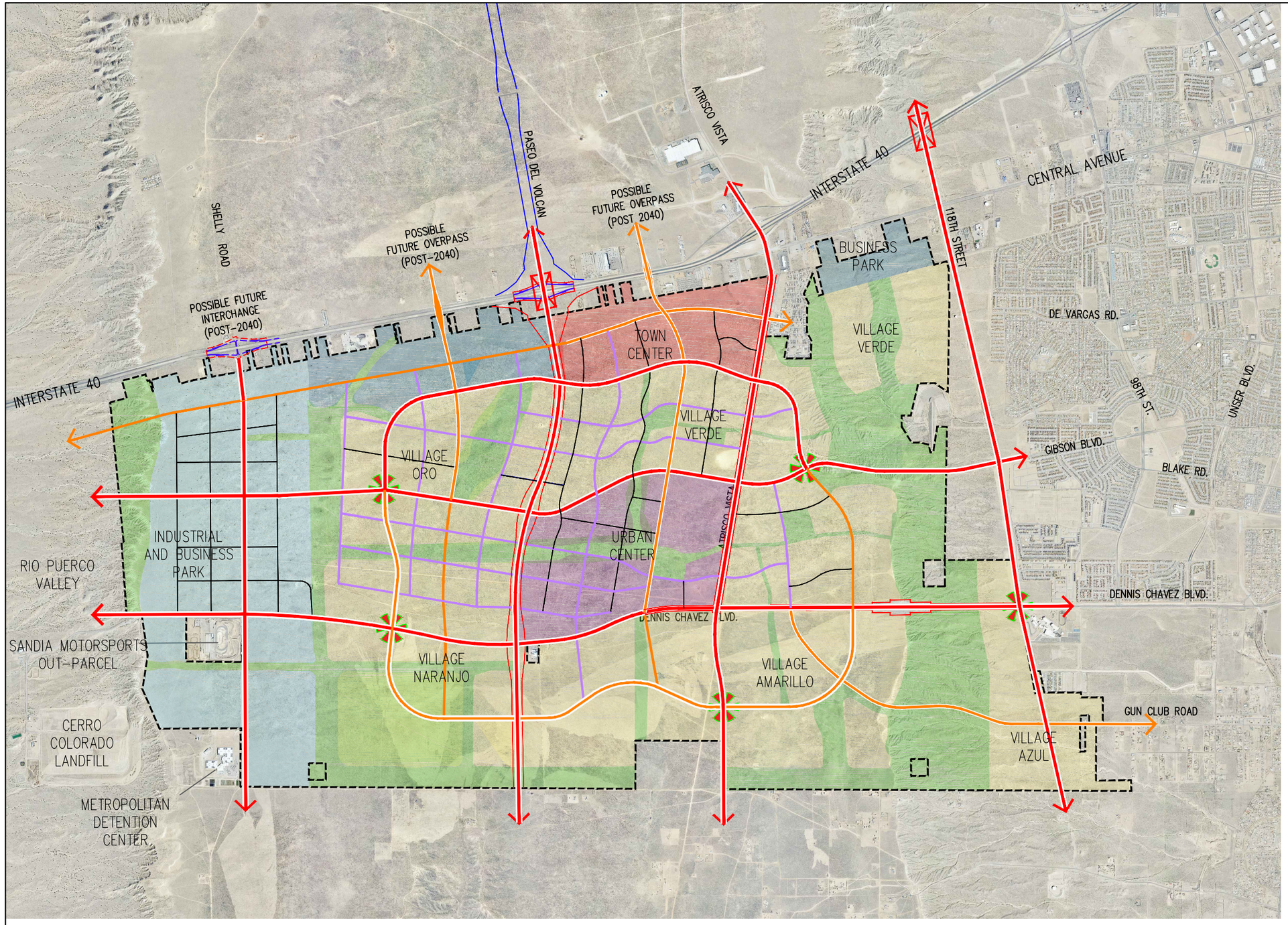
The Planned Communities Criteria (PCC) require that there is no net cost to the County as a result of the development. The Development Agreement and Level A Master Plan, as well as the any improvements identified in this document, is required to satisfy this PCC requirement.

B. MAJOR STREET SYSTEM AND RELATED COMPONENTS

Santolina will benefit from its proximity to a relatively extensive transportation network of existing streets and roadways. These will be extended through the community as needed to serve development, and will be designed to be multi-modal, with adequate room for trails, bicycle, and transit. The roadway corridors shown in the Master Plan are principal and minor arterials with 4-6 lanes. A network of collector and local streets will be developed in the next phase of planning, with the Level B plans for each subarea.

In addition to the next level of roadways, there will also be an overall network of pedestrian and bicycle trails within Santolina which will connect to the larger, regional existing and planned roadway, bicycle, and trail facilities.

As stated in the Level A Master Plan, a goal for the transportation plan is the development of a circulation and transportation system which promotes connections to and from existing and planned freeway interchanges, arterials and collector streets; allows for transit connections throughout the community; that creates links between activity centers and Villages; and provides opportunities for alternative modes of transportation for the community through an extensive network of trails and bikeways. Walkability and transit opportunities are highly valued traits of new communities, and they are prevalent at Santolina.



SANTOLINA

LEVEL A

LEGEND

- Village
- Industrial and Business Park
- Open Space
- Urban Center
- Business Park
- Town Center
- Level A Boundary
- Future Interchange
- Village Center
- Primary - 2-3 Lanes Each Direction*
- Minor - 2-3 Lanes Each Direction*
- Collector- 1-2 Lanes Each Direction*
- Local- 1-2 Lanes Each Direction*

NORTH

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LEVEL A MASTER PLAN

FIGURE 1

1. FUNCTIONAL CLASSIFICATION AND ROADWAY HIERARCHY

As mentioned, all the high level roadways are shown in the Master Plan in Figure 1. Dennis Chavez Boulevard, Atrisco Vista Boulevard, Gibson Boulevard, Shelly Drive, the Loop Road and the future Paseo del Volcan are principal arterials, however, these and all other arterial and collector roadways will generally adhere to the intersection and driveway spacing as identified in section I.B.3 Access Management, discussed on page 5, and shown in Table 1. The Santolina Access Management Plan and intersection spacing policy approved in the Level A Master Plan will be implemented for all roadways within the Master Plan area. The policy generally supersedes other policies that may be in place for roadways within Santolina.

Internal circulation will be focused on a radial loop road through the Villages, with minor arterials and collectors branching off from the loop road to create an internal grid structure within the Villages. This arrangement provides multiple, parallel routes, providing opportunities to disperse traffic.

As the subareas are evaluated in the Level B plan submittals in the future, additional minor arterials, collectors and local streets will be identified.

2. EXTERNAL CONNECTIONS/GATEWAYS

As shown in the Master Plan, primary access to the site will be via:

- Dennis Chavez Boulevard,
- a Gibson Boulevard extension from 118th Street,
- an internal road parallel to Central Avenue/I-40 Frontage Road from Atrisco Vista and possibly down the escarpment in the future, as identified on the MRCOG Long Range Roadway System,
- Shelly Drive,
- the Interstate 40 interchange with Atrisco Vista,
- a future extension of Gun Club Road from 118th Street, and
- the future Paseo del Volcan and interchange with I-40.

All these roadways are expected to carry substantial traffic volumes, particularly post-2040, as the interstate and escarpment limit the opportunities for access to the site. The Master Plan also shows two grade separated overpasses across I-40 that could be constructed in the future to alleviate traffic on Atrisco Vista and Paseo del Volcan as the area north of I-40 develops in the future. It was considered prudent to design the Master Plan to accommodate these connections, so they will integrate with the overall Master Plan road network with minimal disruptions to the land use in the future.

In addition, in the future it is possible that Shelly Drive could become a full interchange with Interstate 40 to facilitate access to the Industrial and Business Park and the lands to the north of I-40.

Prior to the construction of the future Paseo del Volcan interchange, access to Paseo del Volcan in Santolina will be via the internal road that parallels Central Avenue/I-40 Frontage Road. The future configuration of the Paseo del Volcan interchange will be determined during the NMDOT *Location Study Procedures* process. The Santolina Master Plan road network has incorporated the preliminary design and right-of-way requirements of Paseo del Volcan within the boundaries of Santolina so that development will not occur within future Paseo del Volcan right-of-way.

Besides its role as a critical primary access carrying a significant amount of traffic volume, the Gibson Road and Gun Club Road extensions up the escarpment are considered necessary to demonstrate to the Federal Highway Administration (FHWA) that the local roadway network is fully developed to the maximum extent possible, and alternatives to using the Interstate system for local trips are available. This will be crucial in the FHWA review of future 118th Street/I-40 and Paseo del Volcan/I-40 Interchange Access Change Requests (required to gain federal approval for new interchanges on the interstate system). Given the alignments are through the escarpment, these extensions will follow natural contours and be designed to minimize impacts to the Ceja.

Other key roadways near Santolina include 118th Street and Atrisco Vista. Atrisco Vista is an existing roadway, that will be widened as necessary to accommodate development. The 2040 MTP has several projects that will result in 118th Street becoming a continuous roadway from Pajarito Road, south of Dennis Chavez, north to Arroyo Vista, including an interchange with I-40.

3. ACCESS MANAGEMENT

The 2003 Transportation Research Board's (TRB) Access Management Manual defines access management as "the systematic control of the location, spacing, design and operation of driveways, median opening, interchanges and street connections to a roadway." "The purpose of access management is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system."

The Bernalillo County Planned Community Criteria (PCC) defines the level of regulatory detail required for Master Plan submittals.

The Level A submittal is the initial submittal and establishes the overall goals of the Master Plan, which is developed further in Level B and Level C submittals. A full description of the submittal requirements is contained in the Planned Community Criteria, adopted by the Bernalillo County Commission on May 22, 2012, as amended thereafter. Selected excerpts of the submittal requirements are below. Please refer to the adopted PCC for all submittal requirements.

The Santolina Level A Transportation Master Plan analysis is required by the PCC to:

- provide a "comprehensive transportation system plan which discusses major street continuity,"
- "identify major travel corridors,"
- "provide a hierarchy of internal and regionally connected roadway facilities."

The future Level B submittals, in accordance with the PCC, are required to provide:

- Evaluation of the specific development under consideration.
- Demonstration of consistency [of the Level B submittal] with the Level A Master Plan.
- Identify the traffic circulation system, including "major street access and access limitation concepts."

The future Level C submittals can be thought of as a site development plan submittal, with imminent development contemplated. Detailed traffic impact analysis will be submitted at this level, following standard County traffic analysis procedures. This submittal must follow the overall Master Plan criteria, as identified in the Level A and Level B submittals.

This Level A Santolina Access Management Plan document will establish high level access management concepts that will be further developed in the Level B submittal.

a) *Intersection Spacing Criteria*

A common reference for access management in New Mexico is the NMDOT *State Access Management Manual* (SAMM). This document describes the statutory authority for the NMDOT to provide access to roadways under State of New Mexico jurisdiction, as well as the requirements for traffic analysis submittals, intersection spacing criteria, requirements for deceleration and turn lanes, as well as design criteria.

It is not considered necessary for this Santolina Access Management Plan to provide the above described level of detail as the County has extensive documentation detailing development submittal procedures, traffic analysis requirements and design criteria. However, it is considered appropriate to define the specific intersection spacing criteria so that future planners, engineers and developers will know what access will be available.

The table below is an excerpt from the NMDOT SAMM, modified to be appropriate for Bernalillo County and the Santolina Master Plan area. The table below identifies the proposed intersection and driveway spacing for the Santolina Master Plan area, except in areas where other access management guidelines are in effect.

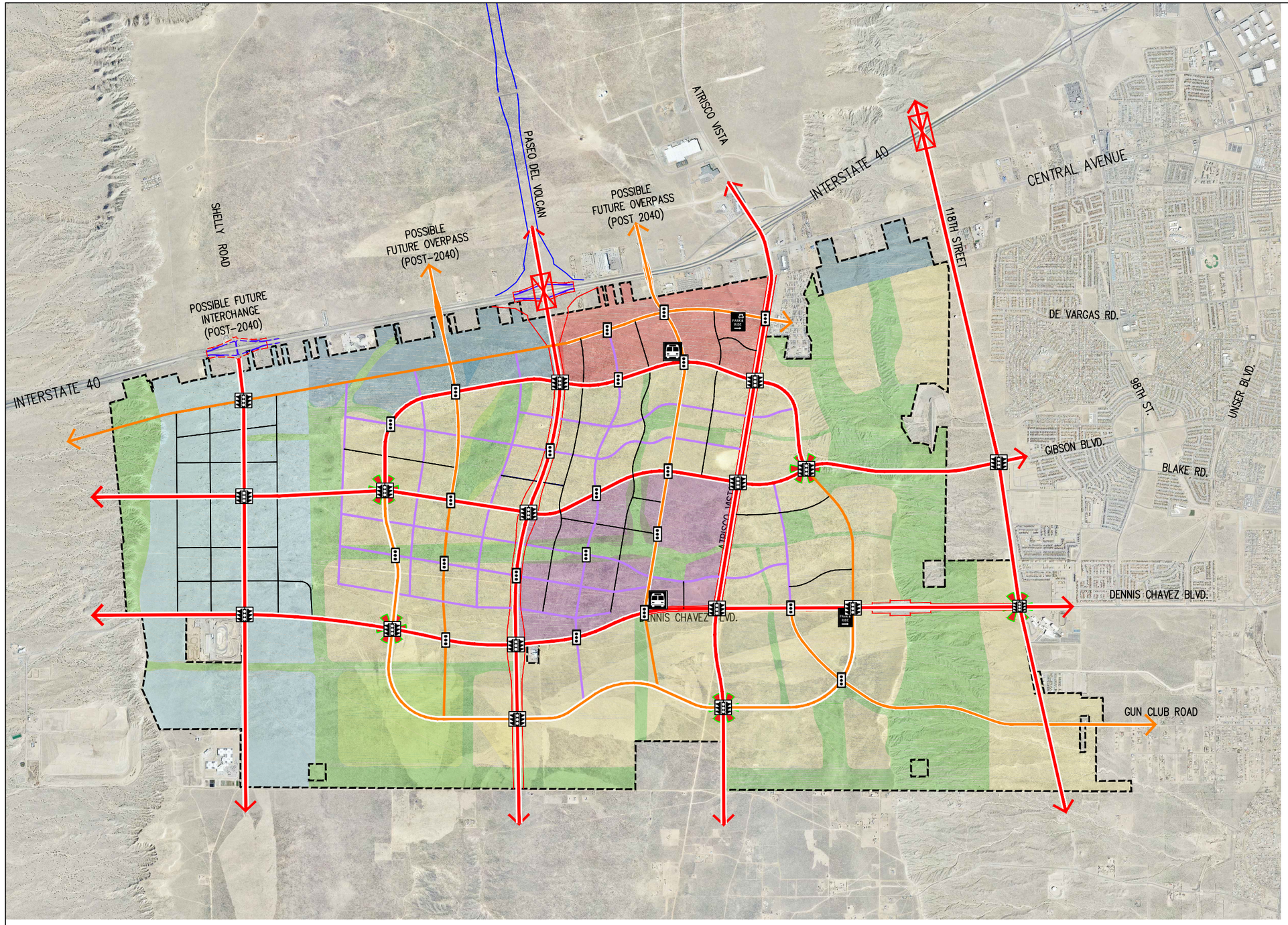
Variances to the spacing listed below can be requested, subject to review and approval of County Staff, with denials appealable to the County Planning Commission for final determination. However, every effort should be made to modify the proposed site development plans to conform to the spacing criteria below.

Table 1 – 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	2,640	1,320	1,320	200	200
	35 to 40 mph	2,640	1,320	1,320	325	325
	45 to 50 mph	2,640	1,320	1,320	450	450
	≥55 mph	5,280	1,320	1,320	625	625
Urban Minor Arterial	≤30 mph	1,760	660	660	175	175
	35 to 40 mph	1,760	660	660	275	275
	45 to 50 mph	2,640	660	660	400	400
	≥55 mph	5,280	1,320	1,320	600	600
Urban Collector	≤30 mph	1,100	330	330	150	150
	35 to 40 mph	1,320	330	330	225	225
	45 to 55 mph	1,760	660	660	350	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.

Figure 2 shows the potential signalized intersection locations based on the above Santolina Access Management Plan (SAMP) intersection spacing criteria for the Full Build scenario, which is anticipated to occur 40-50 years in the future. The 2040 Projected Development (Phase 1) roadway network and potential signalized intersections are shown in Figure 3.



SANTOLINA

LEVEL A

LEGEND

- Level A Boundary
- Future Interchange
- Village Center
- Major Signalized Intersection
- Potential Future Signalized Intersection
- Park and Ride
- Transit Center
- Primary - 2-3 Lanes Each Direction*
- Minor - 2-3 Lanes Each Direction*
- Collector- 1-2 Lanes Each Direction*
- Local- 1-2 Lanes Each Direction*

NORTH

FULL BUILD ROADWAY FUNCTIONAL CLASSIFICATION AND ACCESS MANAGEMENT MASTER PLAN

FIGURE 2

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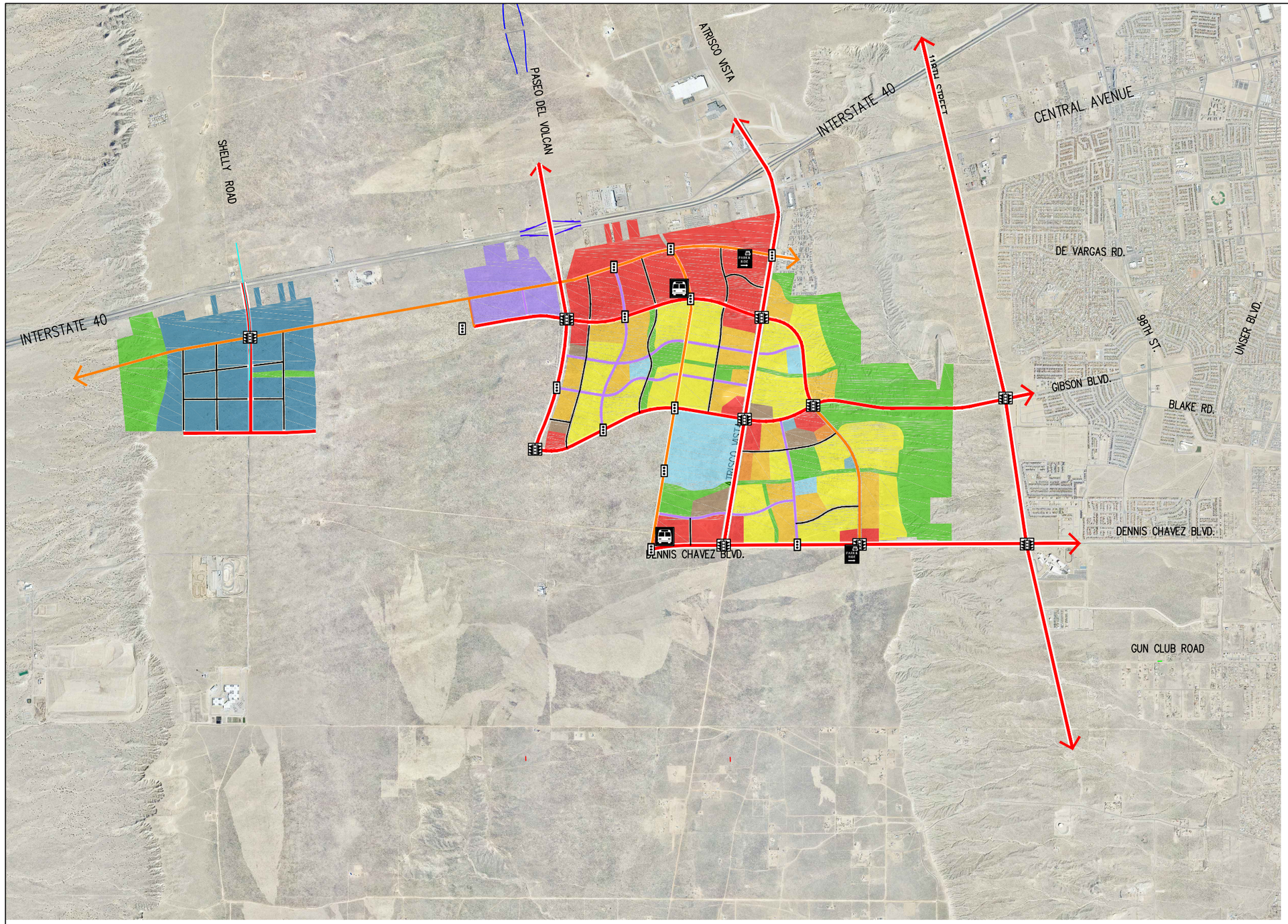

SANTOLINA

LEVEL A

LEGEND

- Future Interchange
- Major Signalized Intersection
- Potential Future Signalized Intersection
- Park and Ride
- Transit Center
- Primary - 2-3 Lanes Each Direction*
- Minor - 2-3 Lanes Each Direction*
- Collector- 1-2 Lanes Each Direction*
- Local- 1-2 Lanes Each Direction*

NORTH

2040 PROJECTED DEVELOPMENT ROADWAY FUNCTIONAL CLASSIFICATION AND ACCESS MANAGEMENT

FIGURE 3

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b) *Illustrative Access Sketch*

In order to assist in the visualization and application of the above Table 1 criteria in the actual preparation of site development plans, an illustrative sketch of how these criteria would be applied at a typical major intersection is shown in Figure 4.

c) *Interim Access Considerations*

It is the intention of this Santolina Access Management Plan (SAMP) Intersection Spacing Criteria, that access shall be limited as defined in the SAMP spacing criteria, with requests for variances subject to County Staff approval and appeal to the County Planning Commission. Accordingly, "full build" site planning complies with the SAMP guidelines.

However, the Master Plan and SAMP recognize that temporary conditions may occur from time to time that do not warrant full compliance with the SAMP. For example, a majority of arterial roadways within the Santolina Master Plan area may initially be constructed in a phased manner, such that only two lanes (one lane in each direction) may exist. In this instance, there will likely be no raised median in the initial two-lane roadway construction to prohibit access. It can be anticipated that these proposed intersections/driveways will seek to be temporarily open for a full access condition, even if they do not meet the ultimate roadway's SAMP spacing criteria.

Accordingly, temporary access conditions may be permitted by the County on a case-by-case basis at the sole discretion of the County. Traffic Impact Studies (TIS) specifically performed for the proposed site developments will address the feasibility of temporary access modifications and must warrant that the temporary access condition meets all typical traffic design and safety conditions.

All future planners, engineers, builders and developers of Santolina lands shall be cautioned to understand that access points that do not meet the proposed Santolina Access Management Plan (SAMP) intersection spacing criteria, will be converted or removed when the roadway is widened to four or more lanes, as and when required by the County. Generally, a special bold note, and/or a separate, signed agreement with the developer and County, stating the above conditions, will be added to all proposed site development plans that identify temporary driveway and intersection spacing that does not conform to the SAMP spacing criteria. The notes will indicate these driveways may be closed or converted to the appropriate level of access, as identified in the Santolina Access Management Plan Intersection/Driveway Spacing Criteria. These access conditions should be also included as a 'condition of approval' when these temporary nonconforming intersections/driveways are approved.

SANTOLINA

LEVEL A

LEGEND

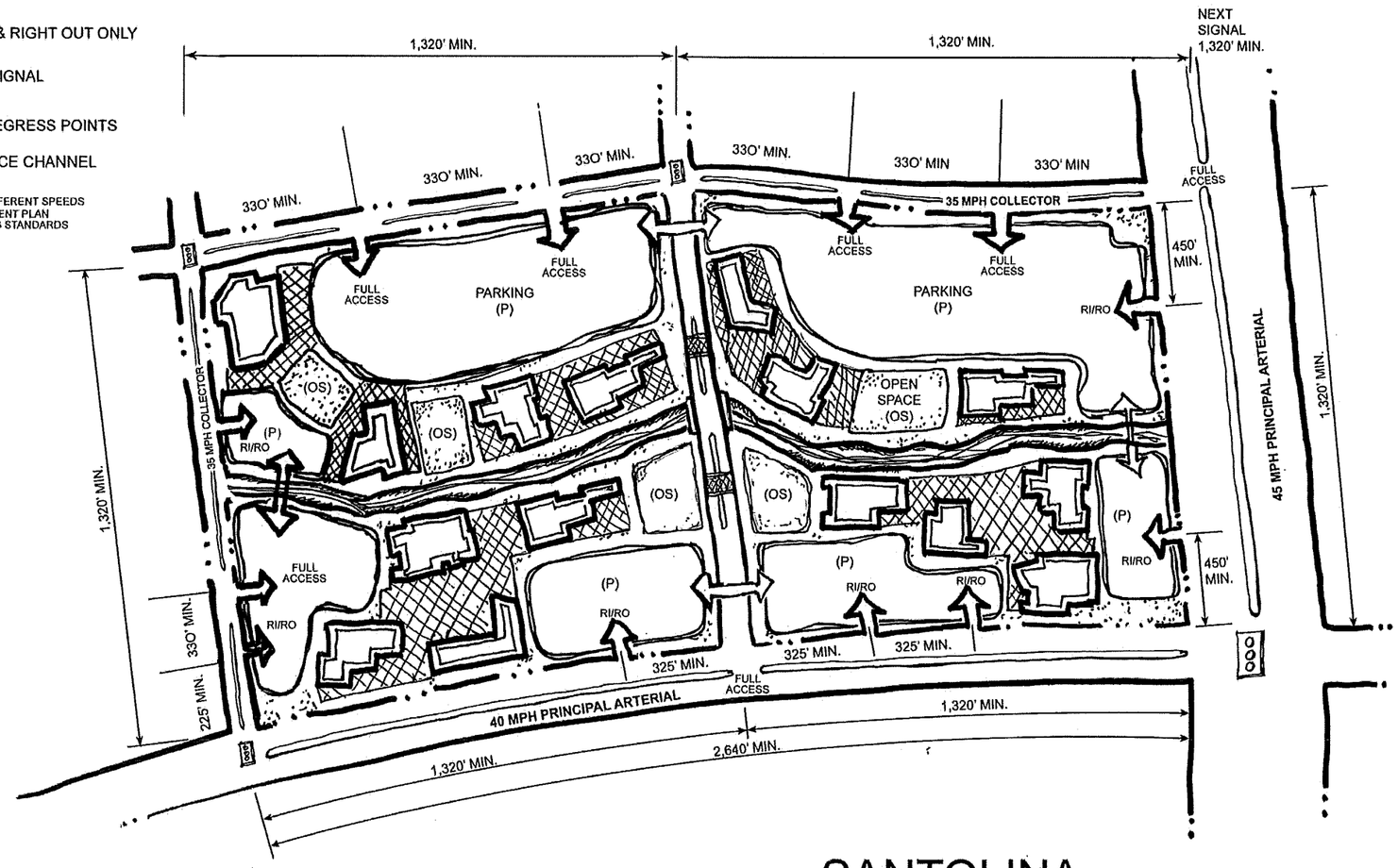
RI/RO = RIGHT IN & RIGHT OUT ONLY

= TRAFFIC SIGNAL

= INGRESS/EGRESS POINTS

= OPEN SPACE CHANNEL

* FOR ROADWAYS OF DIFFERENT SPEEDS SEE ACCESS MANAGEMENT PLAN INTERSECTION SPACING STANDARDS



SANTOLINA ILLUSTRATIVE TRAFFIC PLAN

REPRESENTING THE ACCESS MANAGEMENT PLAN INTERSECTION/DRIVEWAY SPACING

NOVEMBER 2014

NORTH

ILLUSTRATIVE ACCESS CONCEPTUAL SKETCH

FIGURE 4

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An illustrative sketch that shows the interim and future access concepts along a roadway is shown in Figure 5.

d) *Compliance with Existing Policies and Guidelines*

This Santolina Access Management Plan will apply to all of the roadways within the Santolina Master Plan area, however if other access management plans have roadways within Santolina under their jurisdiction, these other access management plans must be followed for those roadways. For instance, roadways that are under the NMDOT jurisdiction must follow the NMDOT *State Access Management Manual* (SAMM) requirements.

In addition, the Mid-Region Council of Governments has also established regional access management criteria for regionally significant roadways. Roadways within Santolina that fall under the MRCOG Roadway Access Policies will be governed by those policy criteria.

Detailed guidance and requirements for access design and other pertinent guidelines, standards and policies are listed below:

1. Bernalillo County Street Standards should be the first reference for detailed information on design guidelines and standards.
2. Current Edition of AASHTO *A Policy on Geometric Design of Highways and Streets*.
3. Bernalillo County Public Works *Traffic Impact Analysis Guidelines*.
4. The NMDOT *SAMM*
5. Mid Region MPO (MRCOG) *Inventory of Roadway Access Limitations*
6. TRB *Access Management Manual*

The MRCOG has also established roadway access for Atrisco Vista Boulevard and Senator Dennis Chavez within the boundaries of the Santolina Master Plan area, and for Paseo del Volcan north of I-40. The access limitations established by MRCOG for Atrisco Vista and Dennis Chavez are similar to those established in the Santolina Access Management Plan for signalized intersections.

MRCOG access policy for Atrisco Vista, south of I-40 currently allows just two full intersections: Dennis Chavez Boulevard and Tierra West Estates Road. Full access intersections between Tierra West and Dennis Chavez is provided at one-half mile intervals, and T-intersections and right-in/right-out driveways are provided at approximately one-quarter mile intervals. The NMDOT has established access control along Atrisco Vista as well. These access points are located at Tierra Estates Road, approximately one-mile north of Dennis Chavez and at Dennis Chavez.

The access shown for Atrisco Vista in the Land Use plan is comparable to the MRCOG access plan, although it is modified to provide for the parallel road to the Frontage Road, as requested by the NMDOT. This parallel road to the Frontage Road is located approximately 2,760 feet from the Frontage Road/Central Avenue intersections, and satisfies the MRCOG access spacing guidelines south to Dennis Chavez. As Santolina proposed development on both the east and west sides of Atrisco Vista, the unsignalized intersections are proposed as left-in/right-in/right-out intersections at no less than one-quarter mile intervals. Any changes in NMDOT Access Control along Atrisco Vista will be requested by Santolina and Bernalillo County through the NMDOT Access Control Procedures in the State Access Management Manual.

MRCOG spacing policy on Dennis Chavez has full access, signalized intersections at one-half mile spacing, with additional intersections also allowed at one-half mile spacing. Currently approved MRCOG intersections are at 118th Street, Atrisco Vista and future Paseo del Volcan. As with Atrisco Vista, development of Santolina will request additional access to Dennis Chavez as the Master Plan develops. The roadway network proposed for Santolina satisfies the MRCOG access spacing policy with full access intersections at one-half mile intervals. Any changes in NMDOT Access Control along Dennis Chavez will be requested by Santolina and Bernalillo County through the NMDOT Access Control Procedures in the State Access Management Manual.

Future access limitations along Paseo del Volcan south of I-40 have not been established by MRCOG or the NMDOT. However, the roadway network established in Santolina does provide access spacing that follows the ultimate access policy for Paseo del Volcan north of I-40. North of I-40, Paseo del Volcan is ultimately planned to be developed to freeway standards with interchanges at approximately one-mile intervals. The Santolina roadway network has been designed to allow for this condition, if it were to occur south of I-40. The right-of-way will also be reserved for future freeway requirements. MRCOG policy states “prior to ultimate development, at-grade intersections with median openings at other than one-mile intervals may be permitted.” The intersection spacing proposed along Paseo del Volcan, south of I-40, provides one-half mile signalized intersection spacing in the interim, prior to ultimate development of the freeway facility. These signalized intersections, with spacing of one-half mile, consistent with the SAMP and SAMM for urban principal arterials, would become underpasses in the event the freeway facility is constructed.

The proposed unsignalized intersections shown with the interim Paseo del Volcan, with spacing of one-quarter mile, consistent with the SAMP and SAMM for urban principal arterials, will terminate at the frontage roads to be constructed with the freeway facility, similarly as they are planned to north of I-40.

Consistent with MRCOG policy, the above proposes an initial access control plan for adjacent and intersecting streets that will be further developed through location corridor studies.

4. TYPICAL SECTIONS

The proposed typical sections are included in the Figure 6. The six (6) typical roadway sections shown include a proposed 6-lane principal arterial with a separate, dedicated bus lane or Bus Rapid Transit (BRT) System, for regional connections, a 6-lane principal arterial without dedicated transit, and a 4-lane minor arterial, a 4-lane collector with parking, a 4-lane collector without parking and a 2-lane collector with parking. Right-of-way widths range from 186-feet to 77-feet.

All six typical sections have on-street provisions for bicycle lanes and sidewalks or multi-use trails. The roadways will be designed to conform to Bernalillo County Ordinance 2015-21, the Complete Streets Ordinance, and match the MRCOG Long Range Transportation System Rodway Design Guidelines.

These typical sections will provide Santolina with a robust set of principal roadways and bicycle and pedestrian facilities resulting in local and regional wide access to alternate travel modes.

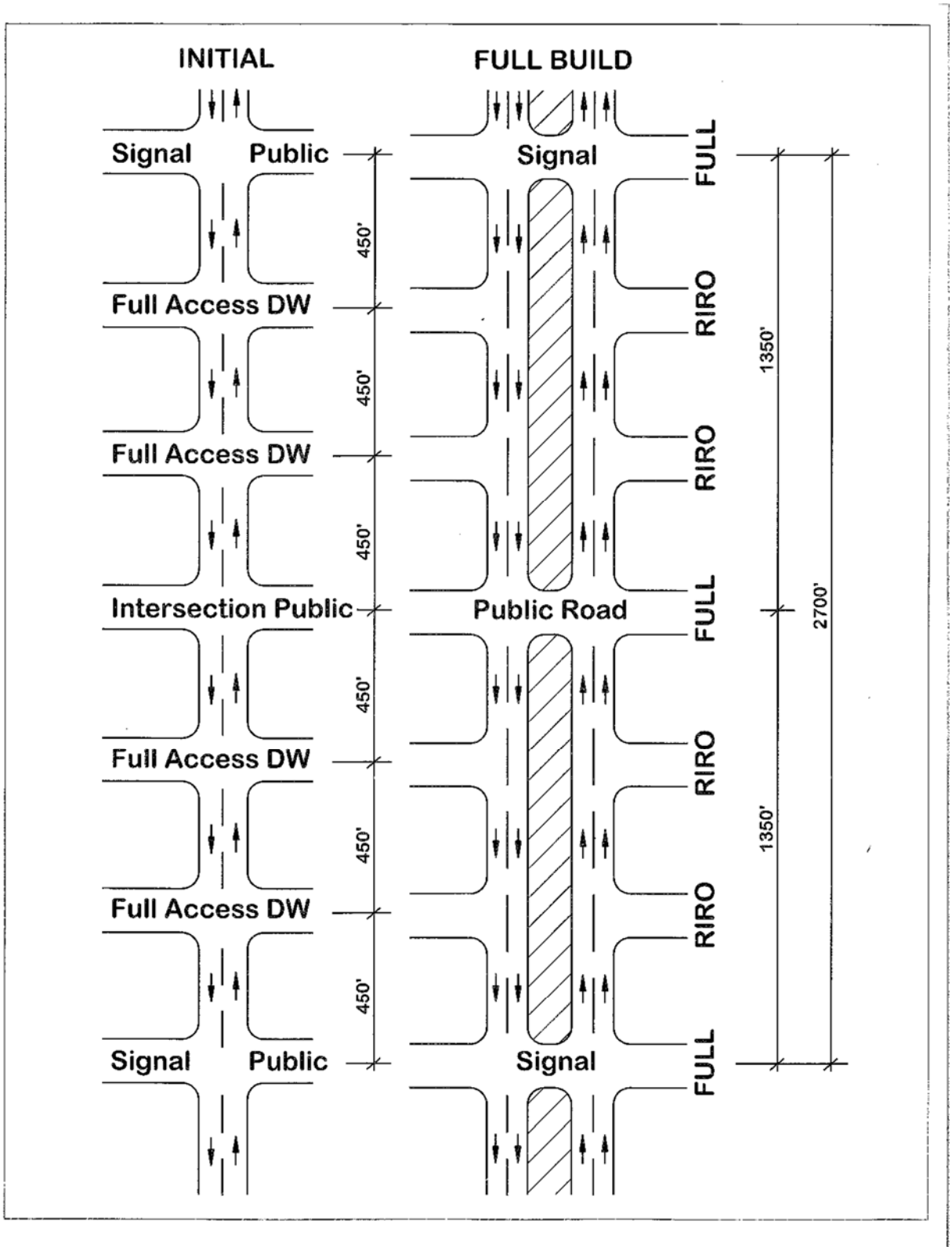
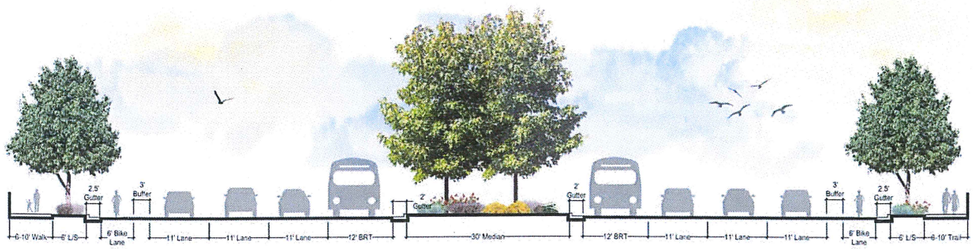


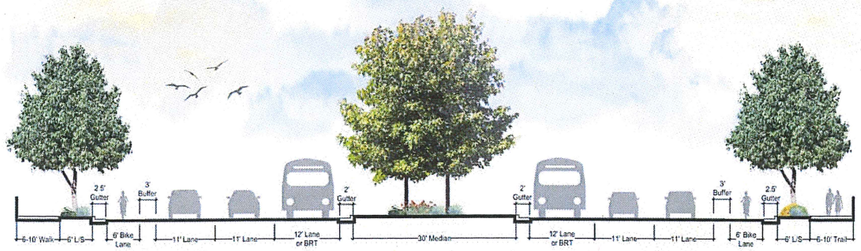
Figure 5 - Interim Access Criteria

SANTOLINA

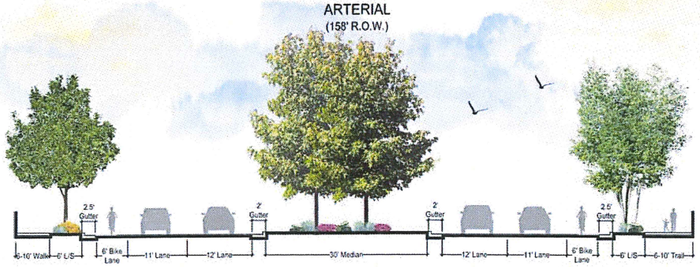
LEVEL A



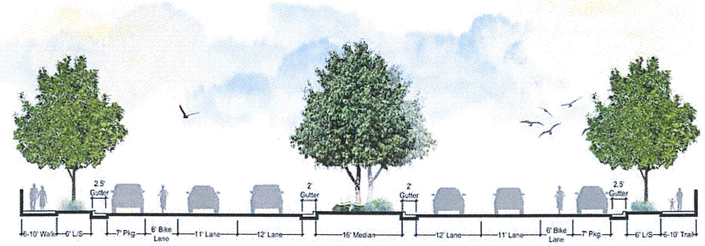
PRINCIPAL ARTERIAL
w/TRANSIT
(186' R.O.W.)



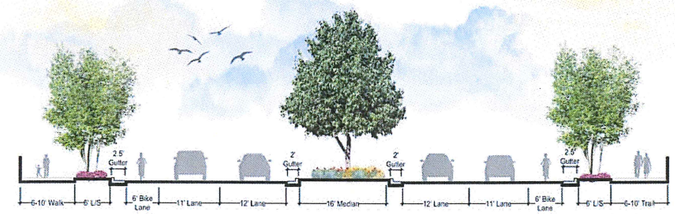
6-LANE PRINCIPAL
ARTERIAL
(158' R.O.W.)



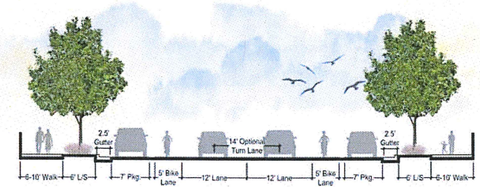
4-LANE MINOR ARTERIAL
(136' R.O.W.)



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



4-LANE COLLECTOR
w/o PARKING
(115' R.O.W.)



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

NORTH

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TYPICAL SECTIONS
FIGURE 6

Photo credit: Complete Streets

Figure 7 – Example of Complete Street with Pedestrian and Bicycle Accommodations

C. STRATEGIES FOR STREET CONSTRUCTION AND DEDICATION

The initial two lanes of permanent roadways, intersections and other elements to serve the development will be constructed by the planned community developer, per the Planned Community Criteria and Development Agreement. Subsequent staged construction of additional lanes, based on actual demand and short term projections of demand, will be eligible for consideration of local government capital programing, as stated in the PCC. As mentioned previously, the PCC requires that infrastructure for the project result in no net cost to the County.

Right-of-way dedication will occur after the Level B studies establish the location of roadways for the Level B project area.

D. ANALYSIS OF INTERNAL NETWORK PERFORMANCE

This section will discuss the approach and results for evaluating the operation of the internal roadway network.

1. STUDY APPROACH AND METHODS

The 2040 Trend forecast for the Data Analysis Subzones (DASZ) that contain the area encompassed by Santolina do not reflect the level of development anticipated by Western Albuquerque Land Holdings.

This study expands and adjusts the land use forecasts in the MRCOG Santolina DASZ's to match the anticipated level of development resulting from the investments to be made in the infrastructure in Santolina. The specifics of these changes in land use are included in a detailed description and report on the study approach and methods is included in Technical Appendix T-1, Travel Demand Model Socioeconomic Forecast, and will be briefly discussed in Section I.D.2.c), Changes in Santolina Zones from 2040 Trend Forecast, on page 22.

The typical procedures used by the MRCOG in developing socioeconomic and roadway forecasts were followed. Coordination with MRCOG and Bernalillo County Planning and Transportation Staff was performed to ensure Staff concurrence of the approach and methods. The NMDOT was also included in the coordination so as to accurately appropriately address NMDOT jurisdictional concerns and future planning activities.

The number of dwelling units was determined from the Comprehensive Plan Designated Area Standards. The population forecasts were derived from the 2010 Census Bernalillo County average household size. Employment area estimates were derived by applying typical floor-to-area (FAR) ratios to anticipated areas considered appropriate for development, and the desired development activity. Job numbers were determined using typical employee per square-foot estimates for each proposed zoning/development district. The level of development by 2040 was forecast using assumptions of anticipated land use absorption and market forecast estimates.

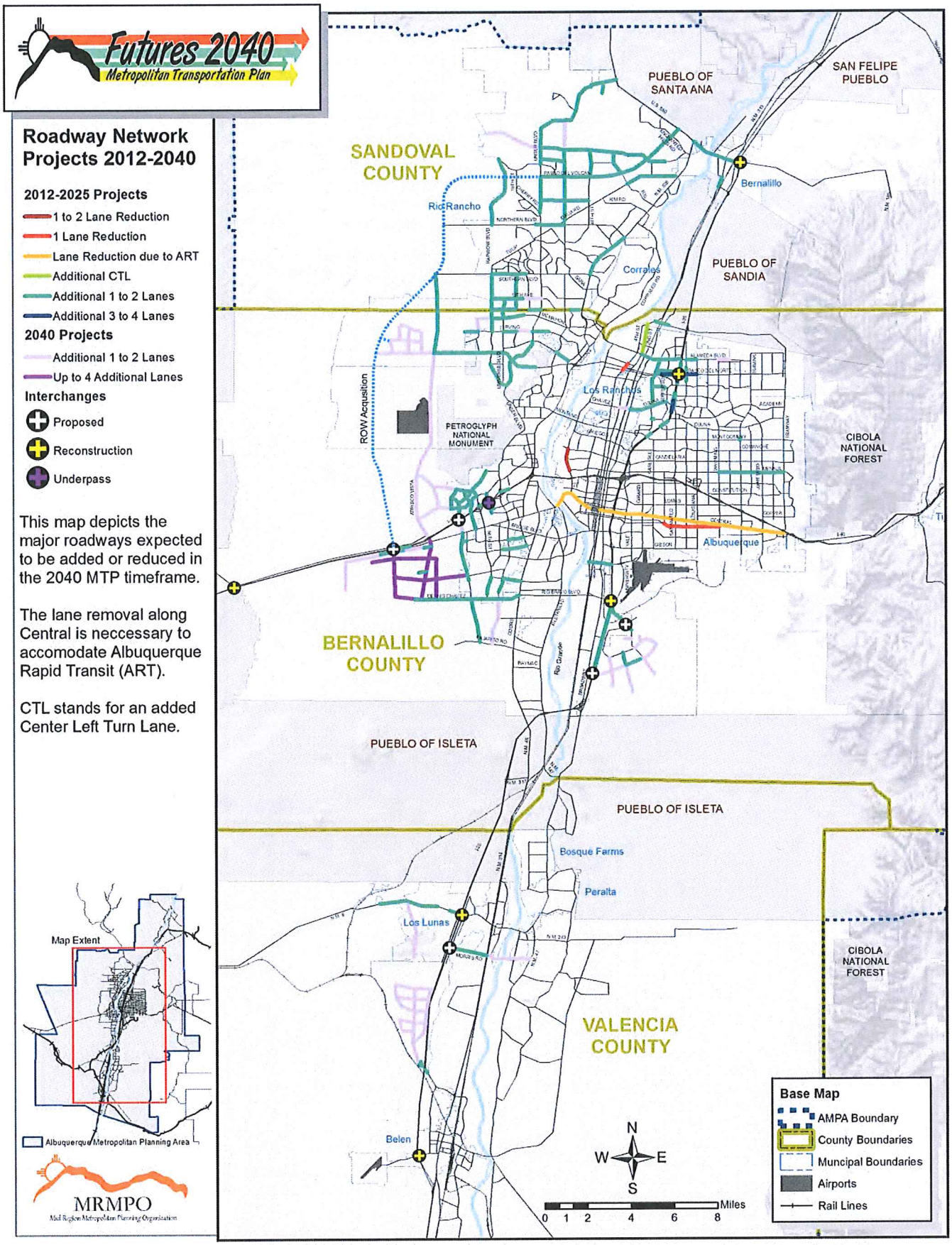
For the 2040 Projected Development (Phase 1) analysis, regional control totals on population and employment were held constant to MRCOG forecasts in order to maintain consistency with adopted forecasts and policy. This means the amount of regional population and number of jobs in the MRCOG planning area for the Santolina 2040 analysis is identical to that used in the 2040 MTP analysis. 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. Furthermore, only future growth of employment and population were reassigned to Santolina, so as not to reallocate existing population or employment to Santolina. These strategies allow the proposed Santolina Level A Master Plan analysis results to be directly compared to the 2040 MTP results.

For the 2040 full build analysis, Santolina was estimated to contain its maximum expected level of development, with the balance of the Albuquerque Metropolitan Planning Area (AMPA) held at forecast 2040 level of development. This was done as there is no accepted or adopted socioeconomic or roadway network established past 2040.

2. 2040 MTP BASE MODEL DISCUSSION

The MRCOG 2040 MTP was developed using population and employment forecasts for the AMPA by the University of New Mexico's Bureau of Business and Economic Research (BBER). These region-wide estimates were refined by the MRCOG, and growth was assigned to specific areas using information collected by MRCOG from approved Master Plans, discussions with local government Staff, local planners and developers, and from data derived from the UrbanSim land use forecasting model. The UrbanSim model uses proximity to existing infrastructure as one feature in identifying future areas for development.

The 2040 MTP also uses a regional travel demand model, which utilizes the socioeconomic forecasts discussed above (population and employment), combined with a future roadway network, to forecast 2040 traffic volumes on the major roadways in the AMPA. This future roadway network is financially constrained, meaning the anticipated funding for the future roadway network is limited to estimates of the future funding available at the federal, state, and local levels. Figure 8 shows the map (Map 3-4) from the 2040 MTP identifying the types and locations of roadway network expansion projects for the AMPA. The 2040 MTP identifies almost $6.3 billion of transportation projects by 2040, with over $5 billion of publicly financed roadway capacity projects, with an additional $1.2 billion identified from private sources.



SANTOLINA

FIGURE 8
2040 MTP ROADWAY NETWORK EXPANSION PROJECTS

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a) *Roadway Network In Santolina*

As a result of the approved Level A Santolina Master Plan, Figure 8 includes some initial roadways within the boundaries of Santolina.

As stated above in Section I.C, Strategies for Street Construction and Dedication, the initial two lanes of permanent roadways, intersections and other elements to serve the development will be constructed by the planned community developer, with future roadway improvements constructed per the Planned Community Criteria and Development Agreement.

b) *Socioeconomic Forecast*

The population forecast for the AMPA was developed by the Geospatial and Population Studies department at UNM, and refined by MRCOG, shows a substantial increase in population by 2040. The forecast has a 50% increase over 2012, from a population of 879,401 in 2012 to 1,317,923 in 2040.

As part of the 2040 MTP, MRCOG has introduced Scenario Planning. Scenario planning involves the comparison of multiple patterns of future growth using performance measures to evaluate the differences that may result from different patterns of future growth. In this document all references and comparisons will be to the MRCOG Trend scenario, unless specifically cited.

Due to existing constraints on development, existing zoning and land use plans, as well as land availability and costs for infrastructure, 53% of the new housing development is anticipated to be constructed west of the Rio Grande River. Constraints leading to development west of the river include tribal, federal and state lands; open space, the river, and other geographical limits such as the escarpments. Fractured land ownership patterns lead to difficult land consolidation and master planning efforts.

There are limited areas in the region than can accommodate new growth before development occurs in the undeveloped master plans areas, such as Santolina. The 2040 MTP Trend forecast already assumes growth in Mesa del Sol and Volcano Heights, as well as a portion of Santolina, based on existing zoning regulations.

Figure 9 shows Map 2-5 from the 2040 MTP, showing the locations of projected population growth for the Trend scenario. The map shows large increases are forecasted for the periphery of the metro area and west of the Rio Grande River, including Santolina.

Figure 10 shows Map 2-6 from the 2040 MTP, showing the locations of projected employment growth for the Trend scenario. The 2040 employment forecast for the region, almost 182,000 new jobs, an approximately 47% increase over 2012.

This job growth does not quite keep up with the increase in population, which is forecast to increase 50%. This is partly due to the baby boomer generation growing older. In 2012 approximately 13% of the AMPA population was over 65, and in 2040 it is projected that almost 21% of the population will be over age 65.

The employment projections show 39% of the new jobs (approximately 71,000) are anticipated to be created west of the river. This will slightly improve the jobs-housing balance on the west side, from 0.56 jobs per household west of the river in 2012, to 0.64 in 2040. The jobs/housing balance will reduce slightly on the east side of the river. East of the river, in 2012 the jobs/housing balance was 1.39, and is forecast to reduce to 1.37, with the 2040 Trend forecast addition of 111,000 new jobs.

c) *Changes in Santolina Zones from 2040 Trend Forecast*

As mentioned previously, the 2040 Trend forecast developed by MRCOG does not include the level of development anticipated by Western Albuquerque Land Holdings. The table below shows the major differences, with a more detailed explanation available in Technical Appendix T- 1, Travel Demand Model Socioeconomic Forecast.

Table 2 – MRCOG 2040 Socioeconomic Forecast and Santolina Projections

	2012	2040	
	Base	**MTP***	**Santolina**
Population	4,499	16,772	45,871
Dwelling Units	728	5,871	18,647
Employment	946	1,618	31,456

*-MTP numbers include the 5 zones that contain Santolina. For the purposed of this analysis, this can be used as a proxy for Santolina, minus the 2012 figures.

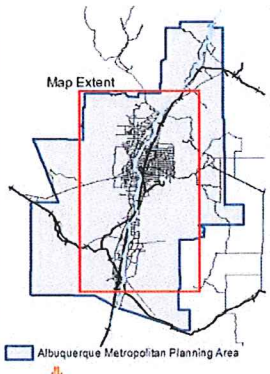
Futures 2040
Metropolitan Transportation Plan

Population Growth Trend Scenario 2012 to 2040

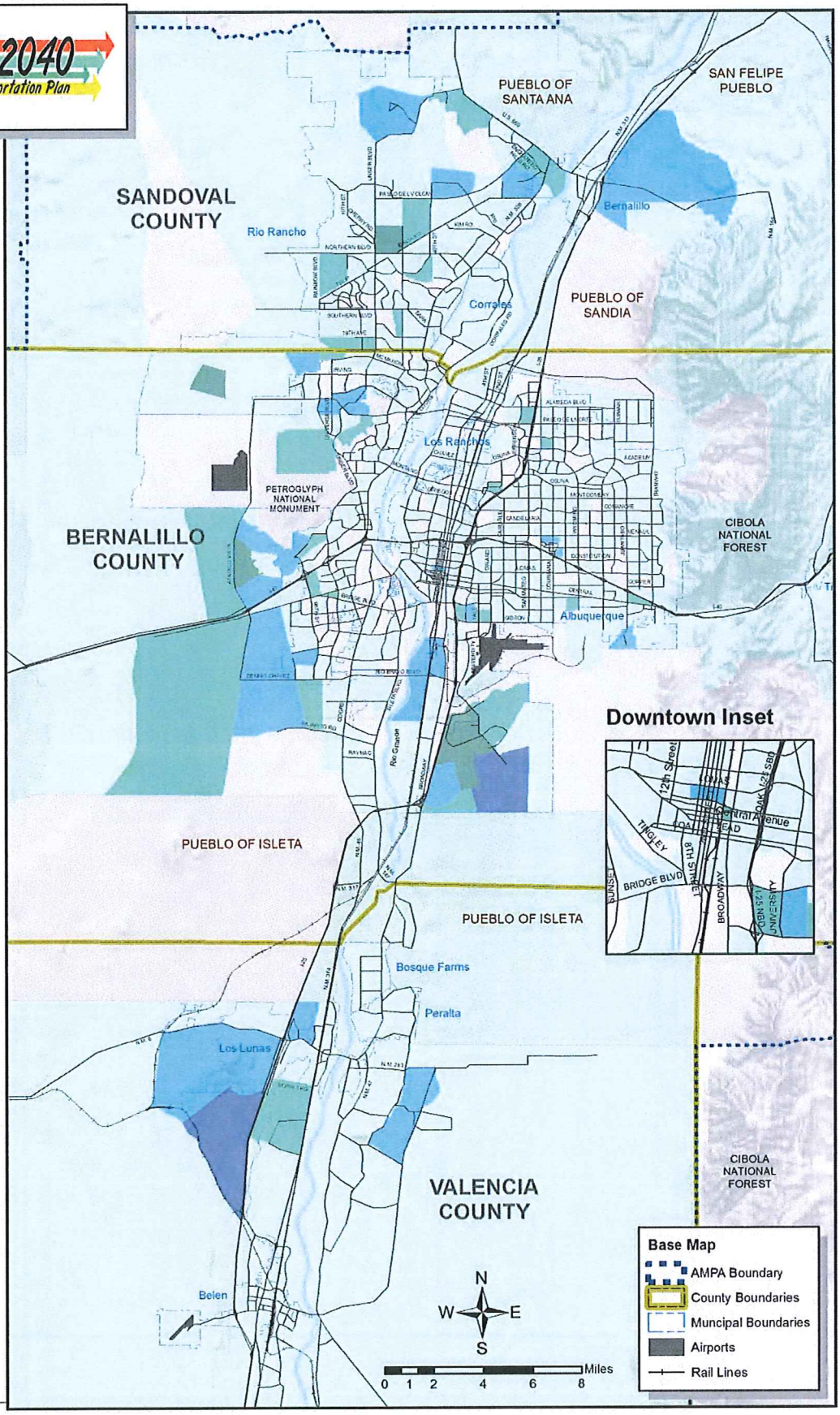
- No Growth
- 1 to 1500
- 1501 to 2500
- 2501 to 5000
- 5001 to 10000
- 10001 to 21762

The AMPA is projected to grow by 438,500 people, or 50 percent over the next 28 years. Approximately 71 percent will take place in Bernalillo County, while Sandoval will capture 17 percent and Valencia County will capture 11 percent.

Overall population growth is expected throughout the region and is more pronounced in larger zones. While Albuquerque's core (defined here as the 1960's boundary) captures 17 percent of all new growth, population growth will also be accomodated by several planned subdivisions throughout the region.



MRMPO
Mid Region Metropolitan Planning Organization



SANTOLINA

FIGURE 9
POPULATION GROWTH PROJECTION - TREND SCENARIO

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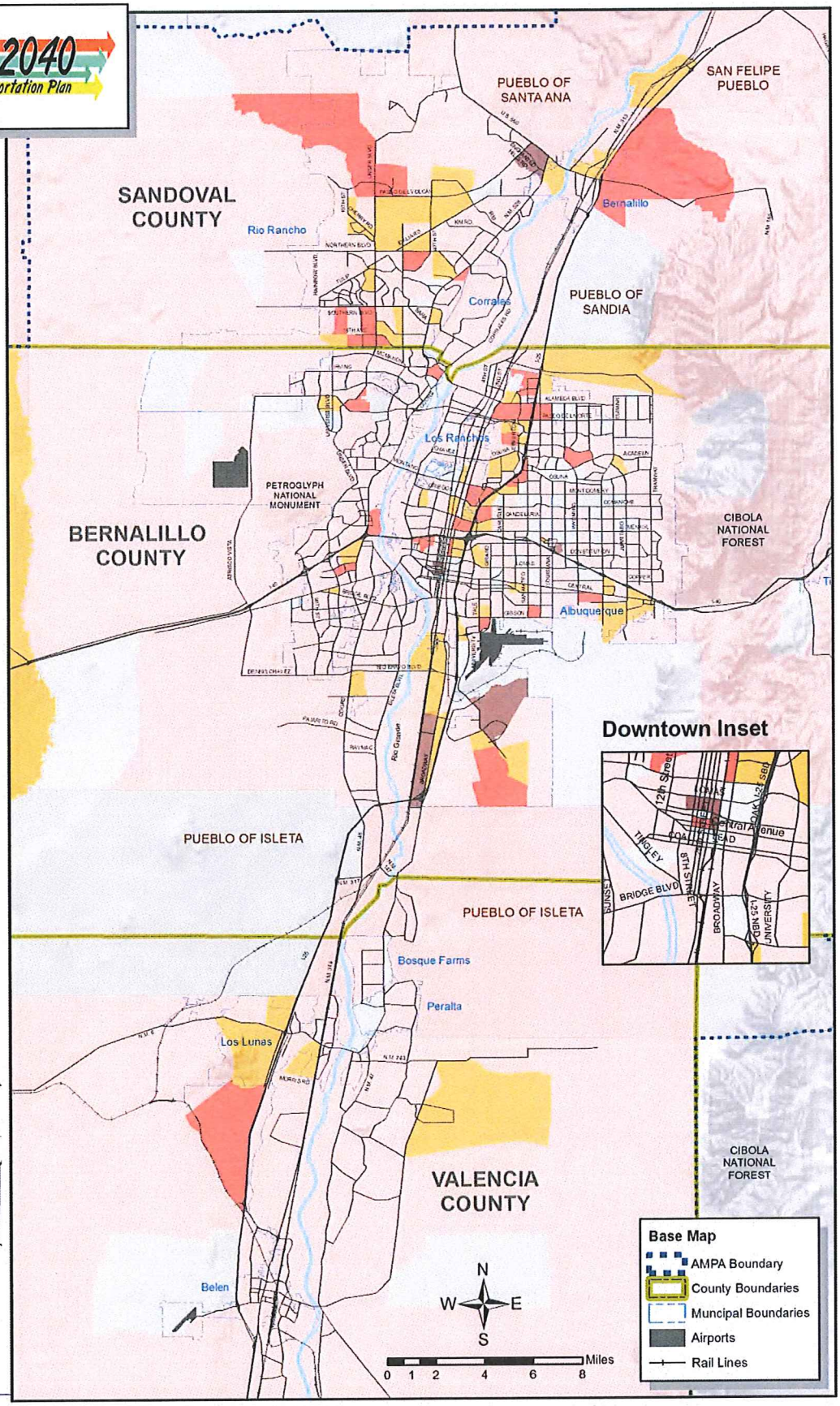
Futures 2040
Metropolitan Transportation Plan

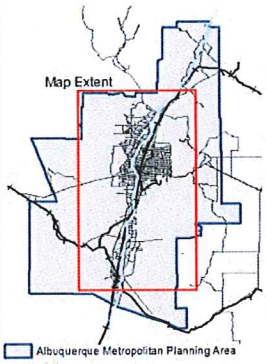
Employment Growth Trend Scenario 2012 to 2040

- No Growth
- 1 to 500
- 501 to 1000
- 1001 to 2500
- 2501 to 4349

The AMPA is projected to grow by 182,000 jobs by 2040. Bernalillo County is expected to capture 72 percent of growth, followed by Sandoval County with 22 percent and Valencia County with 5.4 percent.

Employment growth will continue to concentrate throughout existing employment centers while new nodes of economic activity are also expected throughout the region.





MRMPO
Mid Region Metropolitan Planning Organization

SANTOLINA

FIGURE 10
EMPLOYMENT GROWTH PROJECTION - TREND SCENARIO

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d) *2040 MTP Roadway Network Deficiencies*

Figure 11 shows Map 3-6 from the 2040 MTP, showing the forecast PM peak hour build scenario volume-to-capacity (v/c) ratio for the roadways in the AMPA. This build roadway network assumes the almost $6.3 billion dollars of transportation projects discussed above. The color roadway links (those yellow, red or purple) indicate the roadways are forecast to operate at poor performance, as the volume of traffic trying to use those roadways exceeds the capacity of the roadway (v/c > 1.0). This figure illustrates many roadways throughout the region will have increasing congestion in the future.

With regard to the roadways near Santolina, Interstate 40 and the I-40 interchanges at 98th, 118th and Atrisco Vista/West Central Avenue, and all river crossings are forecast to operate at high v/c ratios, and therefore with high congestion and delay. In addition, 118th Street and Atrisco Vista are forecast to be approaching capacity in 2040.

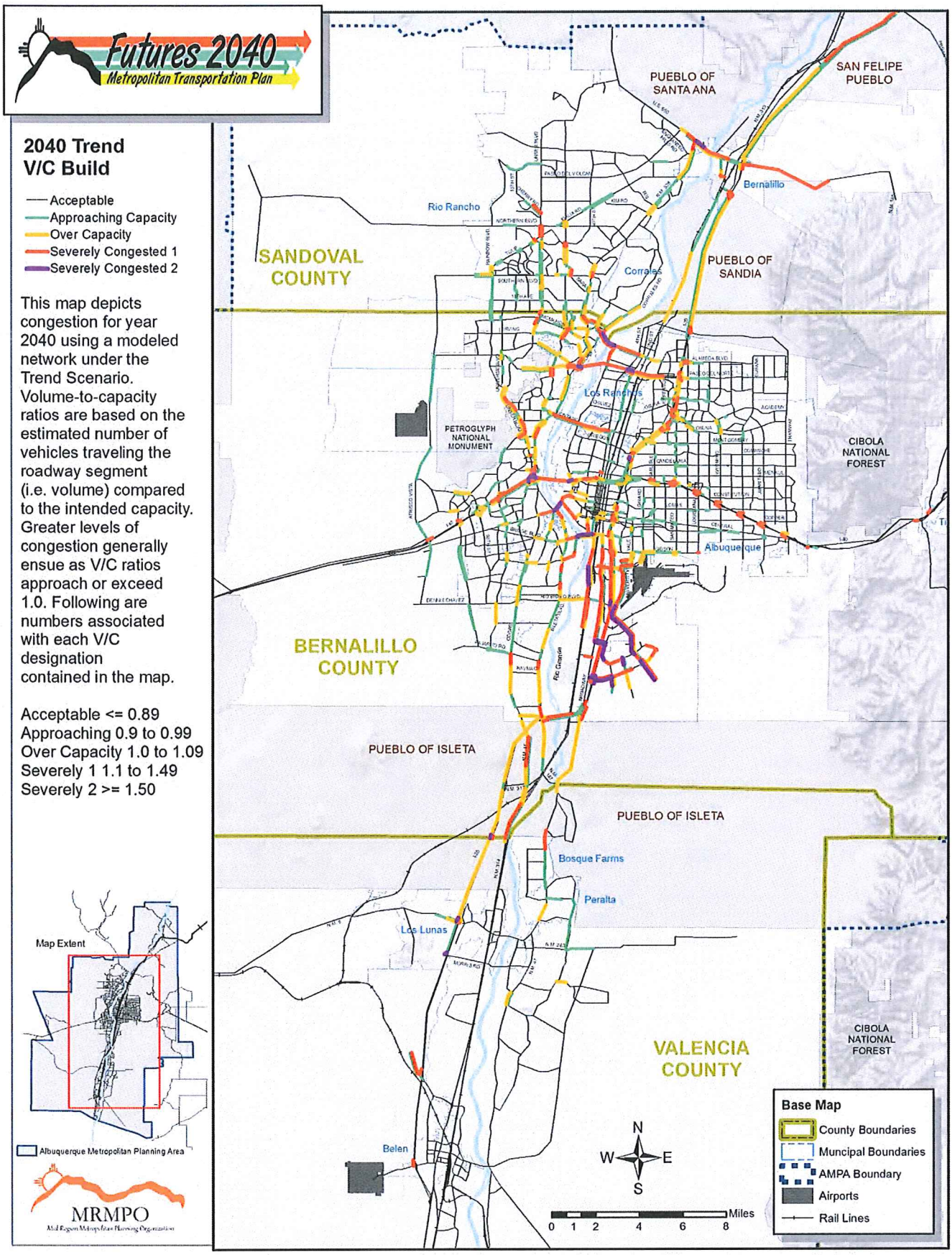
3. 2040 PROJECTED DEVELOPMENT (PHASE 1) INTERNAL NETWORK ANALYSIS

The following section will discuss the transportation analysis performed for the level of development anticipated to occur by 2040, called the 2040 Projected Development (Phase 1). The full build analysis will be discussed later in section I.D.4. Full Build Discussion, beginning on page 39. Discussion of off-site roadway effects, impacts on roadways outside of Santolina, is discussed in Section I.E, 2040 Off-Site Roadway Effects, beginning on page 52.

This discussion will be limited to roadway operations within Santolina.

a) *Phasing - Absorption Schedule/Projected Land Use Summary*

The Santolina area forecast to be developed in 2040 Projected Development (Phase 1) is shown in Figure 12. A large part of the anticipated area of development is centered around Atrisco Vista, bordered by Dennis Chavez on the south, I-40 on the north, the Ceja on the east, and Paseo del Volcan on the west, with portions of the Industrial and Business Park also served off Shelly Drive. This allows existing roadway infrastructure, such as Dennis Chavez and Atrisco Vista, to be utilized in the early phases of development. As development increases, additional roadways can be constructed, such as the Gibson extension, a portion of the internal Loop road, an initial extension of Paseo del Volcan south of I-40, and the parallel road to the Frontage Road.



SANTOLINA

FIGURE 11
2040 MTP BUILD SCENARIO
VOLUME TO CAPACITY RATIO

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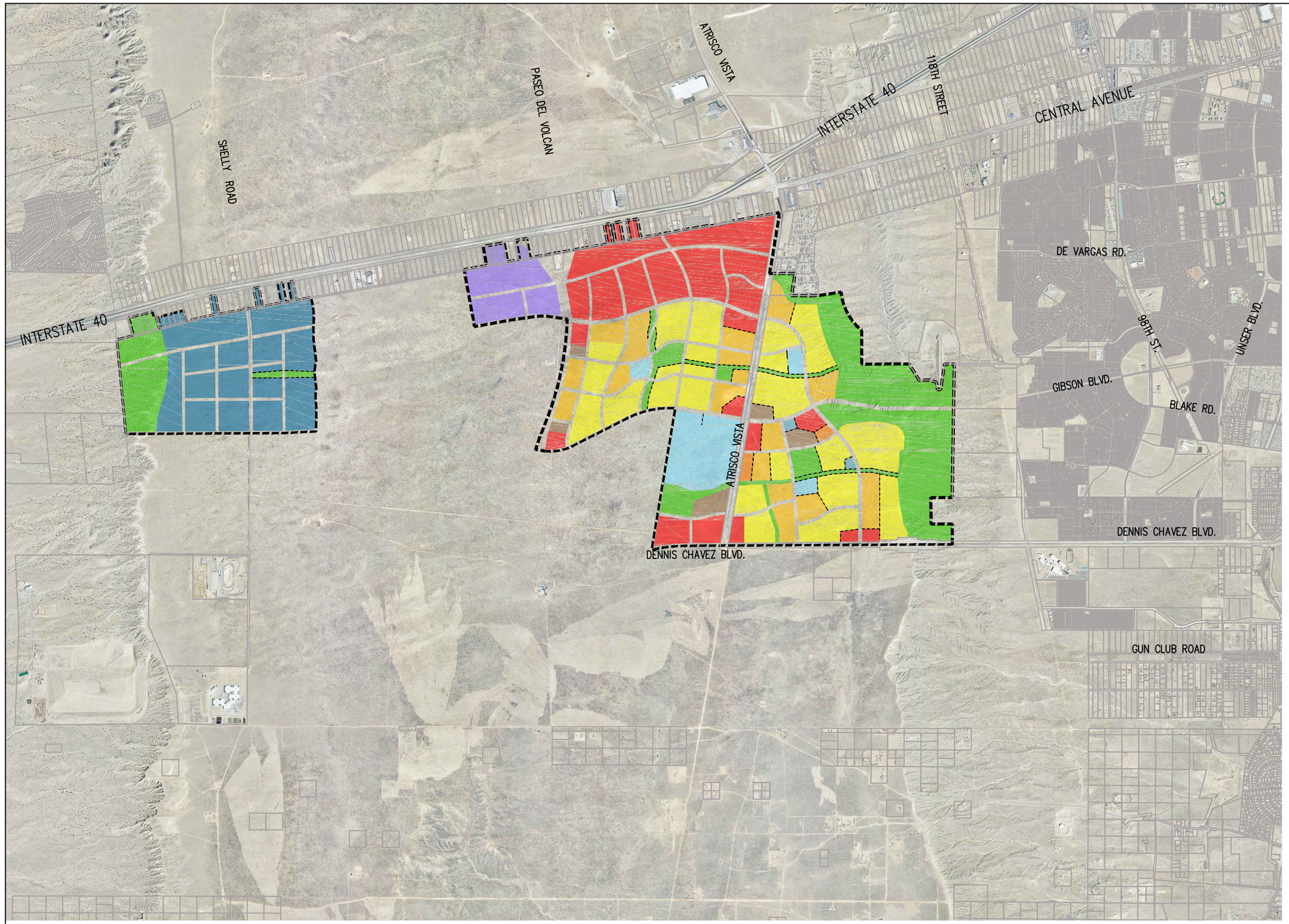

SANTOLINA

L E V E L A

LEGEND

- Village
- Industrial and Business Park
- Open Space
- Urban Center
- Business Park
- Town Center
- 2040 Boundary

NORTH

LEVEL A 2040 PROJECTED DEVELOPMENT (PHASE 1) MASTER PLAN

FIGURE 12

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Table 3 lists the amount of development by land use type anticipated in Santolina by 2040 as given in the Level A Master Plan submittal.

Table 3 – Level A Master Plan 2040 Projected Development (Phase 1) Level of Development	
Area	**Acres**
Villages	3,202
Industrial & Business Park	670.9
Urban Center	270.9
Business Park	194.8
Town Center	285.2
Total	**4,623.8**

In order to perform the transportation analysis using the MRCOG regional travel demand model, the 2040 Projected Development (Phase 1) level of development identified above needed to be broken down into data analysis subzones (DASZ) at a finer level in order to assess transportation performance. The site plan used to develop the DASZ's is shown in Figure 12. As discussed above in Section I.D.1, Study Approach and Methods, on page 17, the employment was broken into the job categories used in the regional travel demand model based on the mixed use assumptions, anticipated FAR's, and estimates of square footage required per employee. These numbers may vary slightly from others presented due to variations in methodology used in developing inputs for the travel demand model. Further discussion of these calculations is included in Technical Appendix T- 1, Travel Demand Model Socioeconomic Forecast. Table 4 lists the land uses per Village.

Table 4 – 2040 Projected Development (Phase 1) Level of Development				
Area	**Acres**	**Population**	**DU's**	**Jobs**
Azul	559	8,245	3,338	648
Verde	1,252.3	16,413	6,643	3,177
Amarillo	1,050.7	16,926	6,854	1,752
Oro	340.0	5,236	2,120	1,052
Naranjo	-	-	-	-
Industrial & Business Park	670.9	-	-	6,580
Town Center	285.2	-	-	6,212
Business Park	194.8	-	-	6,444
Urban Center	285.2	1,299	526	6,945
Total	**4,623.8**	**48,119**	**19,481**	**32,810**

b) *2040 Project Phase 1 Transportation Network*

One of the major objectives of the Level A Master Plan transportation analysis is to assess the adequacy of the proposed internal roadway network to meet future traffic volume in order to set aside sufficient right-of-way to accommodate future needs.

The 2040 Projected Development (Phase 1) transportation network is shown in Figure 13. This network was developed to provide adequate connectivity and capacity to serve the forecast 2040 level of development. This network assumed the construction of projects as identified in the 2040 MTP, discussed above, and shown in Figure 8. Discussion of off-site roadway effects and impacts on roadways outside of Santolina, are discussed in Section I.E, 2040 Off-Site Roadway Effects, beginning on page 52.

This discussion will be limited to roadway operations within Santolina.

Future Level B and Level C analyses will identify specific locations for future roadways. Roadway capacities for these facilities followed MRCOG conventions as discussed in Technical Appendix T- 2, Analysis of Travel Demand Forecasts.

As mentioned previously, a new road parallel to the Frontage Road has been added to the road network for Santolina. In the modeling, no Santolina land uses were connected to the existing Frontage Road, as all Santolina development traffic load links for zones near the Frontage Road were connected to this new parallel road.

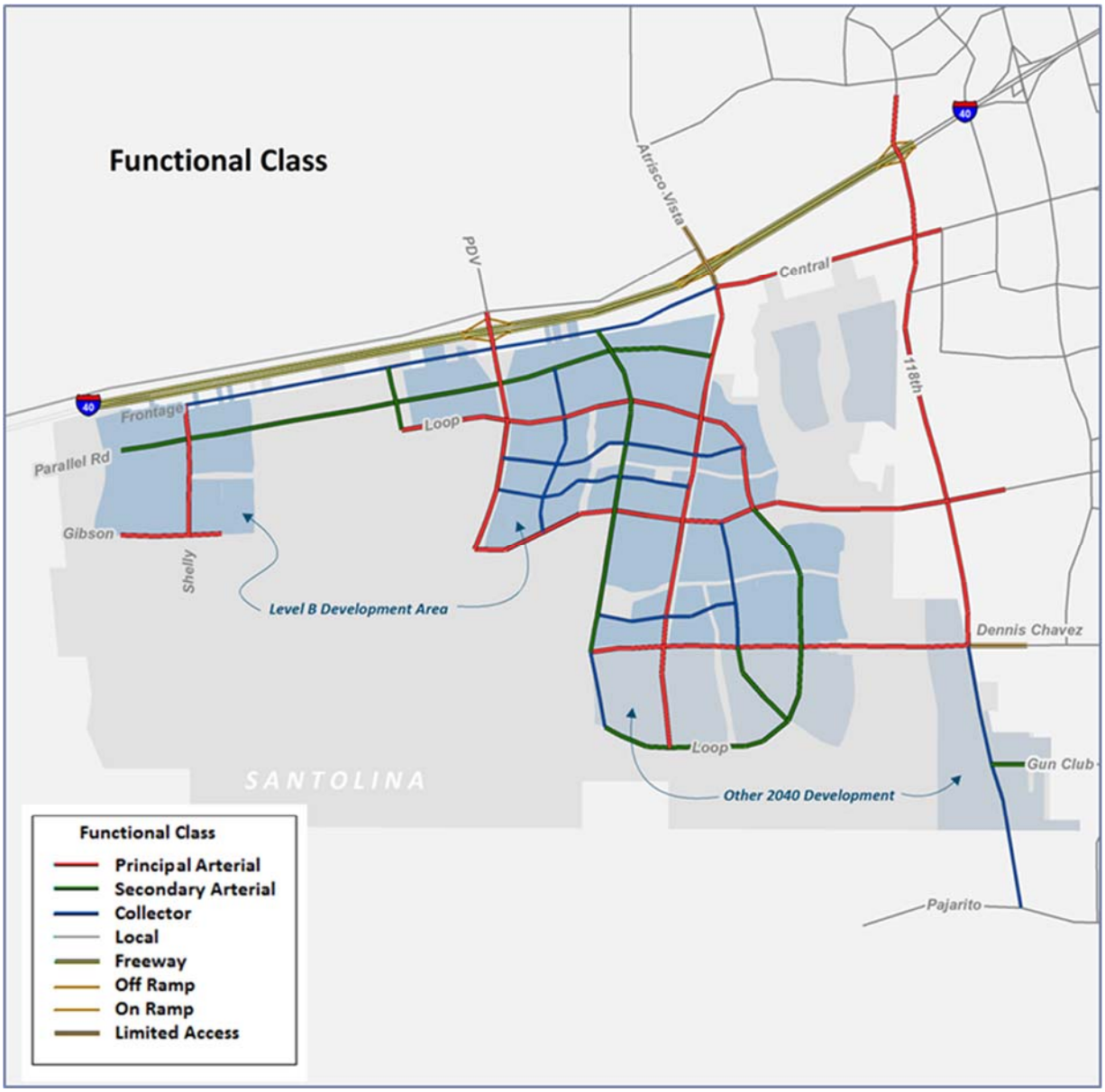


Figure 13 – 2040 Phase 1 Model Functional Classification

c) *2040 Projected Development (Phase 1) Network Analysis Discussion*

The modeled number of lanes for the 2040 Projected Development (Phase 1) analysis is shown in Figure 14. The main entry roads of Dennis Chavez, Gibson and Atrisco Vista are all 3 lanes in each direction initially, and then transition to 2 lanes in each direction as traffic demand lowers. Paseo del Volcan is 2 lanes in each direction south of the future interchange, until it meets the Loop Road, where it can reduce to 1 lane in each direction. The Loop Road, north of Dennis Chavez, is 3 lanes in each direction. The road parallel to the Frontage Road is 2 or 3 lanes in each direction, as needed to serve travel demand.

The collectors are generally 1 lane in each direction. No lane changes were made to streets outside Santolina in order to provide an accurate comparison to the 2040 MTP scenario.

The speeds modeled for each link are shown in Figure 15.

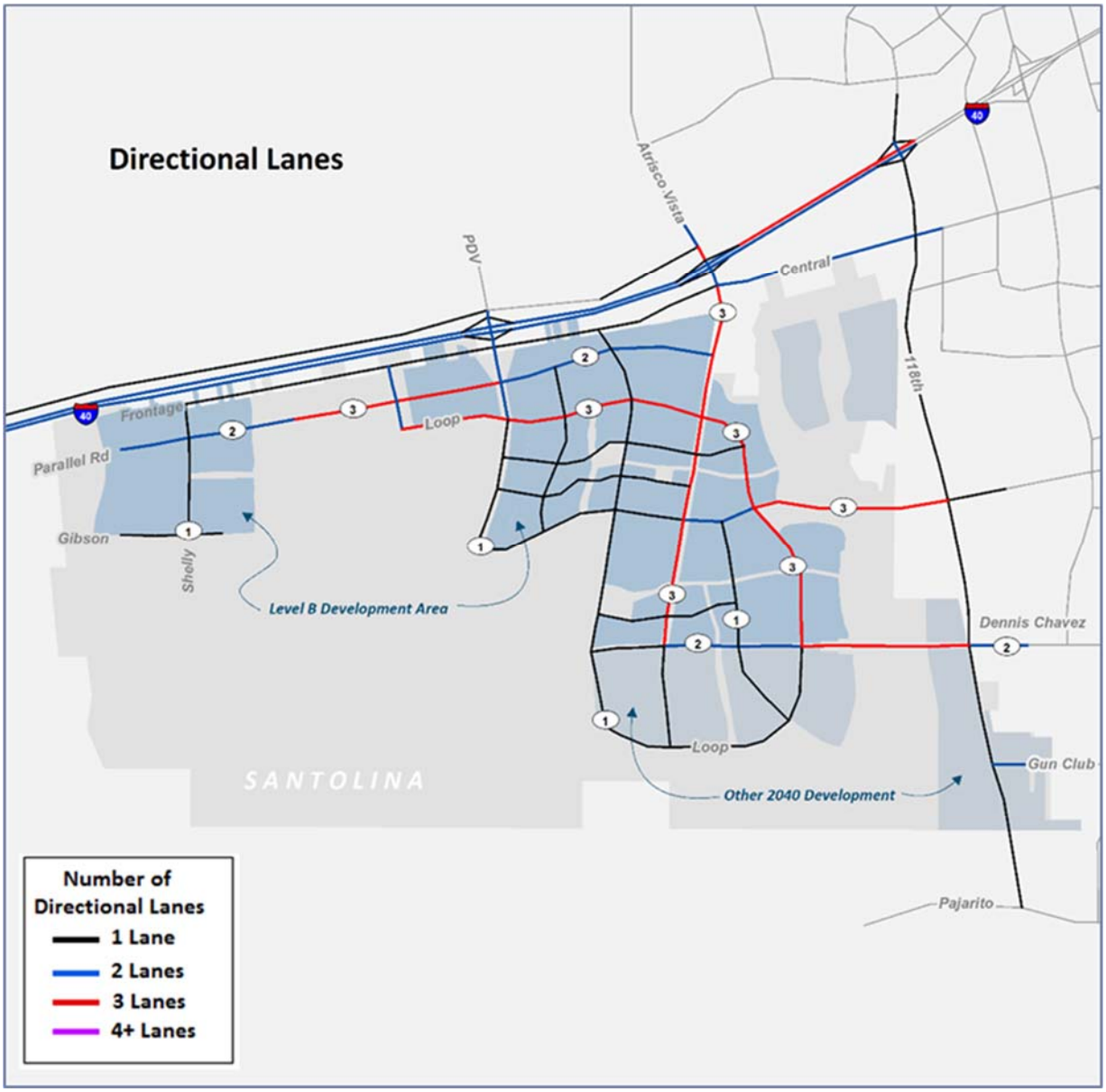


Figure 14 – Modeled Number of Lanes – 2040 Projected Development (Phase 1)

The forecast daily volume for 2040 Projected Development (Phase 1) is shown in Figure 16. Phase 1 2040 AM volume in Figure 17, and 2040 Projected Development (Phase 1) PM volume in Figure 18. The v/c ratios for links where the v/c ratio is greater than 0.9 for the 2040 Projected Development (Phase 1) AM peak hour are shown in Figure 19, with the PM peak hour v/c ratio in Figure 20. Graphics showing the v/c ratio for all links are included in Technical Appendix T- 2, Analysis of Travel Demand Forecasts.

The results forecasted for the level of development anticipated to occur by 2040 (Projected Phase 1) show that the proposed internal roadway network is sufficient to accommodate the anticipated 2040 Phase 1 traffic volumes. The results also indicate the proposed internal network has additional capacity and right-of-way to accommodate faster growth than anticipated by the growth estimates. Most roadway links within Santolina are shown to operate at volume-to-capacity ratios (v/c) of less than 0.9 during the peak hours, indicating congested, but acceptable levels of service. This is considered acceptable for peak hour operations, as the off-peak hour will operate at better levels of service.

Overall, the proposed internal roadway system will meet the needs of the 2040 Projected Development (Phase 1) Santolina site generated traffic.

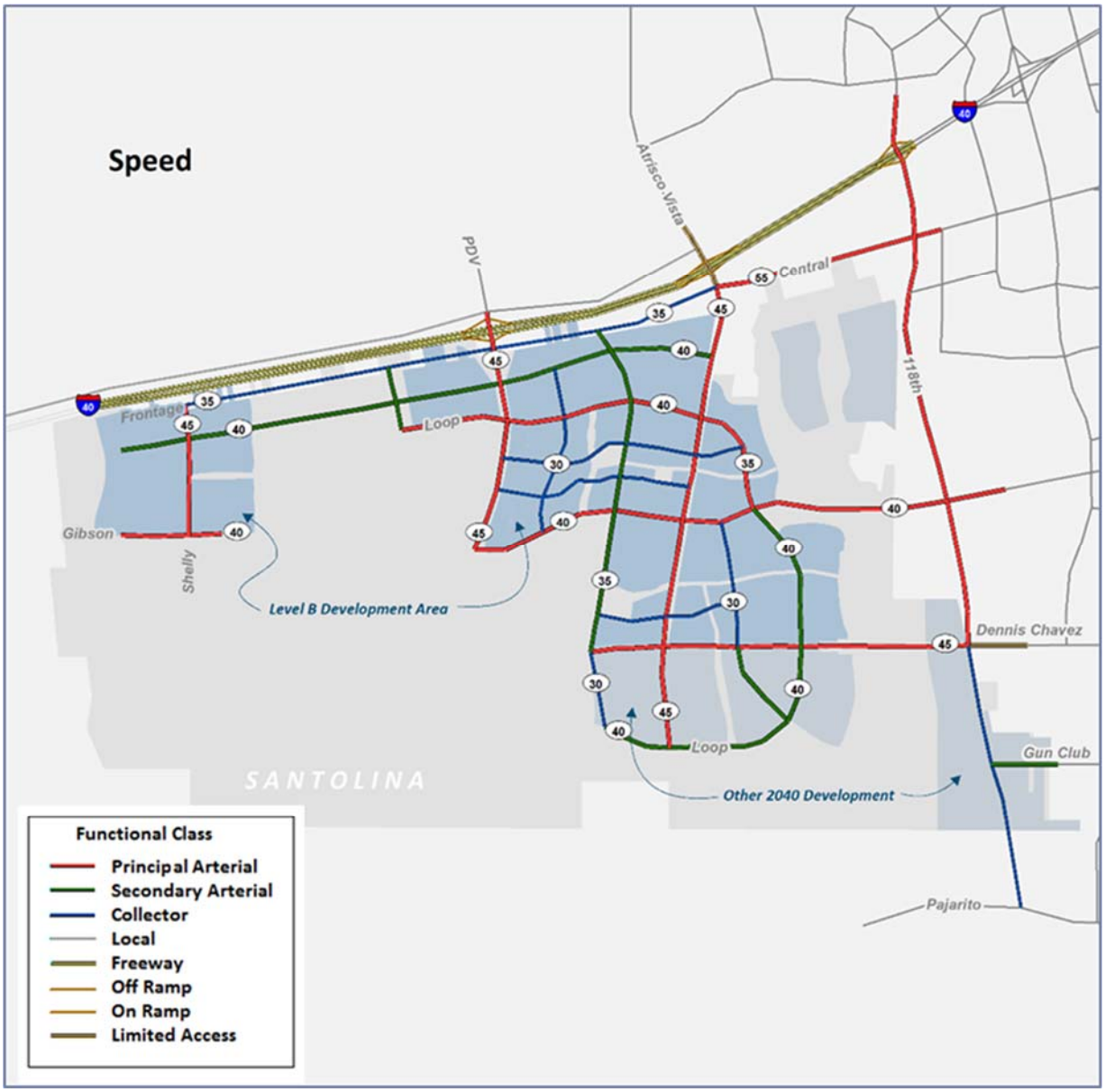


Figure 15 – Modeled Travel Speed – 2040 Projected Development (Phase 1)

The Projected Phase 1 analysis shows in 2040 that the main entry roads, Dennis Chavez, Atrisco Vista, and the Atrisco Vista and Paseo del Volcan ramps, generally have higher v/c ratios than the rest of the internal roadway network. This suggests additional connections to the site may prove beneficial in the future, especially as Santolina grows post-2040 (discussed below). For instance, additional connections from the east up the escarpment, such as via an extension of Gun Club or Grant Road would help to reduce congestion on Dennis Chavez and Gibson. Both of these roadway connections are envisioned in the MRCOG 2040 MTP Long Range Transportation System, as is as an extension of the road parallel to the Frontage to 118th Street.

There are also isolated locations where the v/c ratio is higher indicating intersections of interest that will need further study during the Level C detailed traffic analyses.

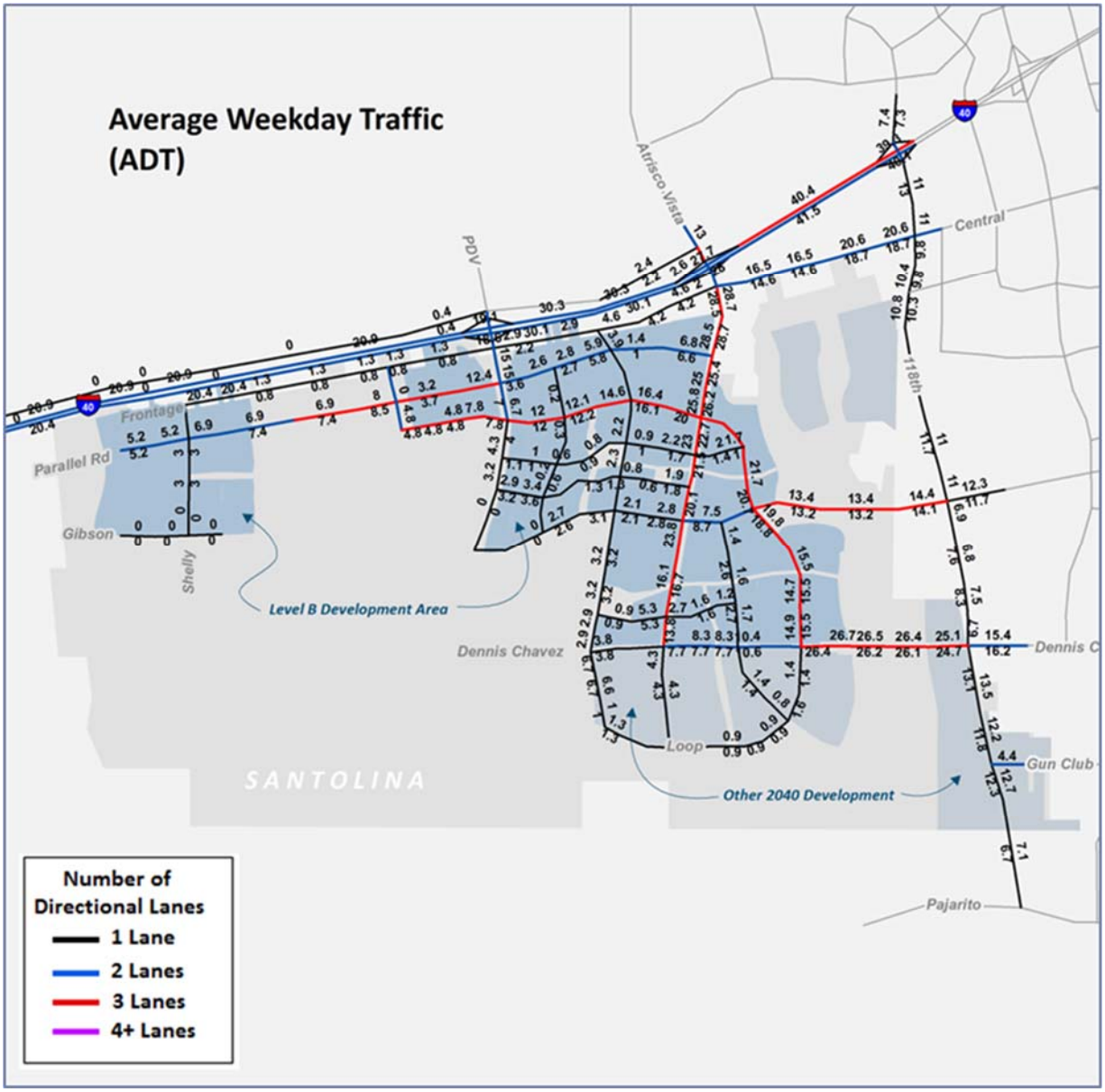


Figure 16 –- 2040 Projected Development (Phase 1) Daily Volume

The area immediately to the north of Santolina, north of I-40, is not currently identified by MRCOG as a growth area. Given the large amount of potential growth in this area in the future, it is likely a substantial road network, similar to that proposed for Santolina, will also be eventually proposed for this area. Grade separated connections across I-40, between this long-range future growth area and Santolina, as well as a possible future interchange at Shelly Drive, will also help reduce congestion on Atrisco Vista and Paseo del Volcan.

The revised roadway network for Santolina includes the planning for these overpasses between these future growth areas.

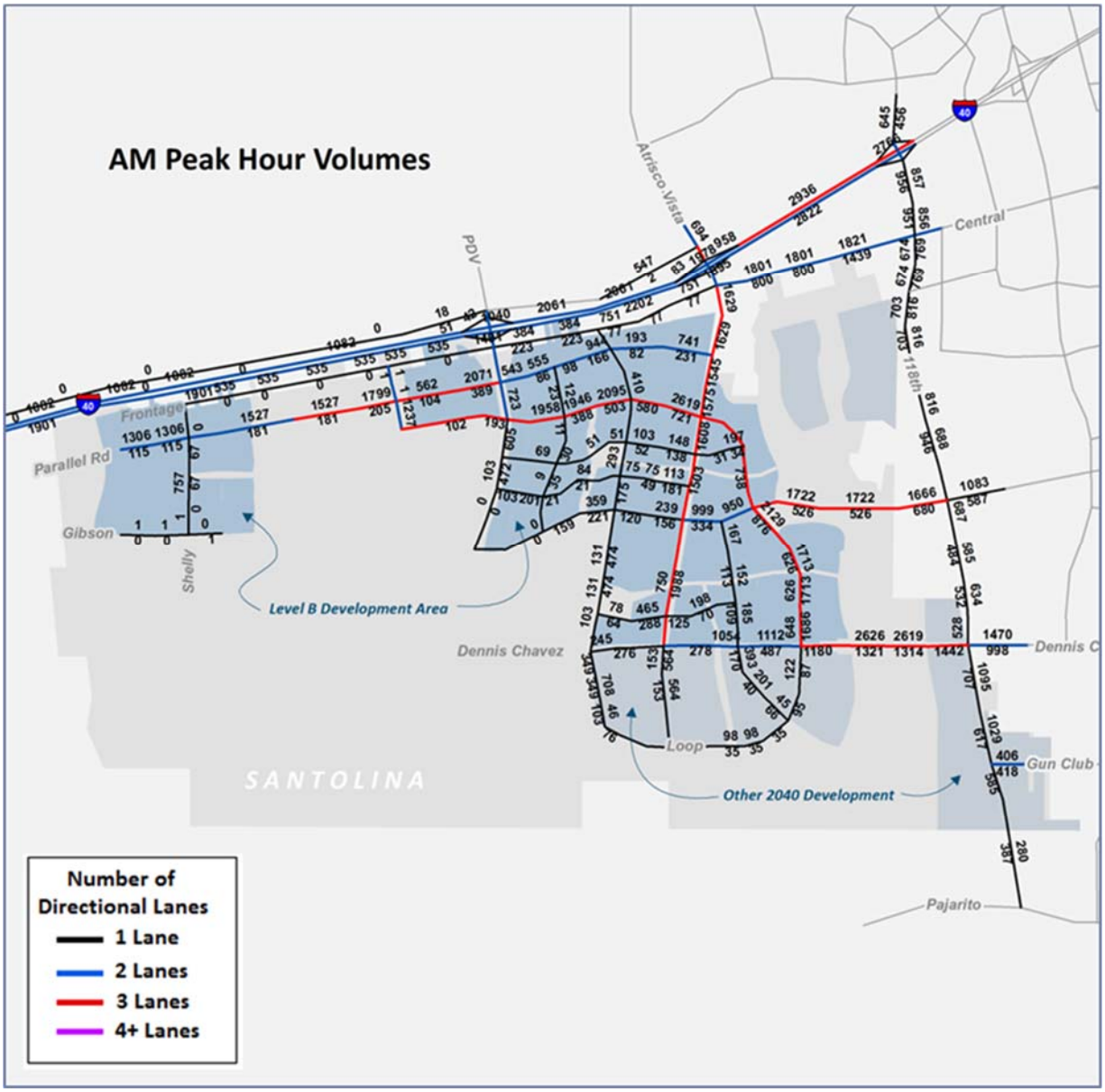


Figure 17 –- 2040 Projected Development (Phase 1) AM Peak Hour Volume

The area south of Santolina could also develop in the future, although currently there is limited planning for this to occur. As this area develops, connections to this area would also be required, and have been included in the model roadway network.

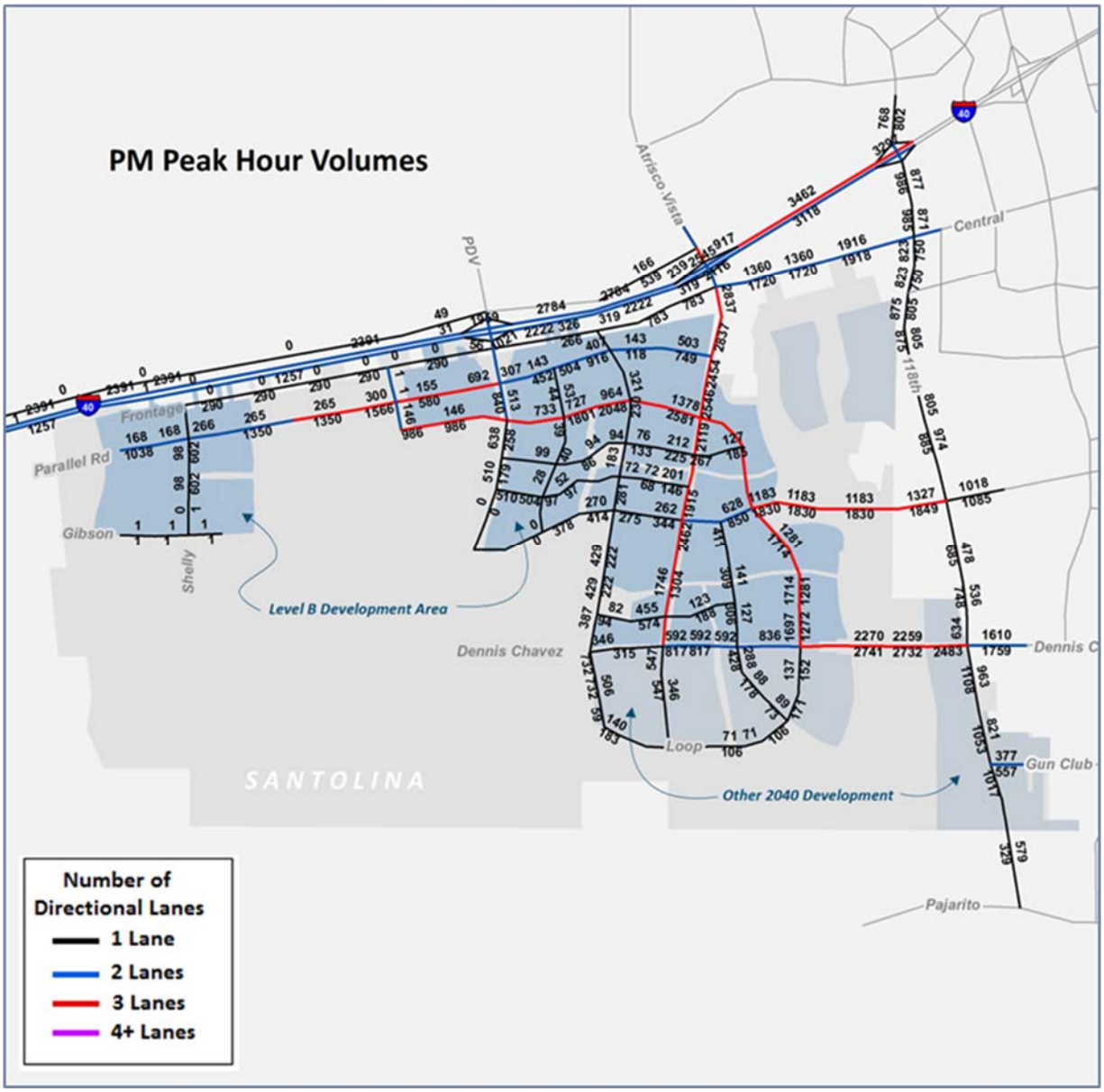


Figure 18 –- 2040 Projected Development (Phase 1) PM Peak Hour Volume

Due to the Central/Frontage Road's status as existing access to multiple existing commercial businesses and properties, with current business marketing exposure to the I-40 vehicular traffic, it is important to retain this roadway's current alignment and function. The County's West Route 66 Corridor Plan promotes continued development of commercial and industrial uses along the extension of Central Avenue as it heads west. This will also require that the current alignment and minimum road function be maintained to serve existing and future businesses in the area.

A new road parallel to the Central/Frontage Road, but entirely within Santolina property, and north of the Santolina internal loop road, has been incorporated into the roadway network. This new, parallel road within Santolina would also serve the existing developed parcels from the south, which parcels are currently anticipating to be accessed by the Central/Frontage Road, though perhaps not directly. It is considered likely those existing developed parcels may transition to different land uses as Santolina develops and increases the value of the parcels for other purposes.

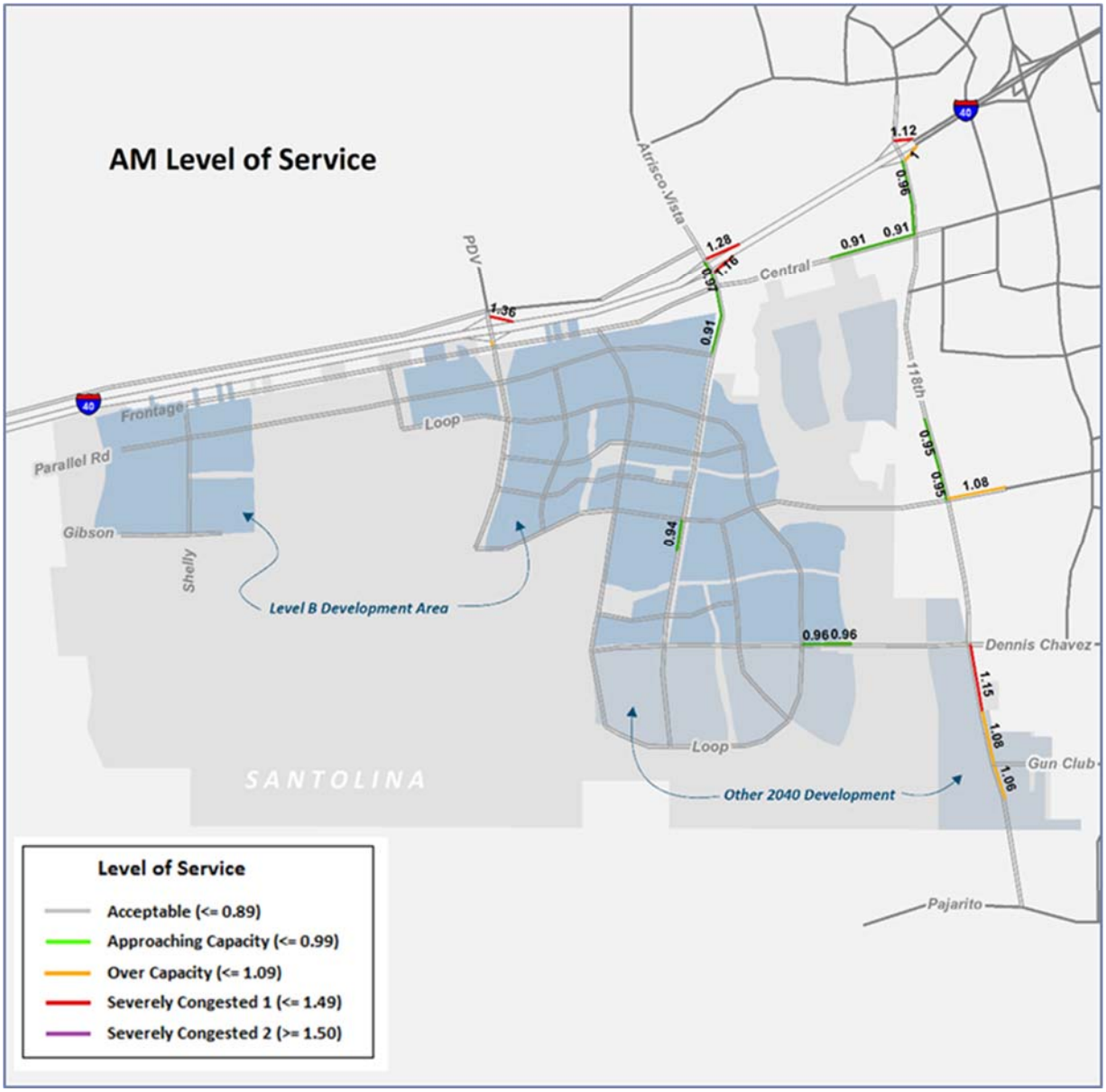


Figure 19 – Forecast Traffic Volume to Capacity Ratio AM Peak Hour – 2040 Projected Development (Phase 1)

The most significant capacity issues identified in the 2040 Projected Development (Phase 1) modeling occur off-site, on roadways that already exhibit operational problems in the 2040 Metropolitan Transportation Plan analysis, prior to the addition of Santolina. These operational problems will be addressed in the future through further studies and modeling that identify and utilize the required number of lanes, etc., using the latest available MRCOG models.

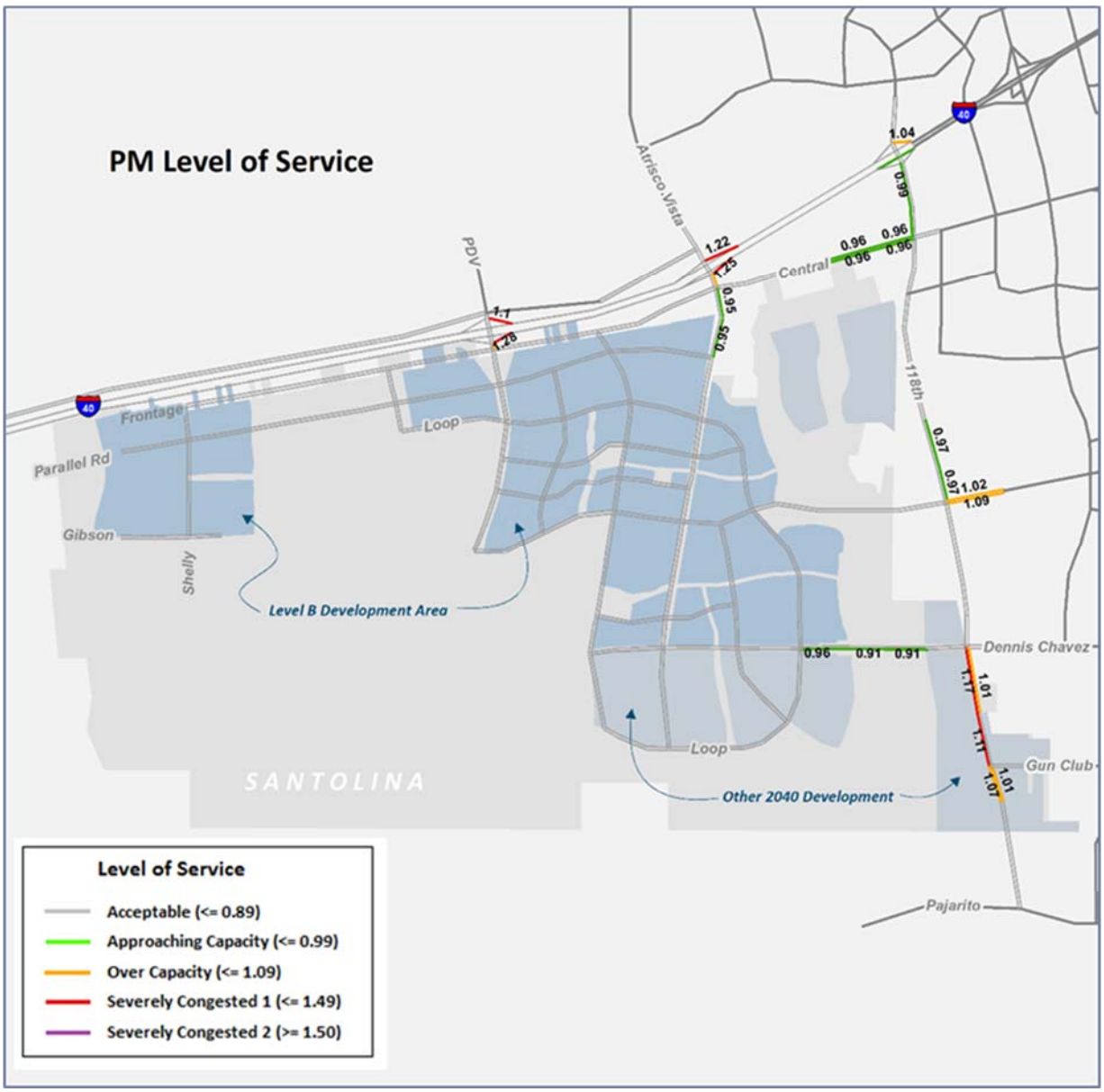


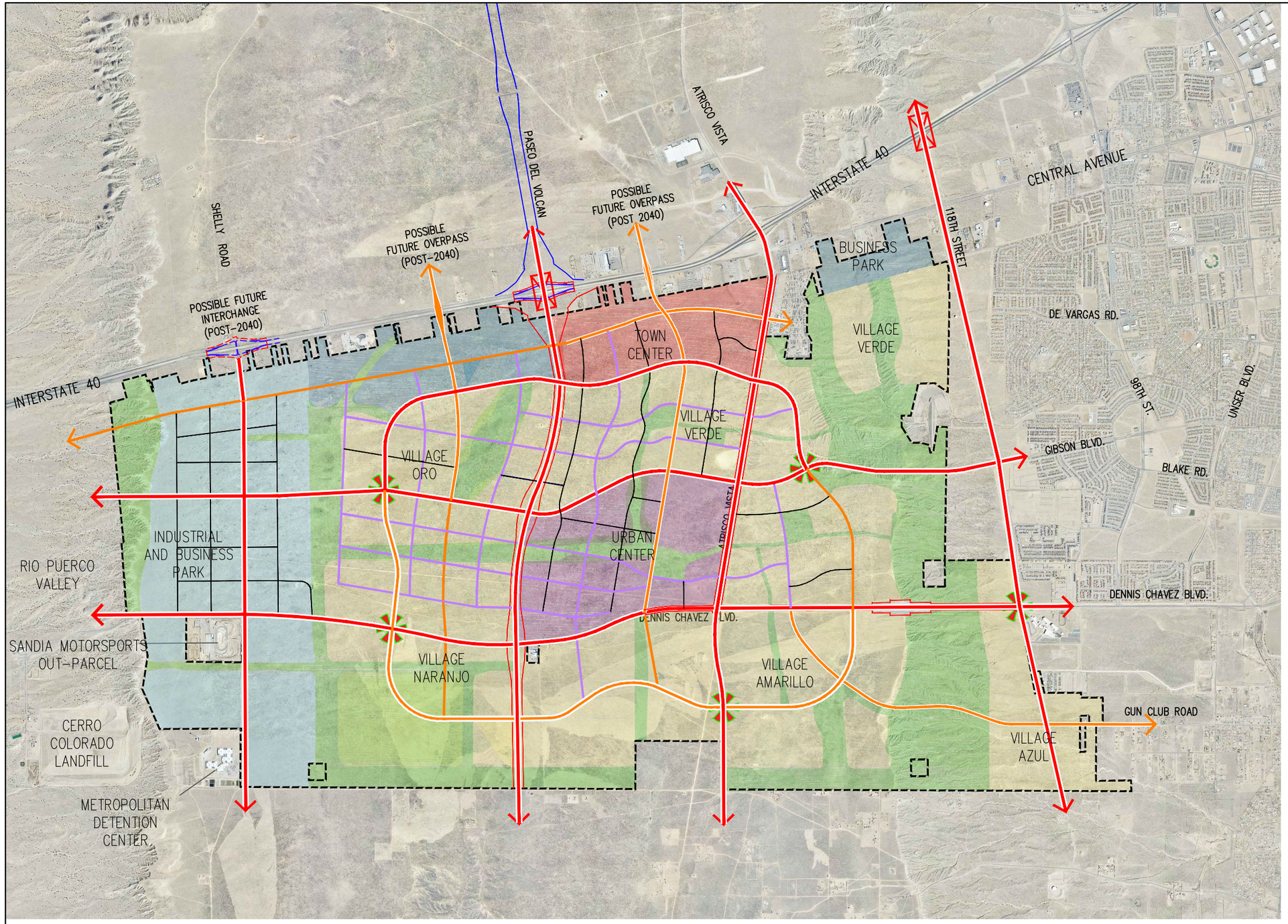
Figure 20 – Forecast Traffic Volume to Capacity Ratio PM Peak Hour – 2040 Projected Development (Phase 1)

4. FULL BUILD DISCUSSION

This section will discuss the transportation analysis performed for the Full Build scenario. This analysis forecast the population and employment anticipated upon full development of the entire Santolina Master Plan area. This analysis by definition is outside the current planning horizon for the region, and is estimated to be approximately 50 years in the future. As there is no adopted roadway network, or socioeconomic projection for this timeframe, the balance of the metro area was held at 2040 levels of development. This Full Build analysis will be used to ensure the internal roadways in Santolina are sized properly to accommodate all future development potential within the Santolina.

a) *Phasing - Projected Full Build Land Use Summary*

The Santolina Master Plan is shown again in Figure 21. The forecast levels of full build population, dwelling units, and employment is shown in Table 6.



SANTOLINA

LEVEL A

LEGEND

- Village
- Industrial and Business Park
- Open Space
- Urban Center
- Business Park
- Town Center
- Level A Boundary
- Future Interchange
- Village Center
- Primary - 2-3 Lanes Each Direction*
- Minor - 2-3 Lanes Each Direction*
- Collector- 1-2 Lanes Each Direction*
- Local- 1-2 Lanes Each Direction*

NORTH

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LEVEL A MASTER PLAN

FIGURE 21

The Level A Master Plan document identifies the full build land use as shown in Table 5 below, and is broken down into the specific areas as shown in Table 6.

Table 5 – Level A Master Plan Full Build Level of Development	
Area	**Acres**
Villages	6,388
Industrial & Business Park	2,043.9
Urban Center	710.9
Business Park	741.5
Town Center	570.4
Total	**10,454.7**

Table 6 – Full Build Level of Development By Area				
Area	**Acres**	**Population**	**DU's**	**Jobs**
Azul	563	8,245	3,338	769
Verde	1,252.3	16,413	6,643	3,177
Amarillo	1,601.7	21,668	8,774	3,057
Oro	1,171	15,546	6,294	3,298
Naranjo	1,800	22,790	9,226	3,458
Industrial & Business Park	2,043.9	-	-	14,594
Town Center	570.4	-	-	12,424
Business Park	741.5	-	-	20,868
Urban Center	710.9	10,142	4,106	14,819
Total	**10,454.7**	**94,804**	**38,381**	**76,464**

The full build development results in a jobs/housing balance of 2.0, thereby providing opportunities for commuting in the reverse of the typical west-to-east anticipated in the 2040 MTO forecast, and well above the 1.37 forecast east of the river in 2040 by MRCOG in the Trend scenario, or the 1.31 forecast in the Preferred Scenario.

The level of development shown in Table 5 was included in the MRCOG regional travel demand model as discussed previously and in Technical Appendix T- 1, Travel Demand Model Socioeconomic Forecast. For the Full Build analysis, the remaining balance of the Albuquerque Metropolitan Planning area was held at the forecast 2040 levels of development.

b) *Internal Network Adequacy Discussion*

The proposed transportation system planned for Full Build consists of expanding the 2040 internal roadway network to accommodate the balance of Santolina. These additional roadways include completing the internal loop roadway, as well as connections to Shelly Drive and additional primary and minor arterials and collectors to serve the development. As discussed above, a future interchange at I-40 with Shelly Drive may also be needed to alleviate congestion at the Atrisco Vista and Paseo del Volcan interchanges, and is currently not modeled because it is on no agency's planning horizon.

The modeled functional classification for full build is shown in Figure 22. The functional classification is the same as for the 2040 Projected Development (Phase 1) roadway network, however the roadways have been extended to serve the entire Master Plan area.

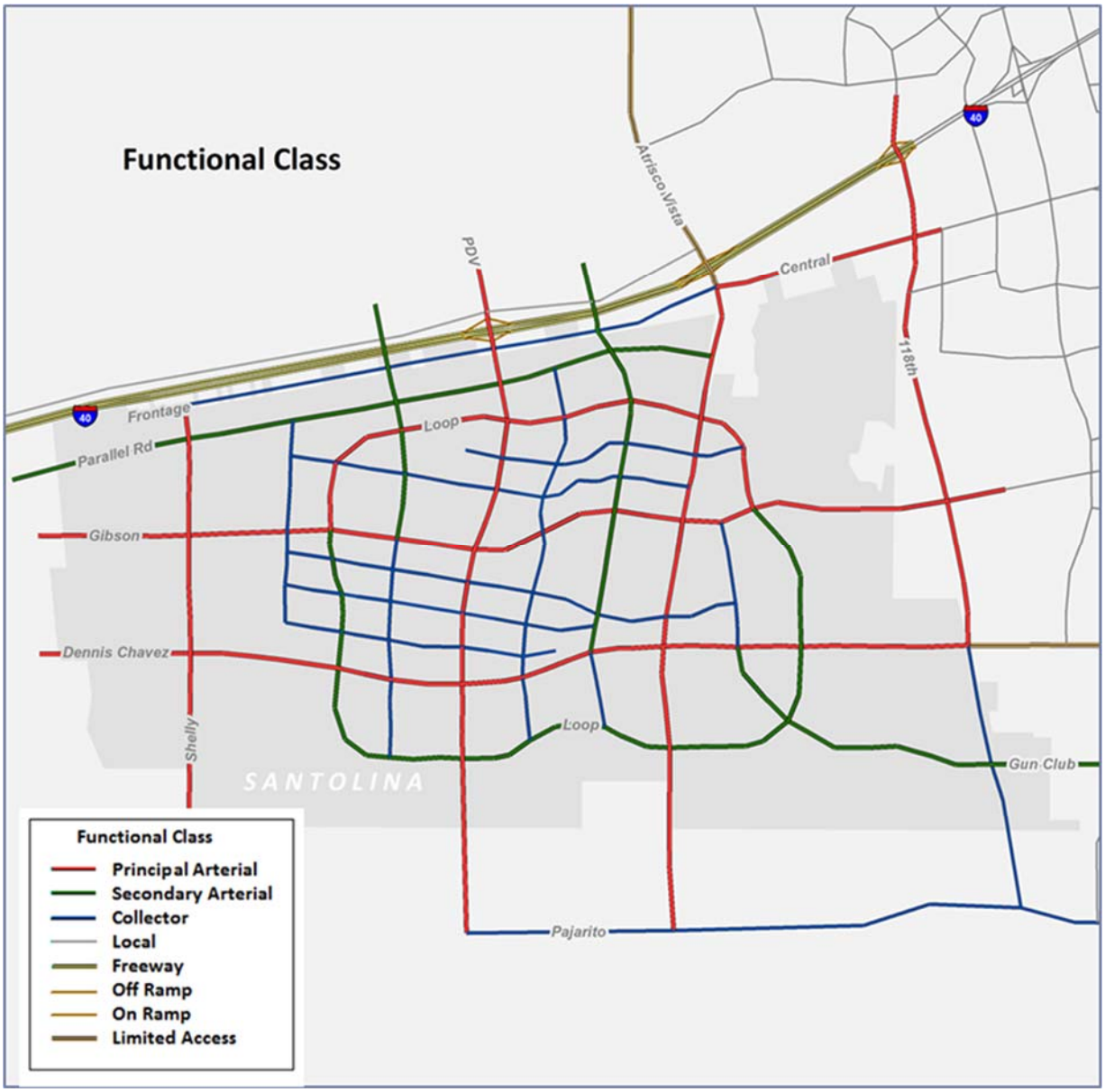


Figure 22 – Full Build Model Functional Classification

The number of lanes modeled for the full build scenario is shown in Figure 23. Due to additional traffic resulting from full development, the number of lanes has generally increased by 1 lane in each direction for all roadways. Exceptions to this are the roadways up the escarpment, due to environmental concerns. Atrisco Vista and Paseo del Volcan also remain at three lanes in each direction, however the right-of-way for these roadways will allow for future, dedicated commuter/BRT bus lanes.

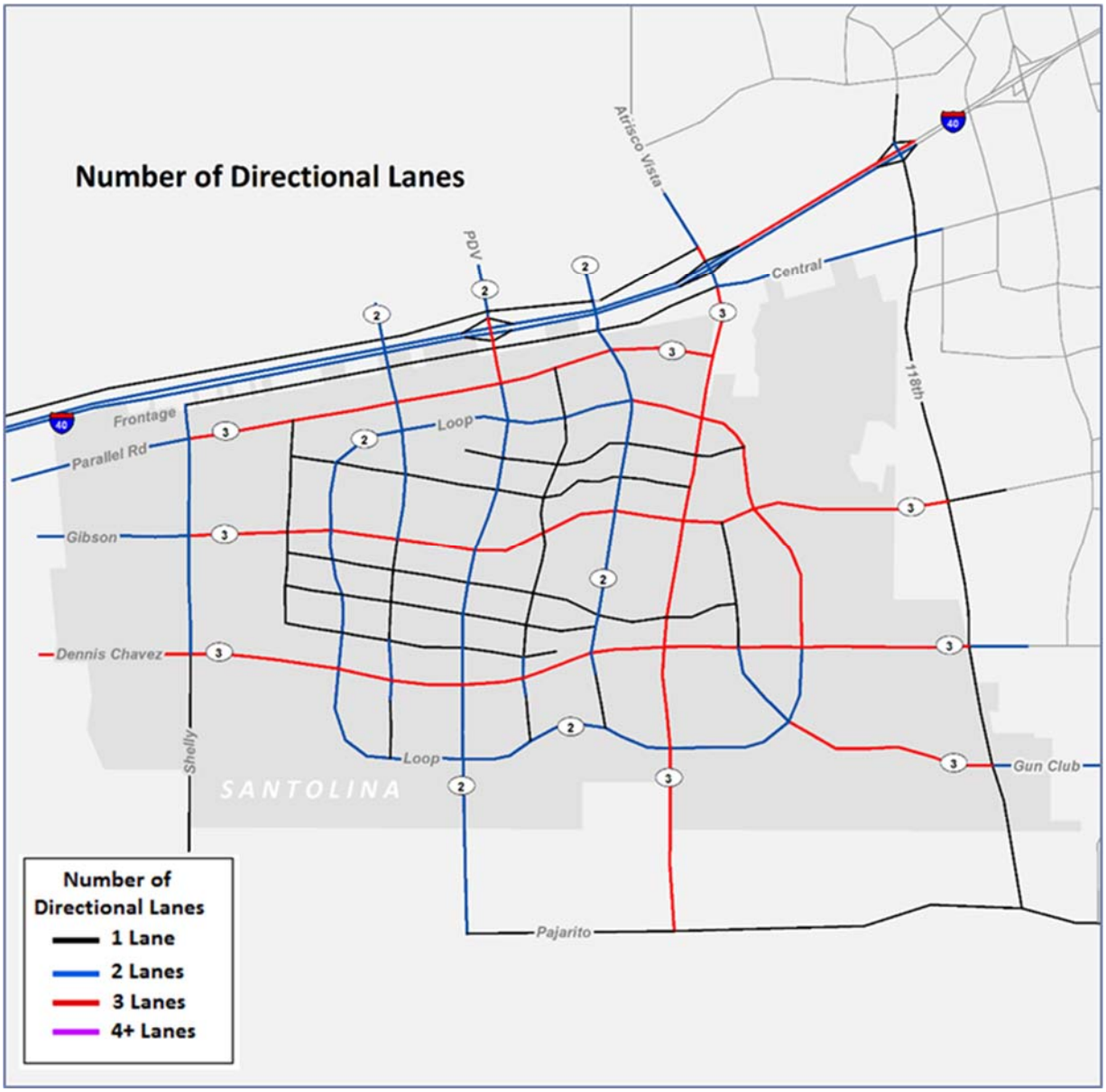


Figure 23 – Modeled Number of Lanes – 2040 Full Build

The modeled speeds for the full build scenario are shown in Figure 24. The modeled speeds are the same as for 2040 Projected Development (Phase 1), but extended to serve the balance of Santolina.

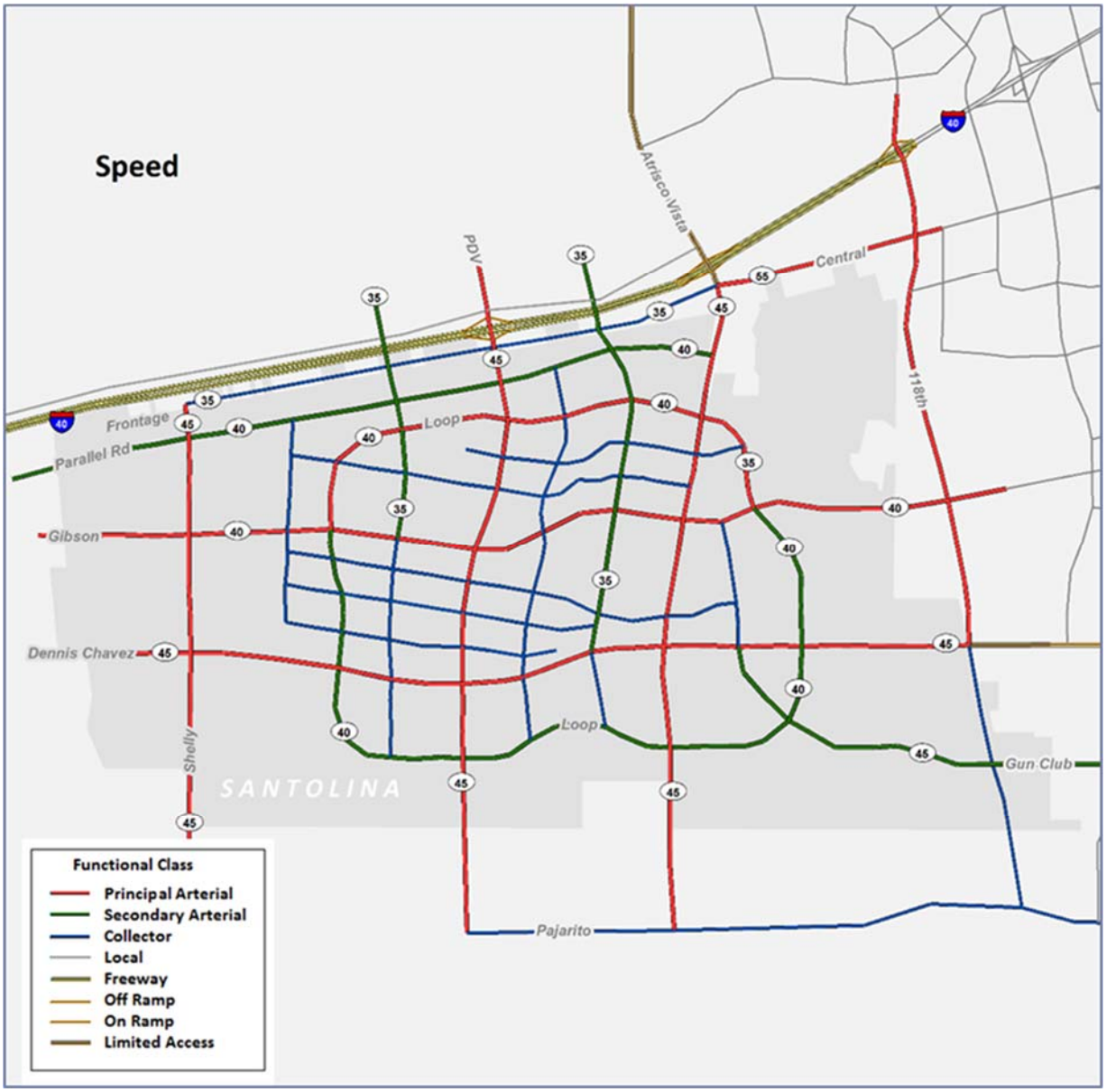


Figure 24 – Modeled Travel Speed – 2040 Full Build

Traffic volumes have been modeled for the Full Build scenario in the same manner as the 2040 forecast; however, the Full Build scenario is likely to require almost 50 years to reach this level of development. There is also no adopted long-range transportation network, or forecast socioeconomic projection for this timeframe, so the Full Build scenario was modeled on the 2040 socioeconomic and roadway network established by MRCOG.

This limitation leads to challenges identifying the source of future roadway capacity deficiencies, as additional roadways and other development will likely be in place by the time Full Build occurs, resulting in changes to travel patterns over that represented by the model runs reported here.

The forecast Full Build daily volumes are shown in Figure 25, the Full Build AM volumes in Figure 26, and the Full Build PM volumes are in Figure 27. The Full Build AM peak hour v/c ratios are shown in Figure 28, with the Full Build PM peak hour v/c in Figure 29. The v/c ratio figures again show just the locations where the v/c ratio is greater than 0.9. Figures showing the v/c ratio on all links is included in Technical Appendix T- 2, Analysis of Travel Demand Forecasts.

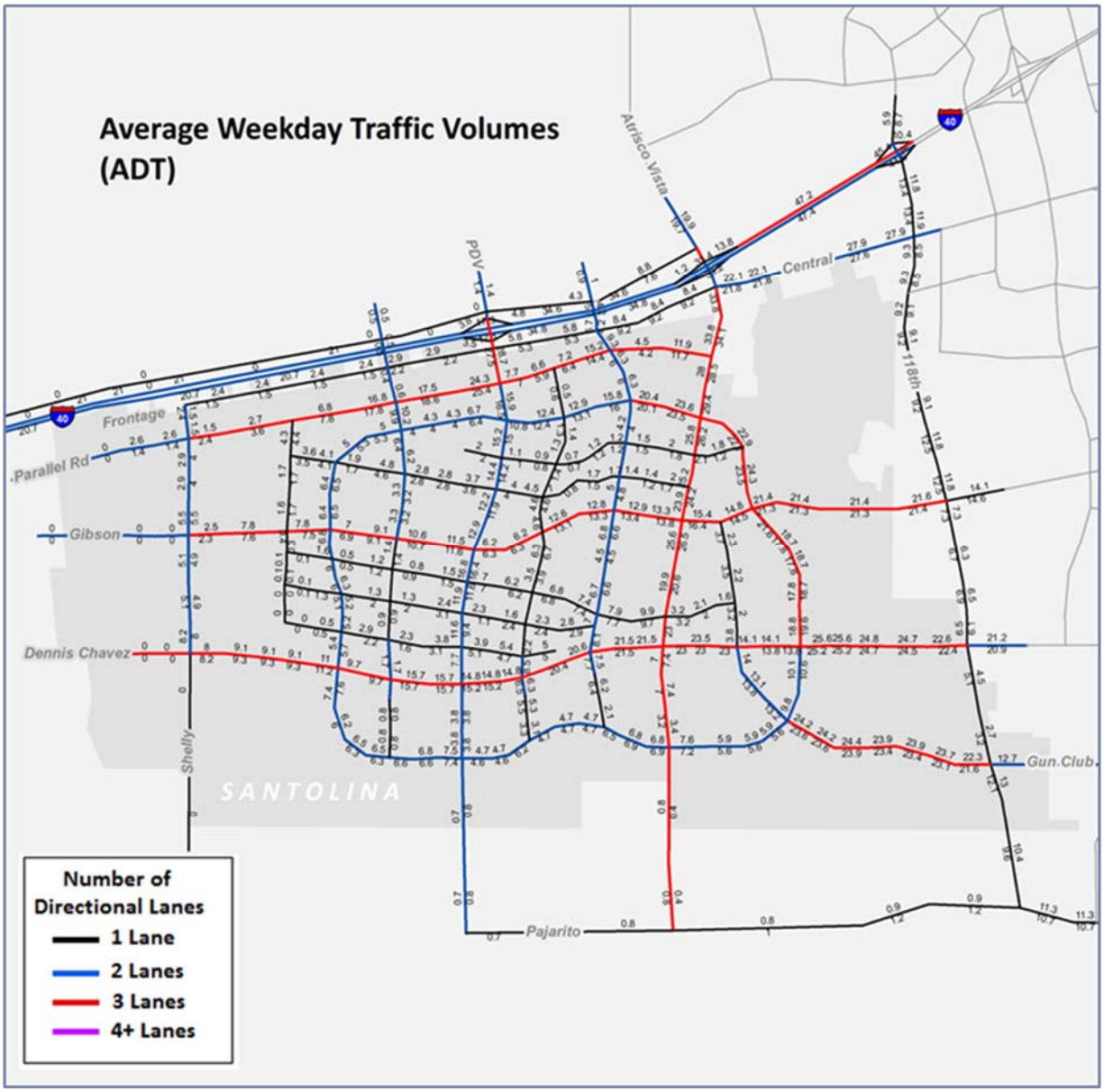


Figure 25 – Full Build Daily Volume

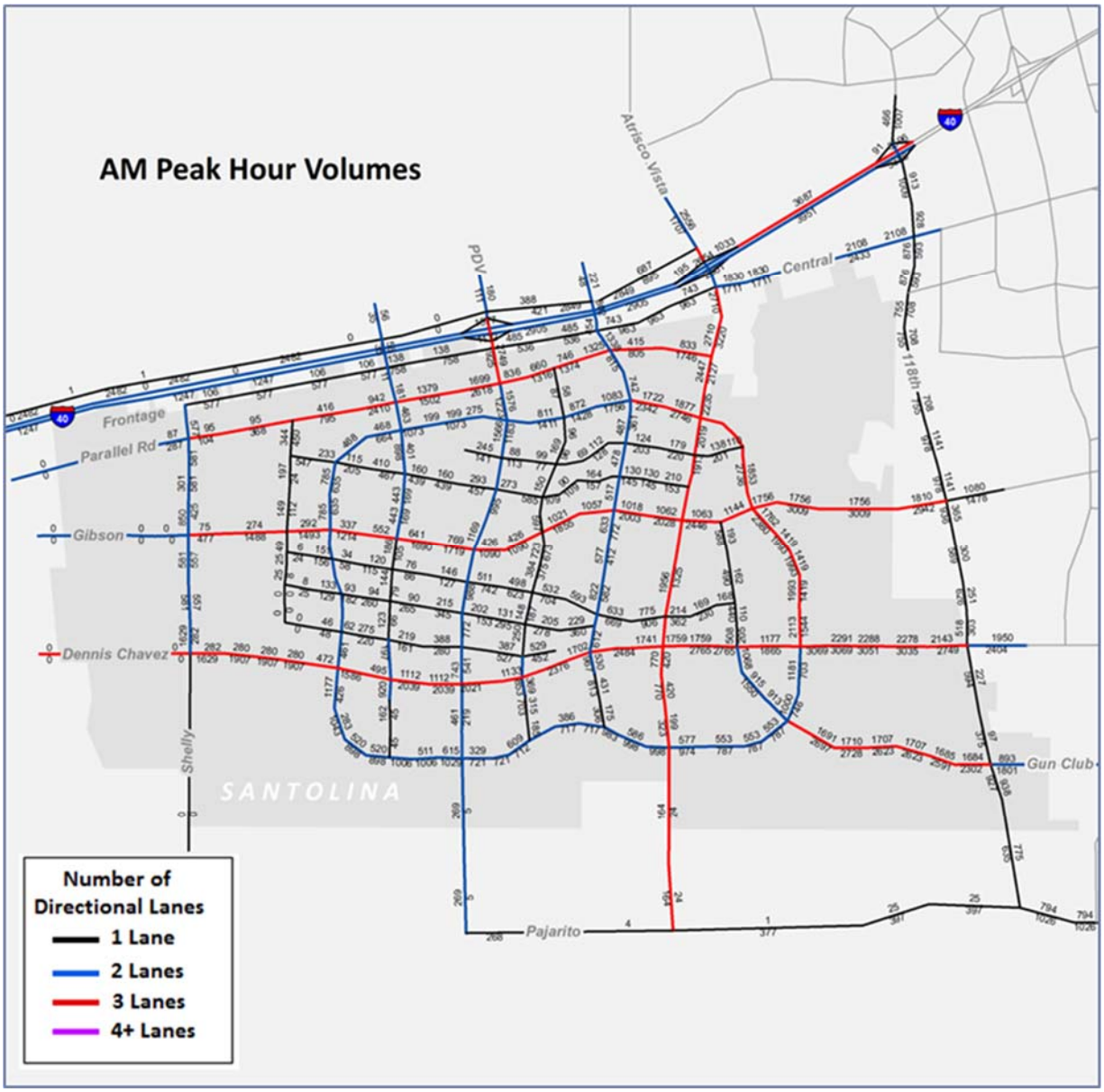


Figure 26 – Full Build AM Peak Hour Volume

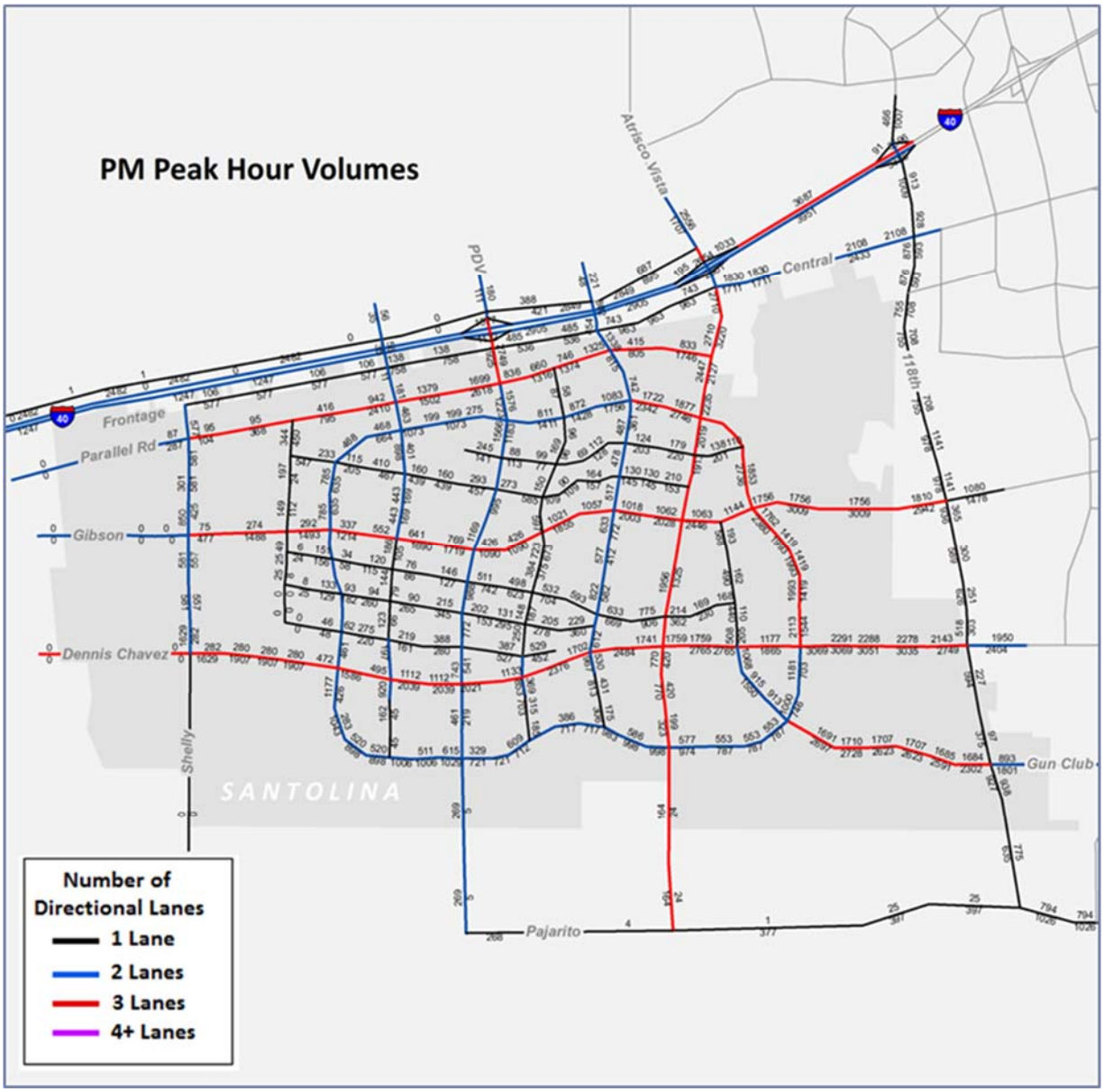


Figure 27 – Full Build PM Peak Hour Volume

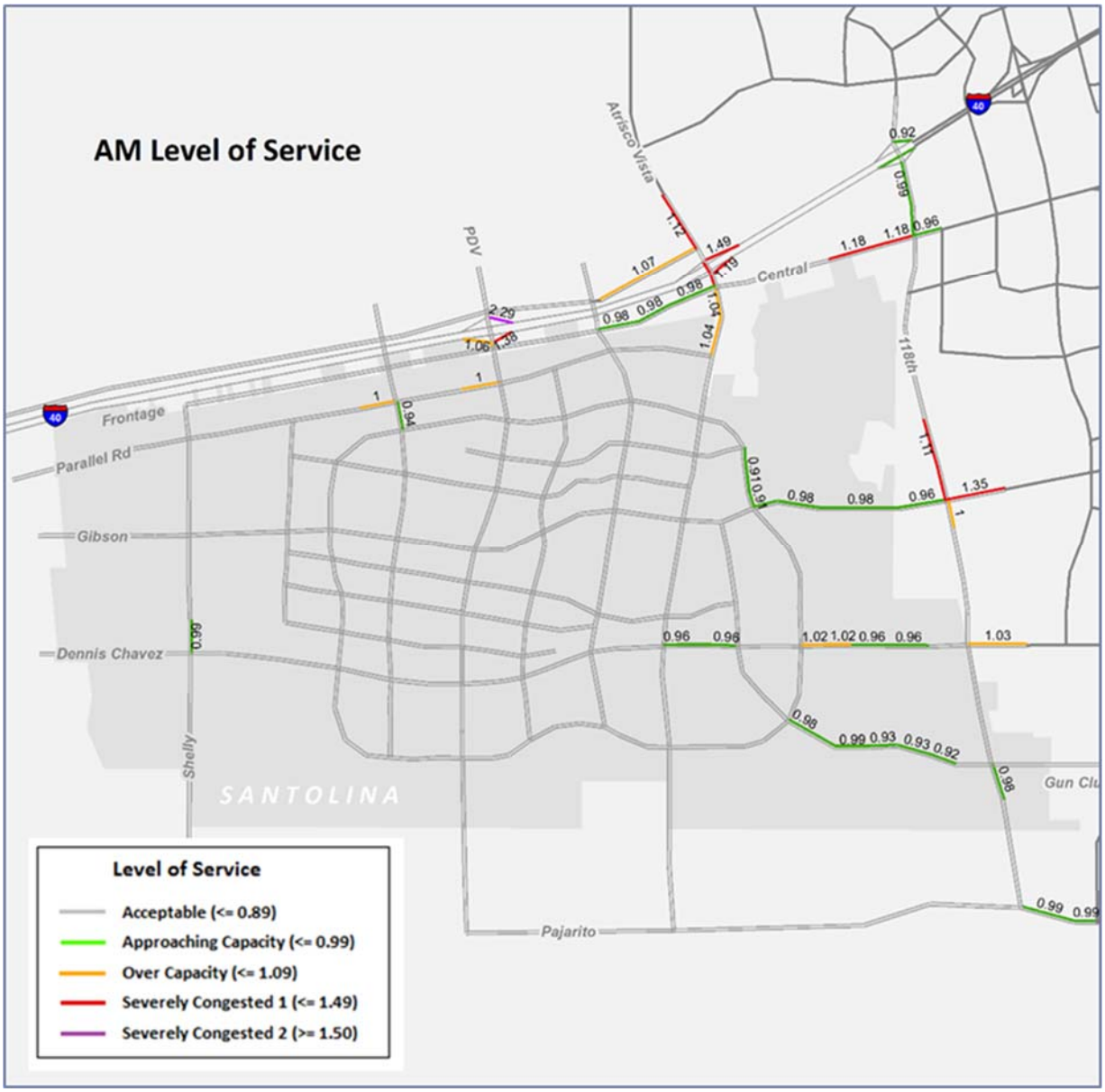


Figure 28 – Forecast Traffic Volume to Capacity Ratio AM Peak Hour – 2040 Full Build

Internal traffic volumes within Santolina increase with Full Build, however the proposed number of lanes within the Master Plan also increases, and these additional lanes in most cases accommodate the additional growth. Segments of portions of the loop road and the Frontage Road, as well as the intersection of Dennis Chavez and Atrisco Vista, are forecast to experience congestion (volume-to-capacity ratio close to 1.0). Intersections along these sections will likely experience peak hour delays similar to current metro Albuquerque intersections; however, the vast amount of internal roadways will operate at acceptable levels of service.

All key entering and exiting roadways are projected to operate with congested conditions. Atrisco Vista, Gibson, Dennis Chavez and Gun Club, and I-40 ramps at Paseo del Volcan and Atrisco Vista are all approaching, or over capacity. This indicates that a future Shelly Road interchange with I-40 would relieve congestion along these corridors, as well as additional roadways to the east, as envisioned in the MRCOG Long Range Transportation System. In addition, the current state of MRCOG modeling has limited transit usage (mode-choice), which may increase in the future. Upon full buildout of Santolina, it is likely some form of transit system will be in place to serve the transit market demand.

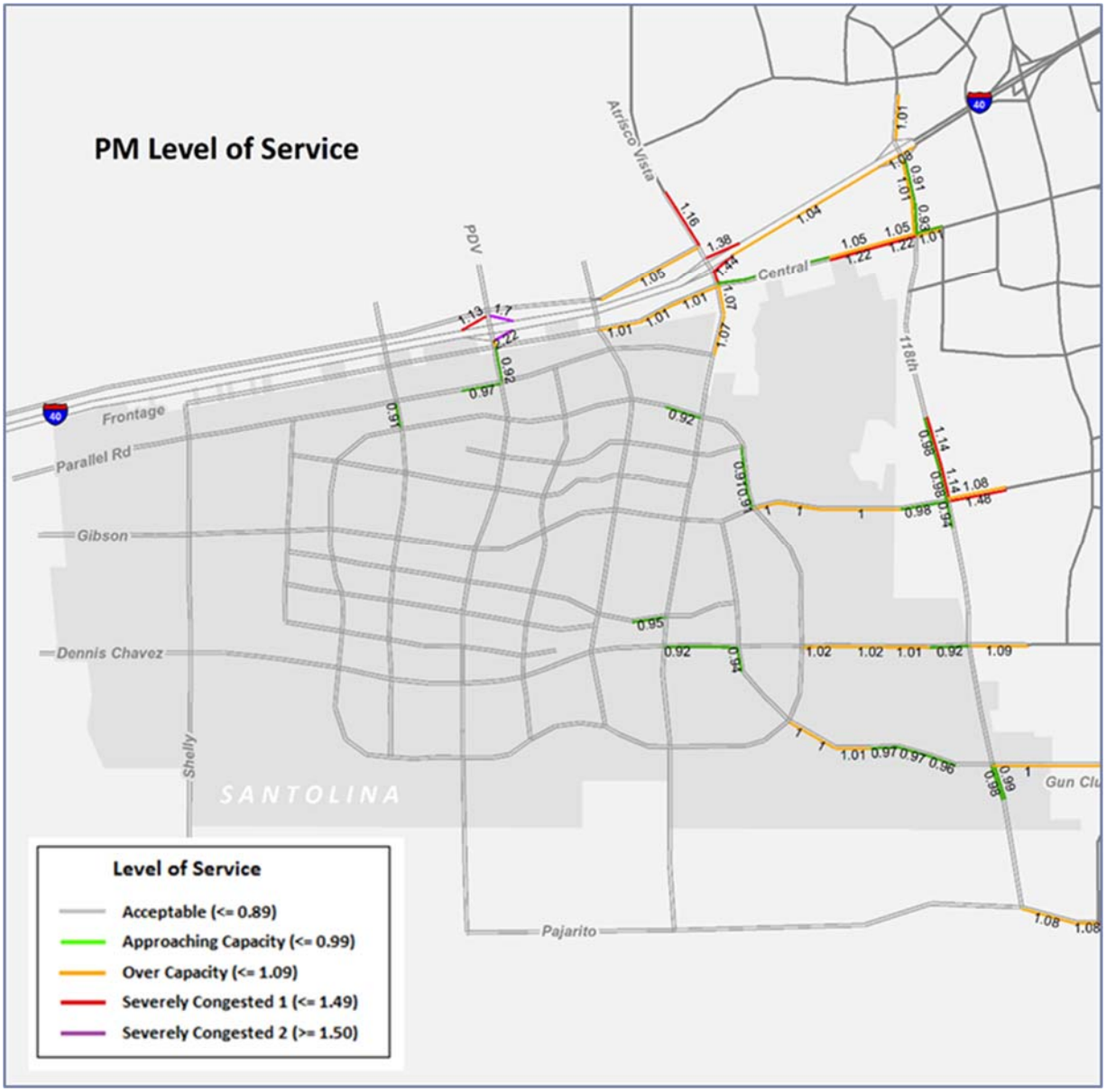


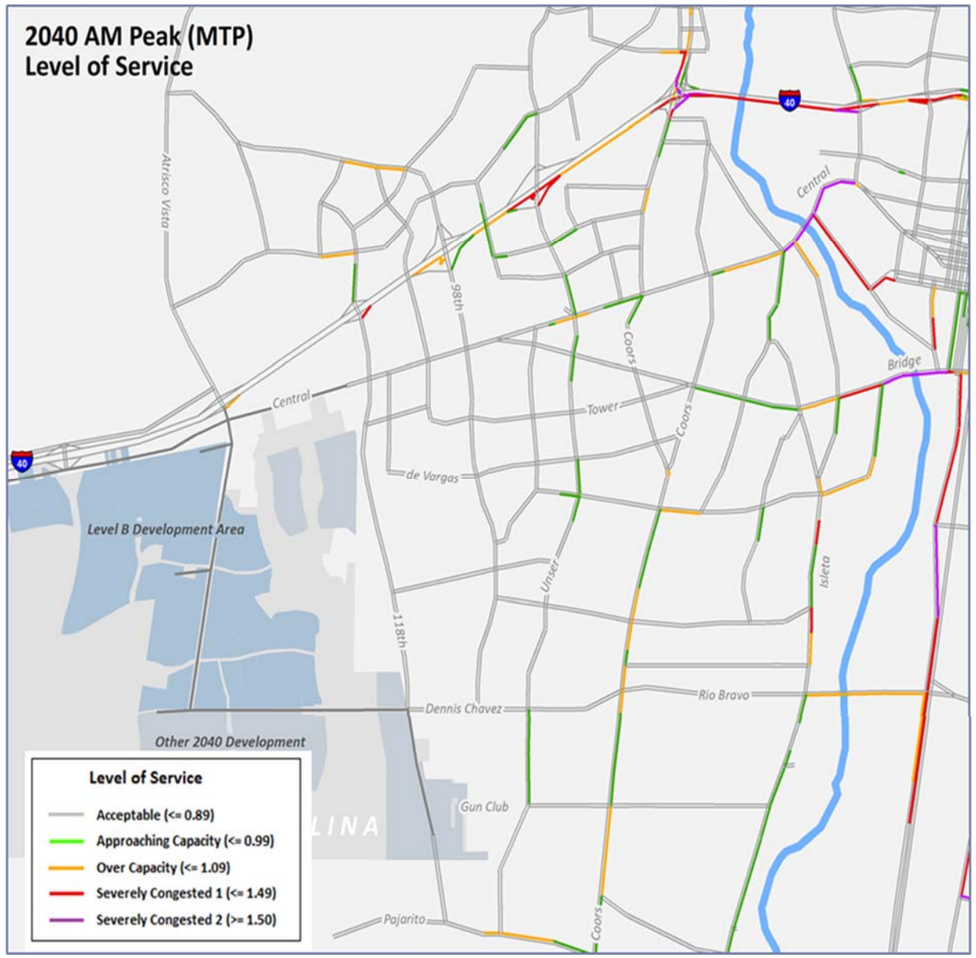
Figure 29 – Forecast Traffic Volume to Capacity Ratio PM Peak Hour – 2040 Full Build

The model forecasts poor off-site roadway performance due to network deficiencies; however, these forecasts are of limited utility due to the post-2040 modeling limitations. More detailed traffic studies will be performed with each submittal of Level B and C plans. These futures studies will provide a more accurate assessment of required transportation improvement at the time, based on more specific development plans and the most current MRCOG forecasts and models.

E. 2040 OFF-SITE ROADWAY EFFECTS

1. OFF-SITE EFFECTS

A side-by-side comparison of the volume-to-capacity ratio for the 2040 AM peak hour is shown in Figure 30, with the change in level of service from the MRCOG 2040 MTP volume-to-capacity shown in Figure 31. Similar graphics for the 2040 PM peak hour is shown in Figure 32 and Figure 33.



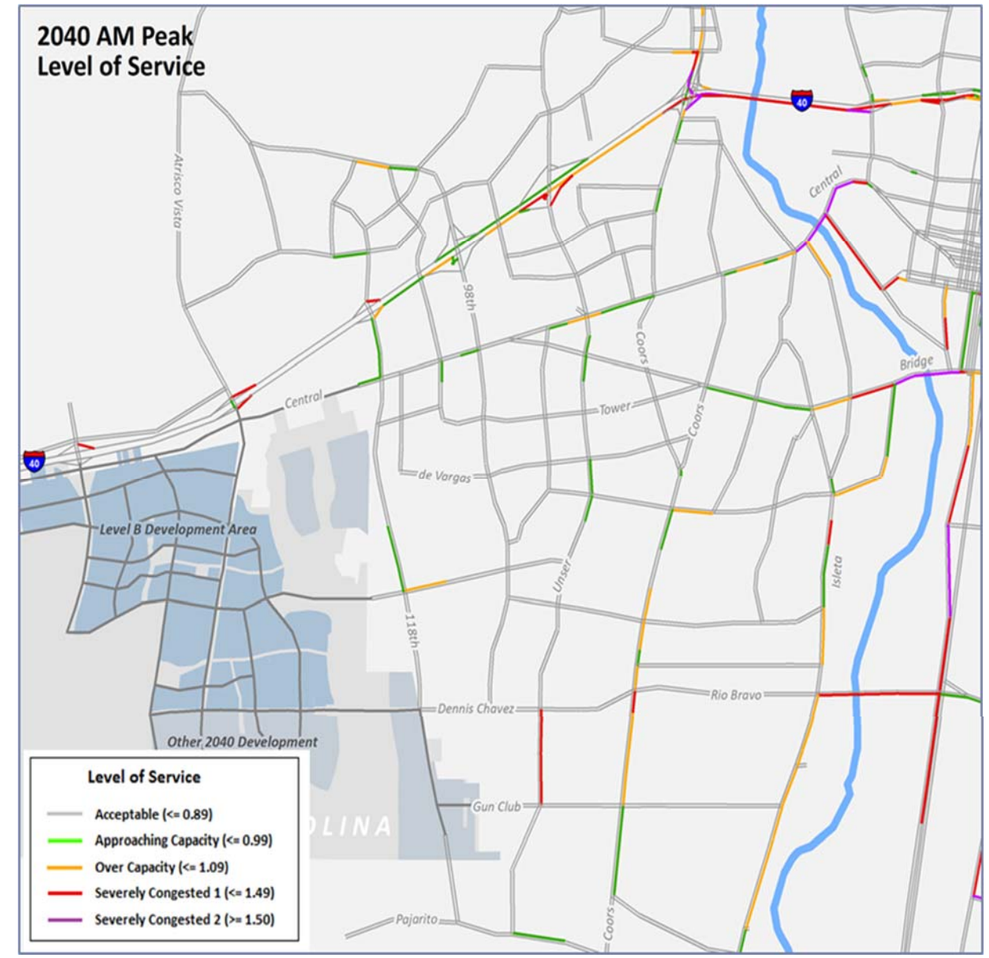


Figure 30 – Forecast Traffic Volume to Capacity Ratio Comparison to MRCOG MTP

AM Peak Hour – 2040

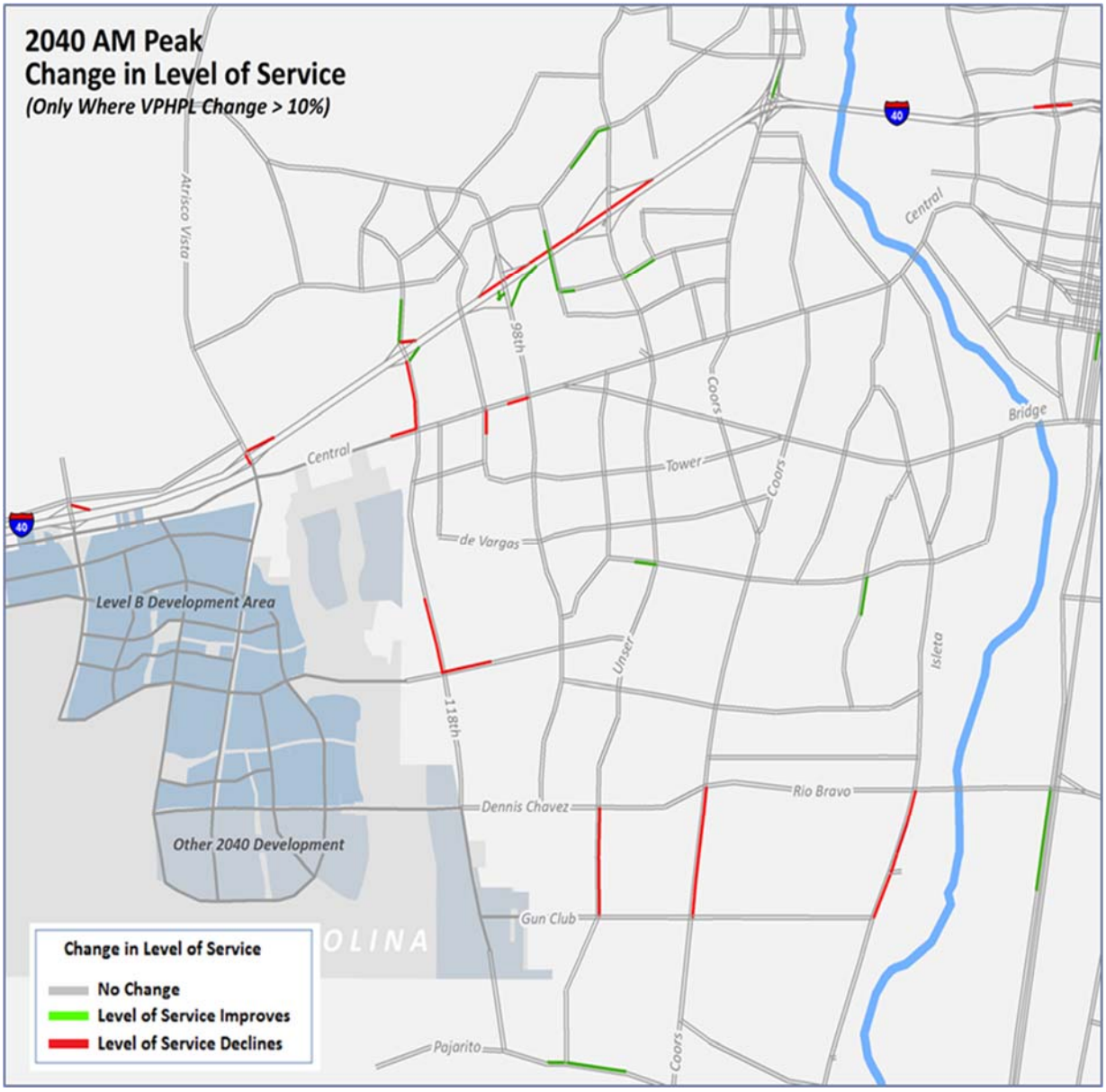
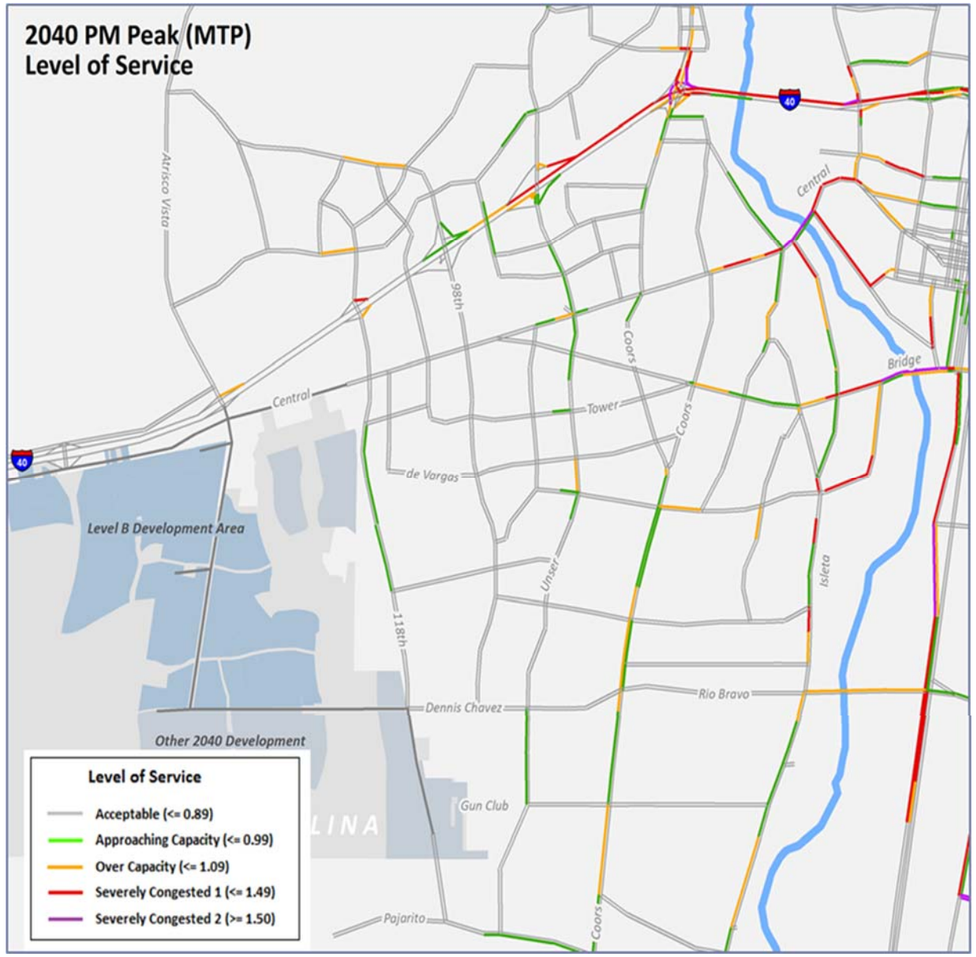


Figure 31 – Change in Volume-to-Capacity Ratio from MRCOG MTP

AM Peak Hour – 2040



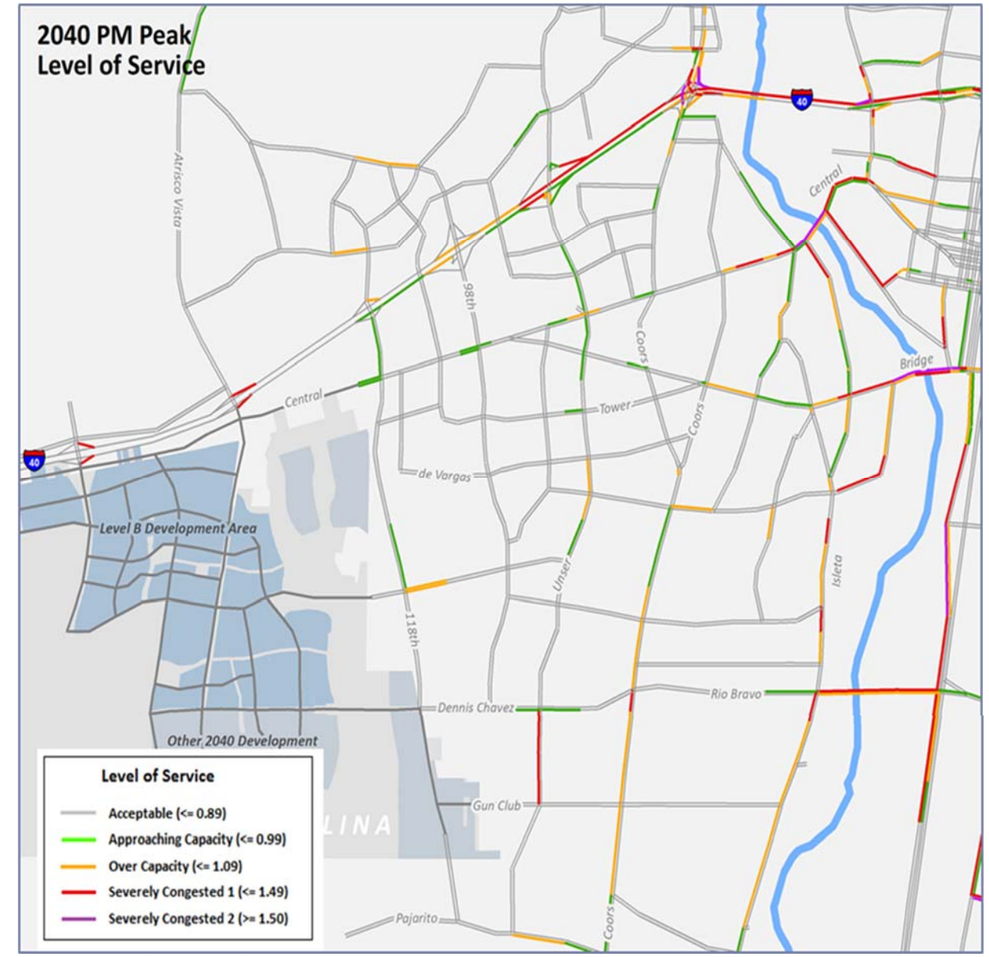


Figure 32 – Forecast Traffic Volume to Capacity Ratio Comparison to MRCOG MTP

PM Peak Hour – 2040

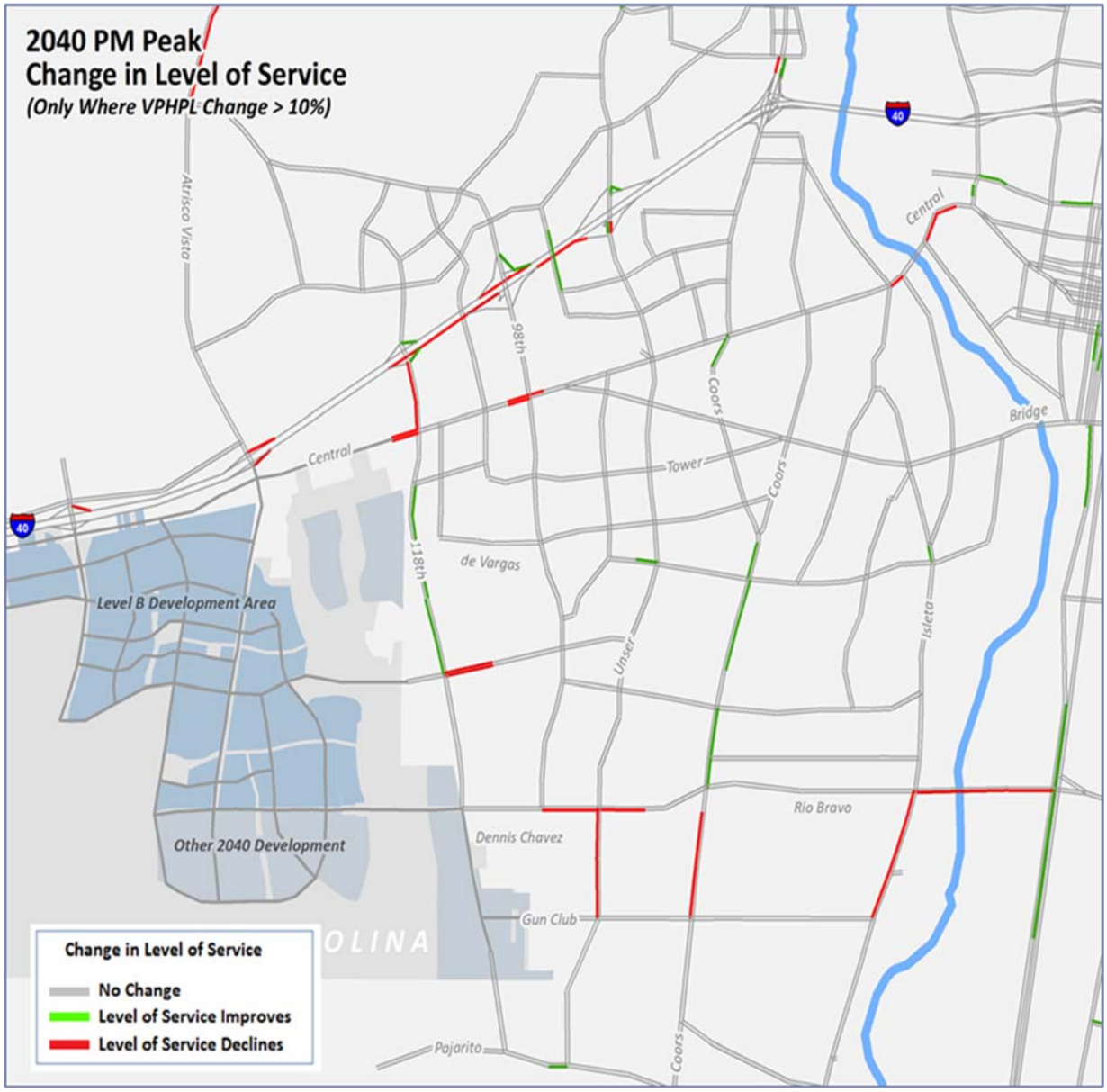


Figure 33 – Change in Volume-to-Capacity Ratio from MRCOG MTP PM Peak Hour – 2040

The overall performance between the 2040 MTP and Santolina scenarios are similar, with congestion in many of the same locations, as shown in Figure 30 (AM) and Figure 32 (PM). The changes volume-to-capacity ration, shown in Figure 31 (AM) and Figure 33 (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 30 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 32, 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 33 do not result in volume-to-capacity ratios greater than 1.0 in Figure 32. However again, some roadways that serve the exiting employment trips do have decreases in level of service.

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.

Table 7 – 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 8 – 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 table below compares the 2040 MTP and 2040 Development Phase 1 Santolina scenarios.

Table 9 shows that the roadway performance summary statistics for the 2040 PM peak hour, all of the roadway performance summaries improve with development of Santolina, with the exception of the small increase in VMT. There was 2.7% 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 3.8% reduction in the amount of delay experienced (vehicle-hours of delay, VHD), and a 5.5% increase in travel speed during the PM peak hour in 2040. 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 9.2%, a 11.5% reduction in the amount of vehicle miles of travel on congested roadways during the 2040 PM peak hour.

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				

A final measure of effectiveness is to compare the population to the number of lanes miles for Santolina with other areas of the AMPA. This is shown in Table 10. The other areas selected were the South Valley, the Northeast Heights, Rio Rancho, and Mesa del Sol. All the areas have comparable acreages.

Table 10 – Population per Lane Mile Comparison

Area	Limited Access	Principal	Minor	Collector	Overall	Acreage
Mesa del Sol	--	4,107	19,768	3,690	1,770	13,863
NE Heights	4,000	1,023	1,818	1,758	426	29,797
North Valley	4,942	587	602	935	216	19,222
NW Mesa	1,012	2,441	2,475	2,231	444	35,527
Rio Rancho	1,043	2,500	1,267	1,304	343	59,965
Santolina	--	637	1,120	1,906	334	4,624
SE Heights	5,523	1,071	2,175	2,476	505	15,993
South Valley	3,418	574	1,921	3,208	349	10,084
SW Mesa	1,608	1,312	7,647	1,435	452	27,238
Santolina @ Full Build	114,638	598	1,044	1,714	310	14,763

The table shows, that for principal arterials in 2040 and Full Build, the population per lane mile for Santolina is lower than most the other areas (smaller population per lane mile). For the other functional classifications, even though the full Santolina roadway network has not been defined in Level A, Santolina is again within the ranges of the developed areas (South Valley, Northeast Heights, and Rio Rancho), and has lower population per lane mile than the other Level A Master Plan development, Mesa del Sol.

F. NON-AUTO MODES OF TRANSPORTATION

Santolina's vision includes the principle of incorporating multi-modal travel with an emphasis on walkability and transit, and has as a clearly defined goal of a transportation and circulation system that allows for transit connections throughout the community, creates transit, bike and pedestrian links between activity centers and villages, and provides opportunities for alternative modes and recreation through an extensive network of trails and bikeways.

The typical sections figure showed that anticipated primary arterial typical sections would have on-street bicycle lanes and sidewalks or trails on both sides of the street, and will tie into the trail systems contained in the Santolina Open Space. These bicycle and pedestrian facilities will tie into the extensive existing system identified in the MRCOG Long Range Bikeway System, and will expand opportunities for bicycle commuting, while providing continuous and connected pathways to encourage pedestrian trips throughout the Villages.

1. TRANSIT

In order to be effective in reducing regional traffic congestion, transit must be frequent, fast and reliable. With the extensive network of pedestrian facilities within Santolina, bus stops can be located within reasonable walking distance of residences, encouraging transit use. Bus Rapid Transit Systems and commuter routes can provide direct routes from Santolina to other regional job centers, or transport employees to the jobs located in Santolina. As the area further develops, local circulator buses can expand on the transit opportunities of the area.

Transit services to County areas are currently provided on a contract basis, as they are outside the City of Albuquerque's ABQ Ride jurisdictional area. As Santolina develops, the available markets for transit ridership is expected grow, prompting the consideration of transit service by the County, ABQ Ride and the Rio Metro Regional Transit District (RTD). These discussions would not be expected to occur until the transit market appears with development. Transit would likely begin with limited commuter routes with limited service in the peak hours, then develop into fixed routes with shorter headways, then ultimately into Bus Rapid Transit System if the demand for this type of service is present.

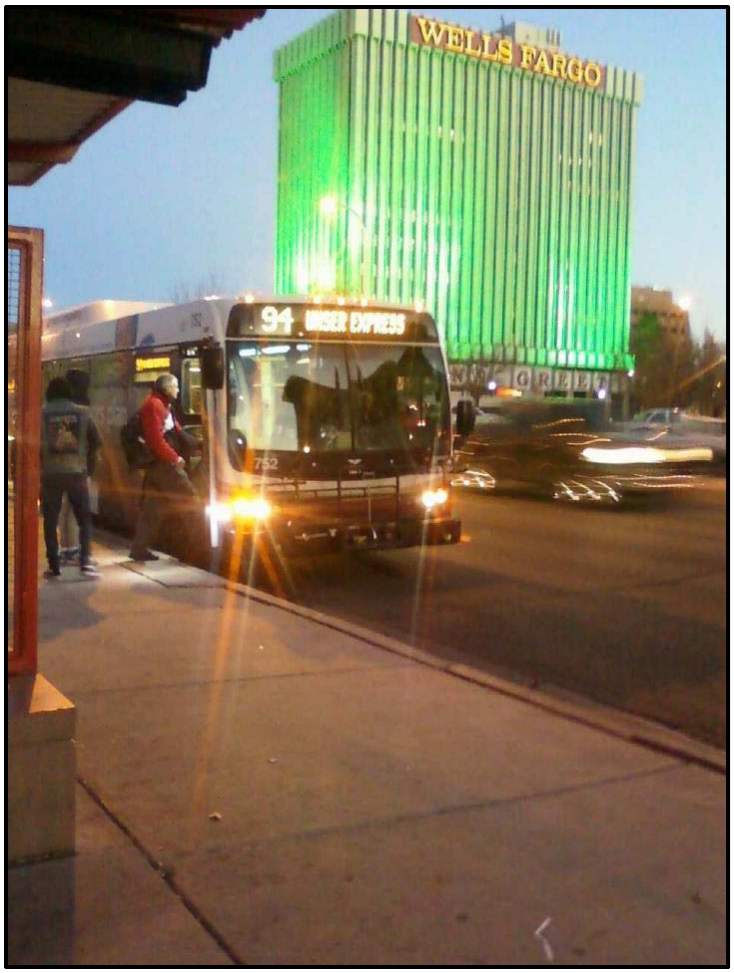


Photo credit: ABQ Ride

a) *Existing*

Currently there are no transit routes serving Santolina. Route 66 (Central Avenue) and 766 (Rapid Ride Red Line) serve the Central and Unser Transit Center and Central Avenue. Route 54 (Bridge/Westgate) serves Bridge and Arenal as it winds its way to the Westgate Library area, before heading north on 98th Street, before reaching the Central and Unser Transit Center.

b) *Proposed*

The conceptual transit network for Full Build is shown in Figure 34, with the 2040 Projected Development (Phase 1) transit network shown in Figure 35. The backbone of the network is the proposed commuter/Bus Rapid Transit System (BRT) routes. As Santolina develops, the area will not only be home to residential areas, but also employment centers.

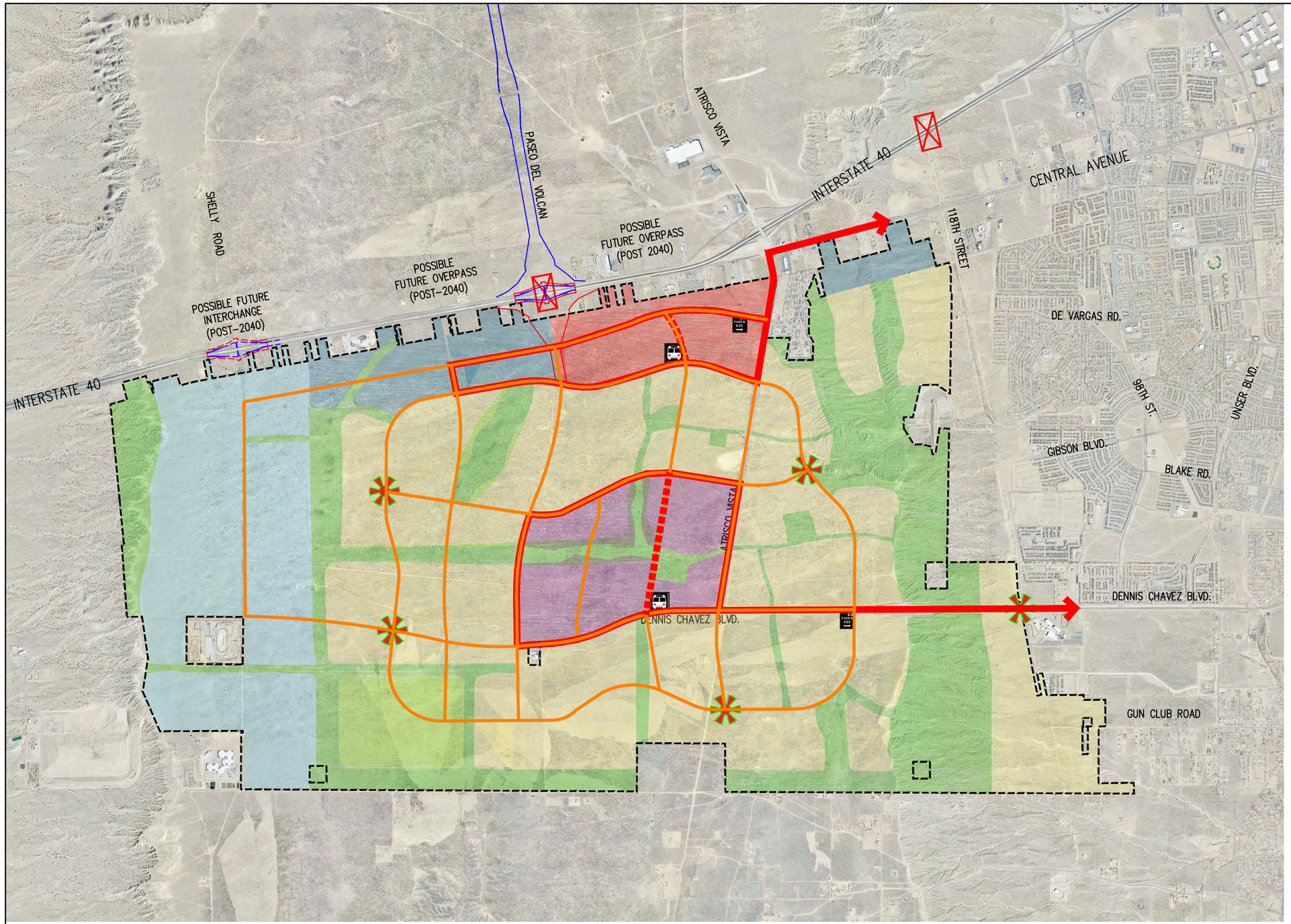
So transit has the opportunity to not only take people from Santolina to other regional employment cents, but also to take people from other parts of the metro area, to the employment centers in Santolina.

The commuter/BRT network as shown 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 Paseo del Volcan, or possibly even further west, to provide transit access to a major employment center. 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 commuter/BRT route is along Dennis Chavez Boulevard, into the Urban Center. Although no commuter/BRT currently serves Dennis Chavez, it is identified as a Priority Transportation Improvement Corridor in the 2040 MTP, and with the Rio Bravo RailRunner Station just west of the river, is a prime candidate for use as a commuter/BRT route. Additionally, Dennis Chavez from 118th Street to the edge of the Urban Center has been identified as a roadway segment under consideration for a 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. Transit center should also be considered near post-secondary education institutions, such as planned for the Urban Center/Hub area.

Although conceptual in nature, the transit network also shows bus stops at all signalized intersections. It is expected, that as future details emerge through the Level B and C studies, additional bus stops and routes will be in place for local service routes that serve not only the principal arterials shown in Figure 34 and Figure 35, but also future minor arterials and collector streets.

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. Care must be taken on these roadways and developments to ensure safe and easy pedestrian crossings and access to bus stops.



SANTOLINA

LEVEL A

LEGEND

- Level A Boundary
- Future Interchange
- Village Center
- Park and Ride
- Transit Center
- Possible Future Commuter / BRT / Primary Route Extension
- Local Circulation Routes
- Alternate / Interim commuter / BRT Route

NORTH

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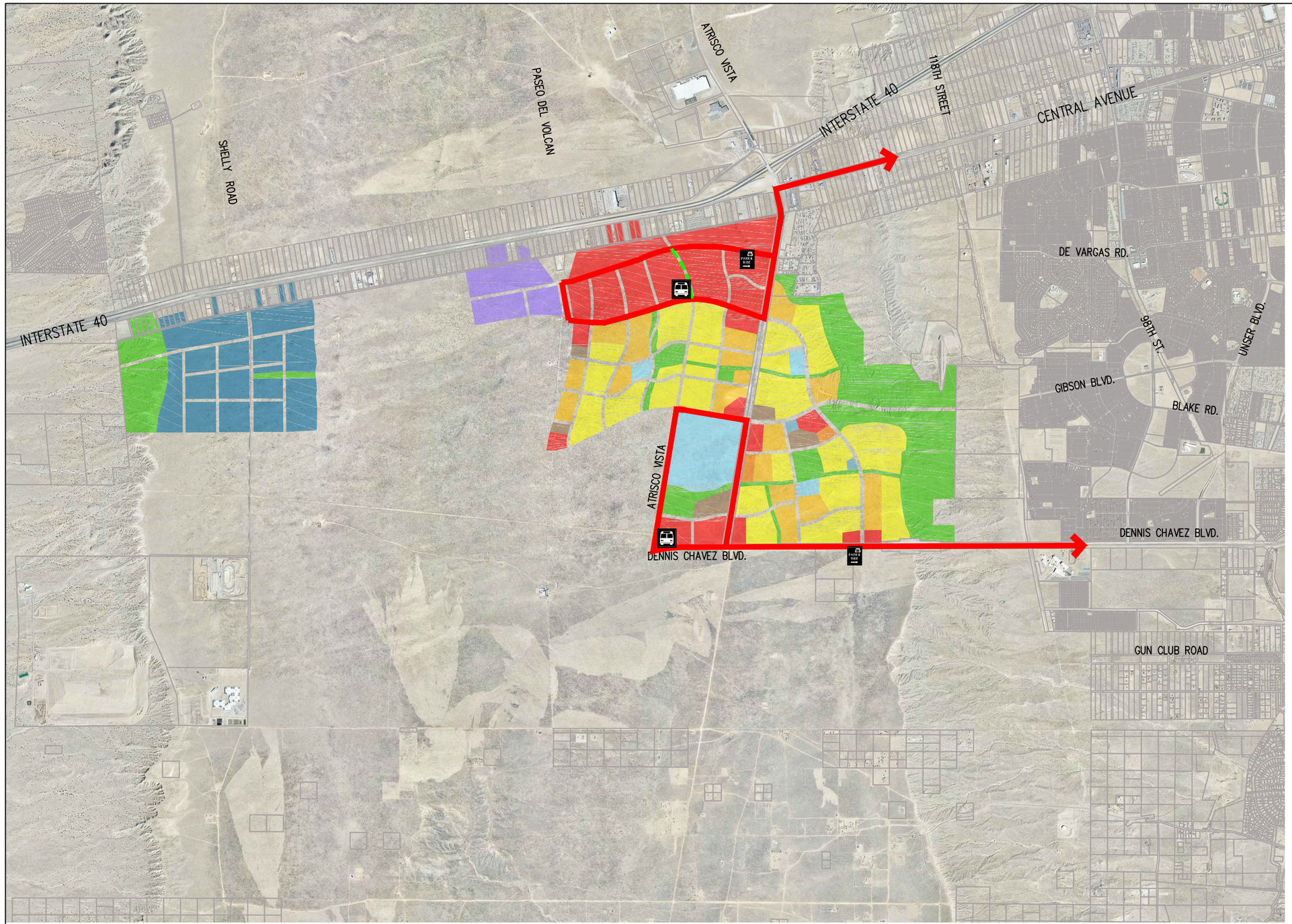
TRANSIT NETWORK - FULL BUILD

FIGURE 34



SANTOLINA

LEVEL A

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

NORTH

LEVEL A 2040 PROJECTED DEVELOPMENT (PHASE 1) TRANSIT NETWORK

FIGURE 35

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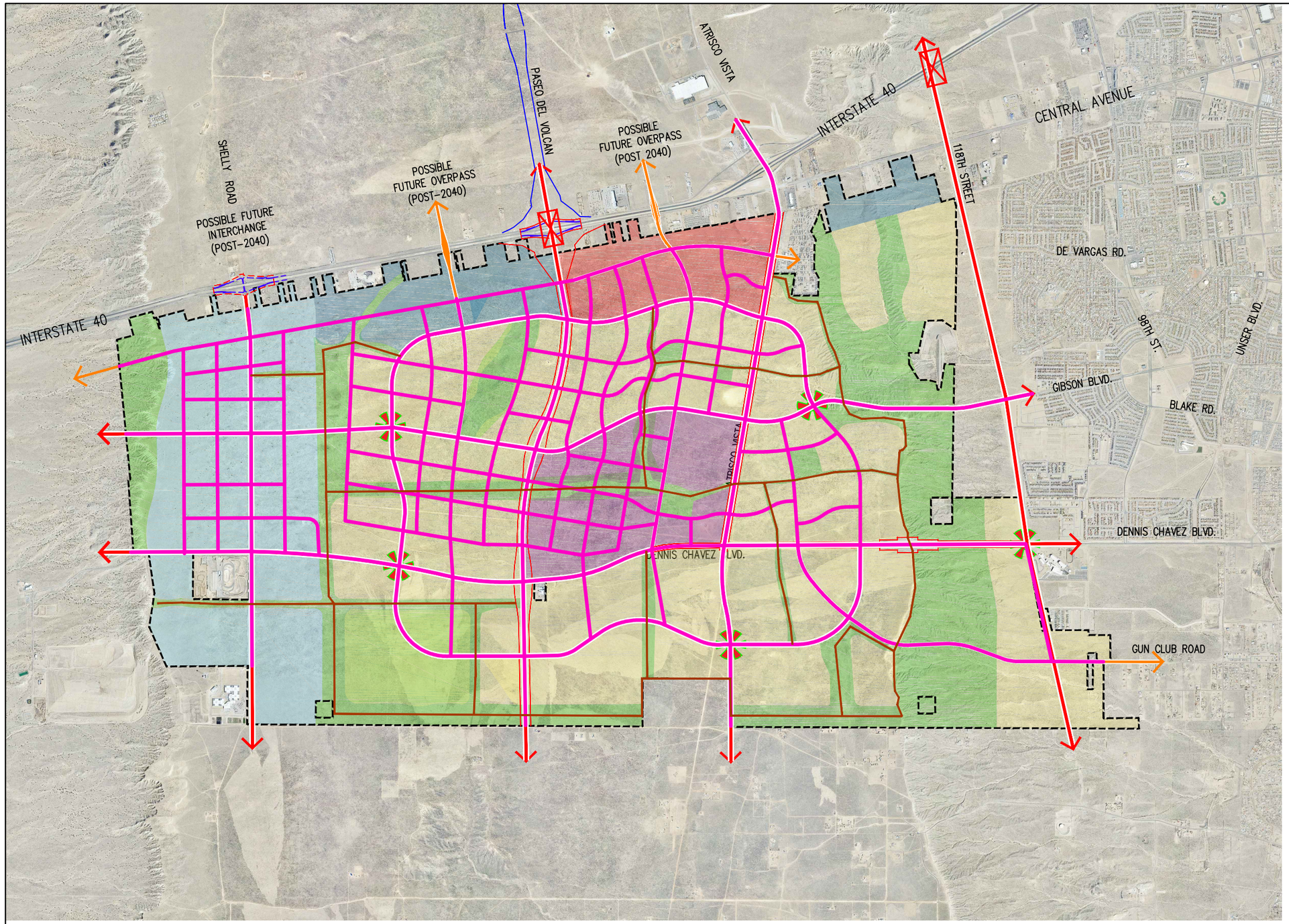
2. BICYCLES

The proposed bicycle network shown in the Pedestrian and Bikeways Master Plan provides complete coverage of the 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 minor arterials and collector streets. Off-Street trails, combined with walking, are also proposed in the typical sections for the principal arterials. 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 will 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.

Photo credit: ACVB



SANTOLINA

LEVEL A

LEGEND

- Level A Boundary
- Future Interchange
- Village Center
- On-Street Bike and Ped Facilities
- Open Space Trails

NORTH

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PEDESTRIAN AND BIKEWAYS MASTER PLAN

FIGURE 36

3. PEDESTRIAN

Similar to the bicycle network, the proposed typical arterial roadway sections provide complete pedestrian coverage throughout Santolina, with a sidewalk or multi-use on both sides of all streets collector and above. In addition, the Open Space trail system provides opportunities for walking separate from roadways and vehicular traffic.

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. Walking within Village Centers will be encouraged due to the land use and site layout and 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.

G. SUMMARY

In summary, the Santolina Level A Transportation Master Plan achieves the goals of the County's Planned Communities Criteria in the following manner. The Master Plan:

- Provides an emphasis on walkability and transit, with the goal of creating a transportation and circulation system that allows for transit connections throughout the community.
- Due to the jobs-housing balance in Santolina, the Master Plan preserves and optimizes the capacity and utilization of the existing roadways, and reduces the percentage of vehicle miles traveled on congested roadways.
- Models two phased development scenarios, Full Build and 2040 Projected Development (Phase 1).
- Proposes a 2040 Projected Development (Phase 1) internal roadway network that is sufficient to accommodate the anticipated Projected Phase 1 traffic volumes. The results also indicate the proposed internal network also has additional capacity and right-of-way to accommodate faster growth than anticipated by the growth estimates, as needed.
- Reduces the vehicle hours of delay, and travel time during the PM peak hour on a regional basis and increase the average travel speed in both 2025 and 2040, as compared to the MRCOG Trend scenario.
- Decreases river crossings by 3.5% - 5% in 2025, and does not increase river crossings in 2040.

- Portrays that internal traffic volume within Santolina increase as Full Build conditions approach, however the proposed number of lanes within the Master Plan also increases correspondingly to manage and address the additional growth. This allows for phased construction of roadways to correspond to actual development progress with the community.
- Provides a framework to identify future transportation needs through future Level B and Level C transportation analyses.
- Requires that all arterial roadways adhere to the intersection and driveway spacing identified in the Santolina Access Management Policy shown in Table 1, with any future proposed deviations to be approved by the County.
- Creates opportunities for alternative modes of transportation for the community through an extensive network of trails and bikeways.
- Provides arterial typical sections with on-street provisions for bicycle lanes and sidewalks or multi-use trails.
- Provides typical roadway sections with a robust set of principal roadways and bicycle and pedestrian facilities resulting in local and regional wide access to alternate travel modes.
- Provides bicycle and pedestrian facilities that will tie into the extensive existing system identified in the MRCOG Long Range Bikeway System, and that expand opportunities for bicycle commuting, while providing continuous and connected pathways to encourage pedestrian trips throughout the Villages.

TECHNICAL APPENDIX T- 1 – TRAVELDEMAND MODEL SOCIOECONOMIC FORECAST

Bohannan Huston

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

Planning Technologies, LLC
January 18, 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.

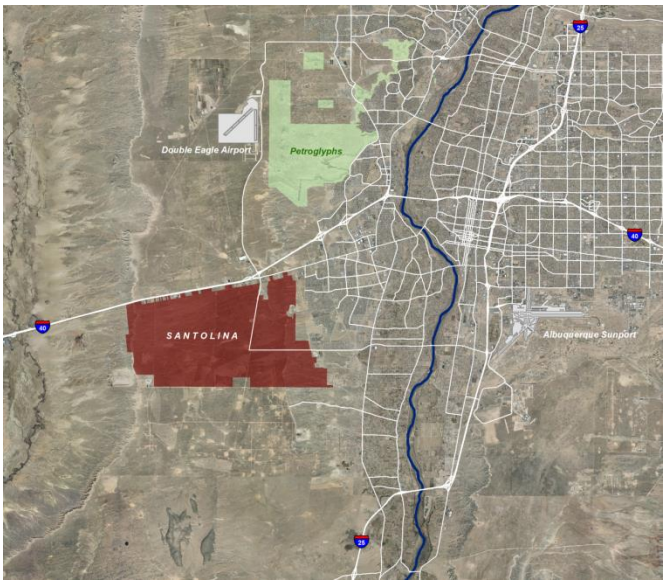

Figure 1: Santolina Study Area

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.

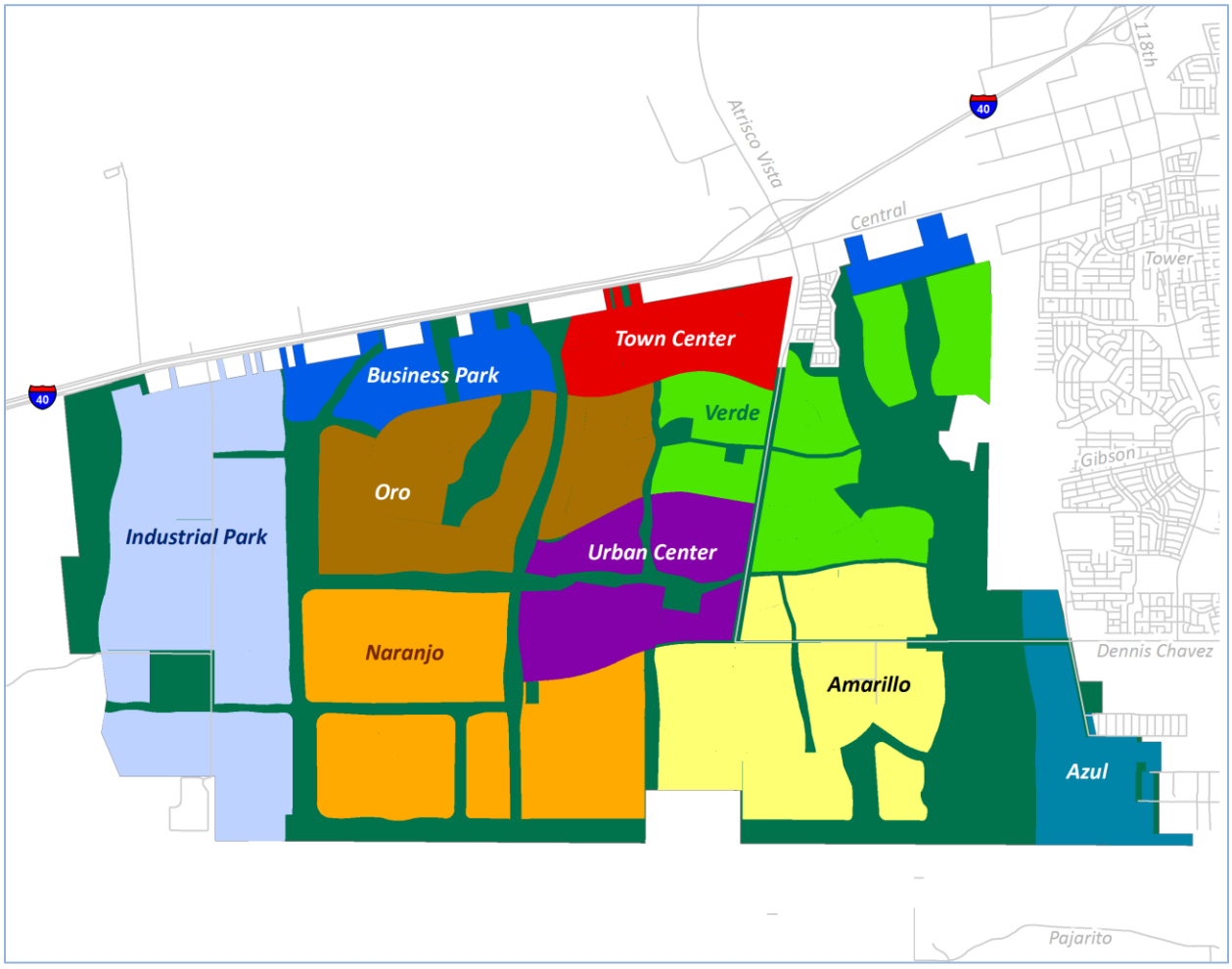

Figure 2: Santolina Village Plan

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.

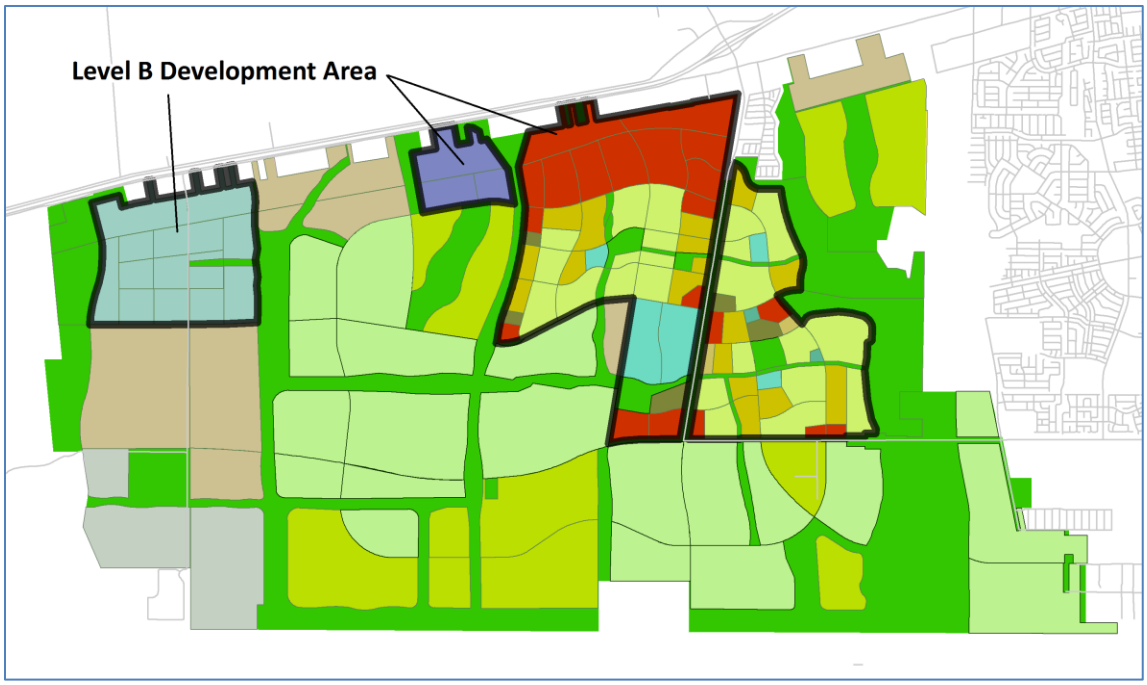

Figure 2: Level B Development Area is shown here. Note the greater detail illustrating the extent and location of dedicated land uses in the Level B area.

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.

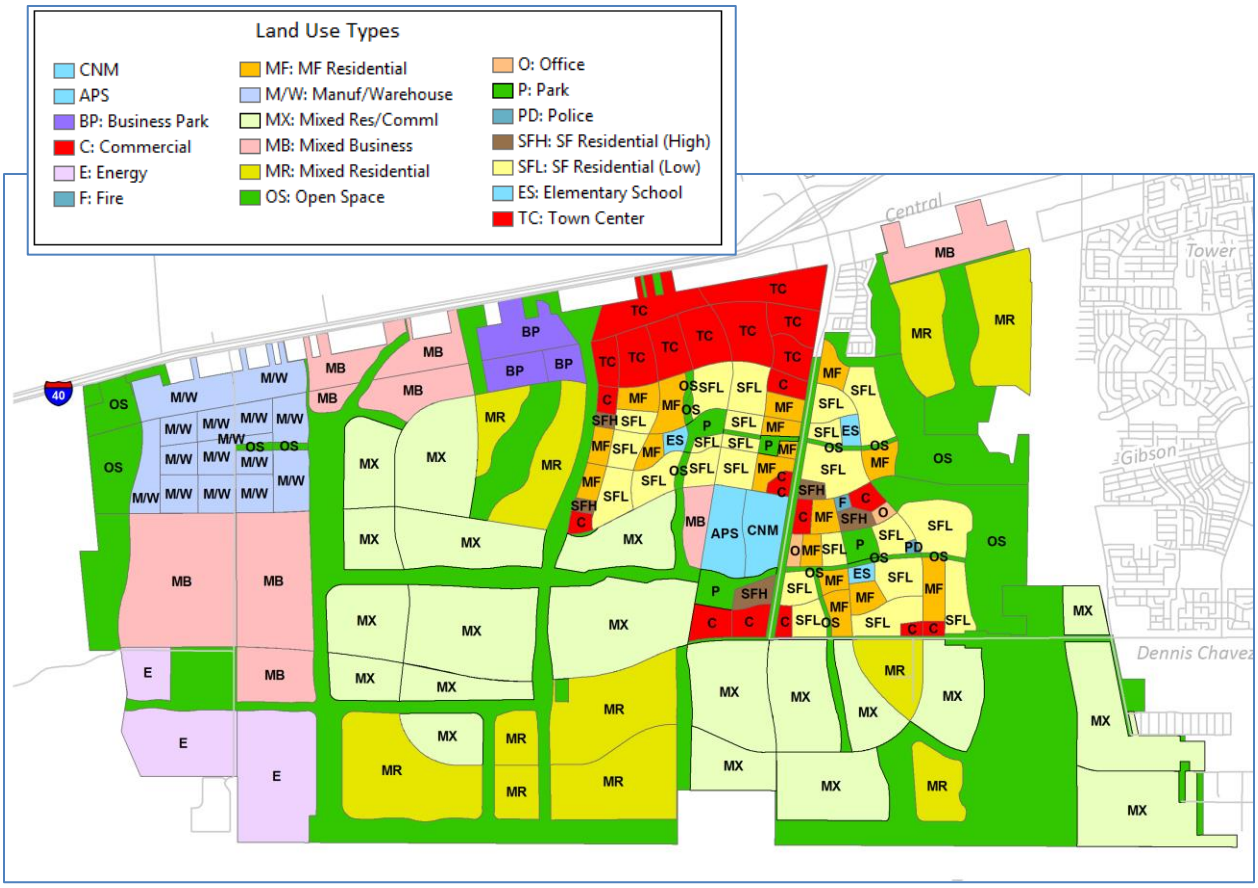

Figure 3: Detailed Land Uses in Santolina.

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	422.4	3,378	0	**3,378**	3,210	8,348
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)	74.7	0	1,494	**1,494**	1,420	3,689
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**

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 Land Use 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	422.4	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)	74.7	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**

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 Land Use 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	422.4	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)	74.7	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**

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		Jobs by Sector			
Type	Acres	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	422.4	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)	74.7	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**

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.

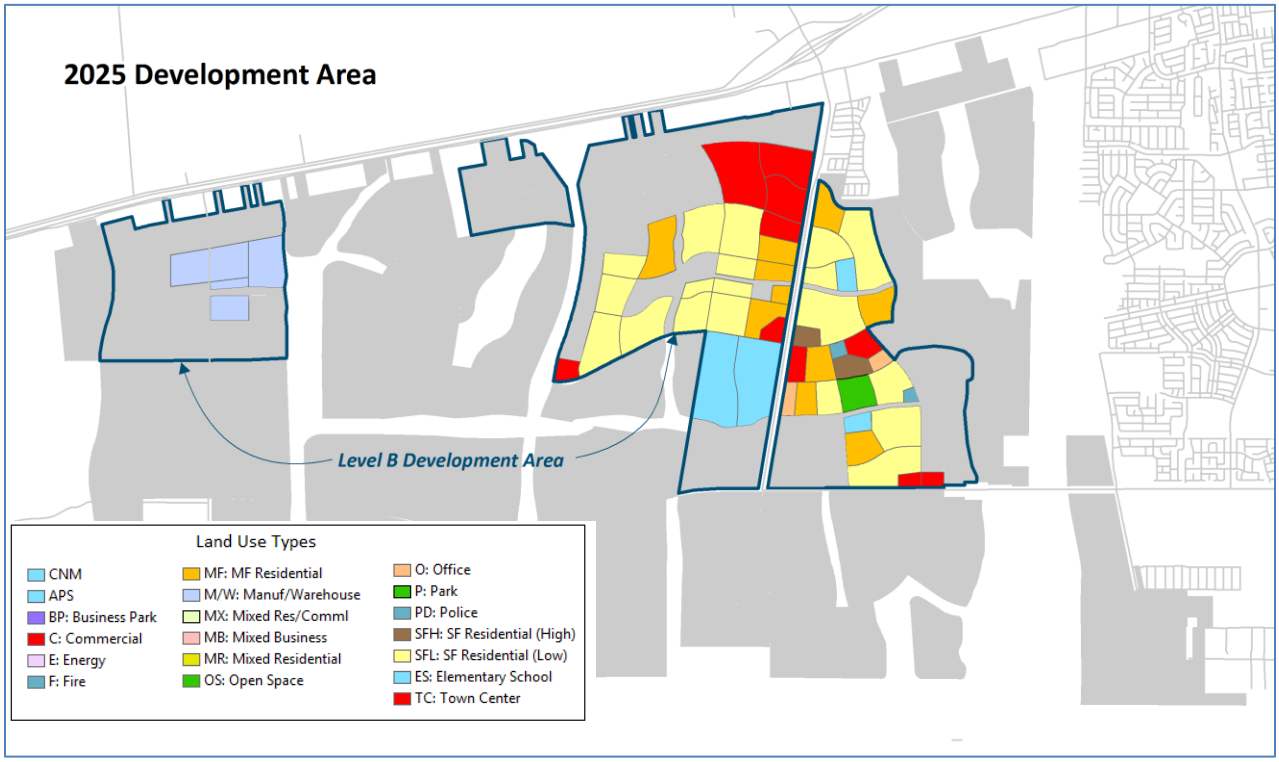

Figure 4: Development included in the 2025 scenario is shown here. The 2025 scenario depicts partial development of the Level B Development Area.

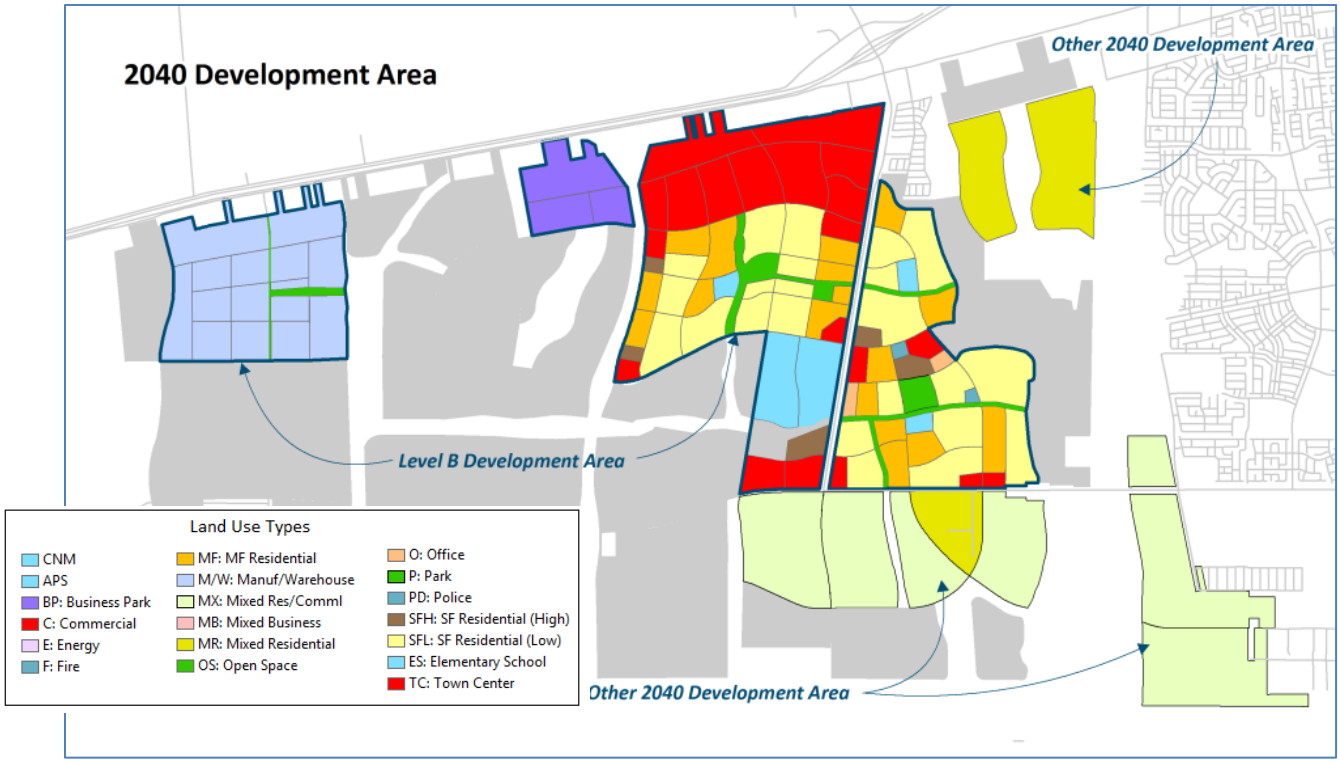

Figure 5: Development included in the 2040 scenario is shown here. The 2040 scenario depicts 100% development of the Level B Development Area. In addition, it includes partial development of other land uses outside of the Level B Development area.

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)

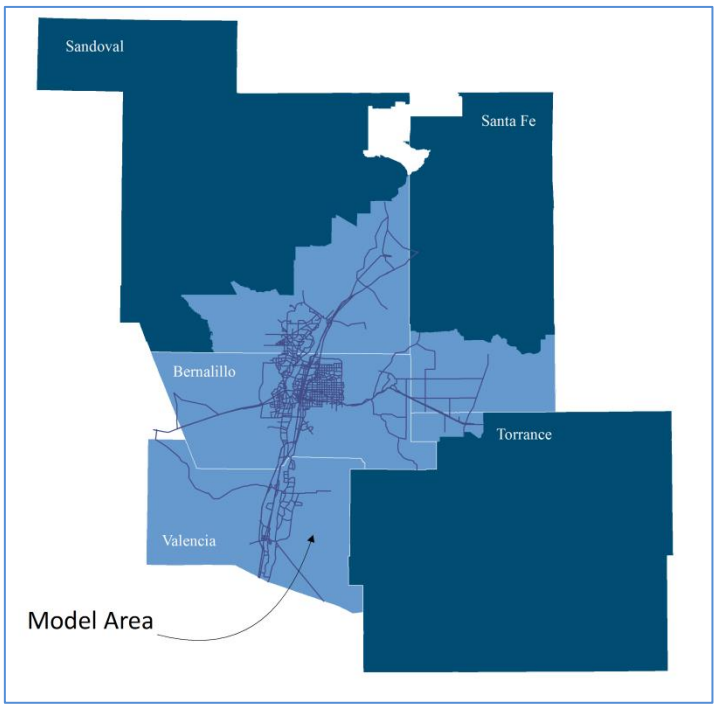

Figure 6: MRCOG Travel Model Area

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.

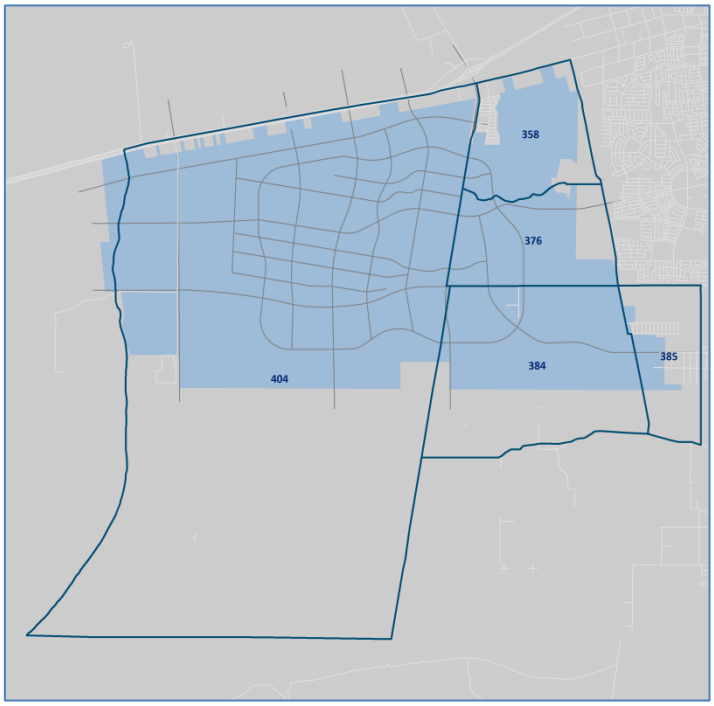

Figure 7: MRCOG Model Zones Near Santolina

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

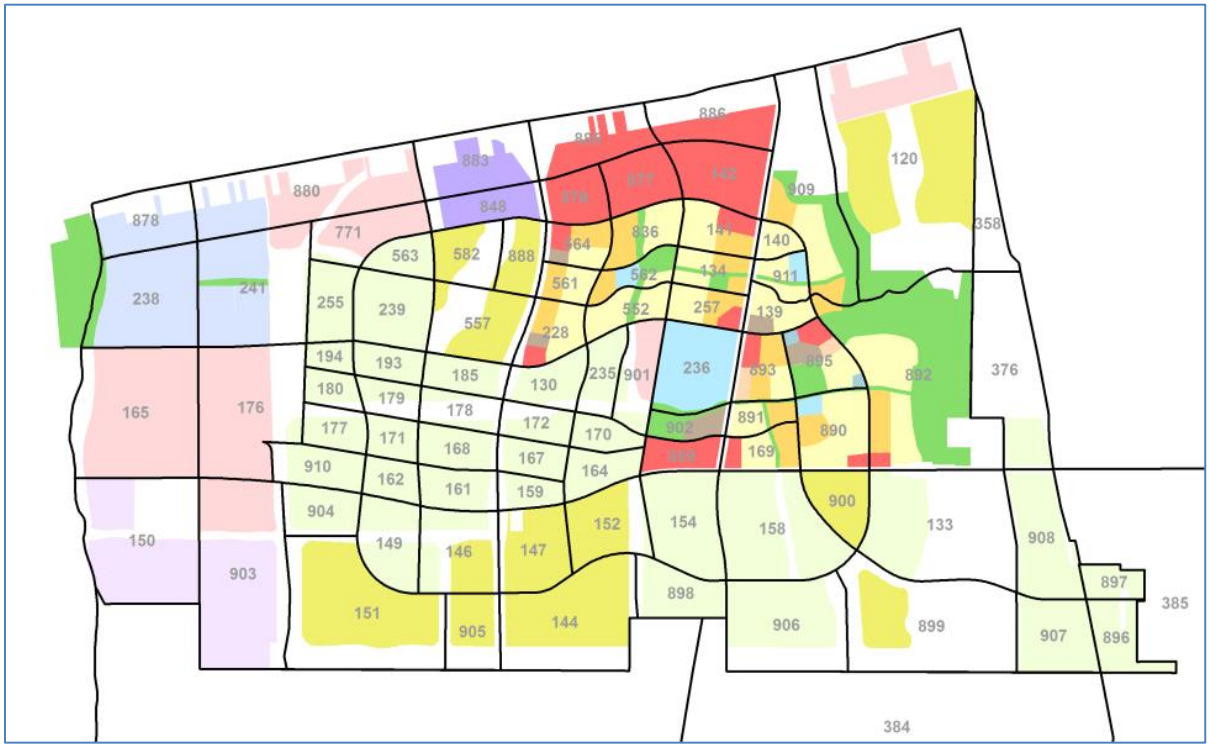

Figure 8: Santolina Zone System

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 BBER, the UNM Bureau of Business and Economic Research, 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	3,972	7,057	130	5,150
	376	5741	2,716	10,768	56	3,171
	384	5761	3,150	16,891	71	1,651
	385	5762	2,055	2,395	293	181
	404	5911	2,139	57,694	1,068	66,313
	Total		**14,032**	**94,805**	**1,618**	**76,466**
	Ratio			**6.8**		**47.3**

** MTP Values are for 2040*

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.

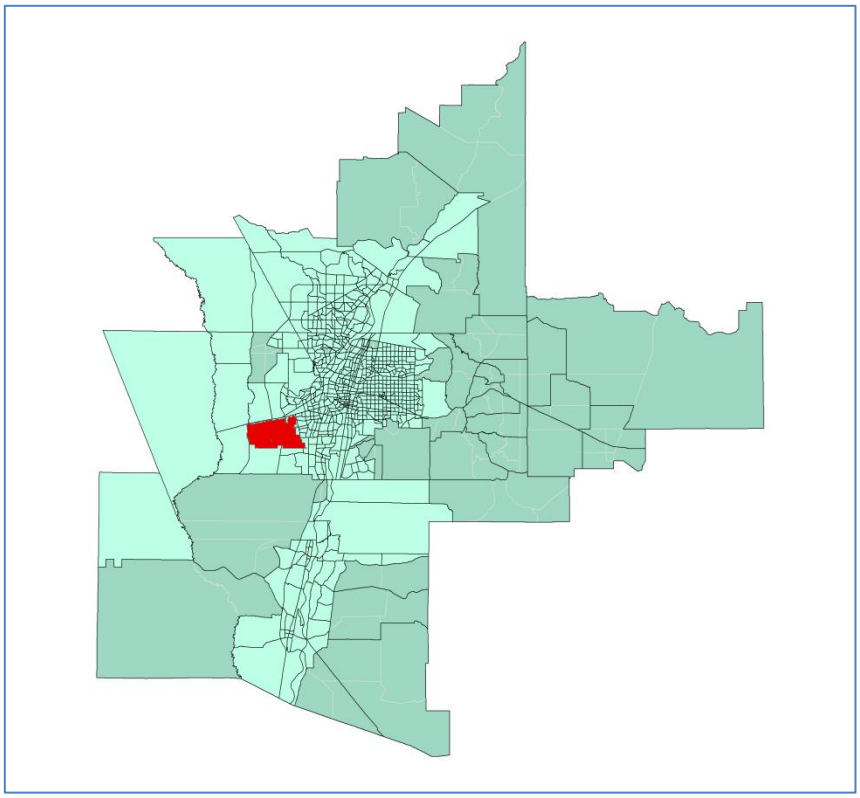

Figure 9: Remote and Rural Zones: Zones indicated here (dark colors) were aggregated, usually 2 to 4 at a time, to reduce the overall zone count in the model.

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.

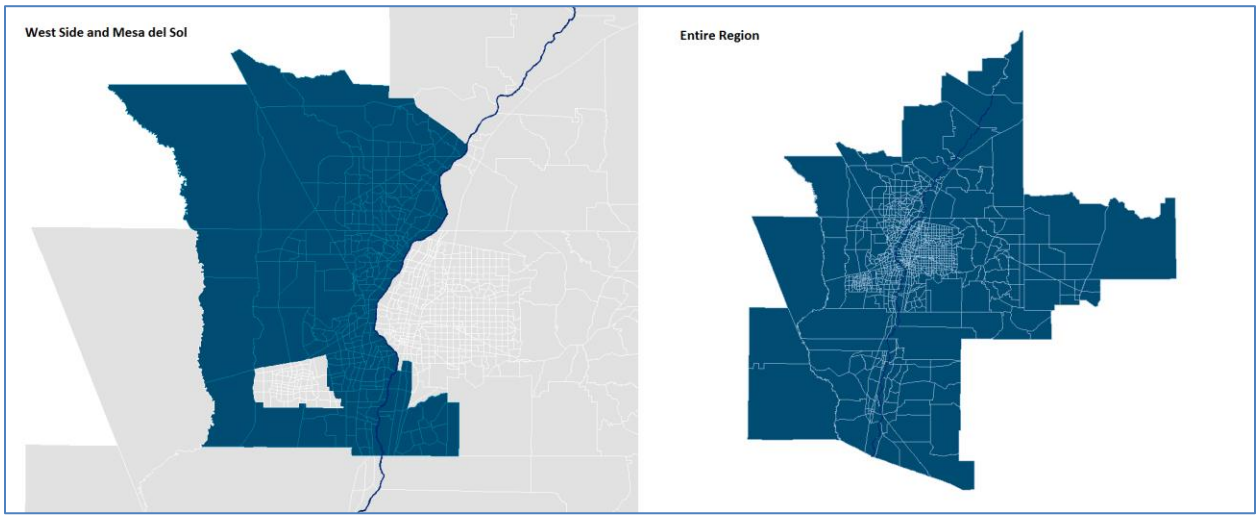

Figure 10: Normalization areas are shown here. The map to the left, highlighting Albuquerque's west side, Rio Rancho, and Mesa del Sol, was used for normalizing population and retail and service jobs. The area to the right, the entire region, was used for normalizing basic jobs

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.

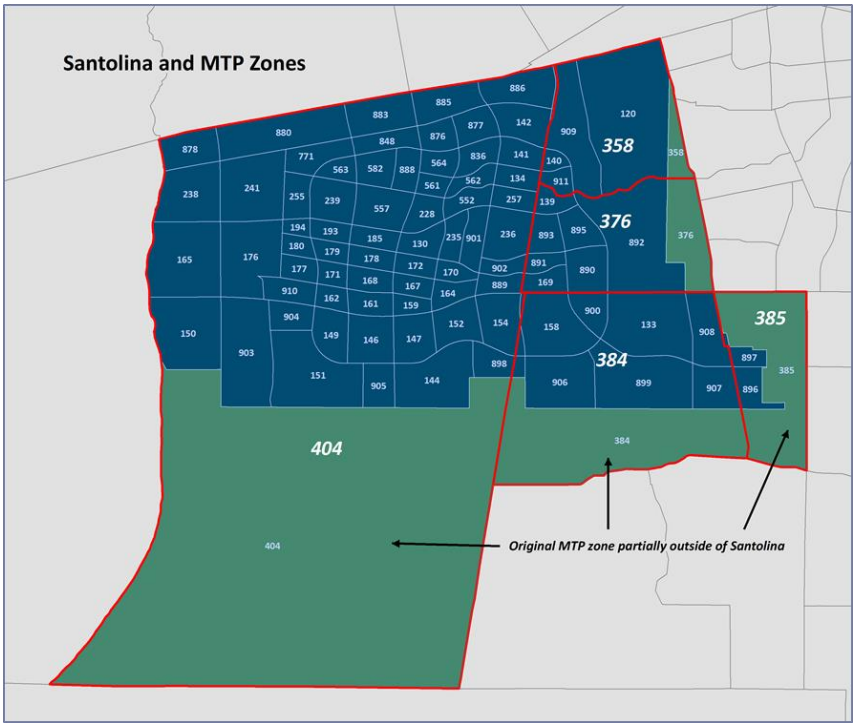

Figure 11: MRCOG MTP zones "partially" covered by the Santolina development.

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

Bohannan Huston

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

Planning Technologies, LLC
January 18, 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.

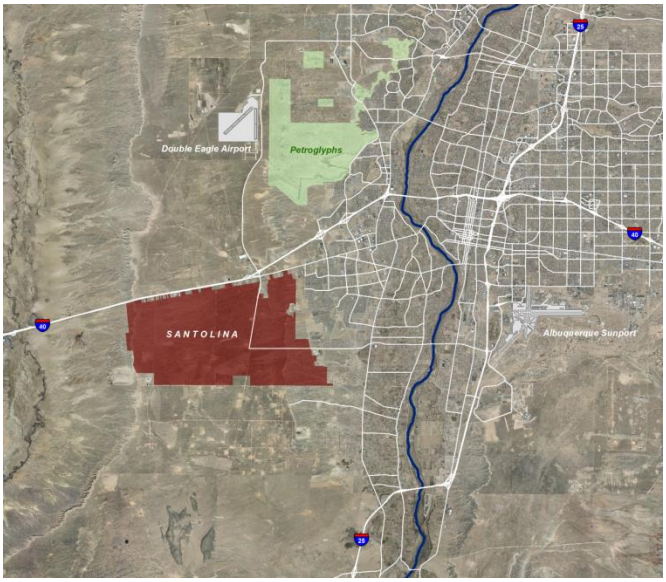

Figure 1: Santolina Study Area

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.

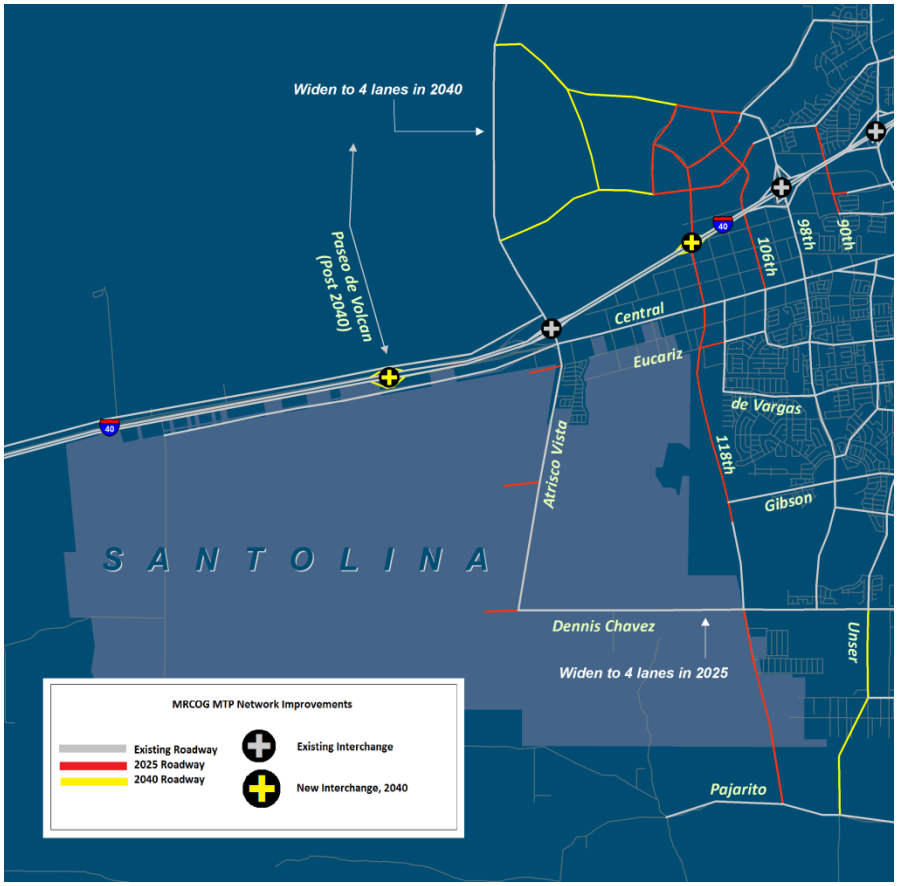

Figure 2: Roadway improvements in the vicinity of Santolina in the MTP networks for 2025 and 2040 are illustrated here.

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.

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 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.

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.

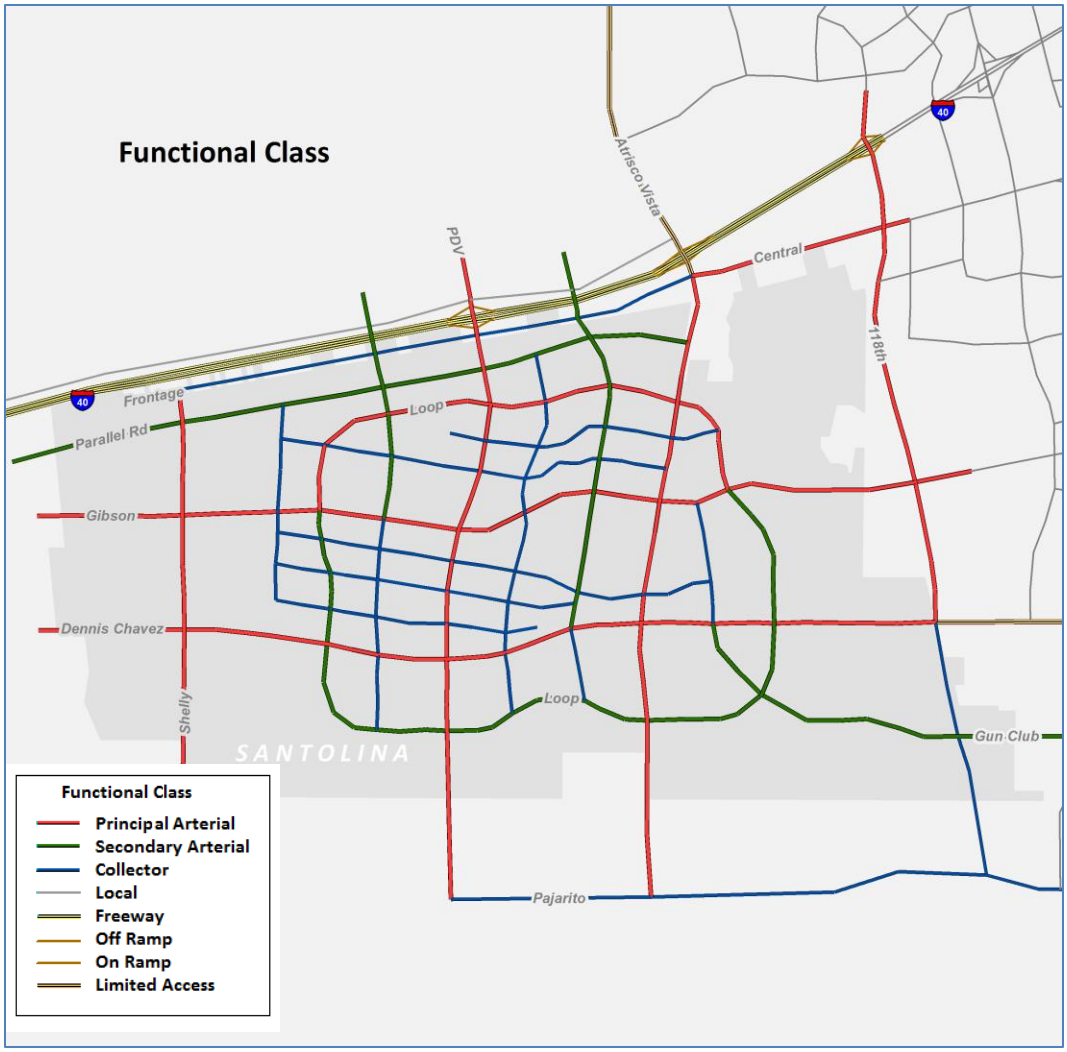

Figure 3: Santolina Circulation Plan

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

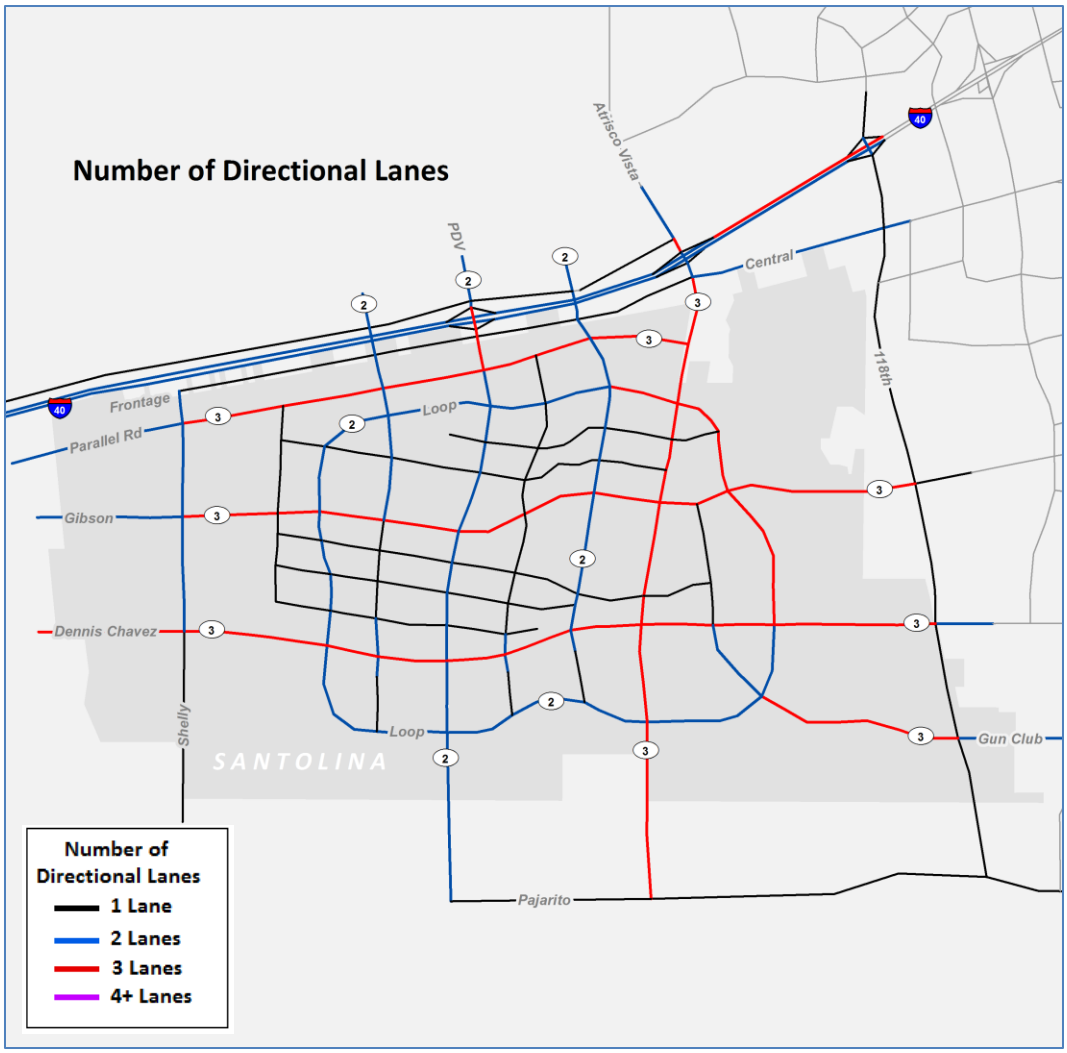

Figure 5: Number of Directional Lanes (Build-Out)

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.

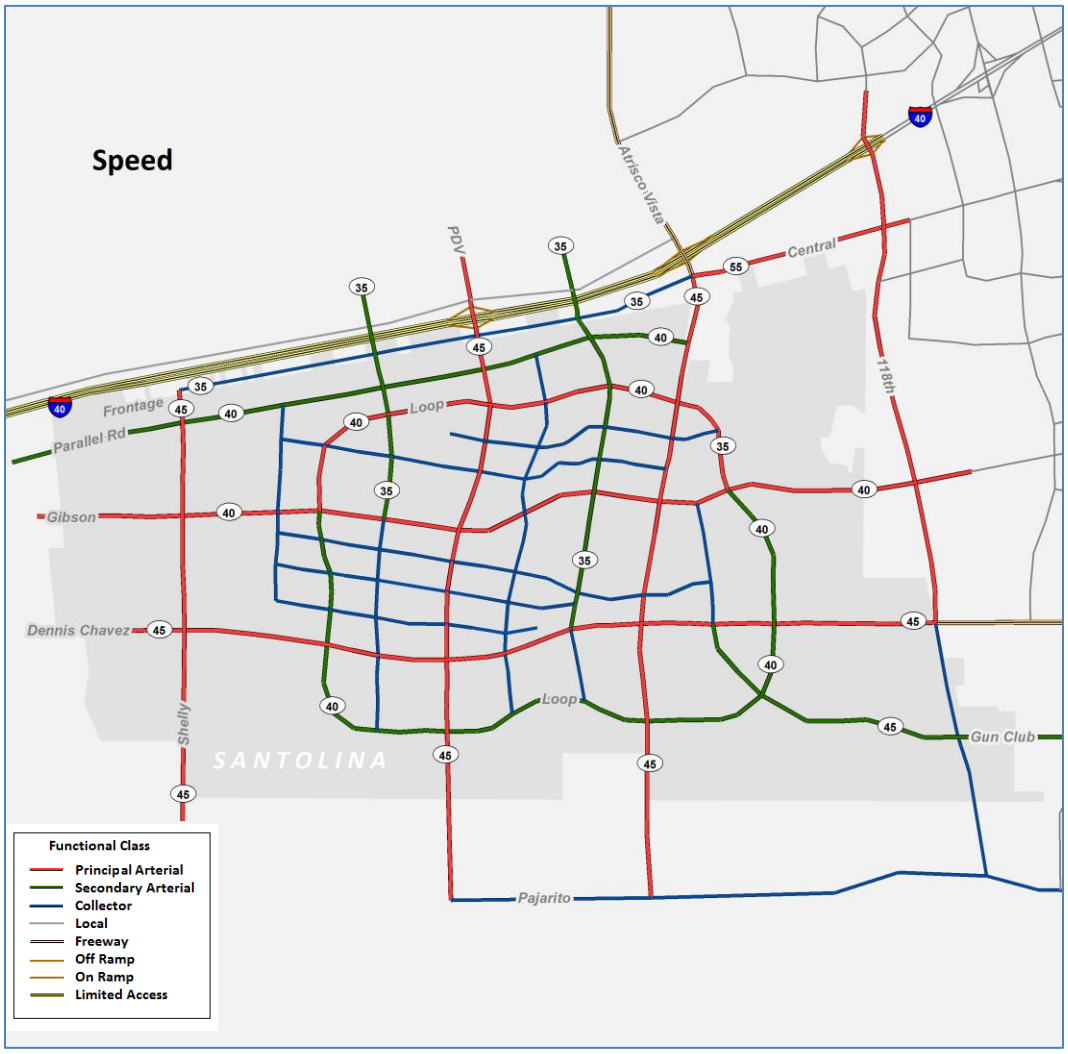

Figure 6: Speed on Santolina Roads (Build-Out)

Average Daily (Weekday) Traffic (Build-Out)

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

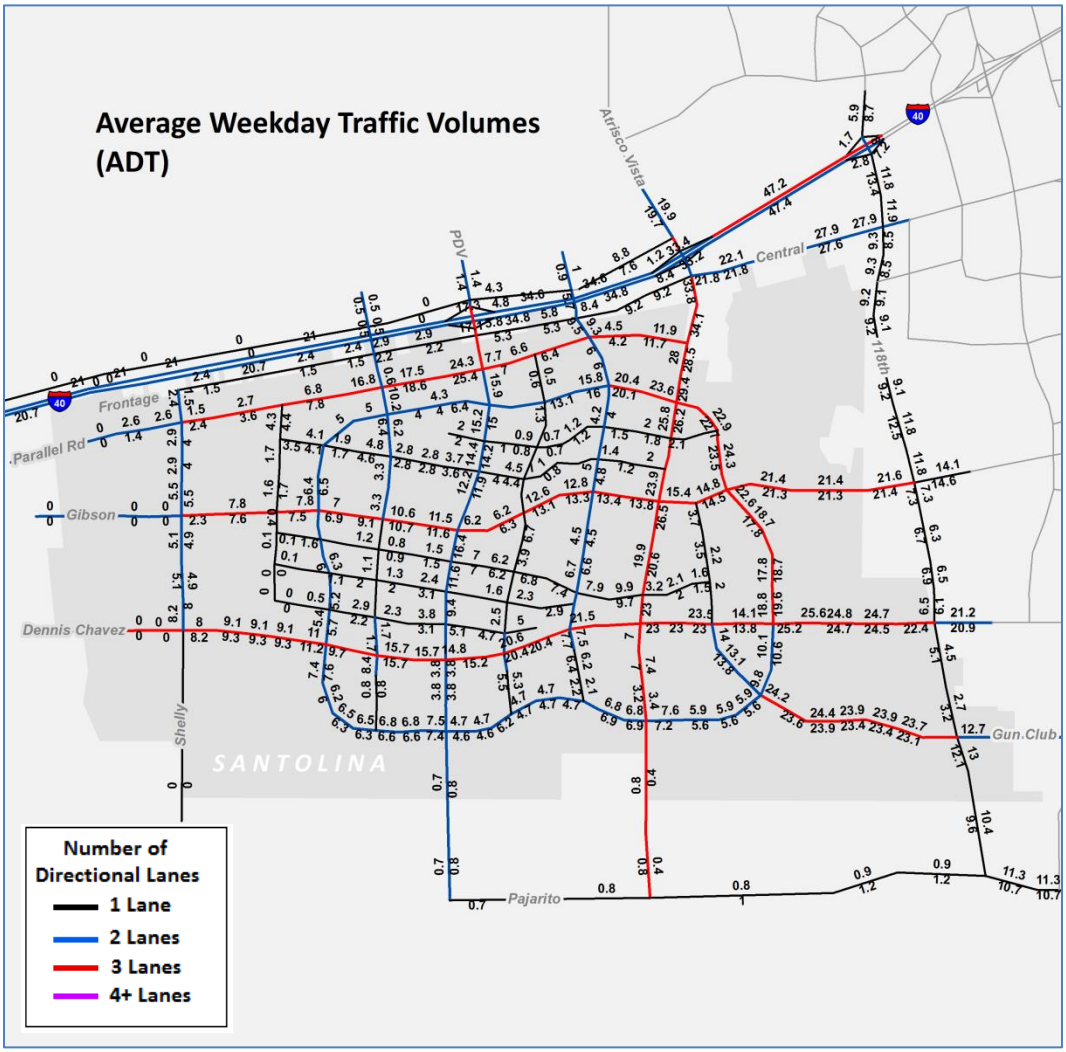

Figure 7: ADT on Santolina Roads (Build-Out) in thousands (000).

AM Peak Hour Traffic Volumes (Build-Out)

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

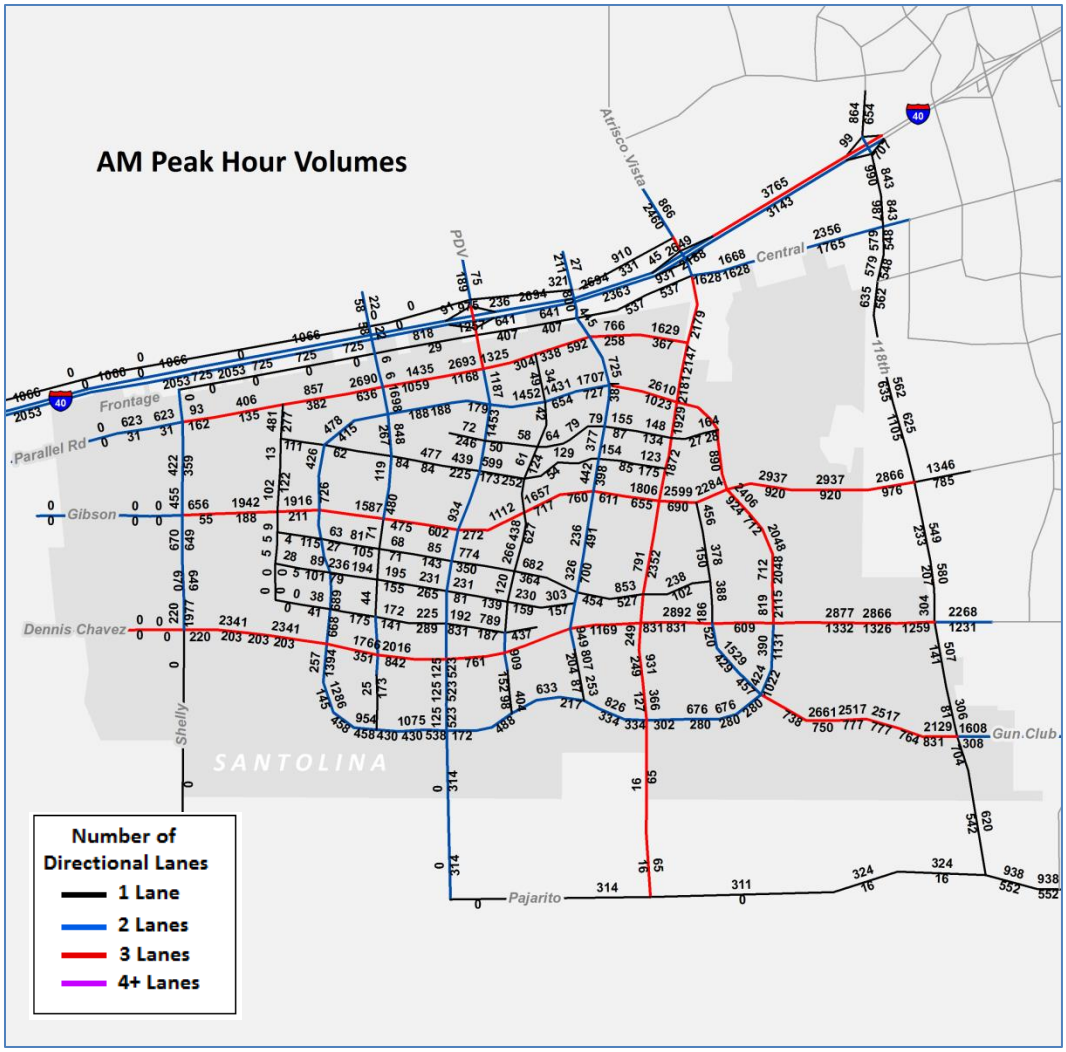

Figure 8: AM Peak Hour Volumes (Build-Out)

PM Peak Hour Volumes (Build-Out)

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

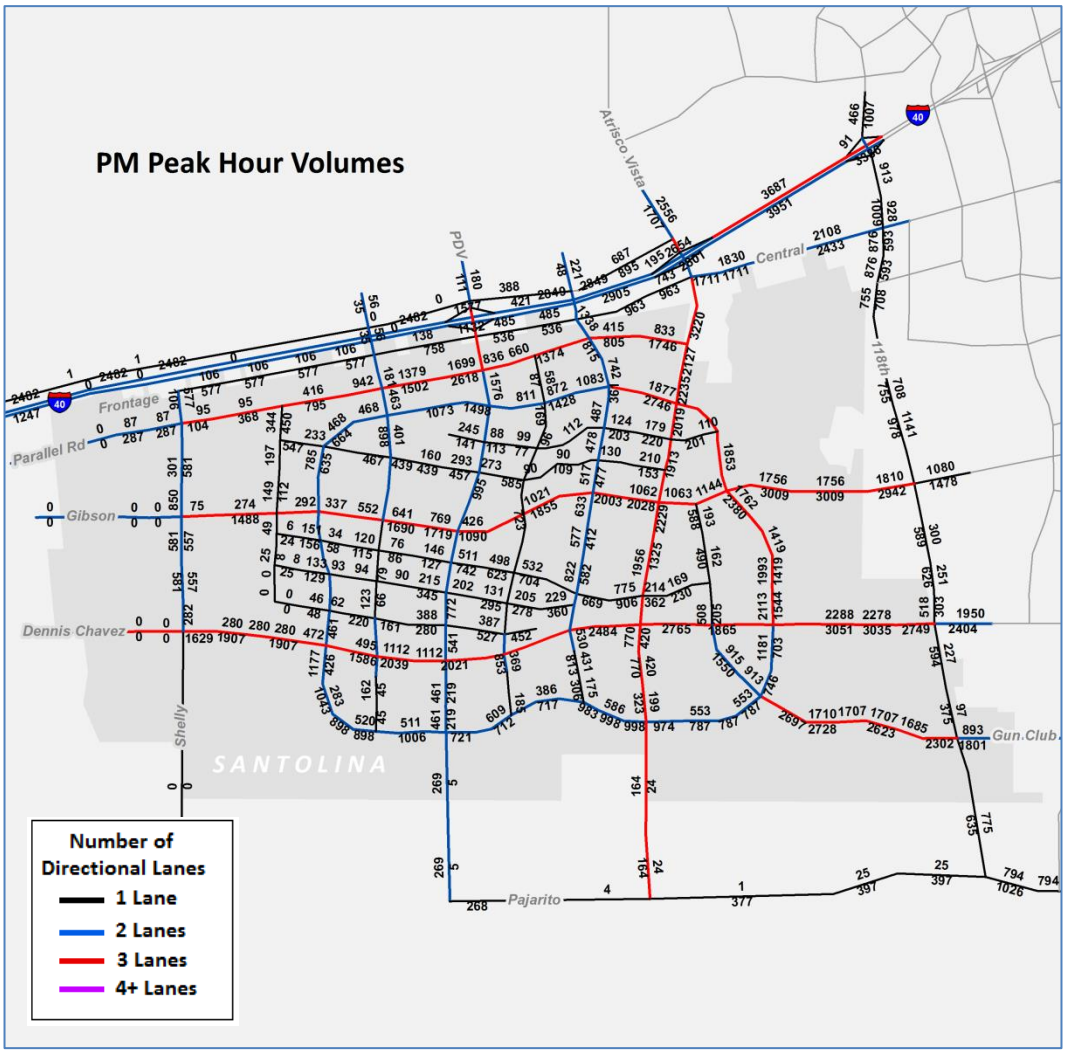

Figure 9: PM Peak Hour Volumes (Build-Out)

Screenline Volumes (Build-Out)

Table 4 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 4: Screenline Volumes (Build-Out)

			AM Peak Hour		PM Peak Hour	
Screenline	**Roadway**	**ADT (000)**	**NB**	**SB**	**NB**	**SB**
Along I-40	*118th*	25.2	843	990	913	1,009
...Between I-40 and Central	*Atrisco Vista*	49.3	1,379	2,685	2,799	1,950
	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**	**ADT (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".

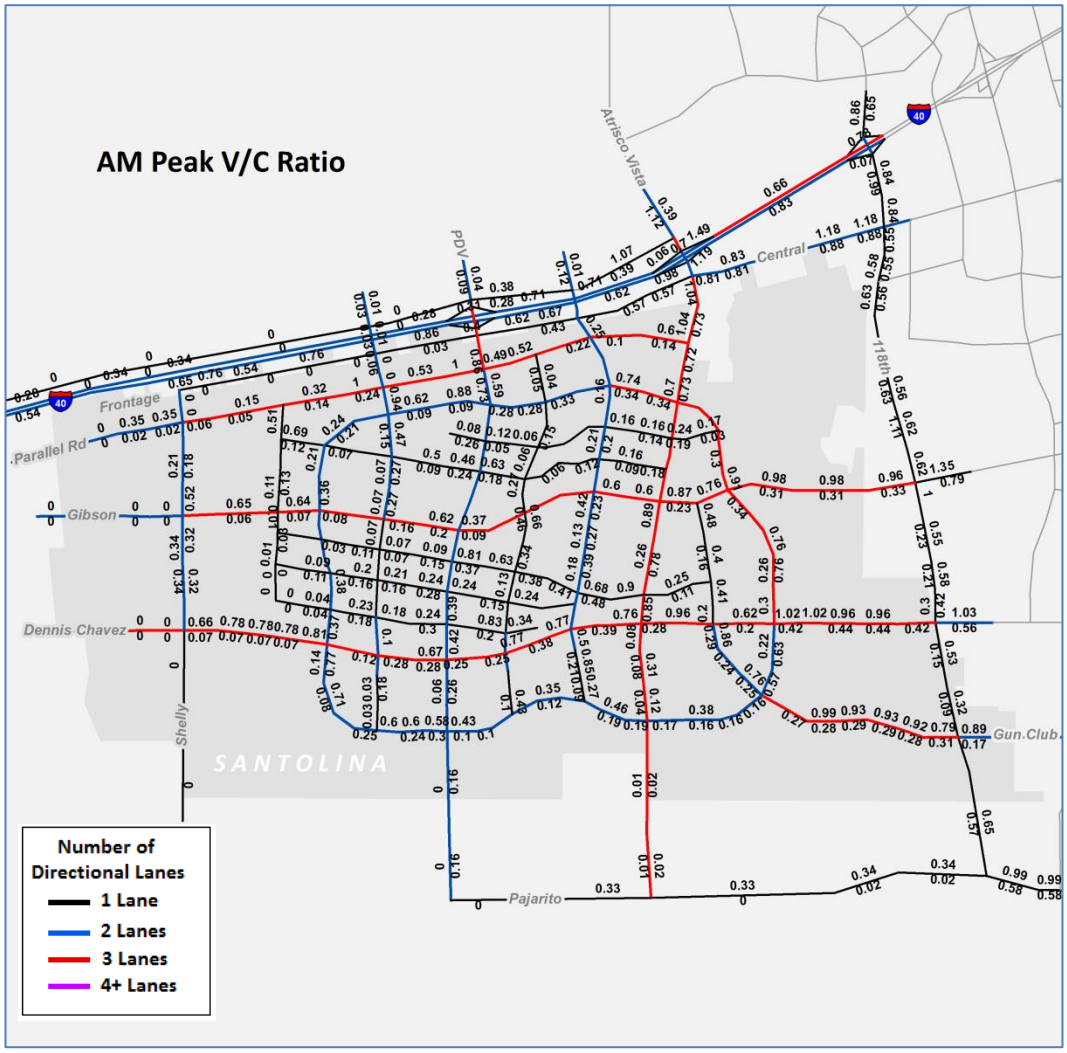

Figure 10: AM V/C Ratios (Build-Out)

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.

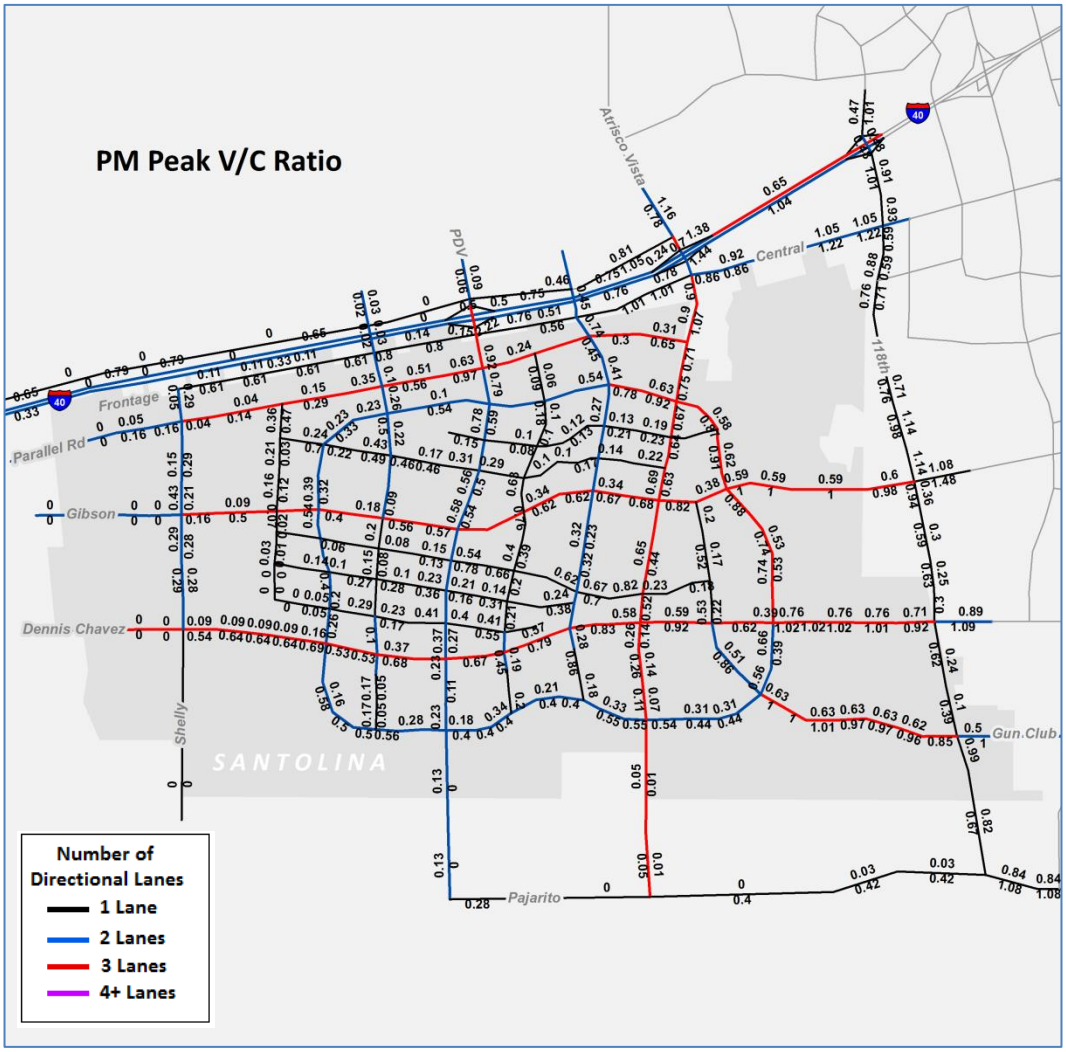

Figure 11: PM V/C Ratios (Build-Out)

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).

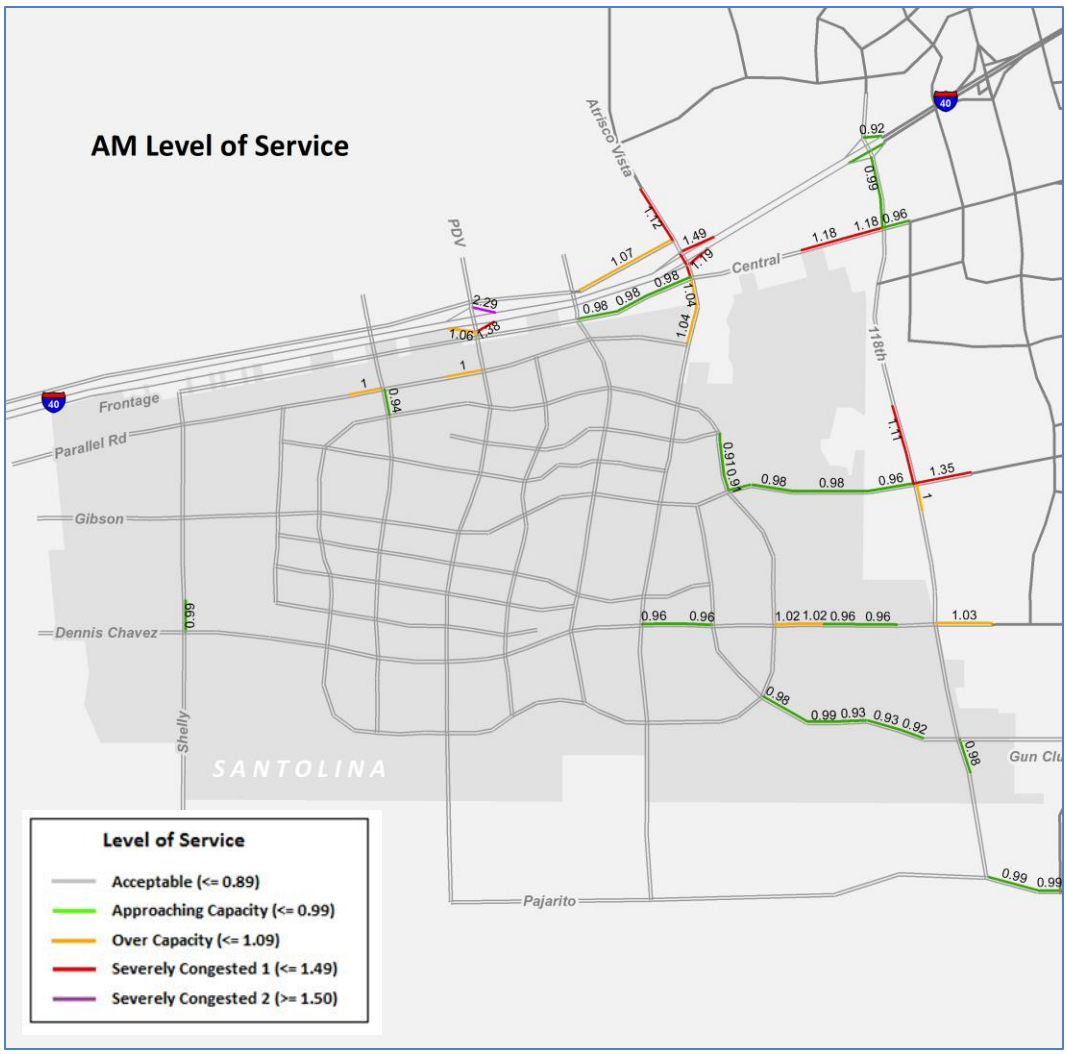

Figure 12: AM Level of Service (Build-Out)

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.

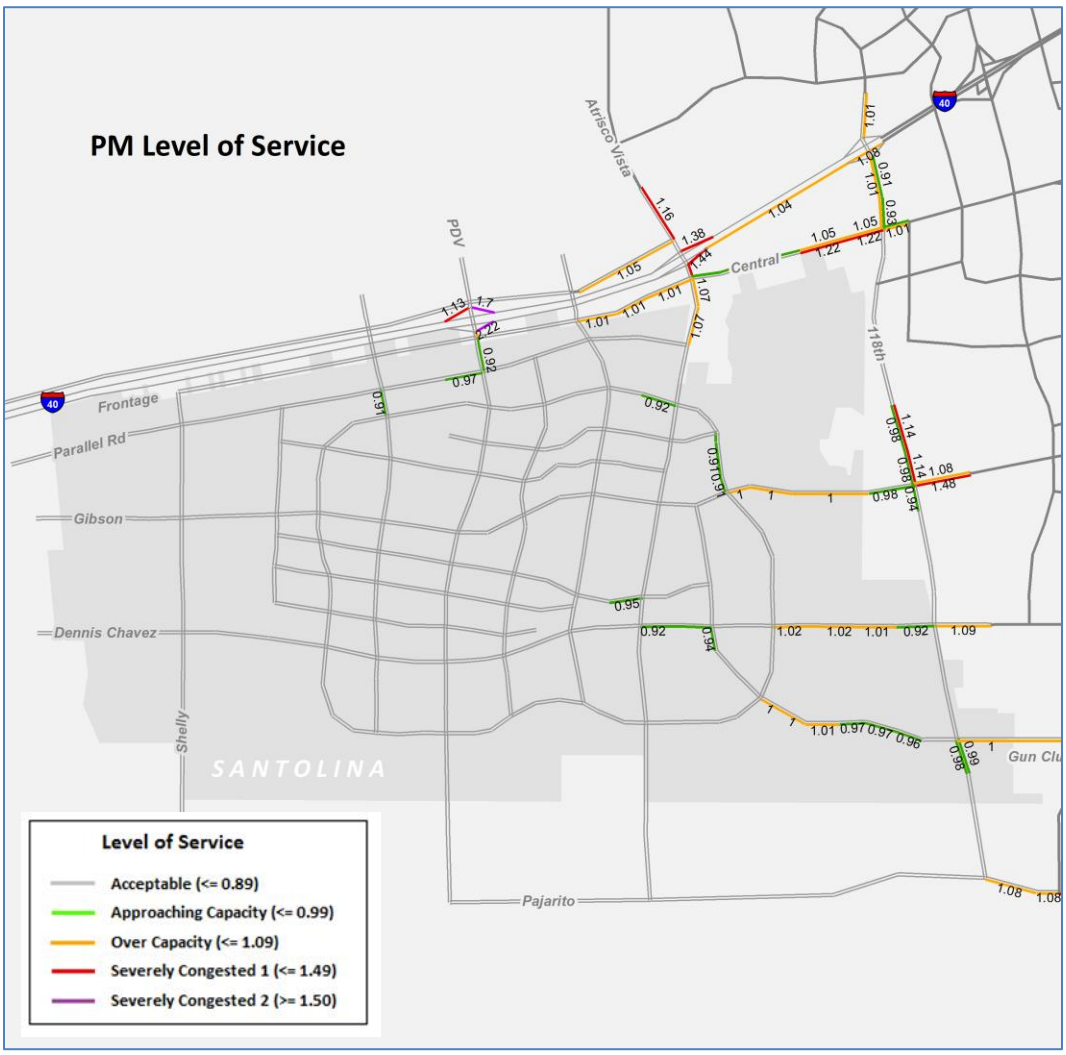

Figure 13: PM Level of Service (Build-Out)

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.

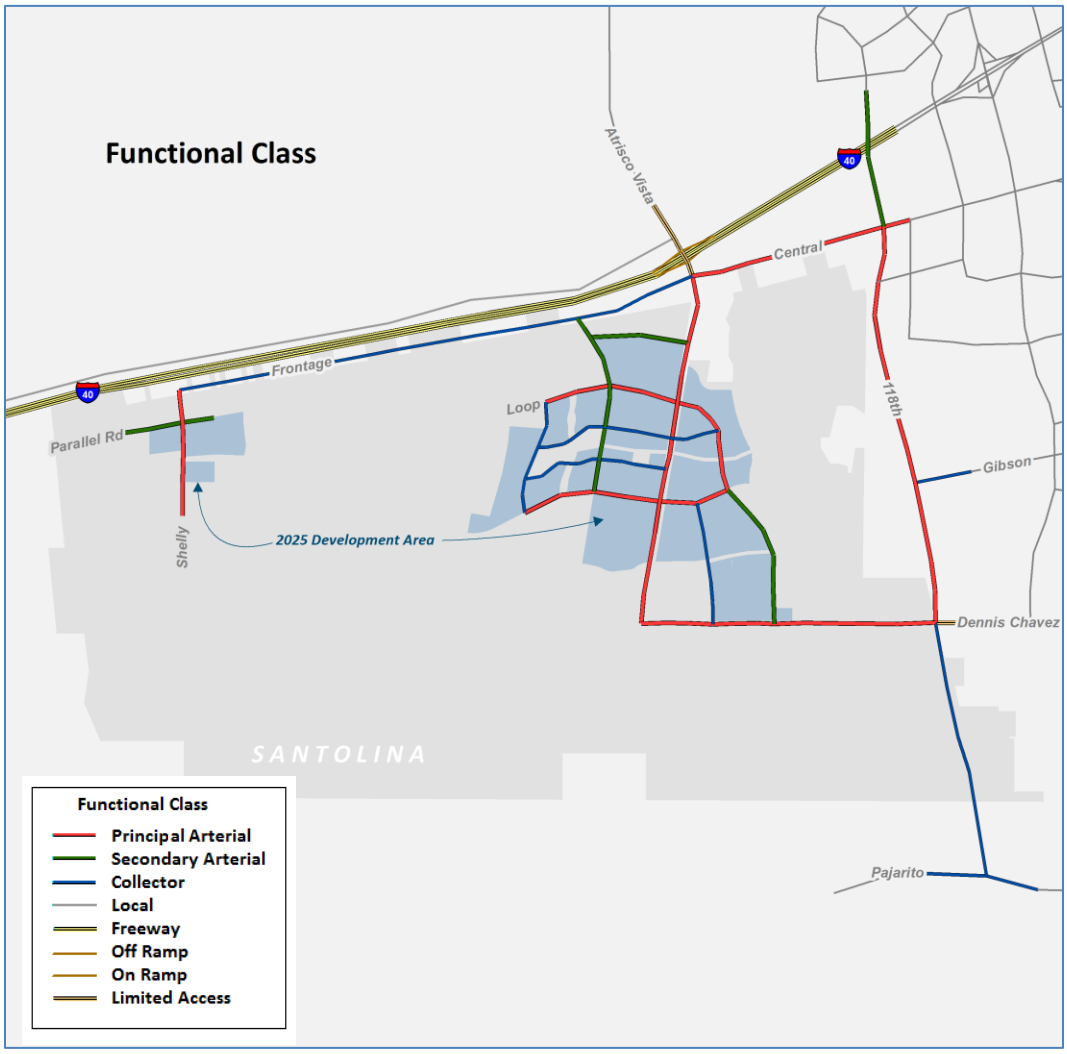

Figure 14: Functional Class (2025): Note the extent of development expected in Santolina by 2025.

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

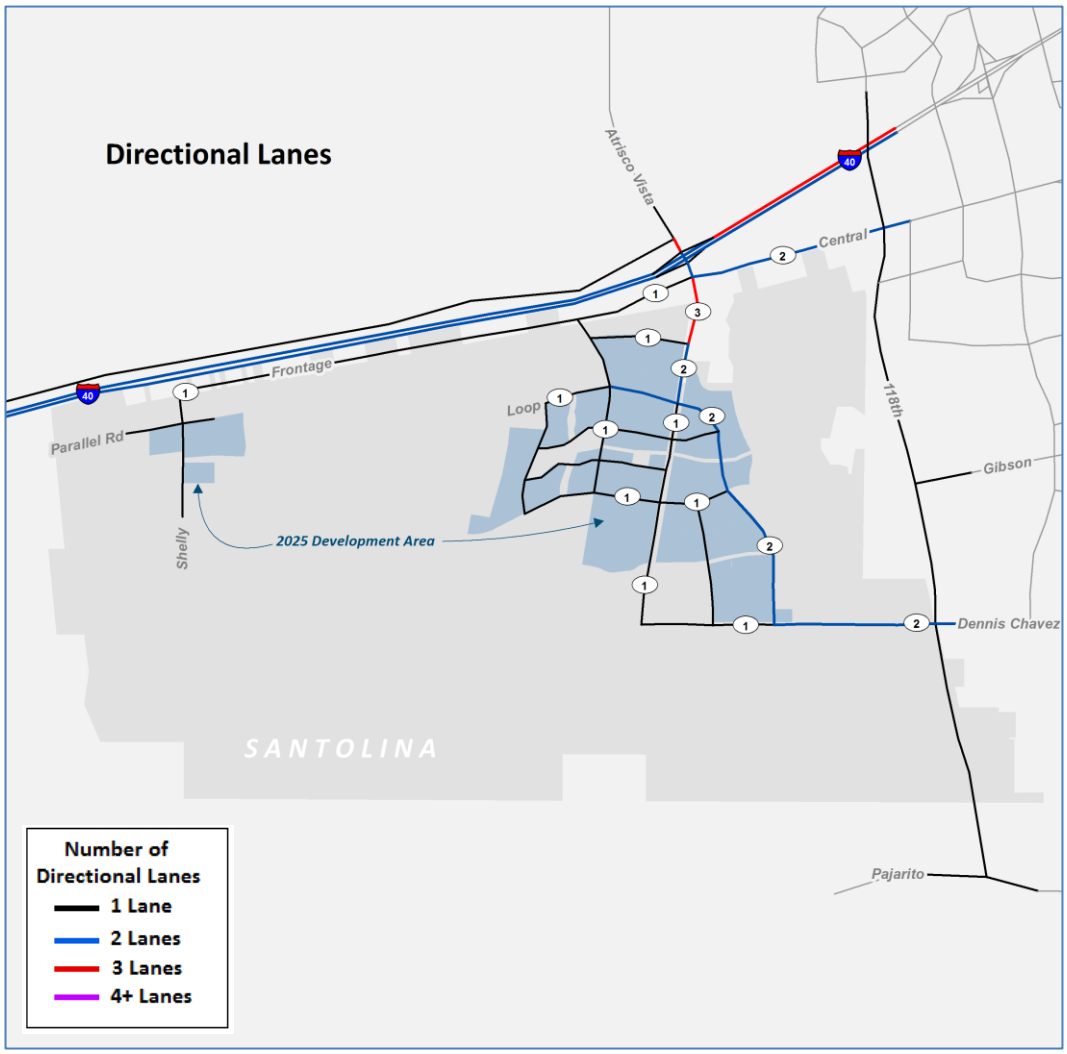

Figure 15: Number of Directional Lanes (2025)

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.

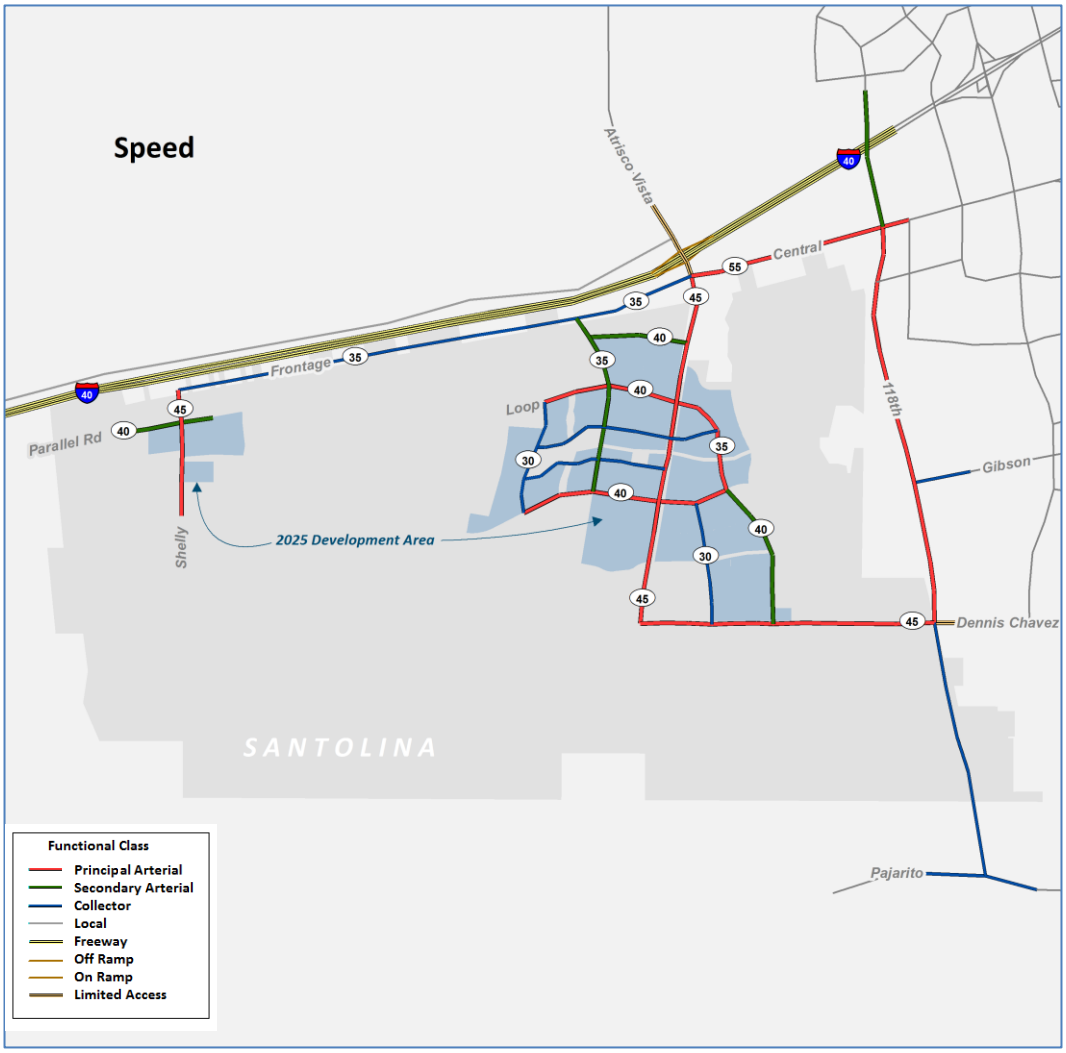

Figure 16: Speed on Santolina Roads (2025)

Average Daily (Weekday) Traffic (2025)

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

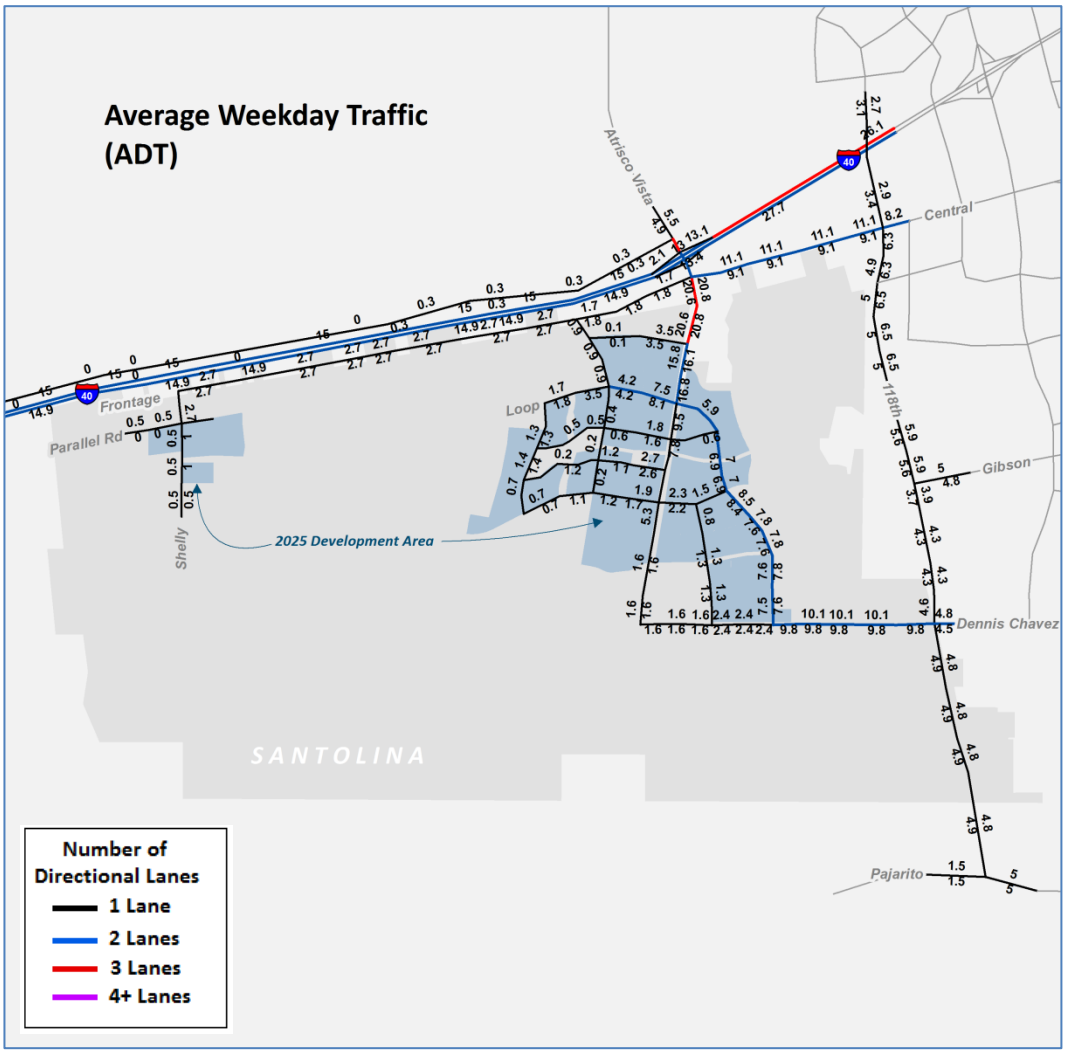

Figure 17: ADT on Santolina Roads (2025), in thousands

AM Peak Hour Traffic Volumes (2025)

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

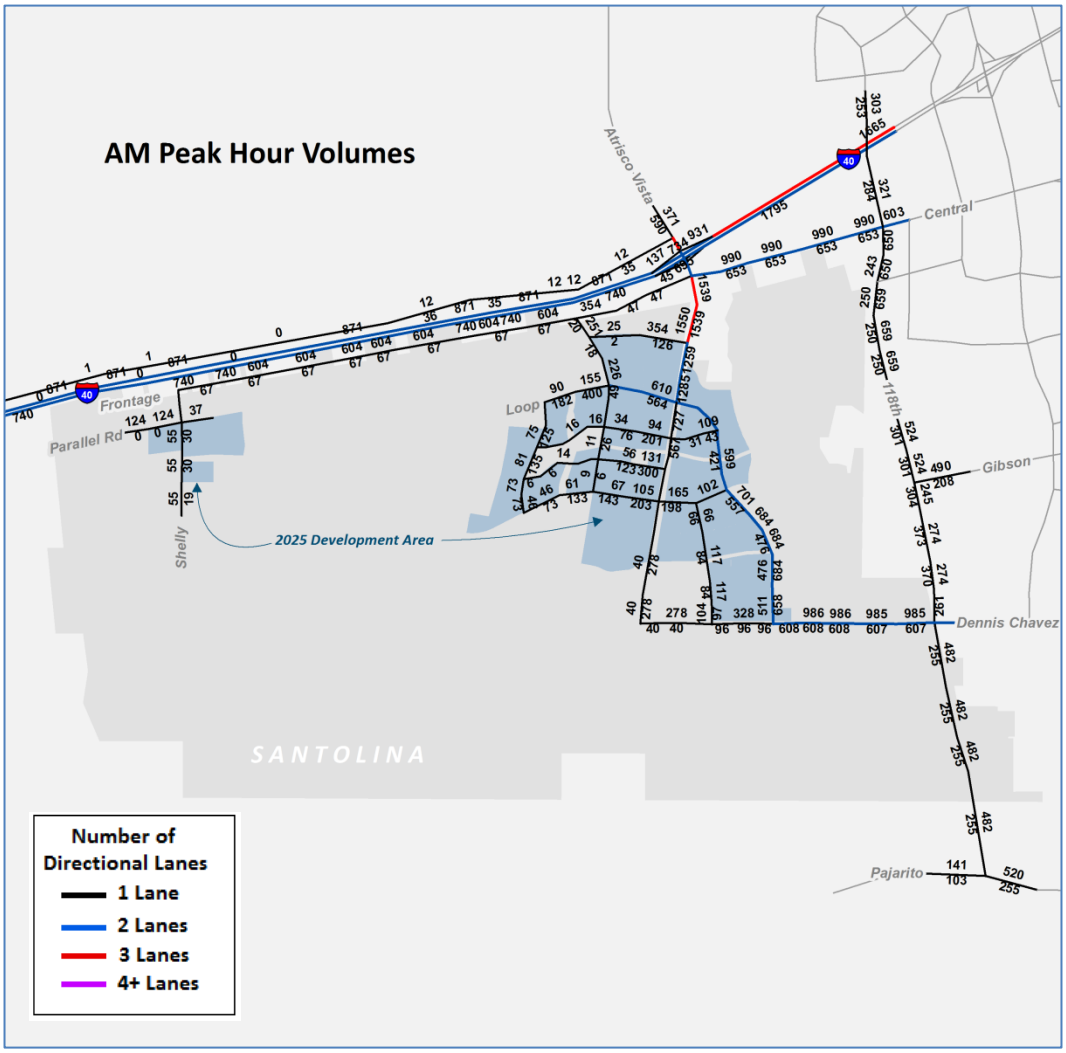

Figure 18: AM Peak Hour Volumes (2025)

PM Peak Hour Volumes (2025)

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

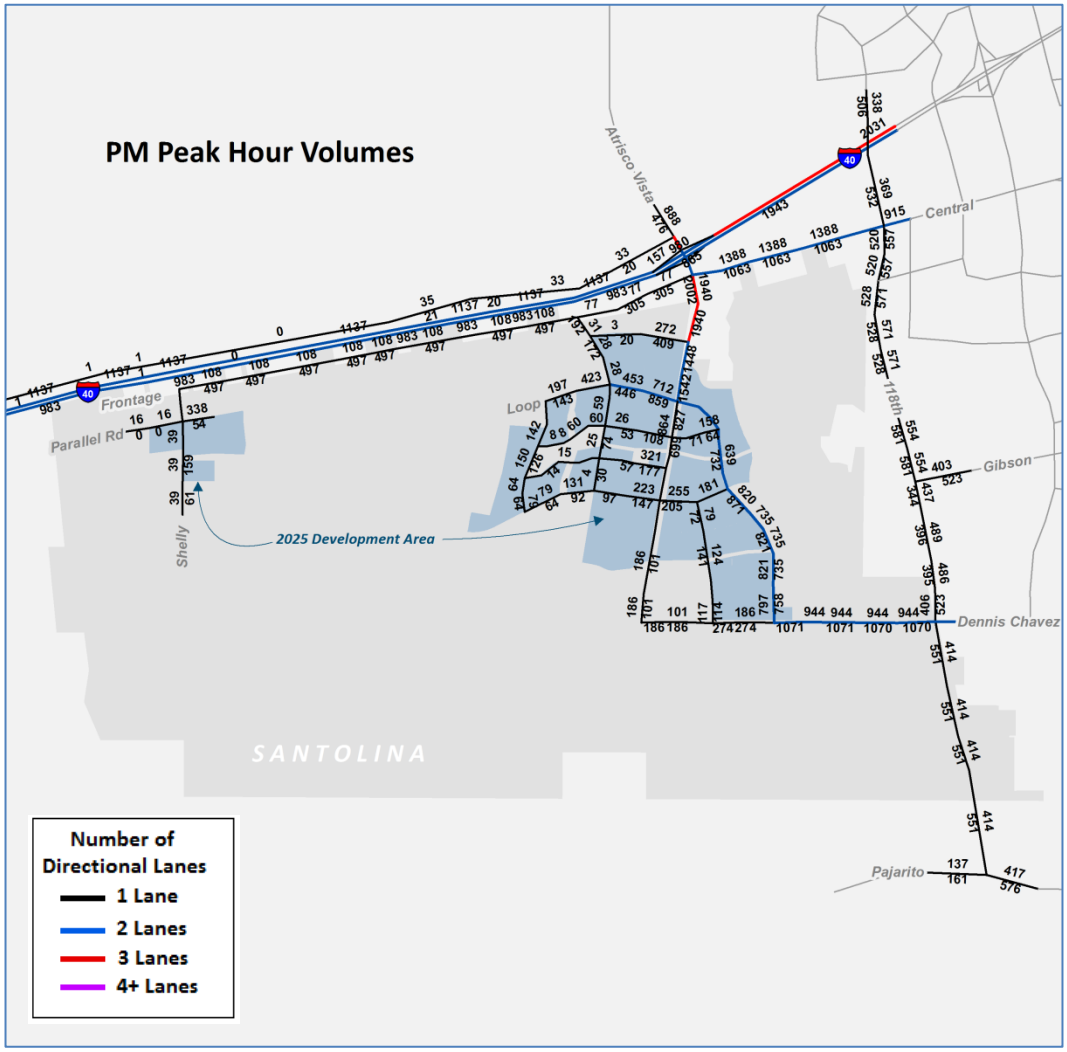

Figure 19: PM Peak Hour Volumes (2025)

Screenline Volumes (2025)

Table 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

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 5: Screenline Volumes (2025)

			AM Peak Hour		PM Peak Hour	
Screenline	**Roadway**	**ADT (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**	**ADT (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".

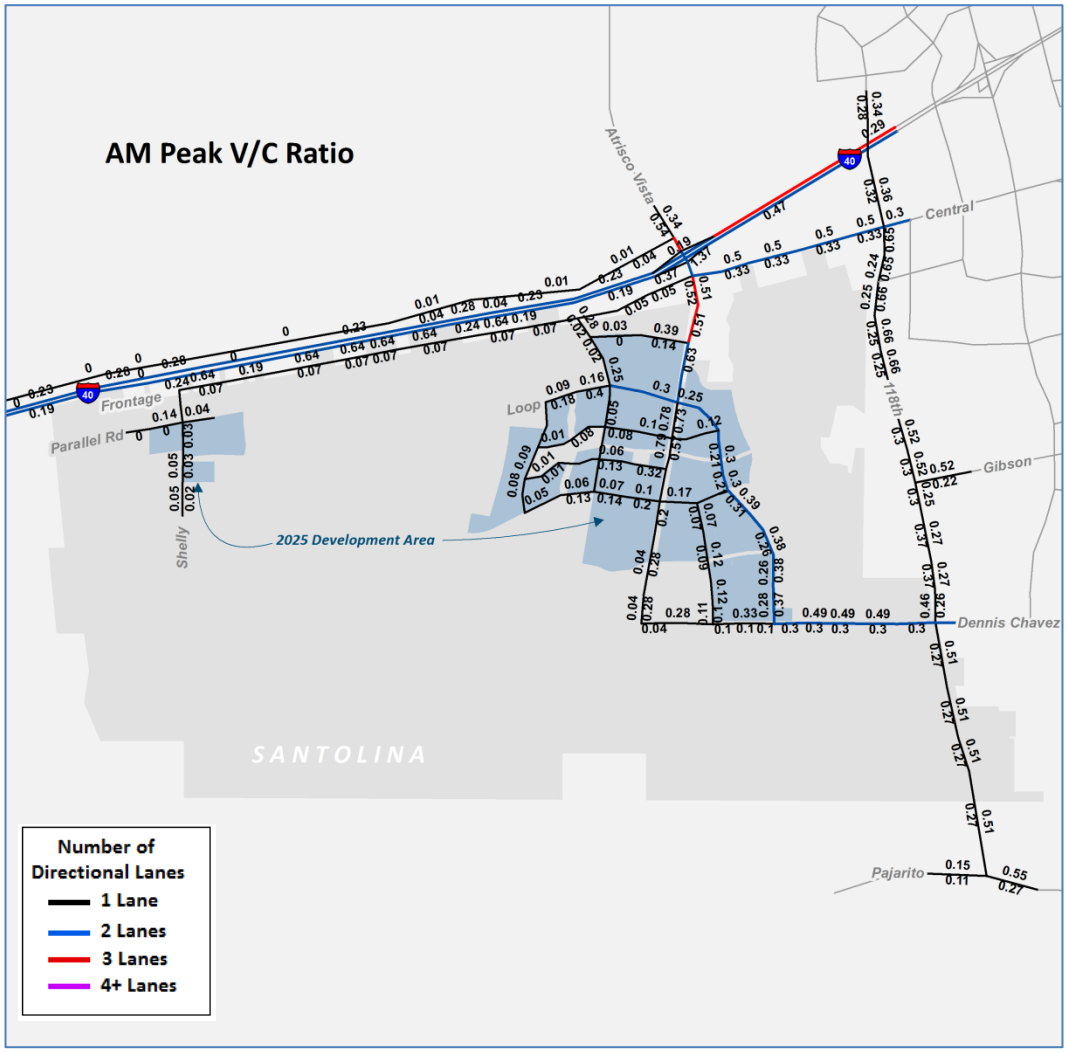

Figure 20: AM V/C Ratios (2025)

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".

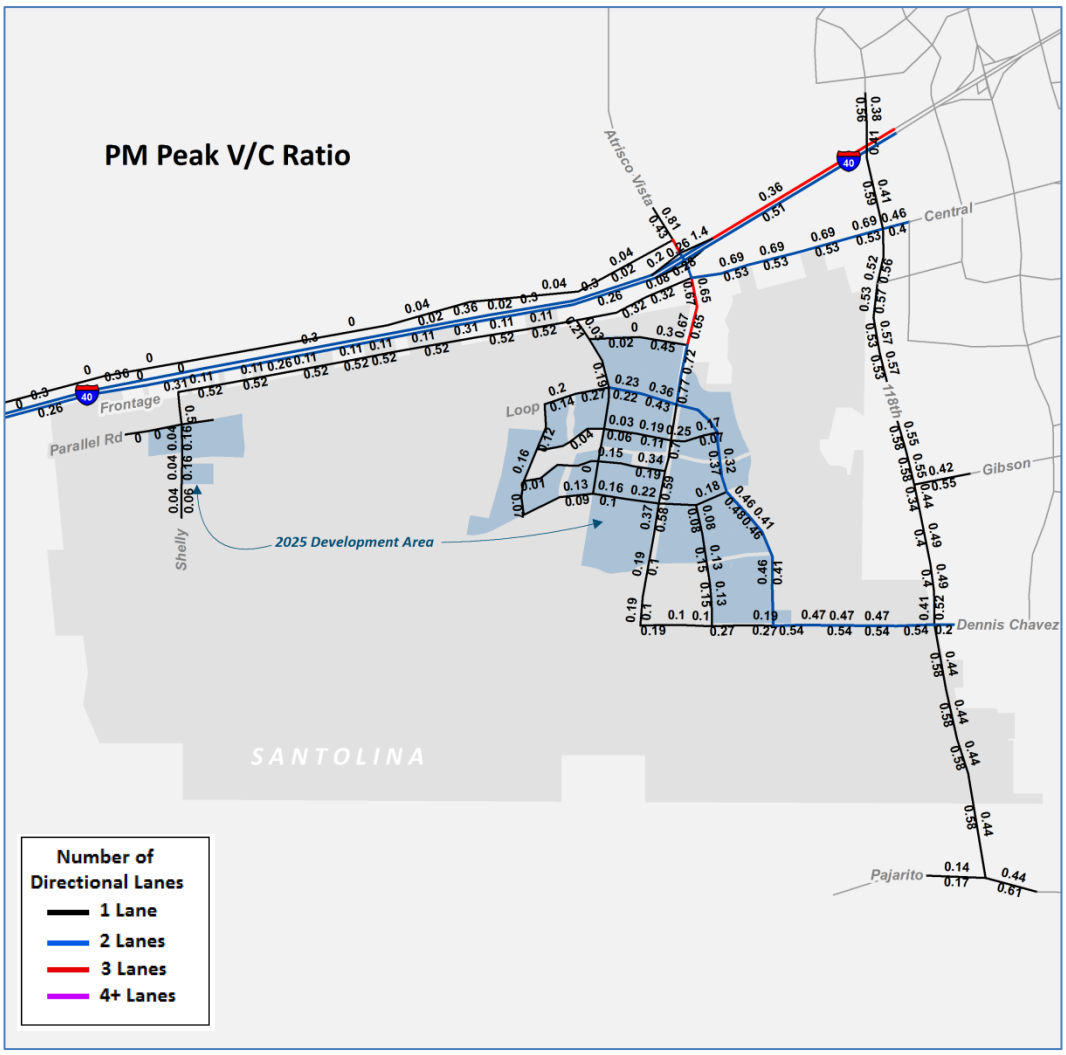

Figure 21: PM V/C Ratios (2025)

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.

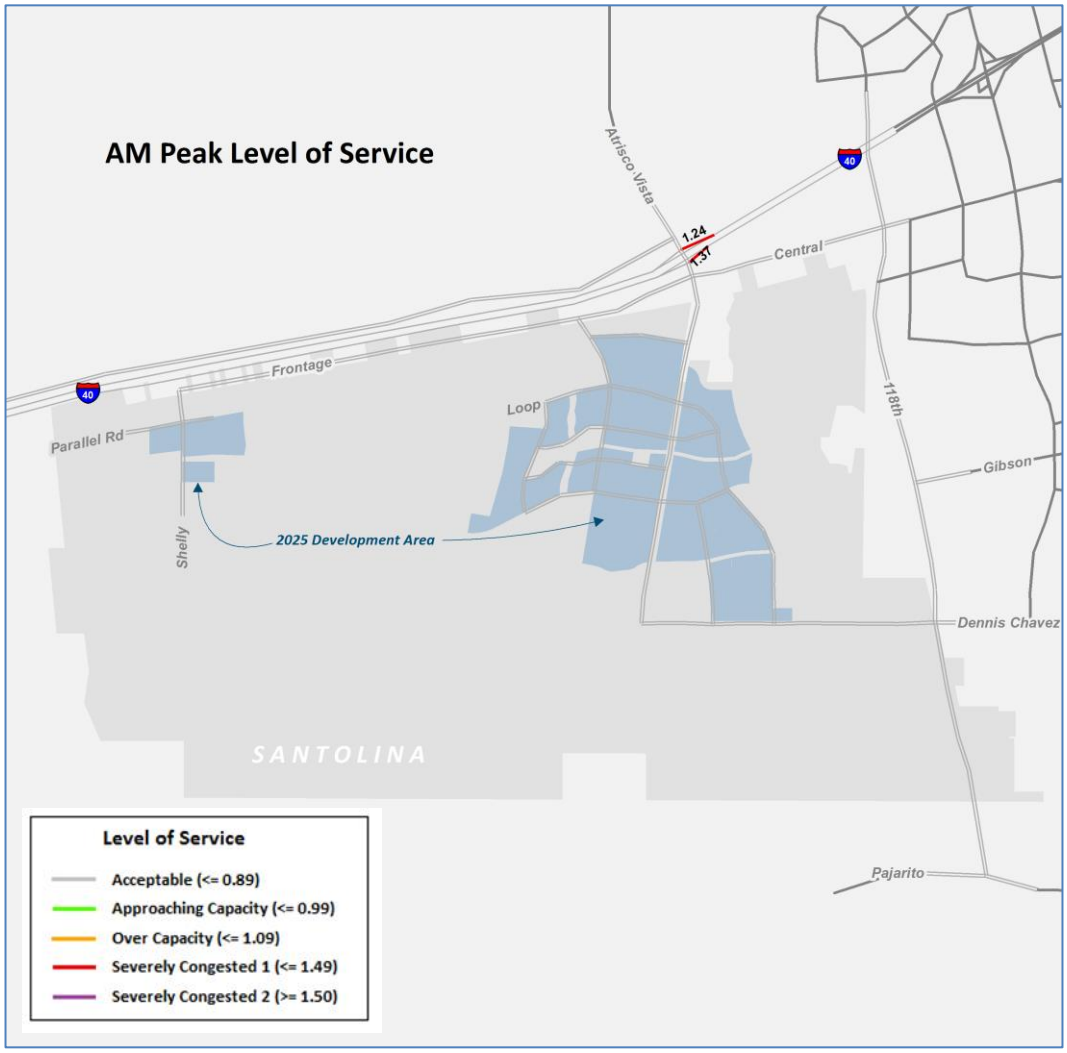

Figure 22: AM Level of Service (2025)

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.

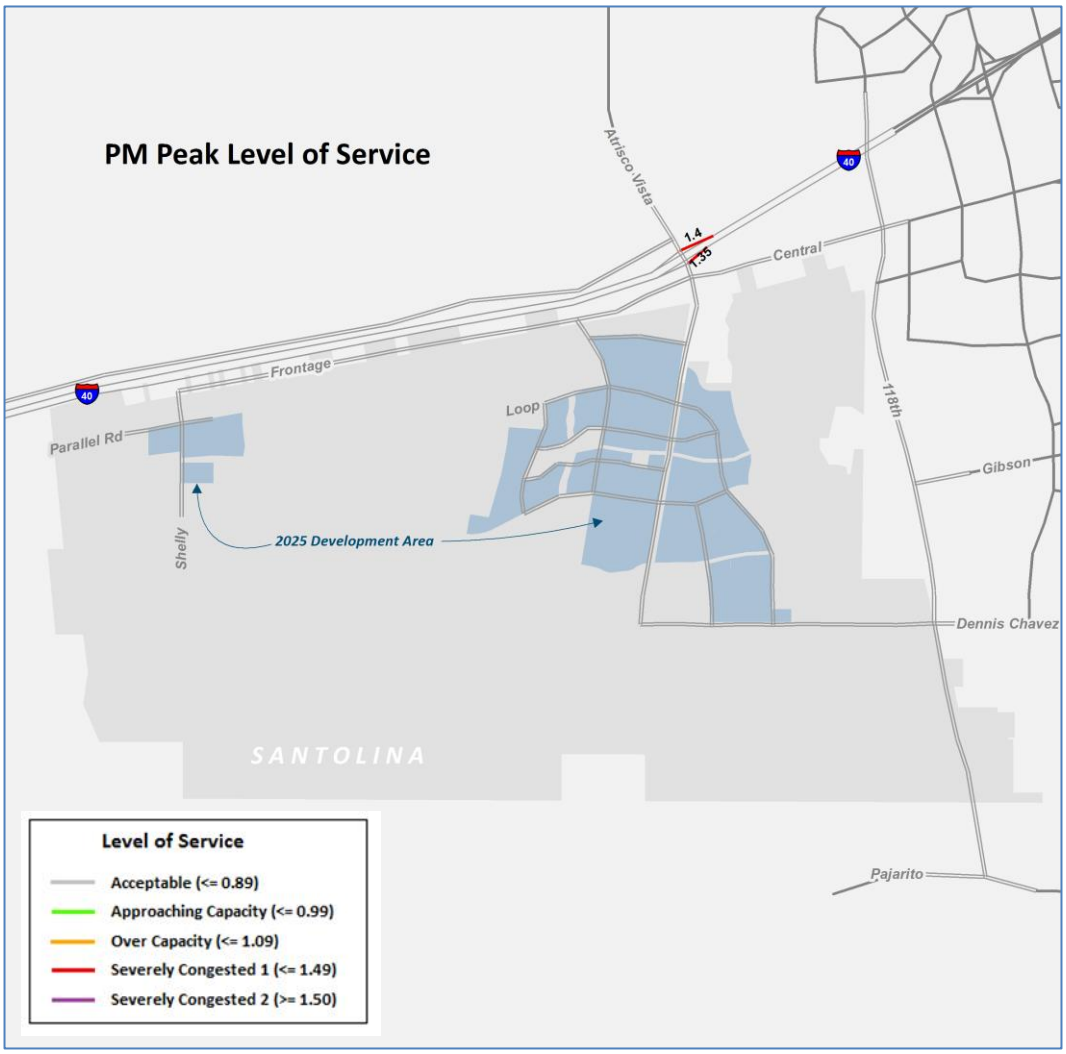

Figure 23: PM Level of Service (2025)

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.)

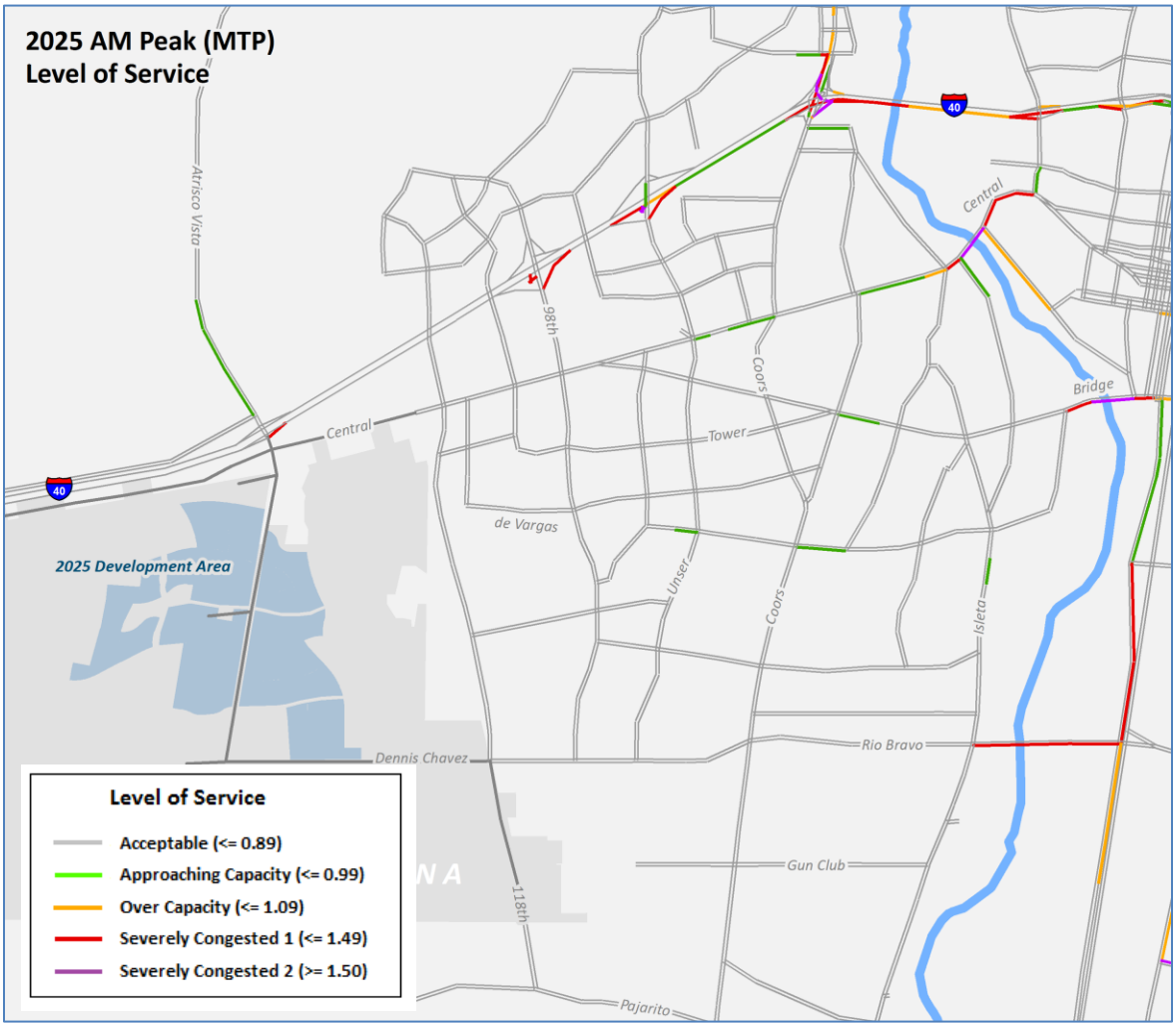

Figure 24: AM Peak Level of Service for the MTP, Off-site (2025)

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.

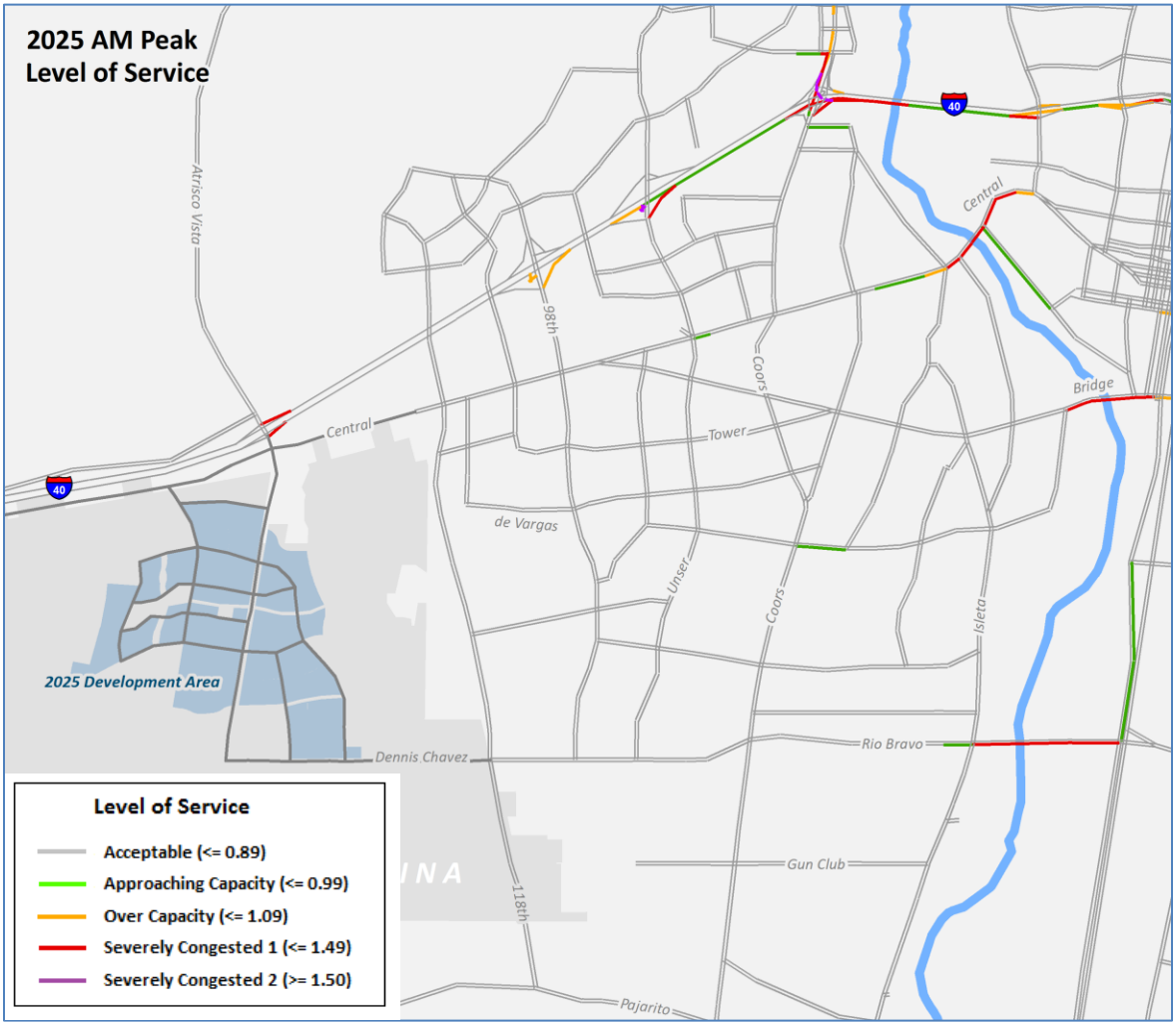

Figure 25: AM Peak Level of Service, Offsite (2025)

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.

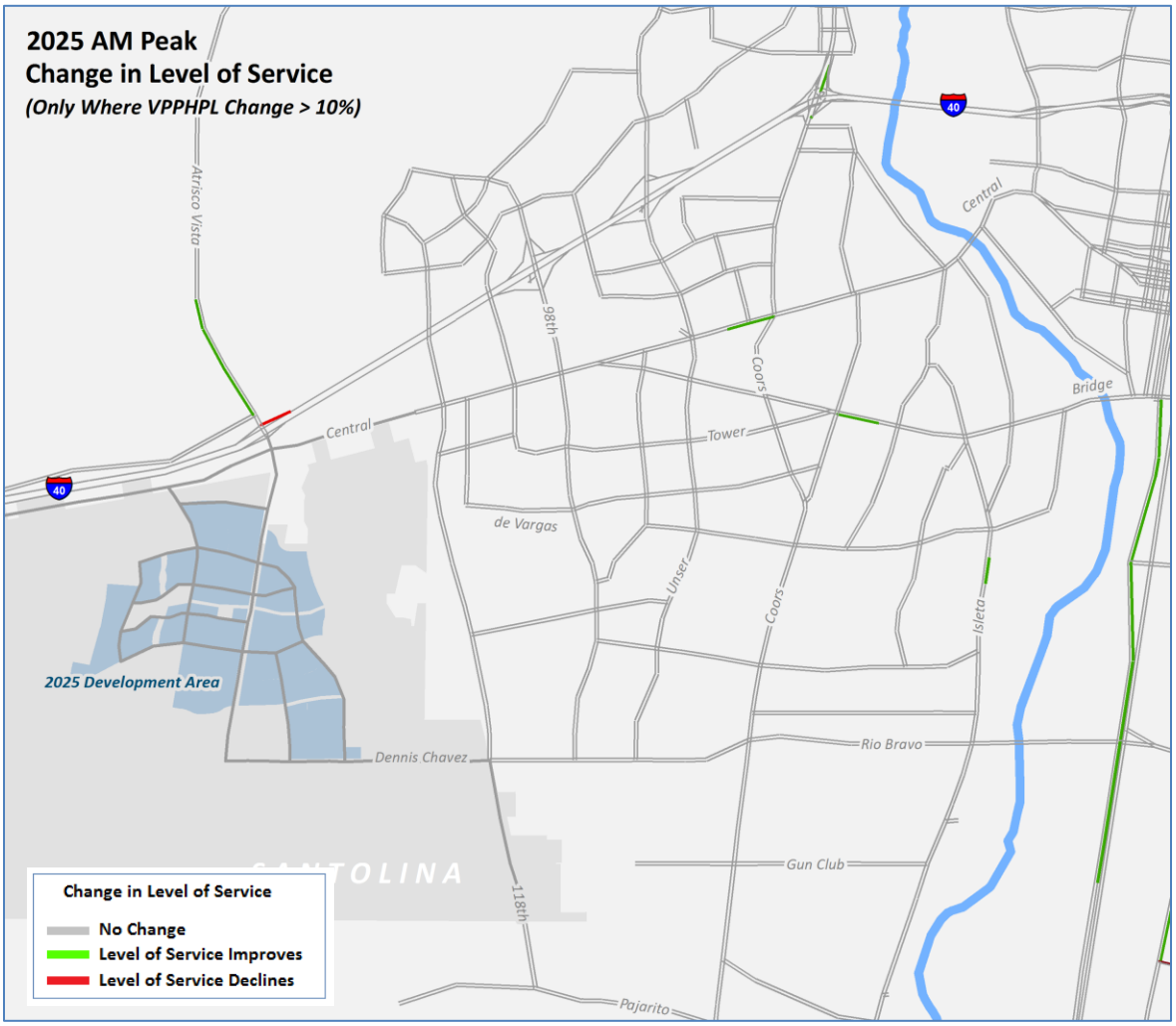

Figure 26: AM Peak Hour: Change in Offsite Level of Service (2025)

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).

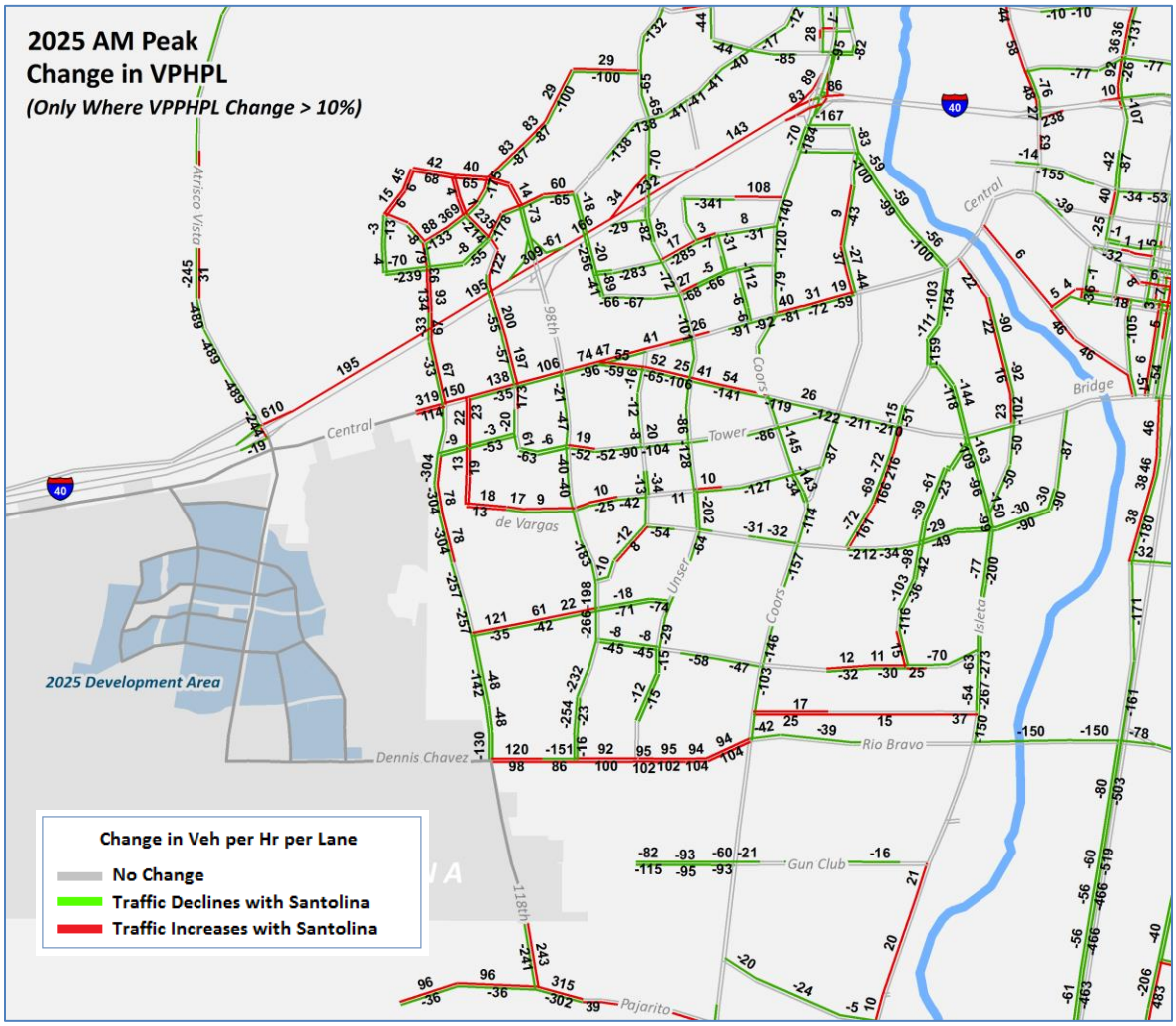

Figure 27: AM Peak Hour Change in VPHPL, Compared with the MTP (2025)

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.

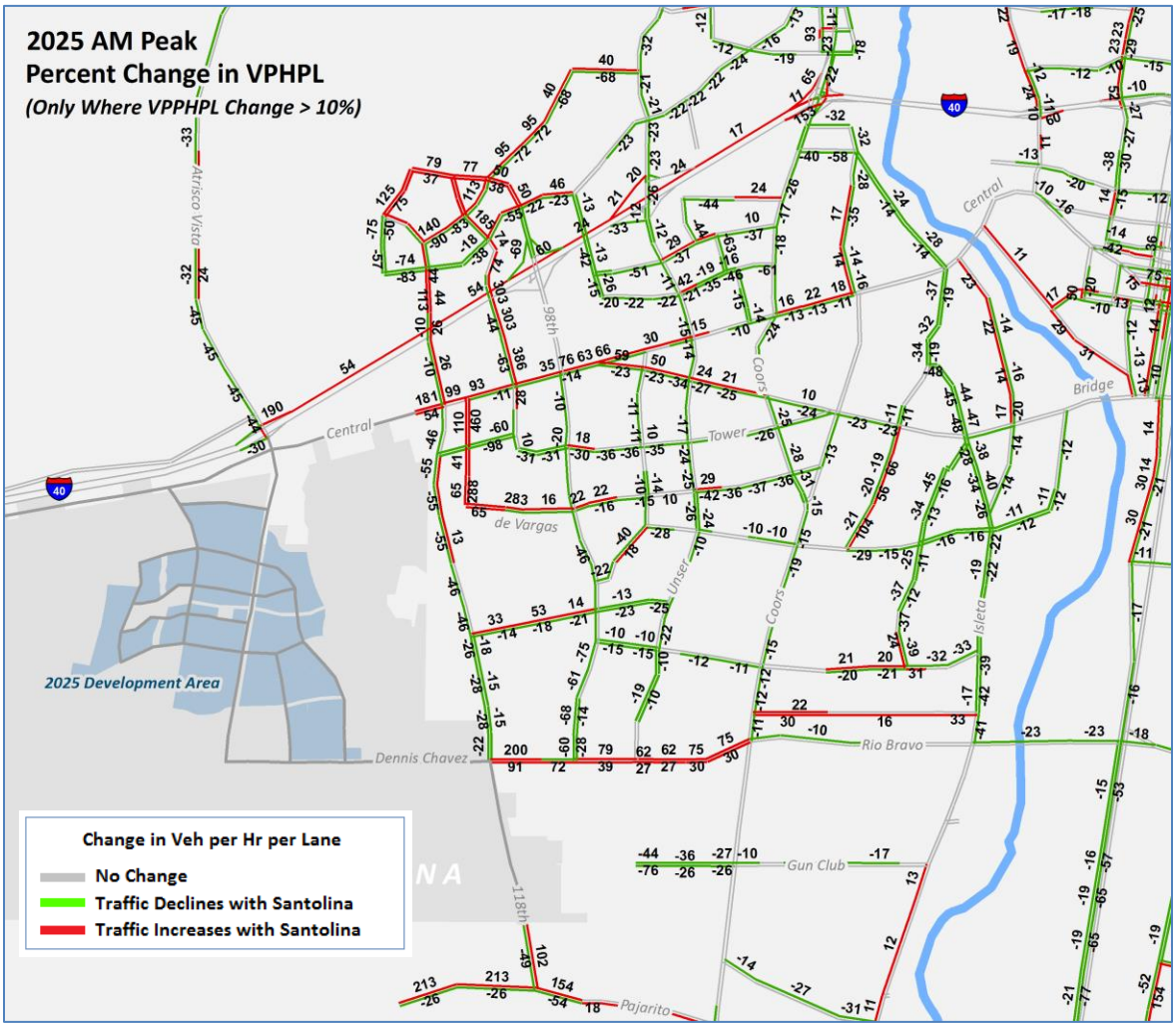

Figure 28: AM Peak Hour Percent Change in VPHPL, Compared with the MTP (2025)

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.)

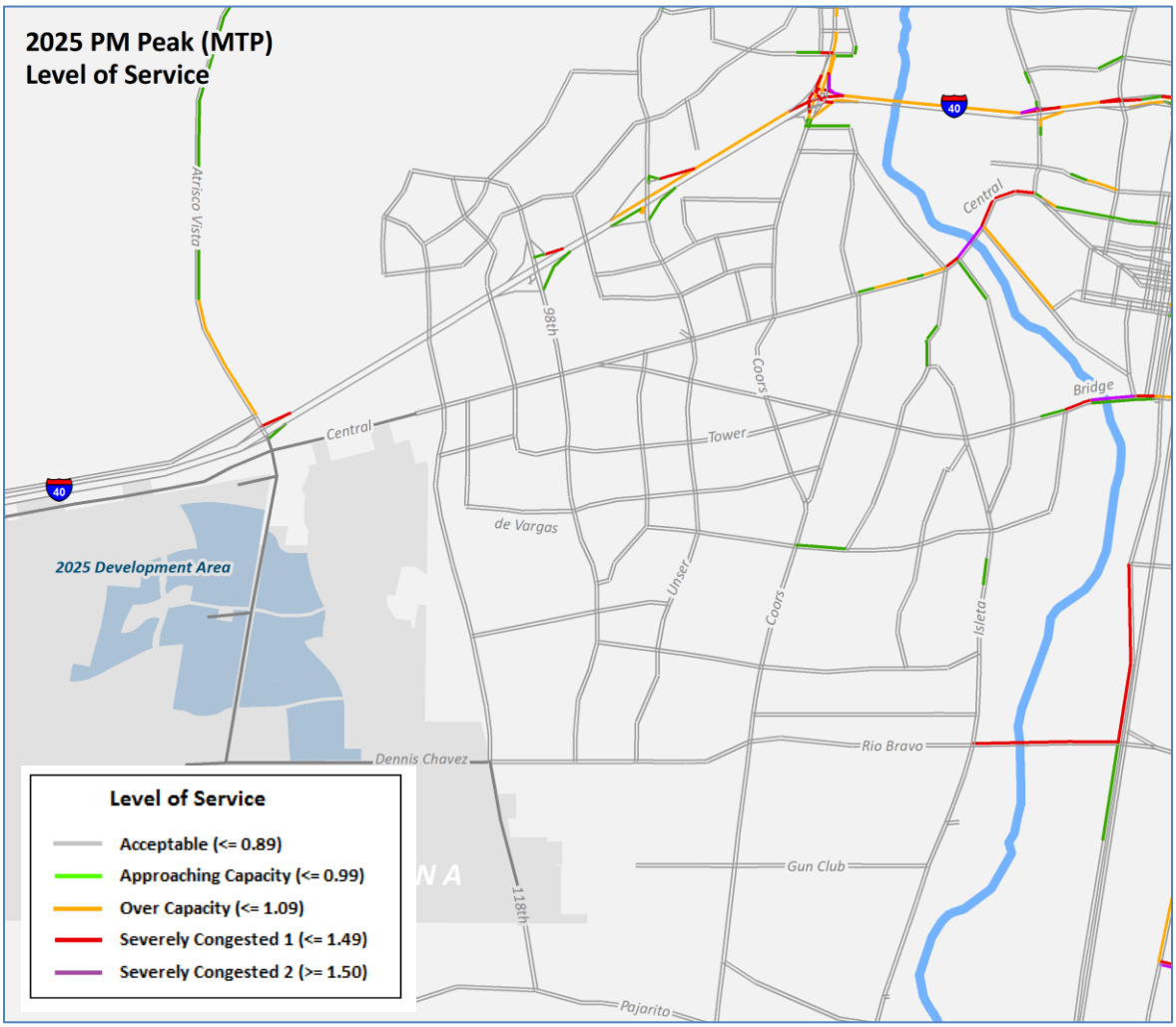

Figure 299: PM Peak Level of Service for the MTP, Off-site (2025)

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.

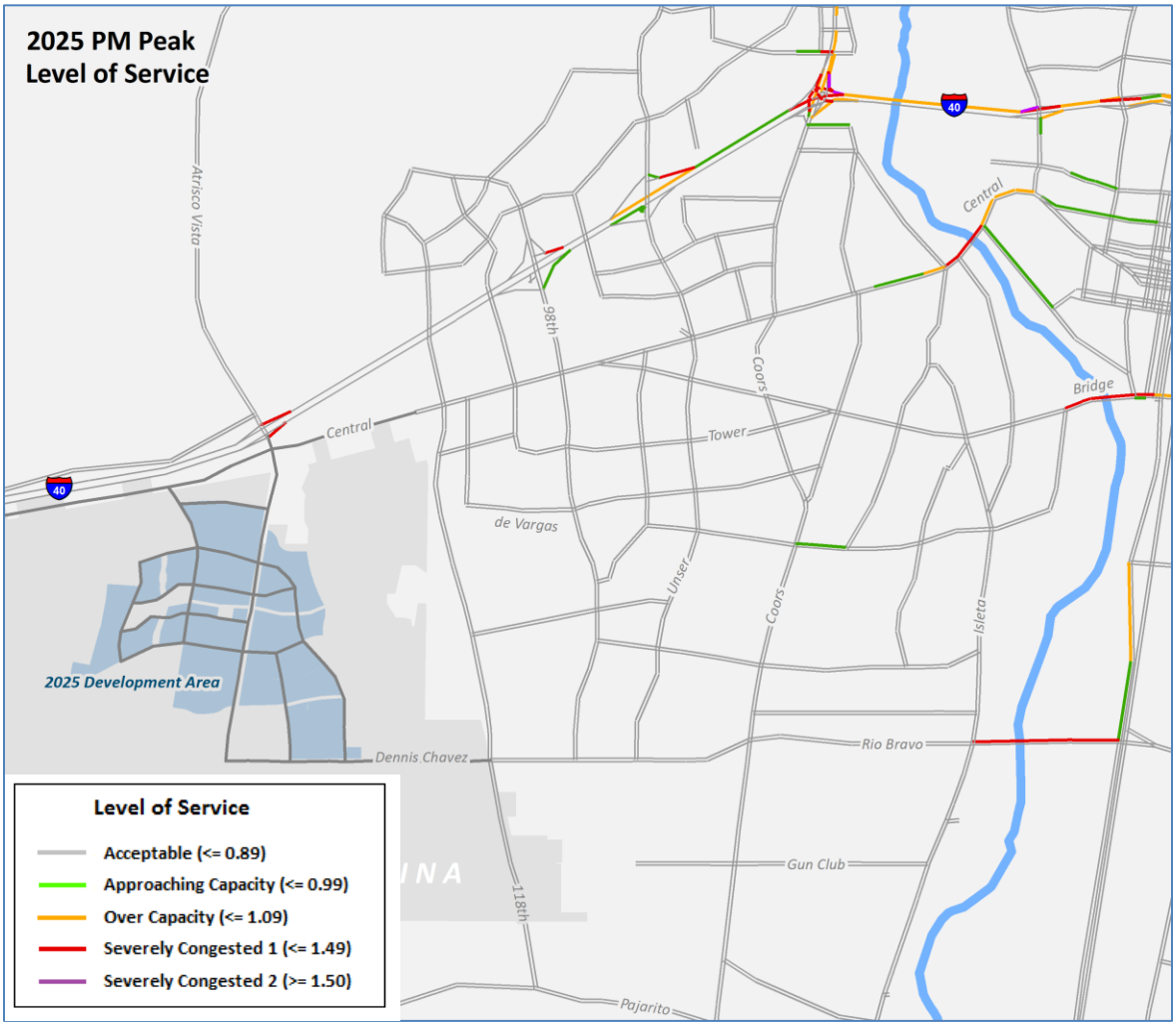

Figure 30: PM Peak Level of Service, Offsite (2025)

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.

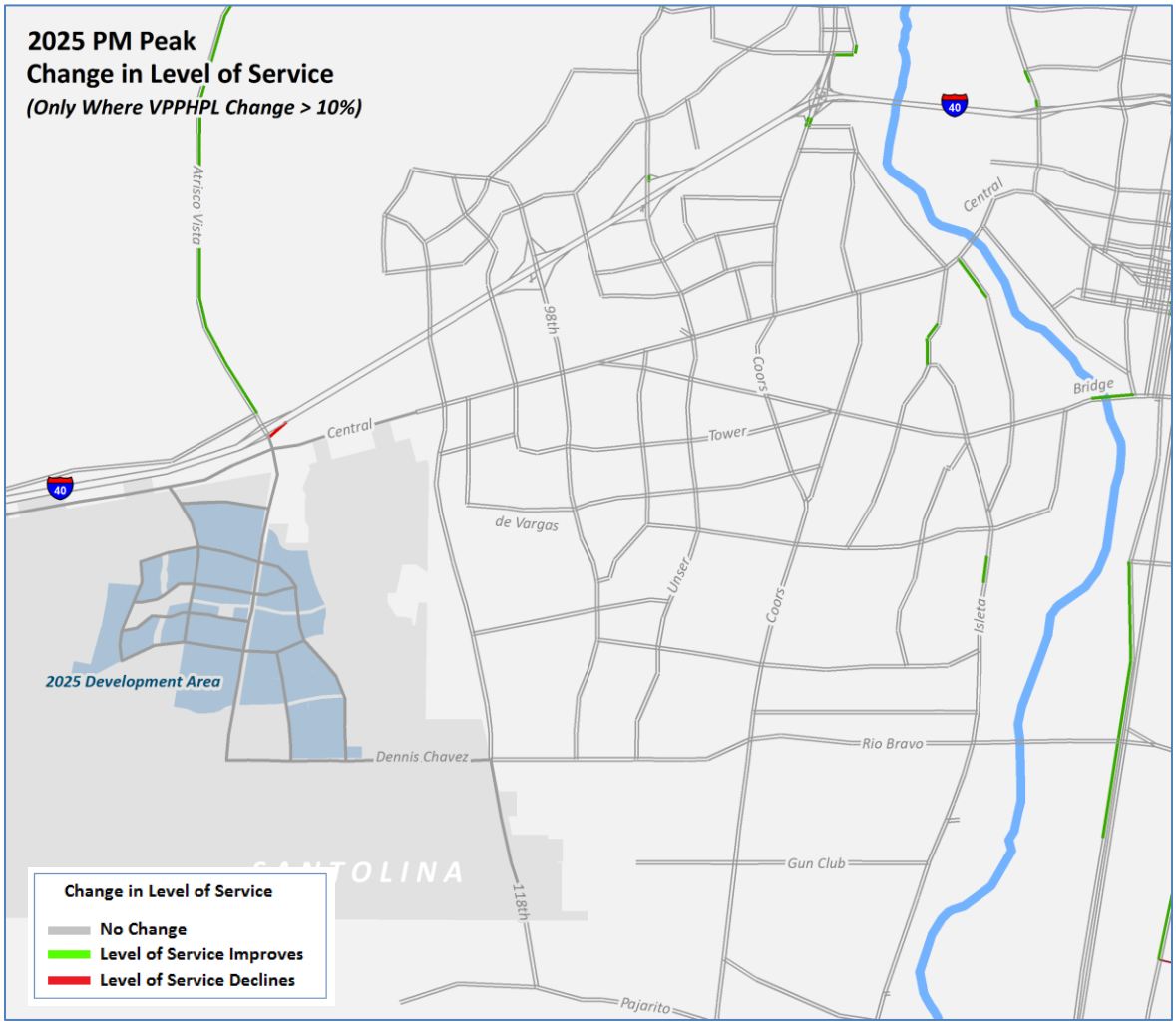

Figure 31: PM Peak Hour: Change in Offsite Level of Service (2025)

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).

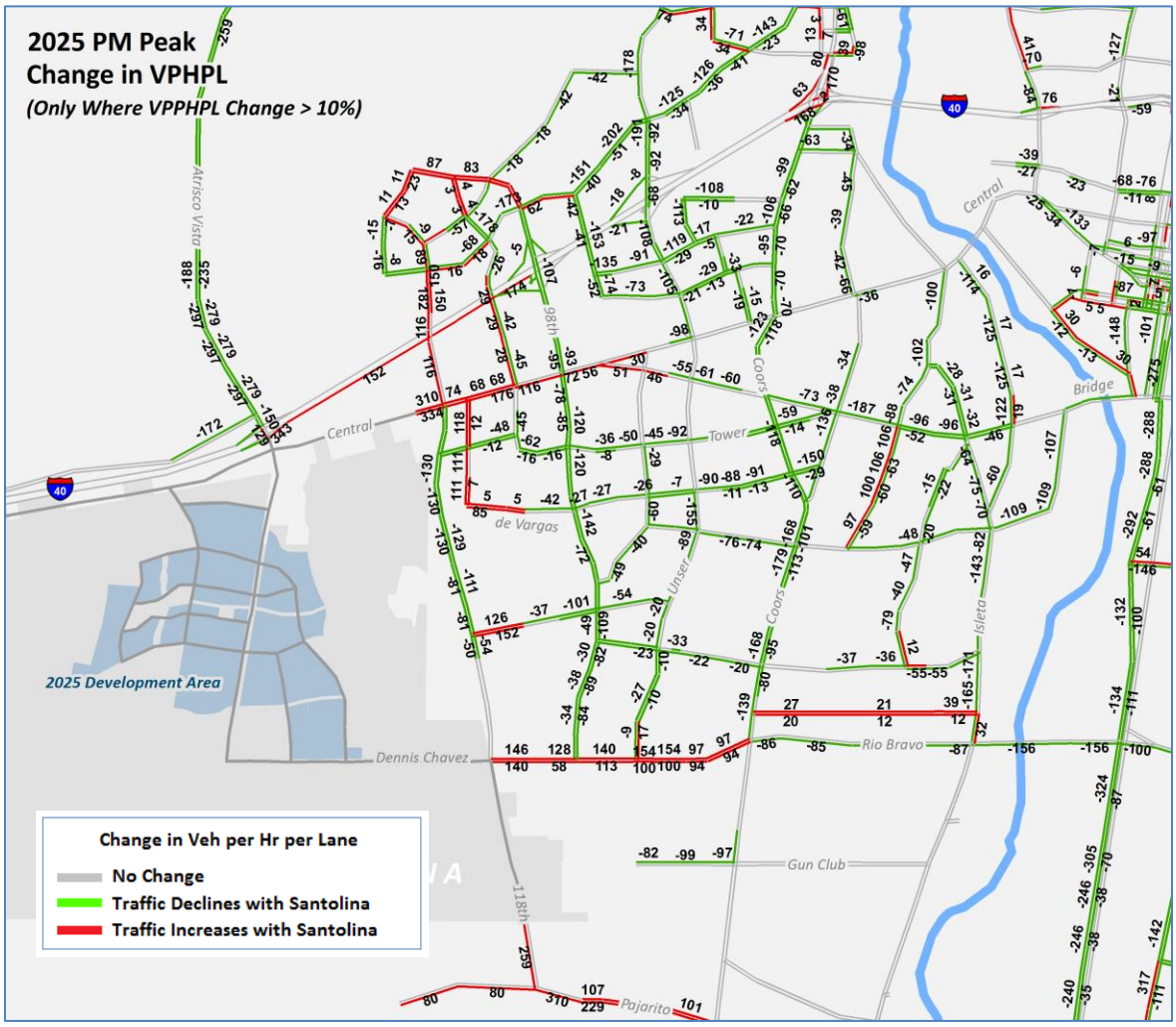

Figure 32: PM Peak Hour Change in VPHPL, Compared with the MTP (2025)

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.

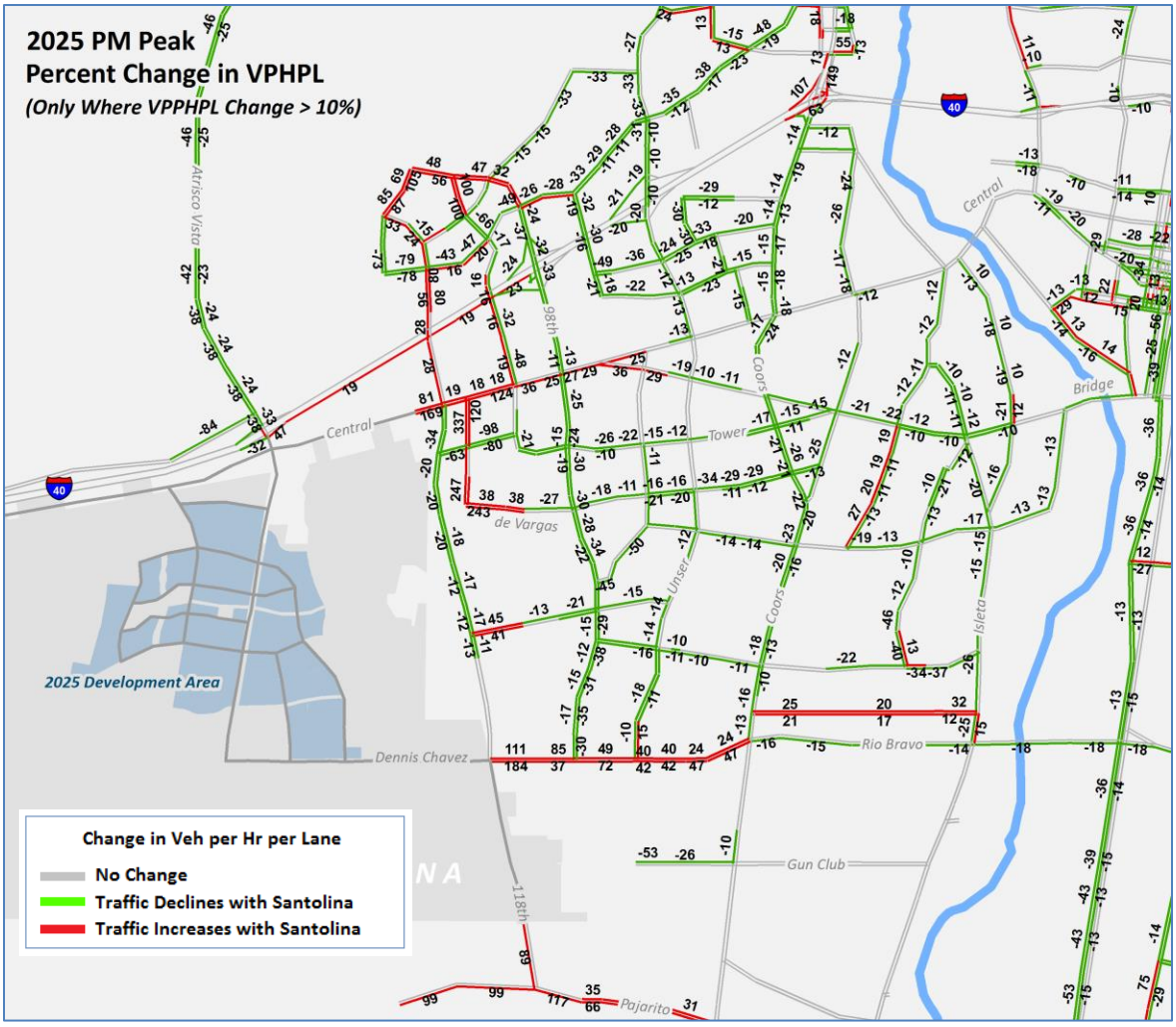

Figure 33: PM Peak Hour Percent Change in VPHPL, Compared with the MTP (2025)

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 6 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 6: 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 7 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 7 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 7: 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.

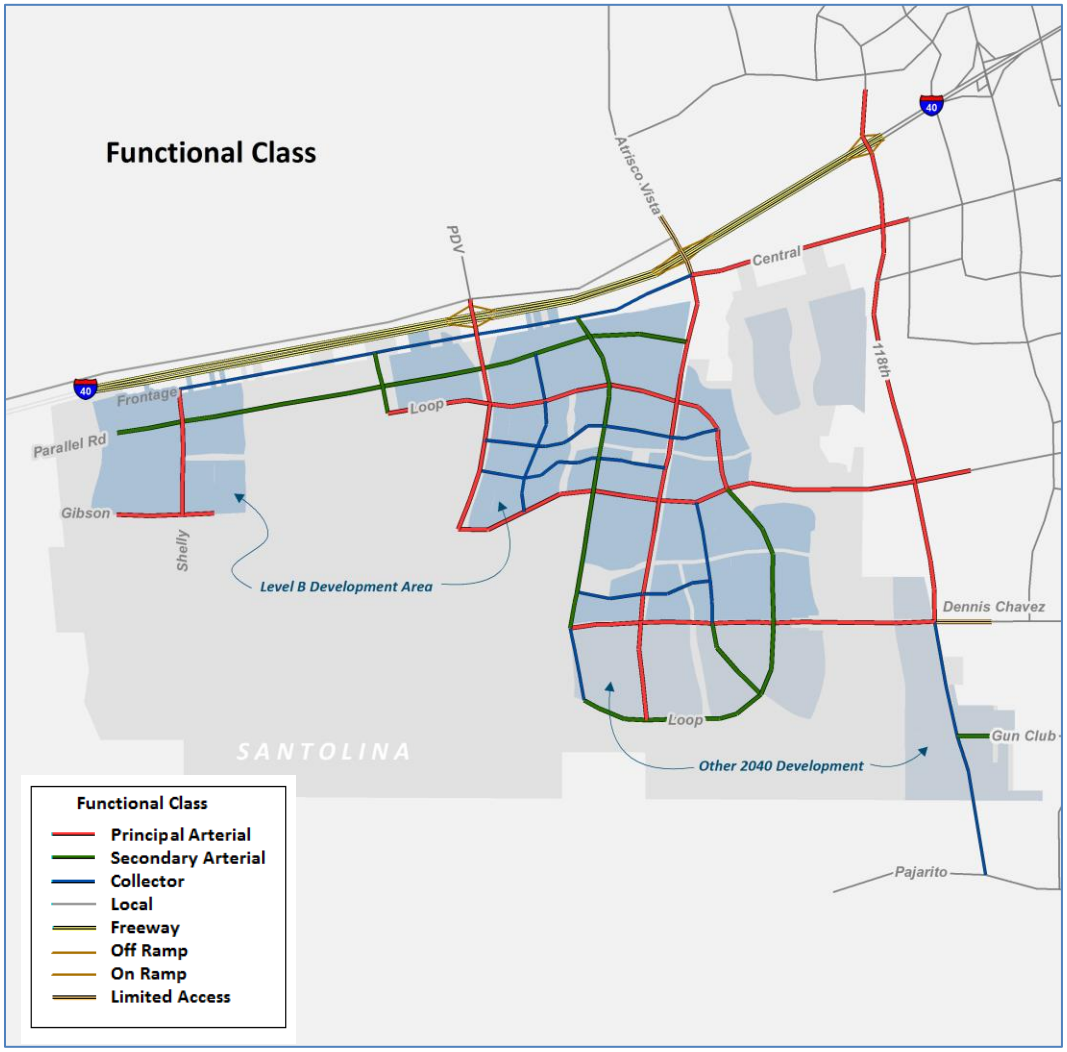

Figure 34: Functional Class (2040): Note the extent of development expected in Santolina by 2040.

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

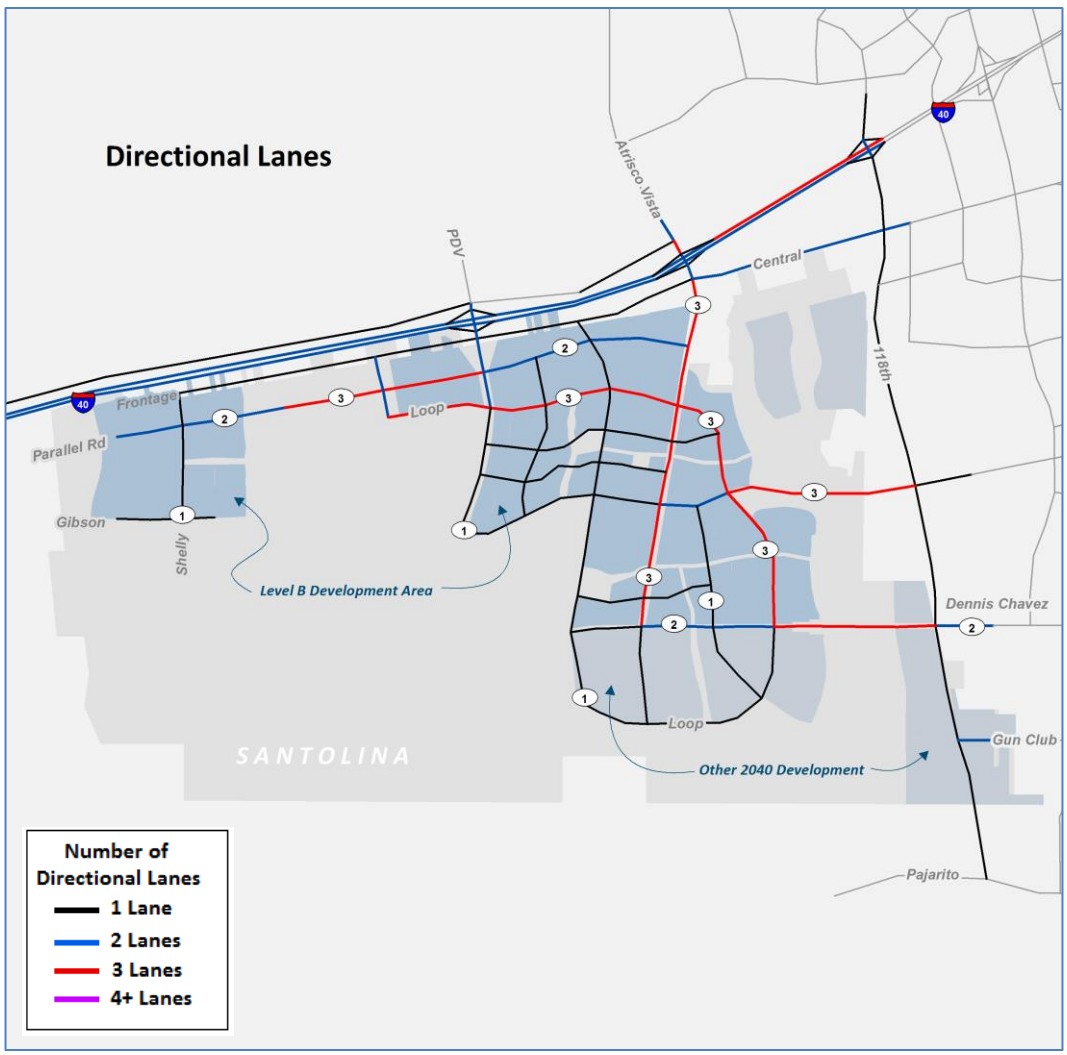

Figure 35: Number of Directional Lanes (2040)

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.

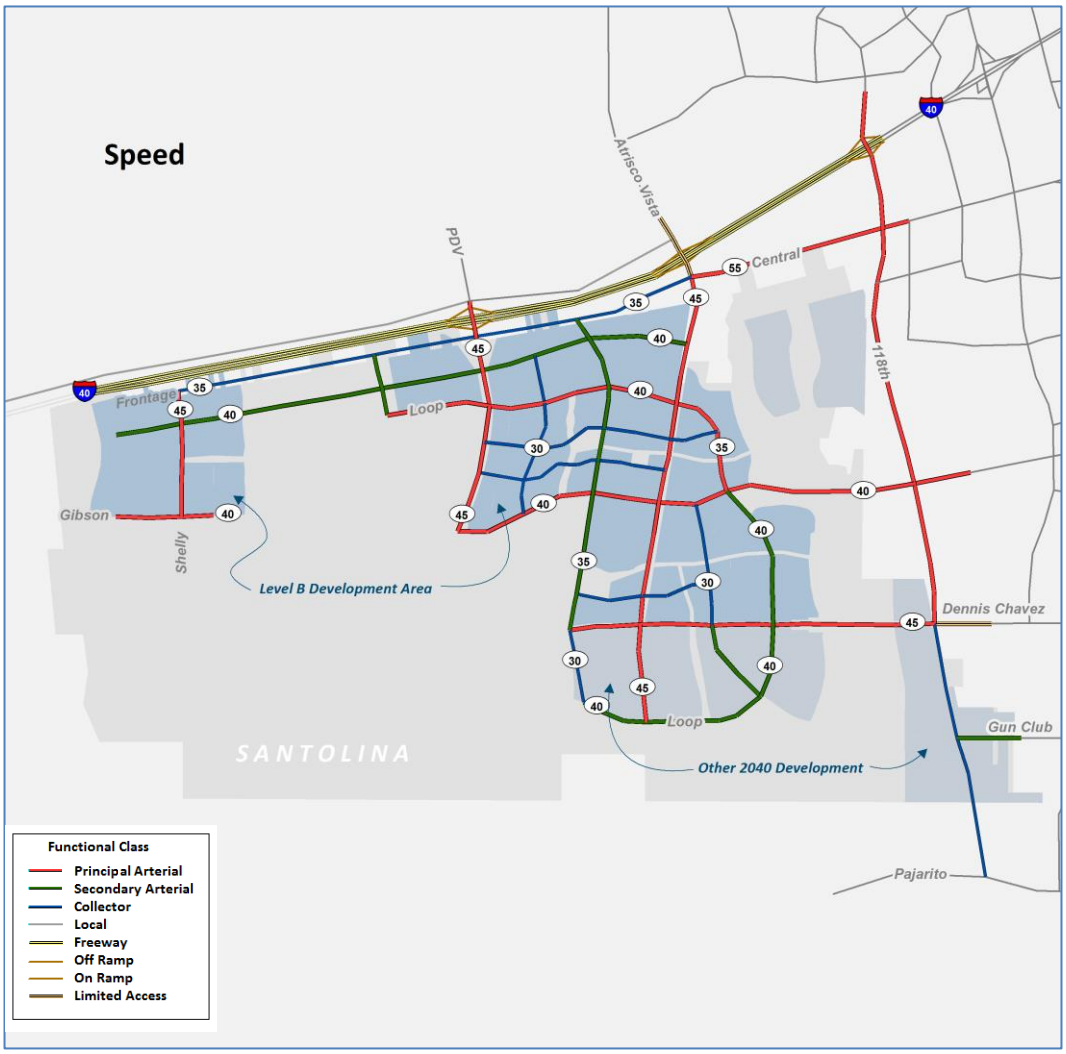

Figure 36: Speed on Santolina Roads (2040)

Average Daily (Weekday) Traffic (2040)

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

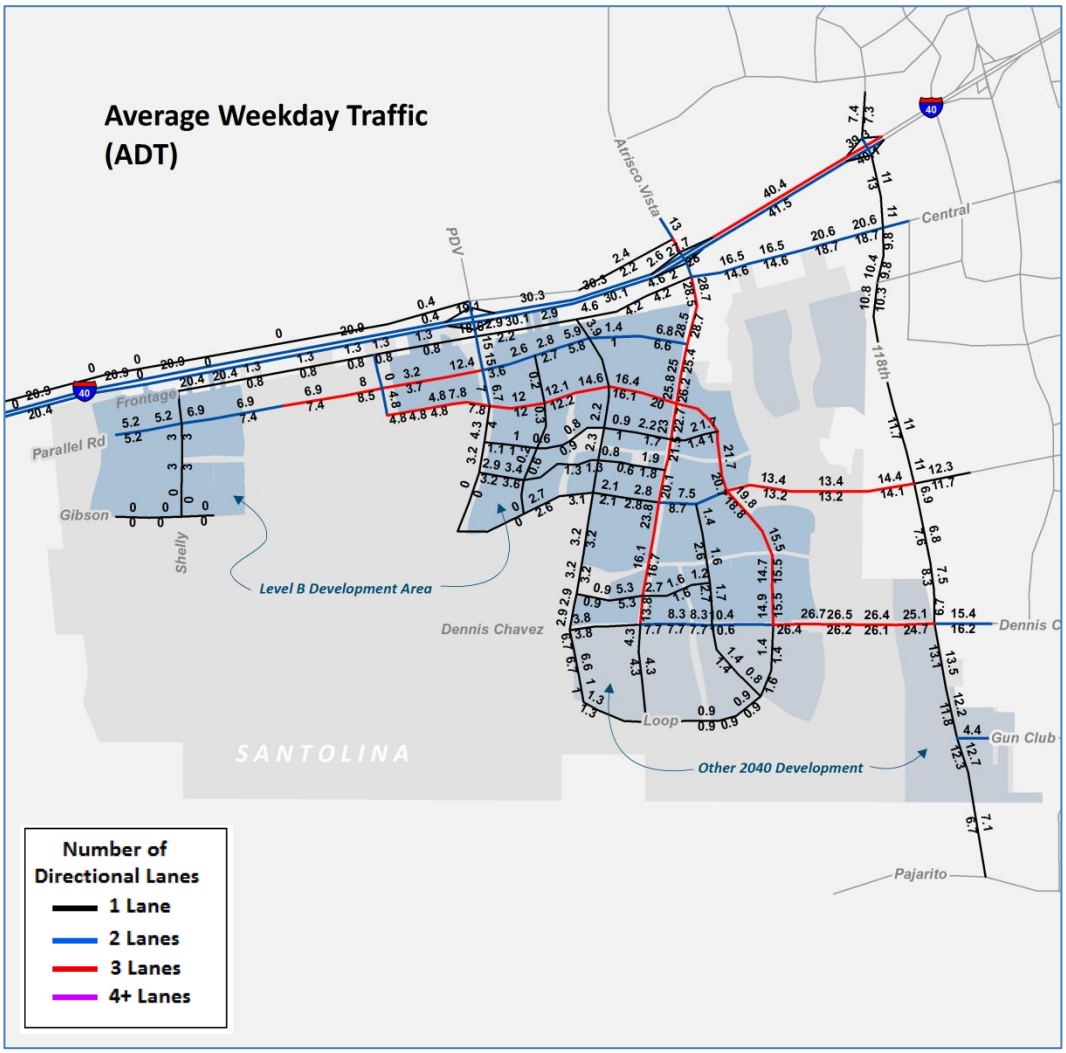

Figure 37: ADT on Santolina Roads (2040), in thousands

AM Peak Hour Traffic Volumes (2040)

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

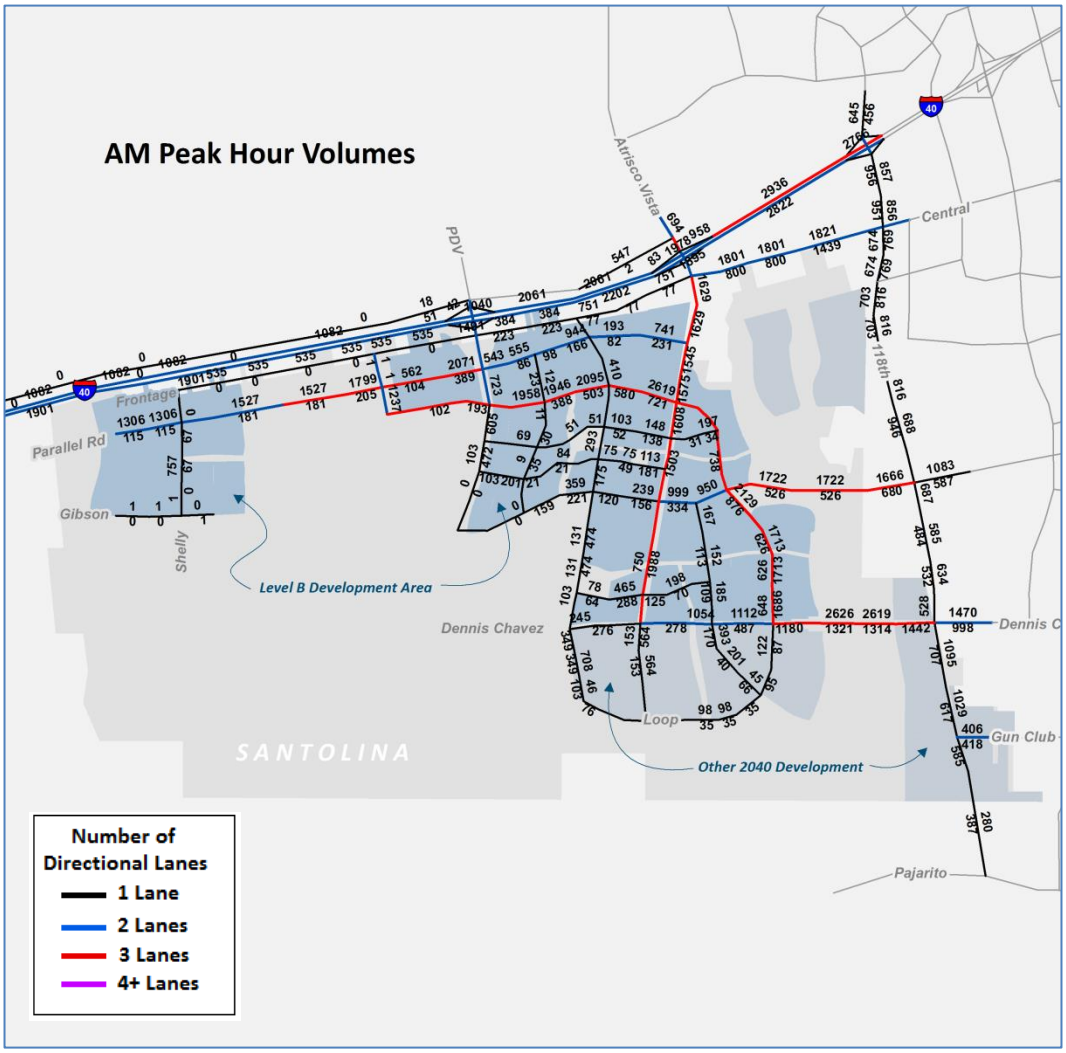

Figure 38: AM Peak Hour Volumes (2040)

PM Peak Hour Volumes (2040)

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

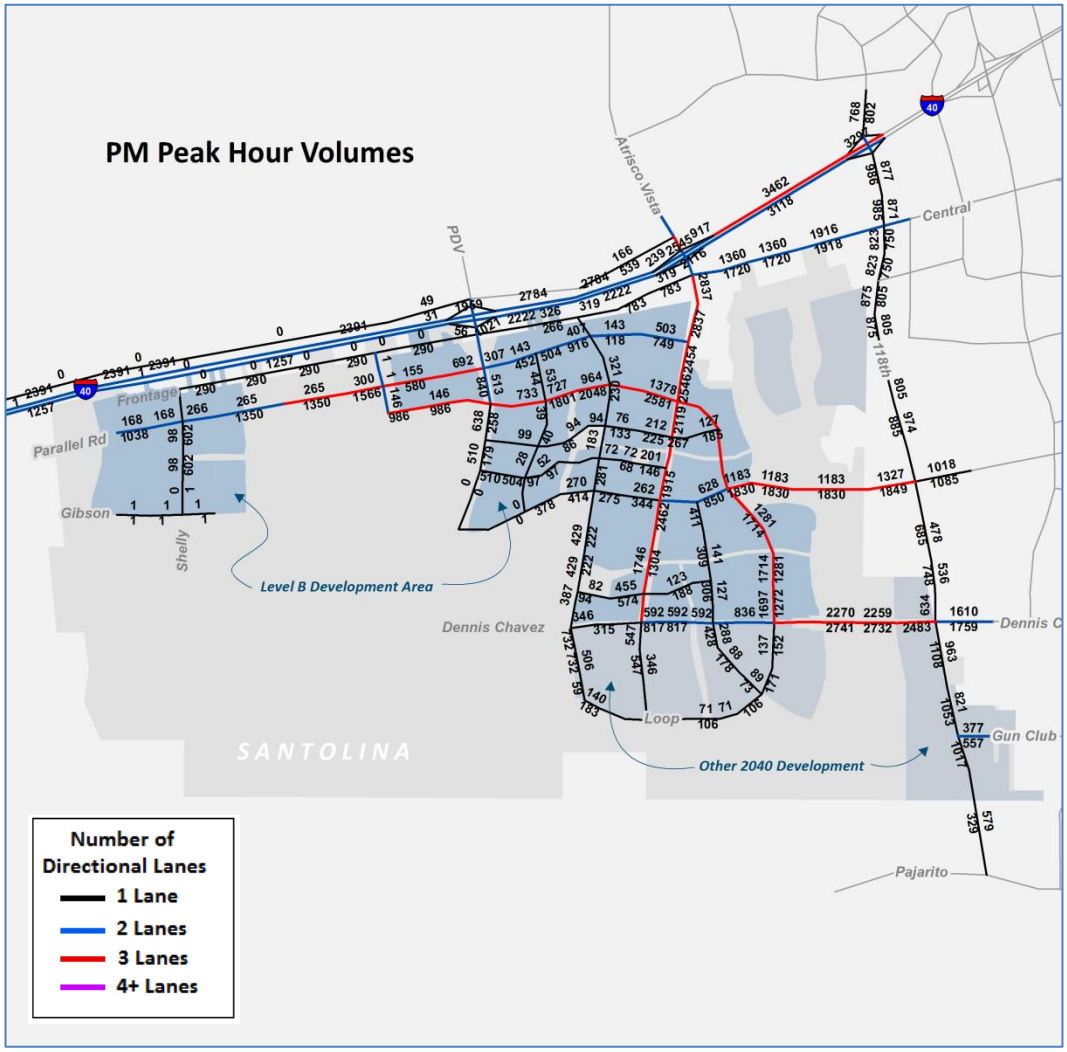

Figure 39: PM Peak Hour Volumes (2040)

Screenline Volumes (2040)

Table 8 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 8: Screenline Volumes (2040)

			AM Peak Hour		PM Peak Hour	
Screenline	**Roadway**	**ADT (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**	**ADT (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".

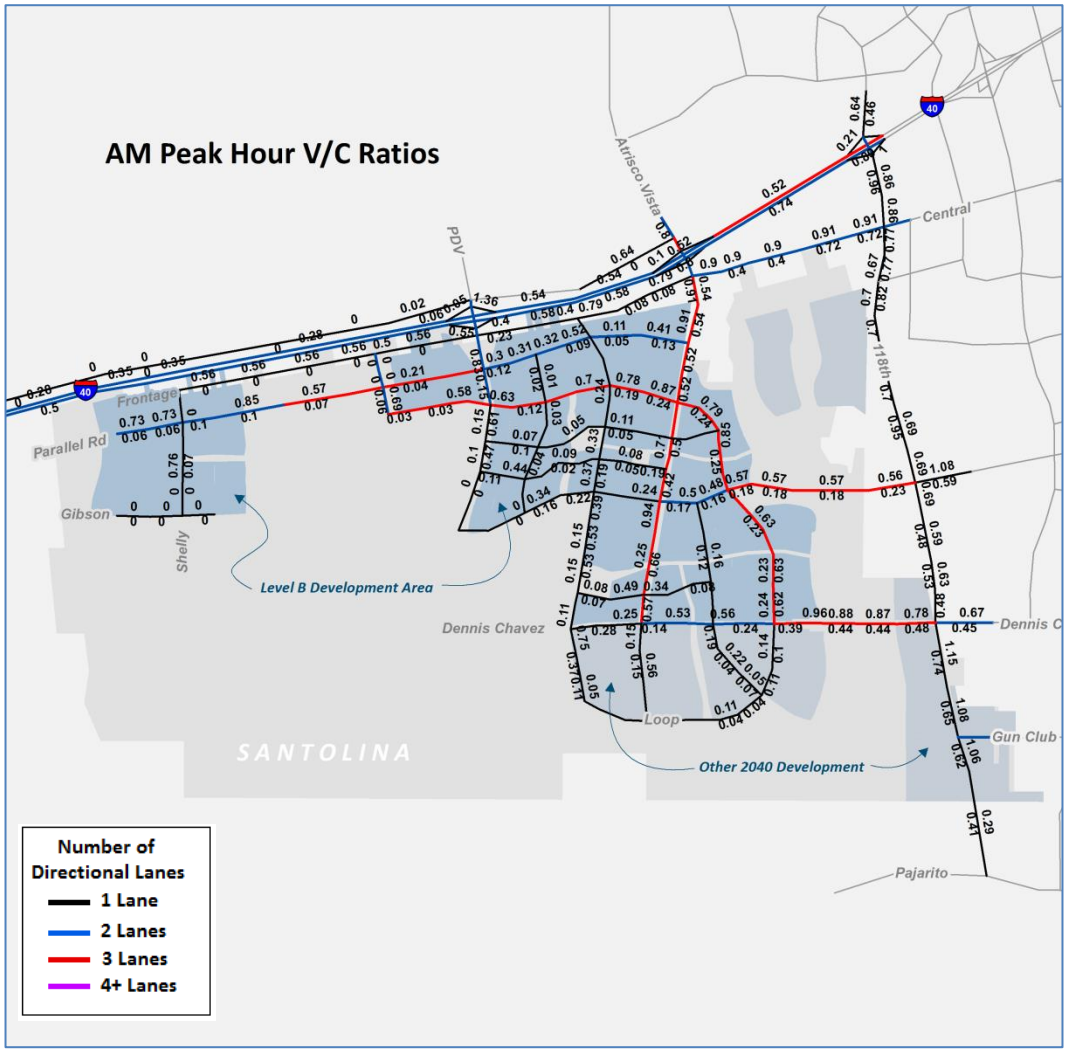

Figure 40: AM V/C Ratios (2040)

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".

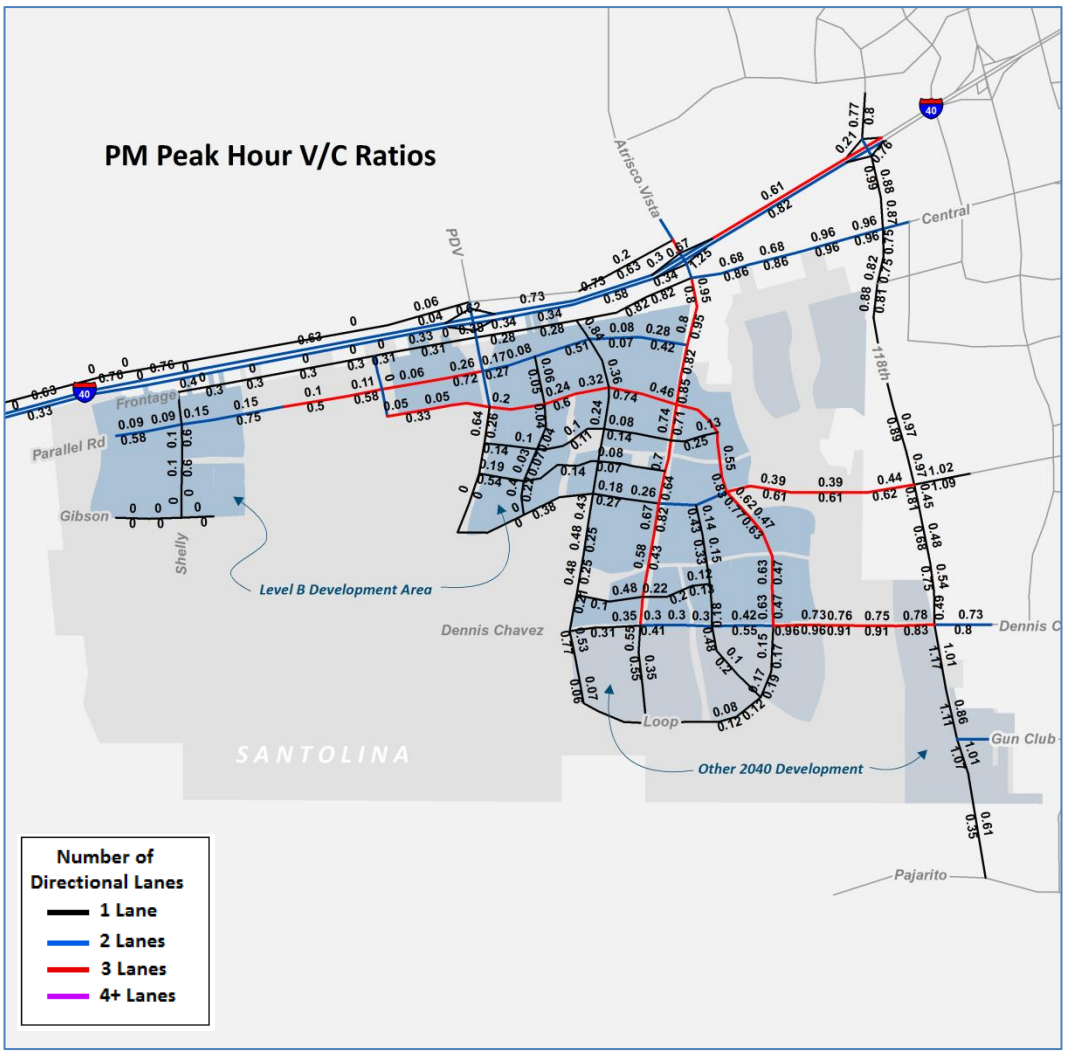

Figure 41: PM V/C Ratios (2040)

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.

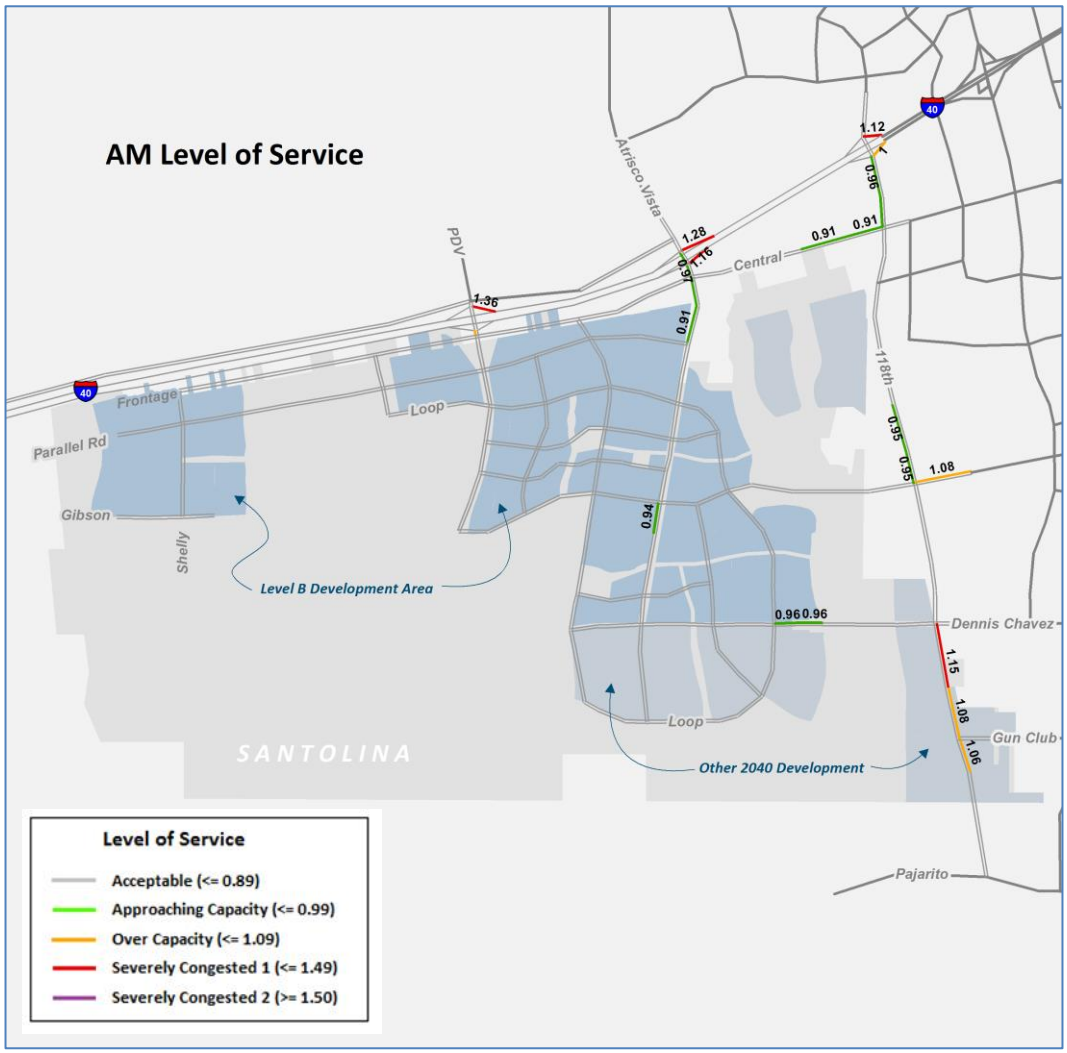

Figure 42: AM Level of Service (2040)

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.

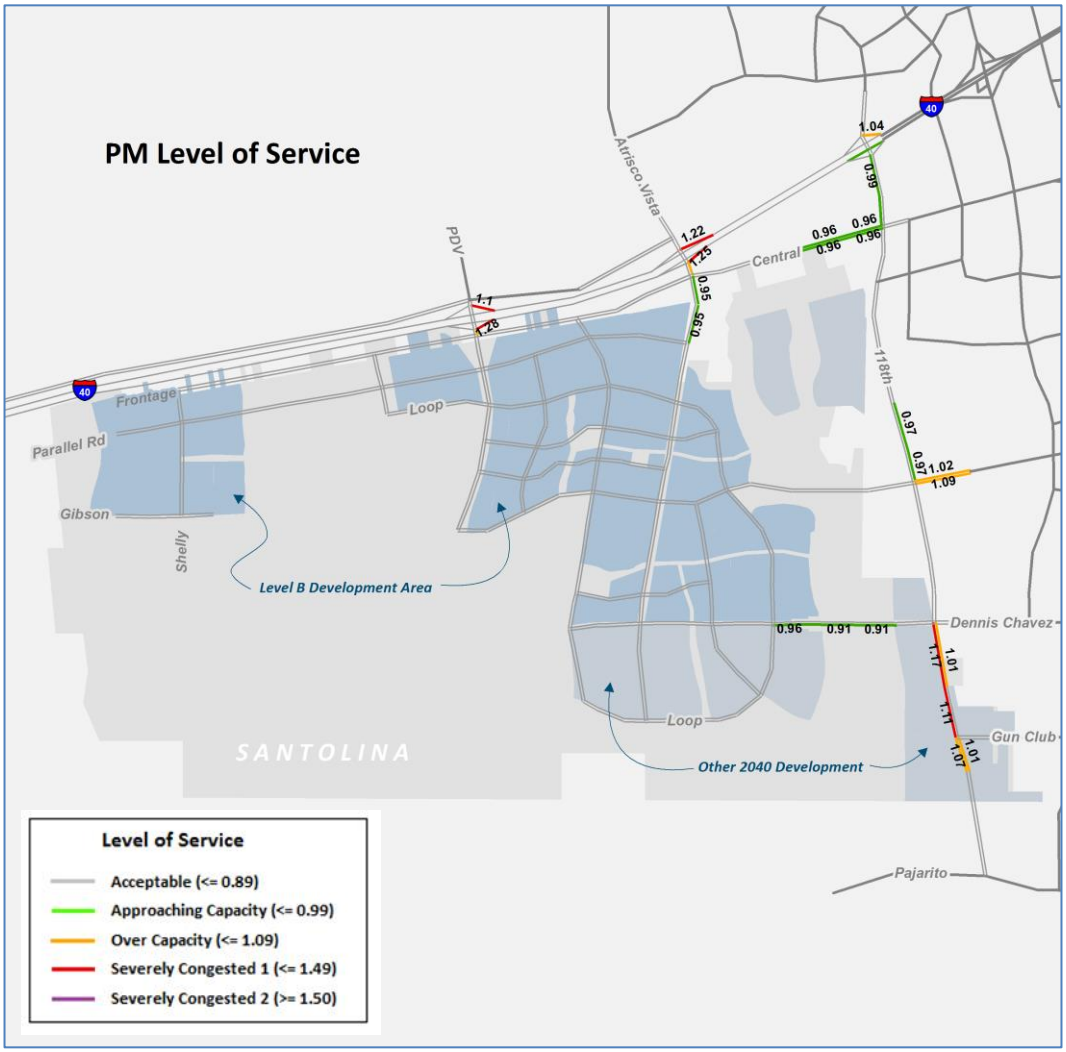

Figure 43: PM Level of Service (2040)

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.

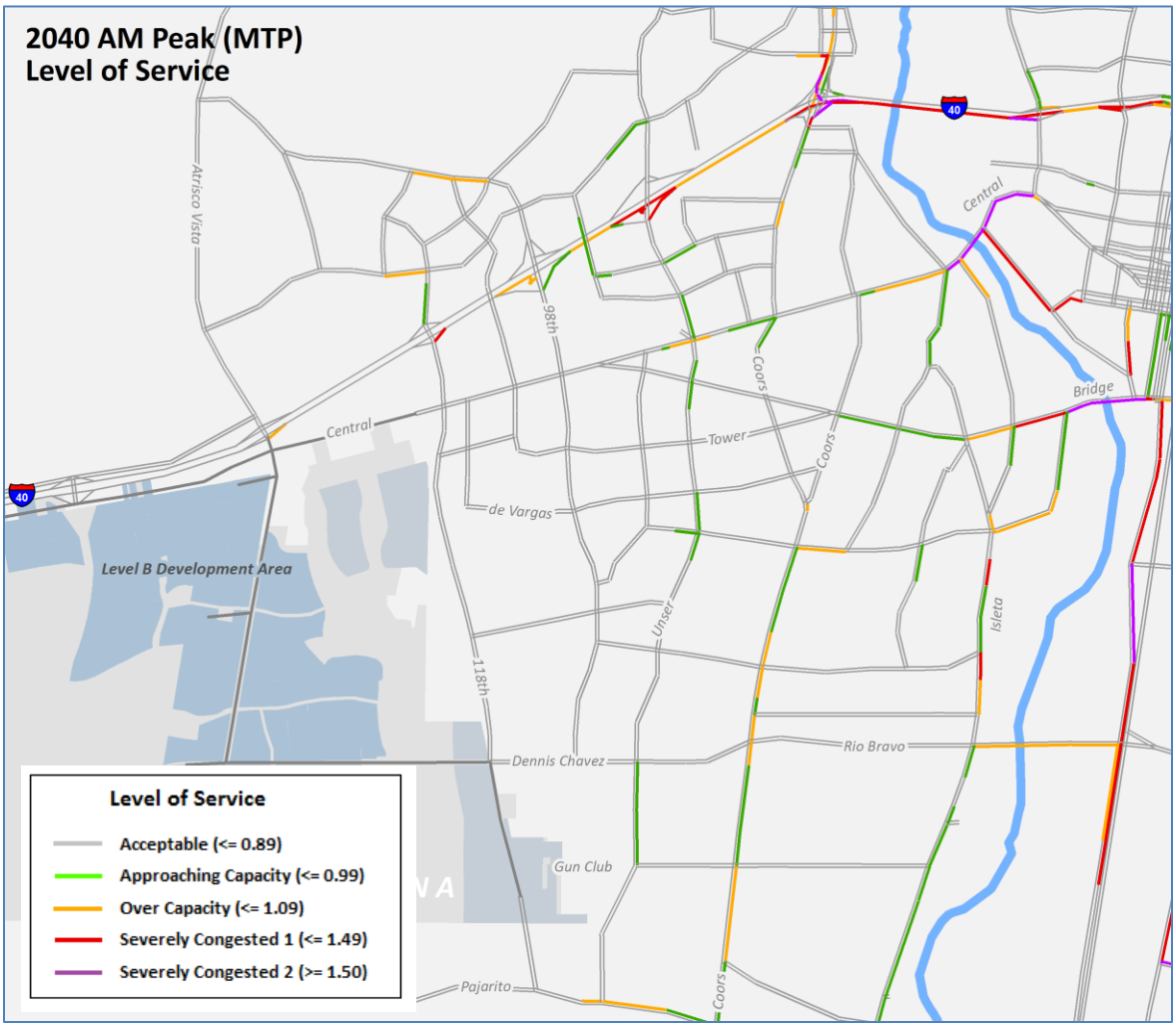

Figure 44: AM Peak Level of Service for the MTP, Off-site (2040)

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.

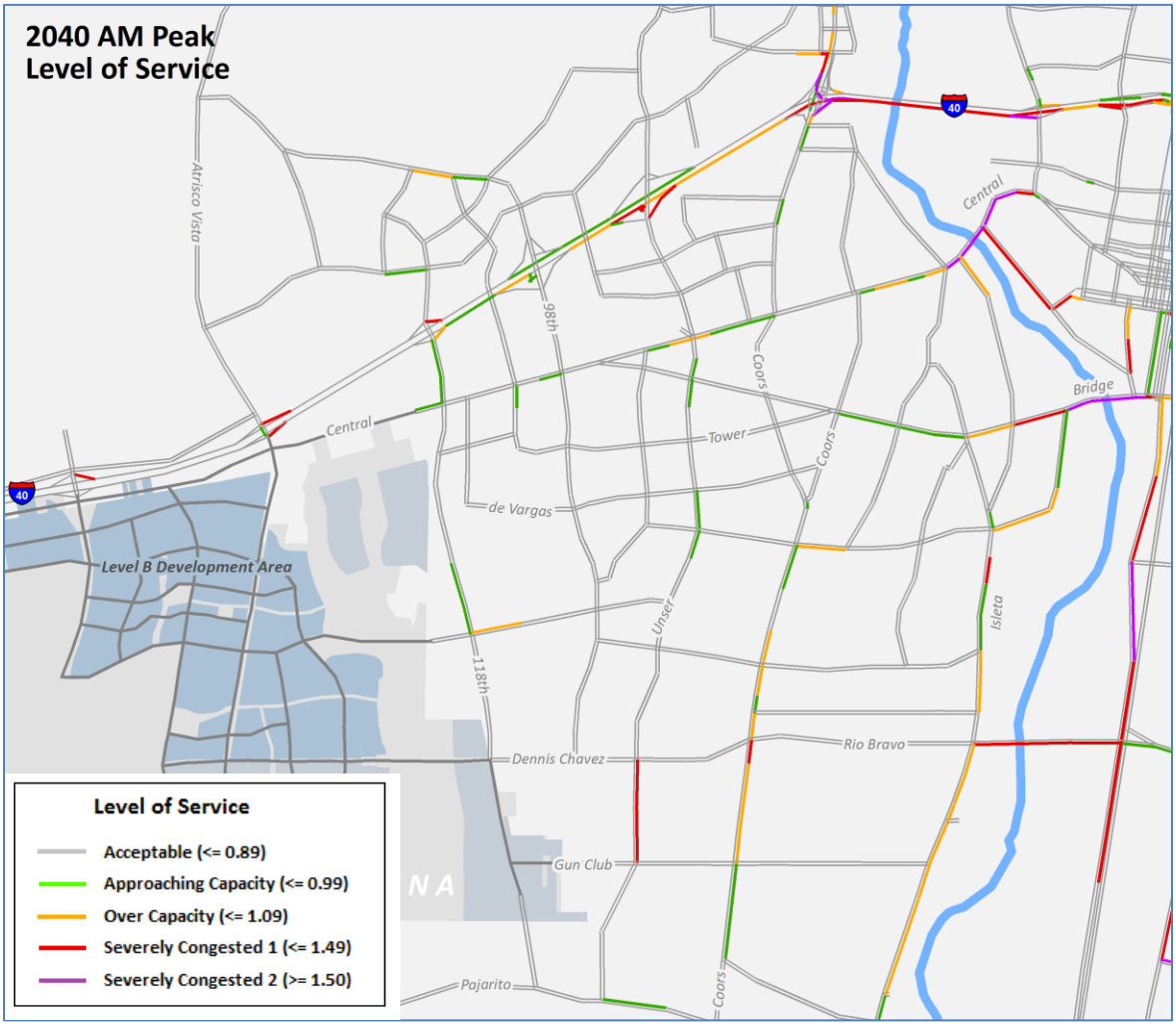

Figure 45: AM Peak Level of Service, Offsite (2040)

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).

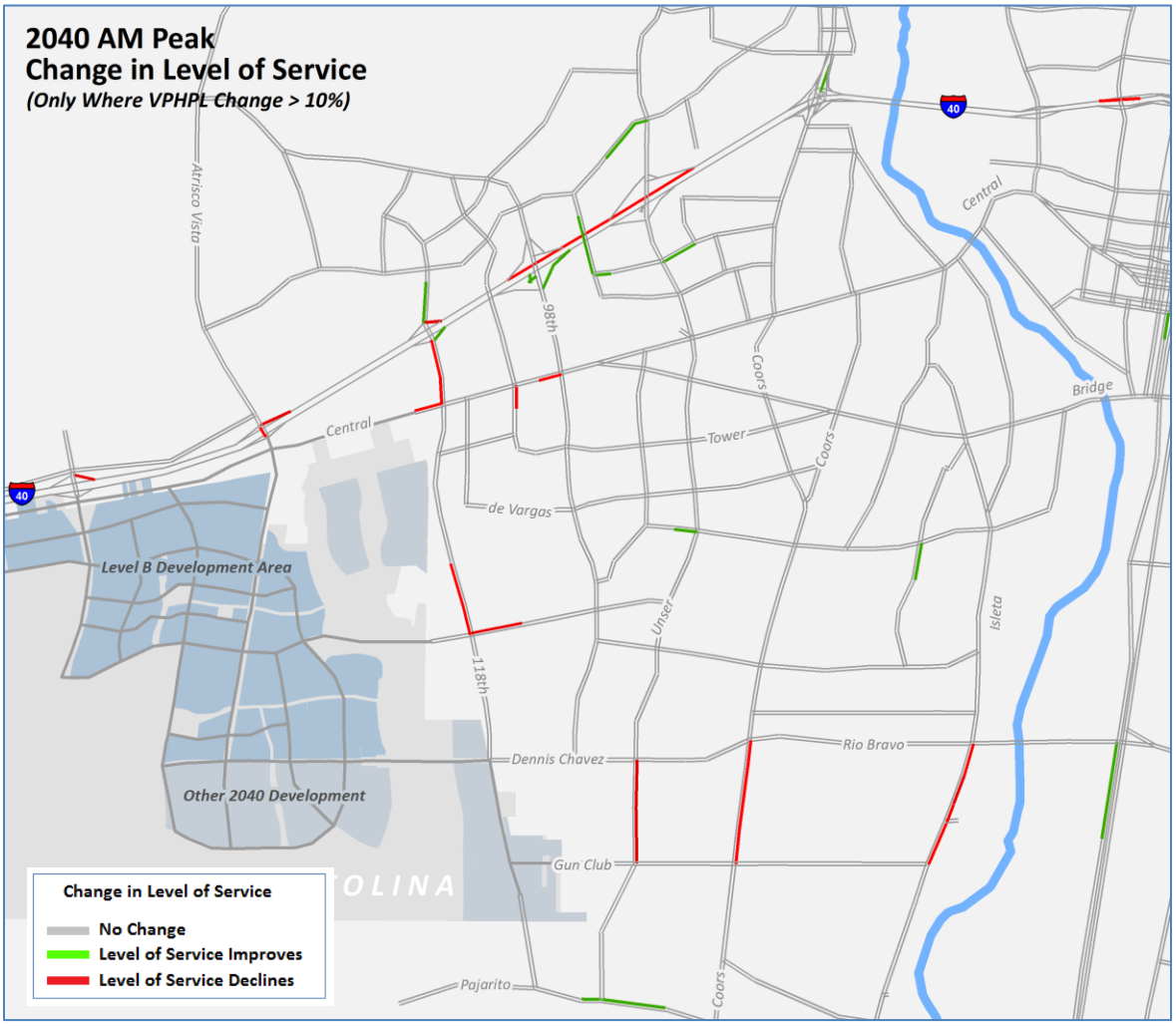

Figure 46: AM Peak Hour: Change in Offsite Level of Service (2040)

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).

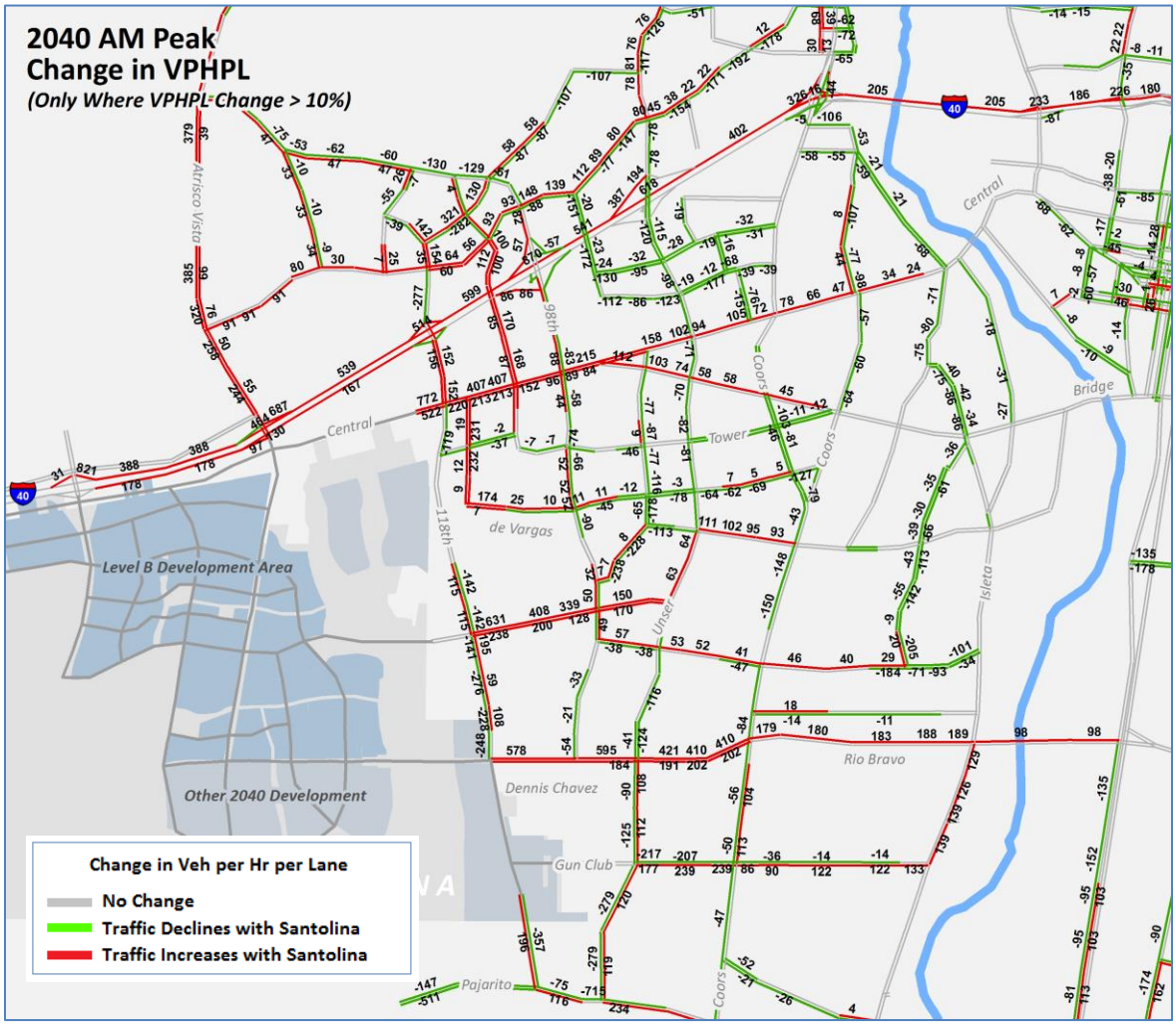

Figure 47: AM Peak Hour Change in VPHPL, Compared with the MTP (2040)

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.

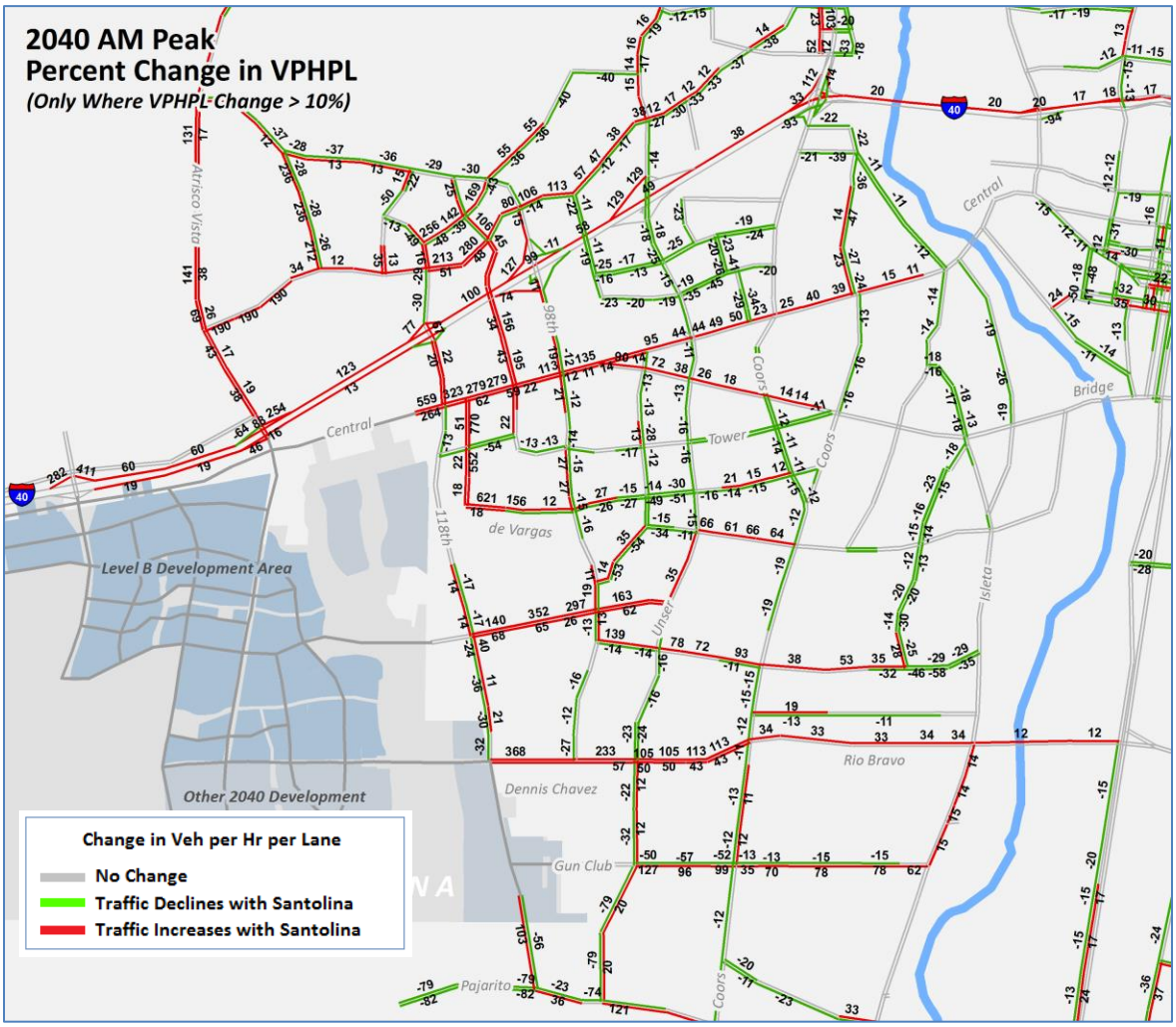

Figure 48: AM Peak Hour Percent Change in VPHPL, Compared with the MTP (2040)

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.

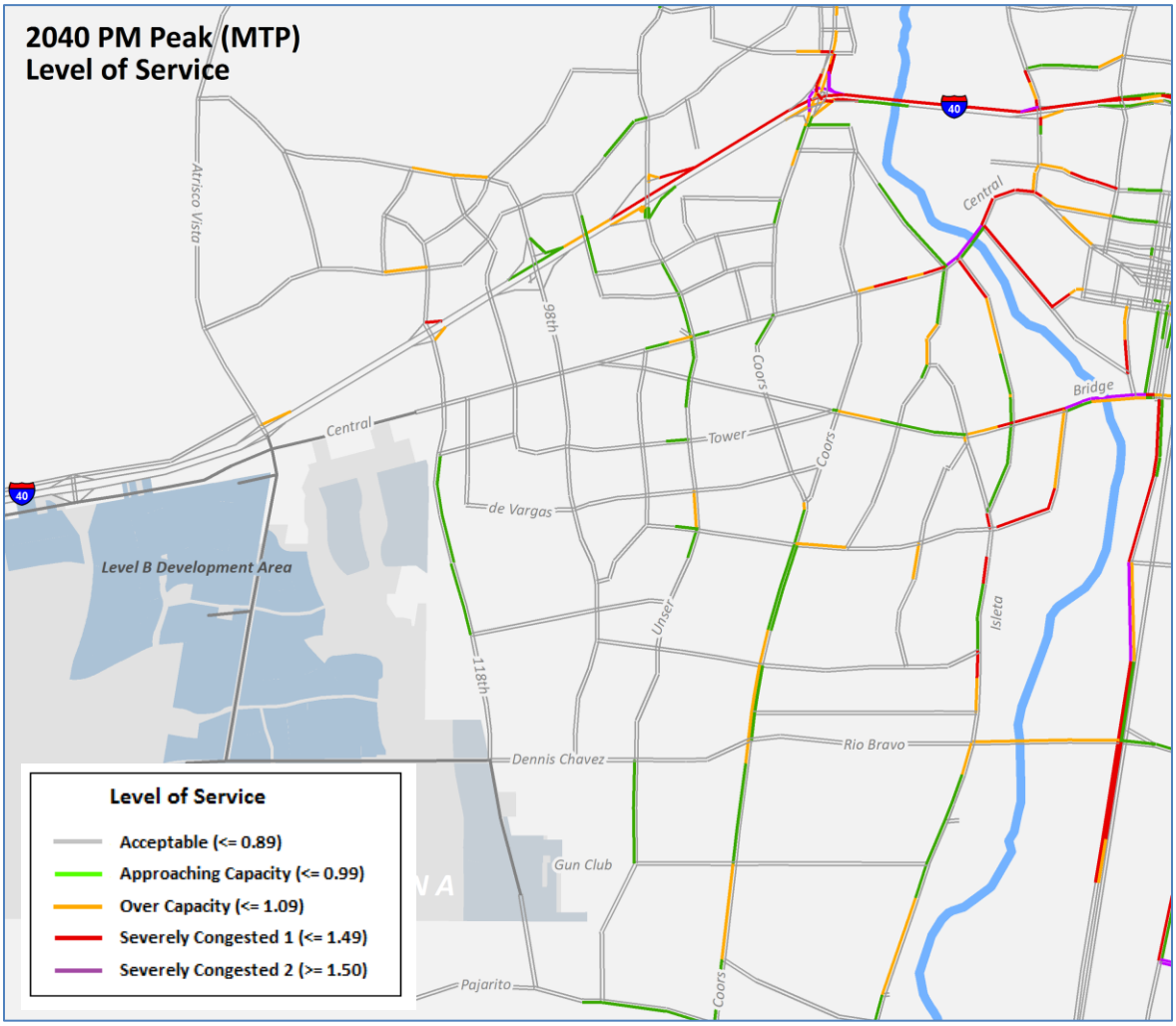

Figure 49: PM Peak Level of Service for the MTP, Off-site (2040)

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.

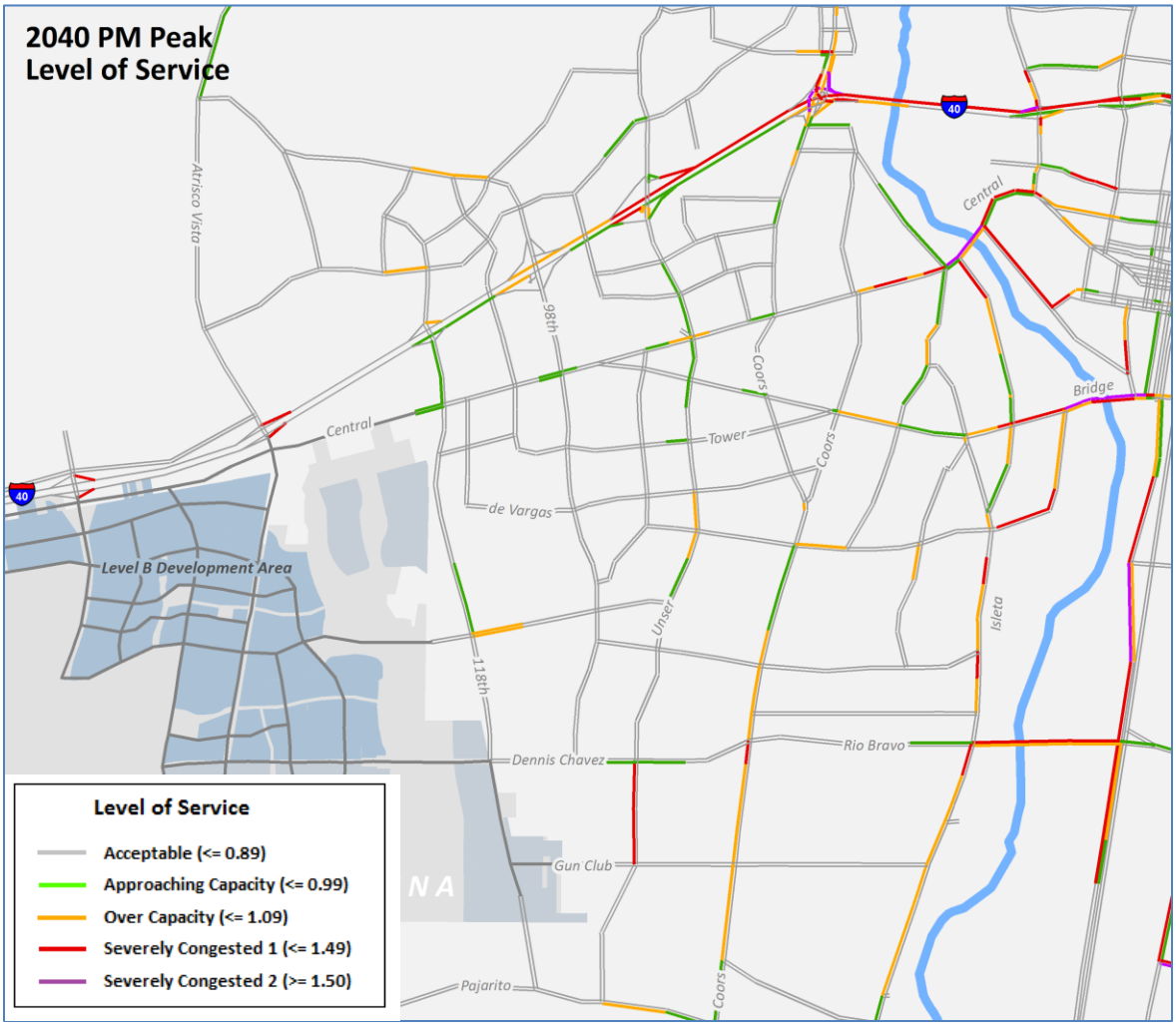

Figure 50: PM Peak Level of Service, Offsite (2040)

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.

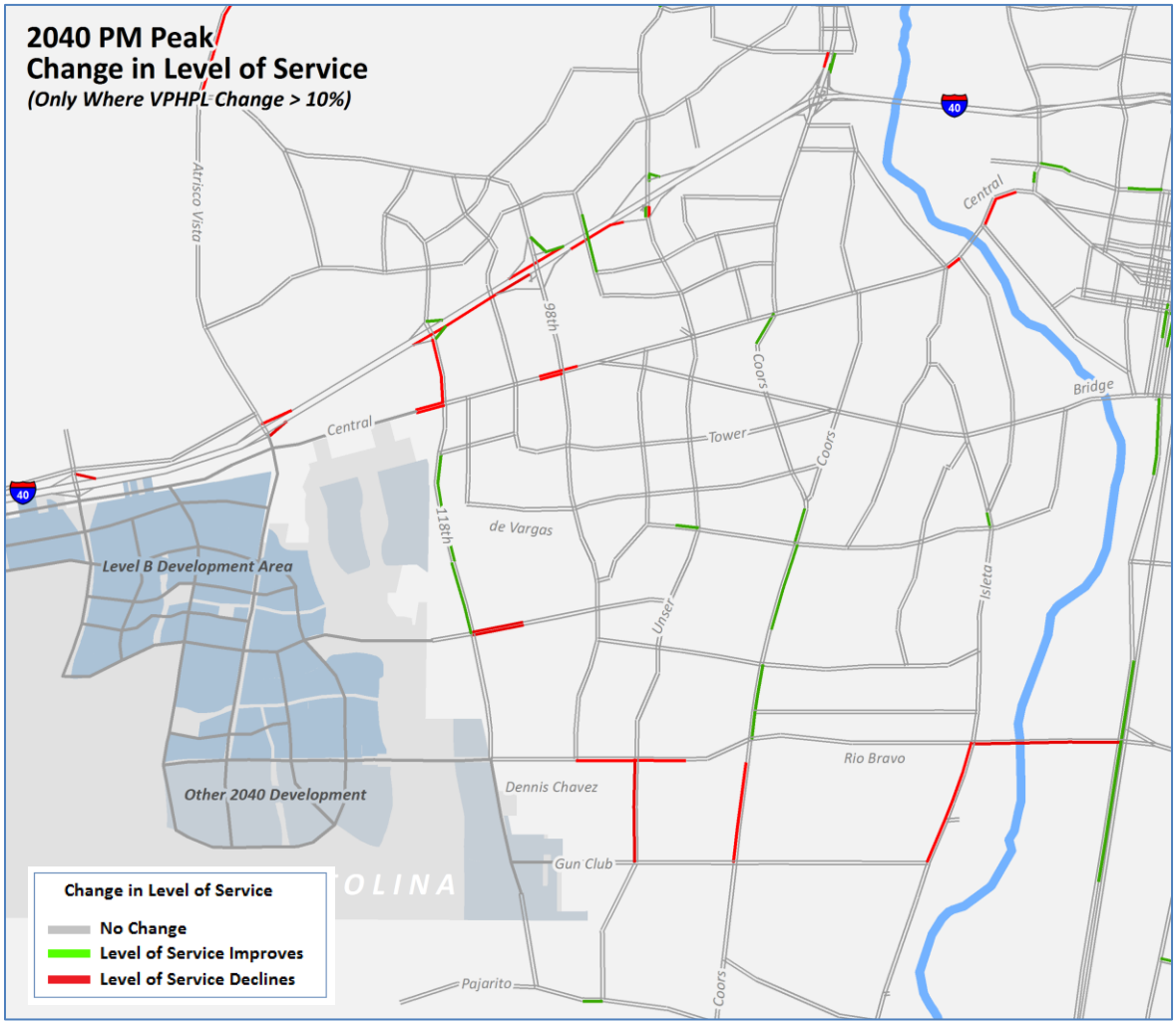

Figure 51: PM Peak Hour: Change in Offsite Level of Service (2040)

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).

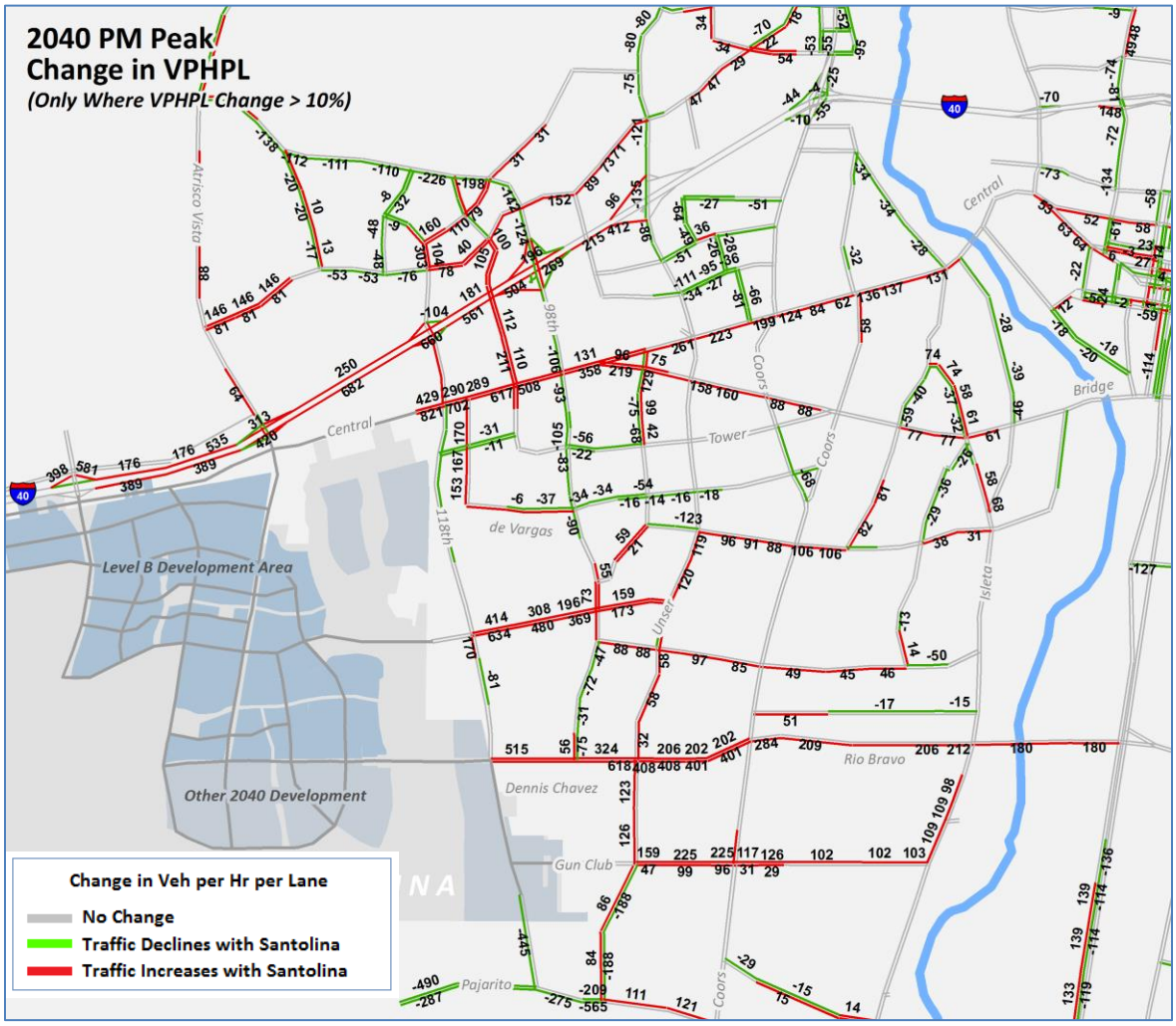

Figure 52: PM Peak Hour Change in VPHPL, Compared with the MTP (2040)

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.

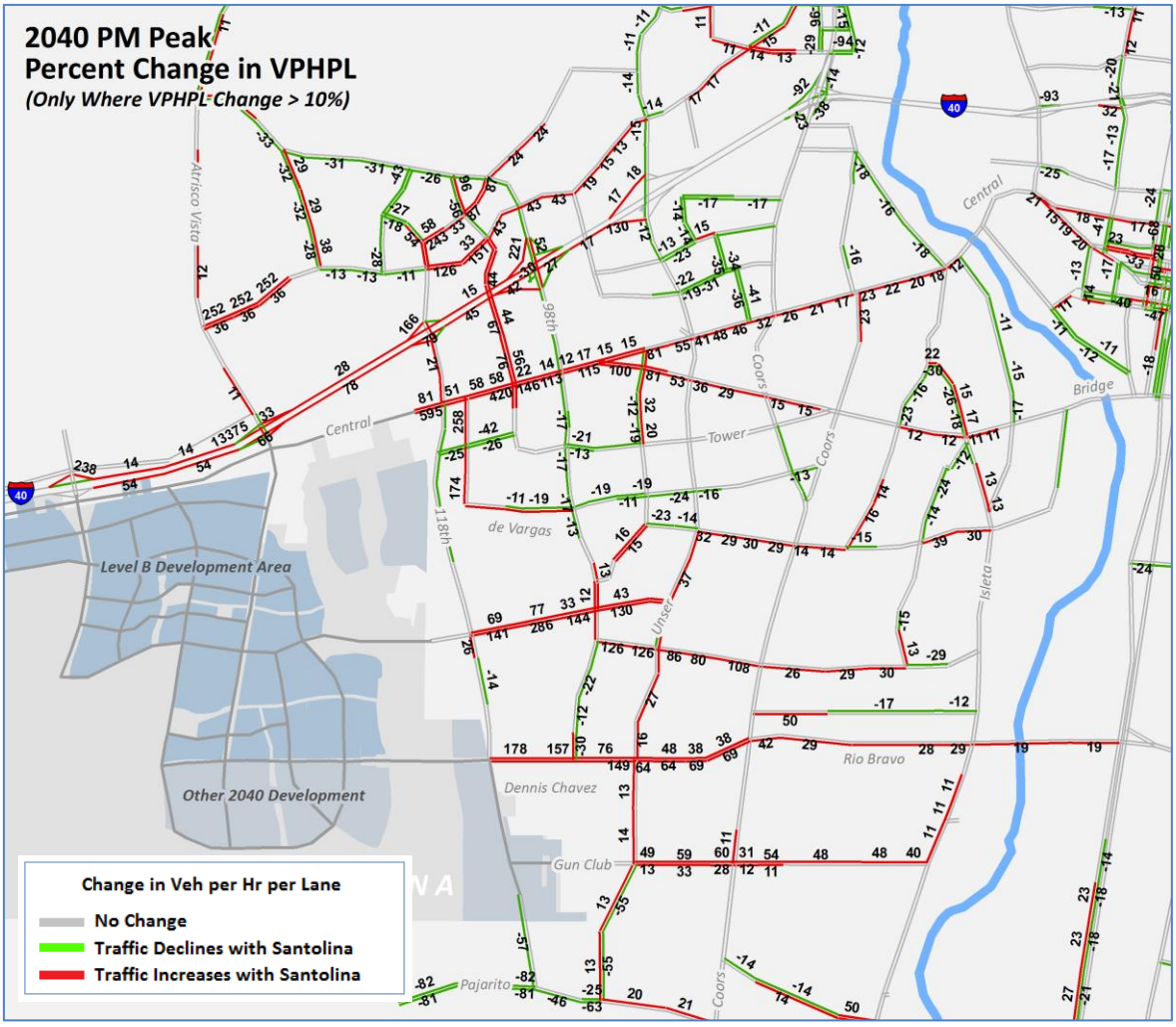

Figure 53: PM Peak Hour Percent Change in VPHPL, Compared with the MTP (2040)

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 8 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 8: 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 9 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 9 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 9: 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)