Traffic Impact Study (TIS) for 98th St Panda Express

DRAFT Report

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Prepared for:

RTM Associates

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EXECUTIVE SUMMARY

The following contains a Traffic Impact Study (TIS) for a Panda Express restaurant in Albuquerque, NM. Lee Engineering has completed this report for RTM Associates. All analyses and items contained herein conform to scoping requirements set forth in a scoping meeting held on February 23rd, 2022.

BACKGROUND

The proposed development is to construct a Panda Express restaurant on 98th St, between Avalon Rd and Volcano Rd. Nearby intersections include 98th St & Avalon Rd/Bluewater Rd, 98th St & North Access Rd, 98th St & South Access Rd, and 98th St & Volcano Rd.

The site is anticipated to generate 68 ingress and 65 egress trips during the PM peak hour. Only PM peak hour was analyzed because the Panda Express development would not operate during AM peak hour, as discussed at the scoping meeting.The number of vehicle trips generated by the proposed development was based on the trip generation rates and equations provided in the Trip Generation Manual, 10th Edition, by the Institute of Transportation Engineers (ITE) 934 – Fast-Food Restaurant with Drive-Through Window.

Site access is available from 98th St via two site access roads, termed "North Access Rd" and "South Access Rd," for the purposes of this report. The Access roads are currently positioned near the north and south corners of the development, respectively.

Study intersections include:

1. 98th St & Avalon Rd/Bluewater Rd
2. 98th St & North Access Rd
3. 98th St & South Access Rd
4. 98th St & Volcano Rd

Construction is anticipated to begin in 2022, with full completion of the Development in 2023. The Development is to be constructed in a single phase.

Analysis scenarios for this study include:

- Existing (2022) – Field counted Existing traffic volumes
- Build-Out Year (2023) Background –Existing traffic volumes with an applied annual growth rate and the addition of traffic volumes generated by the nearby development of a Tire Superstore ITE code 846.
- Build-Out Year (2023) Total – Build-Out Year Background volumes plus Panada Express site-generated Direct and Pass-By trips.
- Build-Out Year (2023) Optimized – Traffic volumes used are identical to Build-Out Year (2023) Total. Scenario analyzes optimization of 98th St right turn lane configuration at Bluewater Rd.

Existing turning movement counts were collected on March 1st, 2022, for all study intersections. These volumes were analyzed unaltered in the Existing portion of the Capacity Analysis section.

Site trips for the development site were generated based on ITE 934 – Fast-Food Restaurant with Drive-Through Window, Peak Hour Generator. Proposed development-generated trips were used to analyze Build-Out Total volumes.

SUMMARY OF RECOMMENDATIONS

The following presents a summary of recommendations included in this report.

CONCLUSIONS

- All study intersections operate at an acceptable LOS throughout all study scenarios
- 95th % Queue Lengths do not exceed queue storage at any intersection for any scenario
- HCS results do not suggest the need for capacity mitigation measures or street improvements related to the proposed development
- Proposed Drive-Through Queue Storage can accommodate 95th % vehicle queues as designed
- There are no site-specific Bicycle Facility recommendations based on the review of the Long Range Bikeway System

DEVELOPMENT SPECIFIC RECOMMENDATIONS

- No change to existing auxiliary lanes or addition of new auxiliary lanes is recommended for either site access point.

ANCILLARY RECOMMENDATIONS

- Convert the existing Right/Through lane southbound on 98th St at Avalon Rd / Bluewater Rd into a Right Turn Only Lane.
- Restripe the outer southbound lane on 98th St that would have previously continued through from the north side of Avalon Rd to provide an auxiliary right turn lane into North Access Rd.
- Close existing gaps in the bike lanes between Volcano Rd and Bluewater Rd / Avalon Rd

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INTRODUCTION

This report details the procedures and findings of a Traffic Impact Study (TIS) performed by Lee Engineering for RTM Associates. This report and the analyses herein were performed for a Panda Express restaurant to be constructed on 98th St in Albuquerque, NM. This study examines the impacts of the proposed Development on surrounding traffic conditions and discusses the potential impacts of trips generated by the Development on the study intersections.

The scope of this report and the analyses performed were completed in agreement with the scoping requirements set forth by the NMDOT. Scoping meeting notes from the scoping meeting held on February 23rd, 2022, are included in Appendix A. Analysis procedures, conclusions, and recommendations for this study were developed according to the *Highway Capacity Manual 6th Edition* and the *Manual on Uniform Traffic Control Devices 2009 Edition*.

Single-phase construction is anticipated to begin in 2022, with full completion of the Development in 2023. The proposed development site plan displayed in Figure 1 shows that the proposed development is a restaurant with a drive-through window. In consideration of the development's hours of operation, only PM peak hour volumes were analyzed for each scenario. Traffic generated by the site is anticipated to be 68 ingress and 65 egress trips during PM peak hour. Lee Engineering conducted an HCS Capacity Analysis for the following PM peak hour scenarios:

Traffic Analysis

- Existing (2022) – Field counted Existing traffic volumes
- Build-Out Year (2023) Background –Existing traffic volumes with an applied annual growth rate and the addition of traffic volumes generated by the nearby development of a Tire Superstore ITE code 846.
- Build-Out Year (2023) Total – Build-Out Year Background volumes plus Panada Express site-generated Direct and Pass-By trips.
- Build-Out Year (2023) Optimized – Traffic volumes used are identical to Build-Out Year (2023) Total. Scenario analyzes optimization of 98th St right turn lane configuration at Bluewater Rd.

The HCS Capacity Analysis Reports are presented in full in the Appendix.

PROJECT LOCATION & SITE PLAN

The restaurant will be located on 98th St, south of I-40, in the southwest quadrant of Albuquerque. Figure 1 shows the proposed site plan, and Figure 2 shows the site location, study intersections, and the surrounding area. Nearby intersections include 98th St & Avalon Rd/Bluewater Rd, 98th St & North Access Rd, 98th St & South Access Rd, and 98th St & Volcano Rd. The nearby proposed development of a Tire Super Store within the study scope is expected to be completed within the study period and is considered herein. Existing commercial businesses border the project area on 98th St to the north and south.

The proposed development would convert 42,367 square feet of land (17,713 square feet undeveloped and 24,654 square feet partially developed) into a Panda Express fast-food restaurant with a driveway. The development would include 32 existing parking spaces, 24 new parking spaces, a 2,600 square foot building, and 2,364 square feet of newly landscaped area. Proposed access points include two existing shared access roads located at the north and south corners of the development site.

The development Site Plan is presented in Figure 1, and Figure 2 shows the Vicinity Map, which includes the study area and intersections.

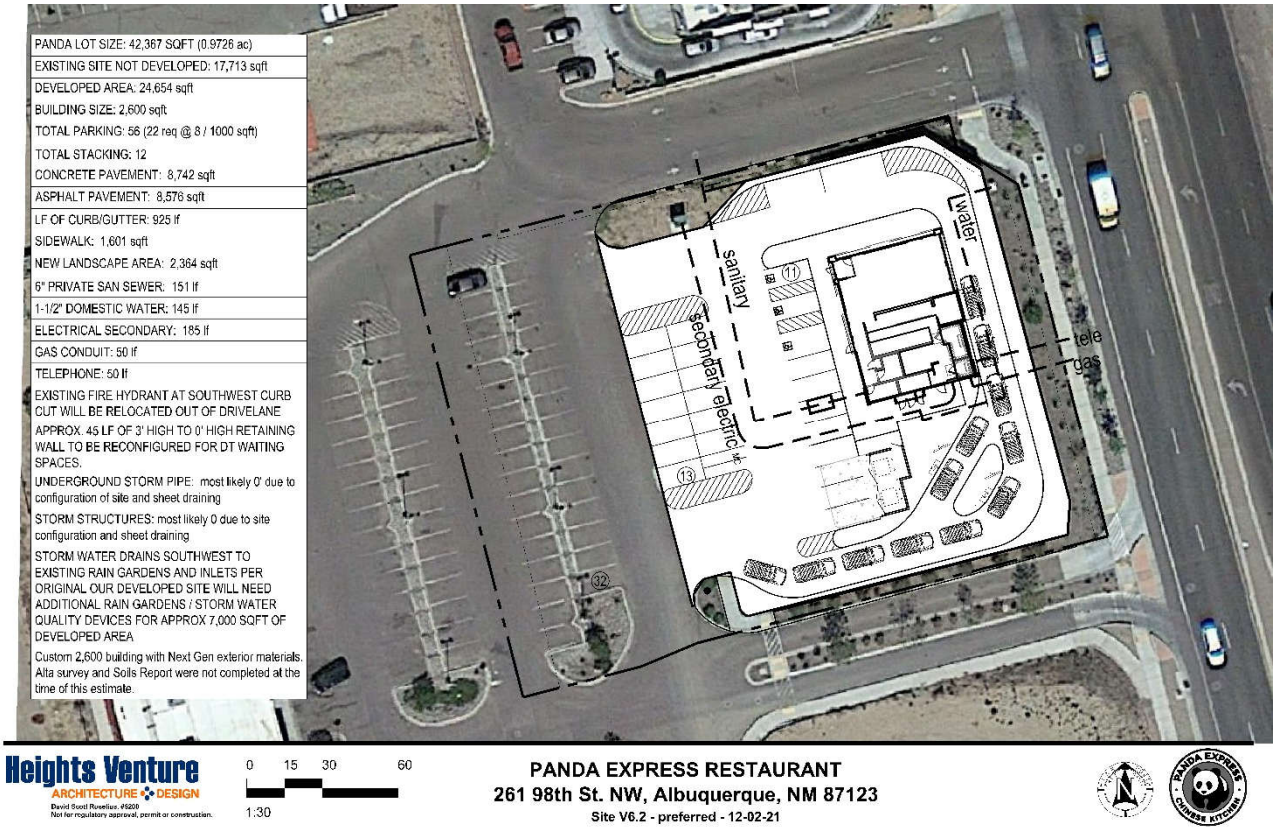


Figure 1: Site Plan

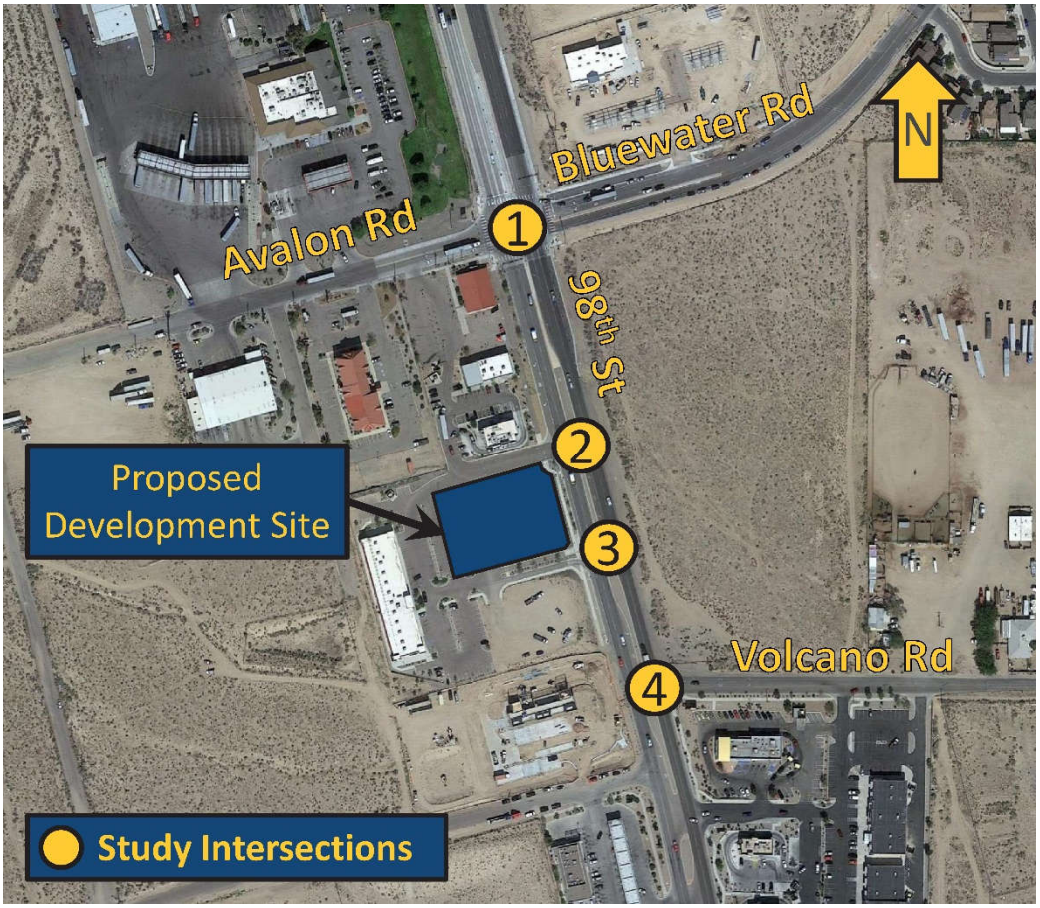


Figure 2: Vicinity Map

STUDY AREA, AREA LAND USE, AND STREETS NARRATIVE SUMMARY

STUDY AREA

The study area is defined as 98th St from Avalon Rd/Bluewater Rd to Volcano Rd. The following intersections were identified for analysis during the scoping meeting:

1. 98th St & Avalon Rd/Bluewater Rd
2. 98th St & North Access Rd
3. 98th St & South Access Rd
4. 98th St & Volcano Rd

AREA LAND USE

The Development will be located on the west side of 98th St. Land uses adjacent to and surrounding consist of the following:

- Commercial: Existing commercial developments immediately surrounding the development site include car washes, restaurants, gas stations, a travel center, and a hotel.
- Residential: A residential zone is located northeast of the development site, and a mobile home park is located east of the development site.
- Undeveloped: Undeveloped plots are located directly east of the development site, on 98th St. There are additional undeveloped plots to the north, west, and south of the study area.

STREETS

The following details the characteristics and features of streets included in the study area:

98th St is a CABQ maintained roadway classified as a principal arterial, running north in Albuquerque, NM. The posted speed limit is 45 MPH. The roadway has six lanes north of Avalon Rd and four lanes south of Avalon Rd. Travel lanes are 12 feet wide, and the road is divided by a 20-foot-wide raised median. The median narrows to accommodate northbound and southbound left turn lanes at Avalon Rd/Bluewater Rd, a northbound left turn lane at North Access Rd, and a southbound left turn lane at Volcano Rd. In the southbound direction, there is continuous sidewalk, a bike path that extends from Avalon Rd to North Access Rd, and a 6-foot bike lane south of North Access Rd. No sidewalks or bicycle facilities are present in the northbound direction.

Avalon Rd/Bluewater Rd is a two-lane CABQ maintained local road running west. The posted speed limit is 35 MPH. Avalon Rd is located west of 98th St, and Bluewater Rd is east. The roadway has 11-foot travel lanes with striping. On Bluewater Rd, a 5-foot-wide raised median is present for 340 feet approaching the intersection with 98th St. There are 6-foot bike lanes in each direction on Bluewater Rd, but no bicycle facilities on Avalon Rd. Intermittent sidewalk is present in both directions.

North Access Rd is a road providing access to commercial developments on the west side of 98th St. Travel lanes are 11 feet wide, with one entrance lane and two exit lanes.

South Access Rd is a road providing right in right out (RIRO) access to commercial developments on the west side of 98th St. Travel lanes are 11 feet wide, with one entrance lane and one exit lane, divided by a raised median.

Volcano Rd is a two-lane CABQ maintained local road running west. The posted speed limit is 30 MPH. Travel lanes are 11 feet wide with striping. Sidewalk is present in the eastbound direction. No bicycle facilities are present.

INTERSECTIONS

The following details the traffic control and characteristics of existing intersections in the study area:

98th St & Avalon Rd/Bluewater Rd is a 4-legged, signalized intersection of a principal arterial and a local road. The eastbound and westbound legs each consist of a left turn lane and a through/right turn lane. The northbound leg consists of a left turn lane, two through lanes, and a through/right turn lane. The southbound leg consists of a left turn lane and three through lanes, with right turns permitted. Painted crosswalks and pedestrian pushbuttons are present at each leg of the intersection.

98th St & North Access Rd is a 3-legged, stop-controlled intersection of 98th St, a principal arterial, and an unnamed business access road, which for the purposes of this study will be referred to as North Access Rd. There is a stop sign on the North Access Rd, for approaching eastbound traffic. The eastbound leg consists of two right turn lanes and one left turn lane. The northbound and southbound legs each comprised of two through lanes and the northbound approach has a left turn lane. Curb cuts with ramps are present, but there is no stripped crosswalk. There are also stop signs facing the sidewalk, presumably for pedestrian traffic on either side of the access road.

98th St & South Access Rd is a Right-in/Right-out unnamed business access road intersecting with the southbound leg of the principal arterial 98th St. For the purposes of this study the unnamed access road will be referred to as South Access Rd. A stop sign is present on the South Access Rd eastbound approach. The southbound leg consists of a through lanes and a through/right turn lane. A painted crosswalk is present across South Access Rd.

98th St & Volcano Rd is a 3-legged, stop-controlled intersection of a principal arterial and a local road. The only stop sign is on Volcano Rd, for westbound traffic. The westbound legs consist of a left turn lane and a right turn lane. The northbound leg consists of two through lanes with right turns permitted. The southbound leg consists of a left turn lane and two through lanes. No crosswalks are present.

BICYCLE FACILITIES

An existing 10-foot-wide bike lane runs adjacent to the Proposed Panda Express development on the west side 98th St. This southbound bike lane begins on the southside of North Access Rd and continues south to Central Ave. A narrower existing northbound bike lane on the east side of 98th St terminates with appropriate signage at Volcano Rd. A 6-foot bike lane is present on Bluewater Rd, running in both directions. Recent satellite data, confirmed by a site field visit, show these bike lanes along Bluewater Rd are regularly occupied by parked vehicles.

DATA COLLECTION

The following section details the data collection method used in subsequent analyses of this report. The data discussed below was collected via a combination of field observations and machine/video recordings.

FIELD DATA COLLECTION

ON-STREET PARKING

On-street parking facilities were assessed via satellite imagery and confirmed by a field visit. No dedicated on-street space is provided in the study area. However, It was noted that vehicles were parked within the Bluewater Rd bicycle lanes during the field visit.

PEDESTRIANS AND BICYCLES

Pedestrian and bicycle volumes were collected at all study intersections with turning movement counts (see Turning Movement Counts section below). Pedestrian and bicycle hourly volumes were used in the HCS capacity analyses and are provided in Appendix B.

TRANSIT

Based on the ABQRIDE System Map (February 2022) no transit routes serve the 98th St corridor through the study area. As such, there are no bus stops inside the study area.

SIGNAL TIMINGS

Signal timing for the signalized intersection of 98th St at Bluewater Rd / Avalon Rd was provided by the City of Albuquerque Traffic Department. Signal timing sheets used in the capacity analyses are provided in Appendix C

Turning Movement Counts

Turning movement counts for the study intersections were collected for two separate three-hour periods: 11:00 AM to 2:00 PM, and 3:30 PM to 6:30 PM, on March 1st, 2022. Turning movement volumes collected at the study intersections show a typical commuter directionally biased distribution with observable AM and PM peak hour periods. Network peak hours were determined by summating the Turning Movement Counts from all study intersections to determine the network AM and PM peak hours. Only PM peak hour was analyzed because the Panda Express development would not operate during AM peak hour, as discussed at the scoping meeting. PM peak hour counts are shown in Figure 3 and complete turning movement counts can be found in Appendix B.

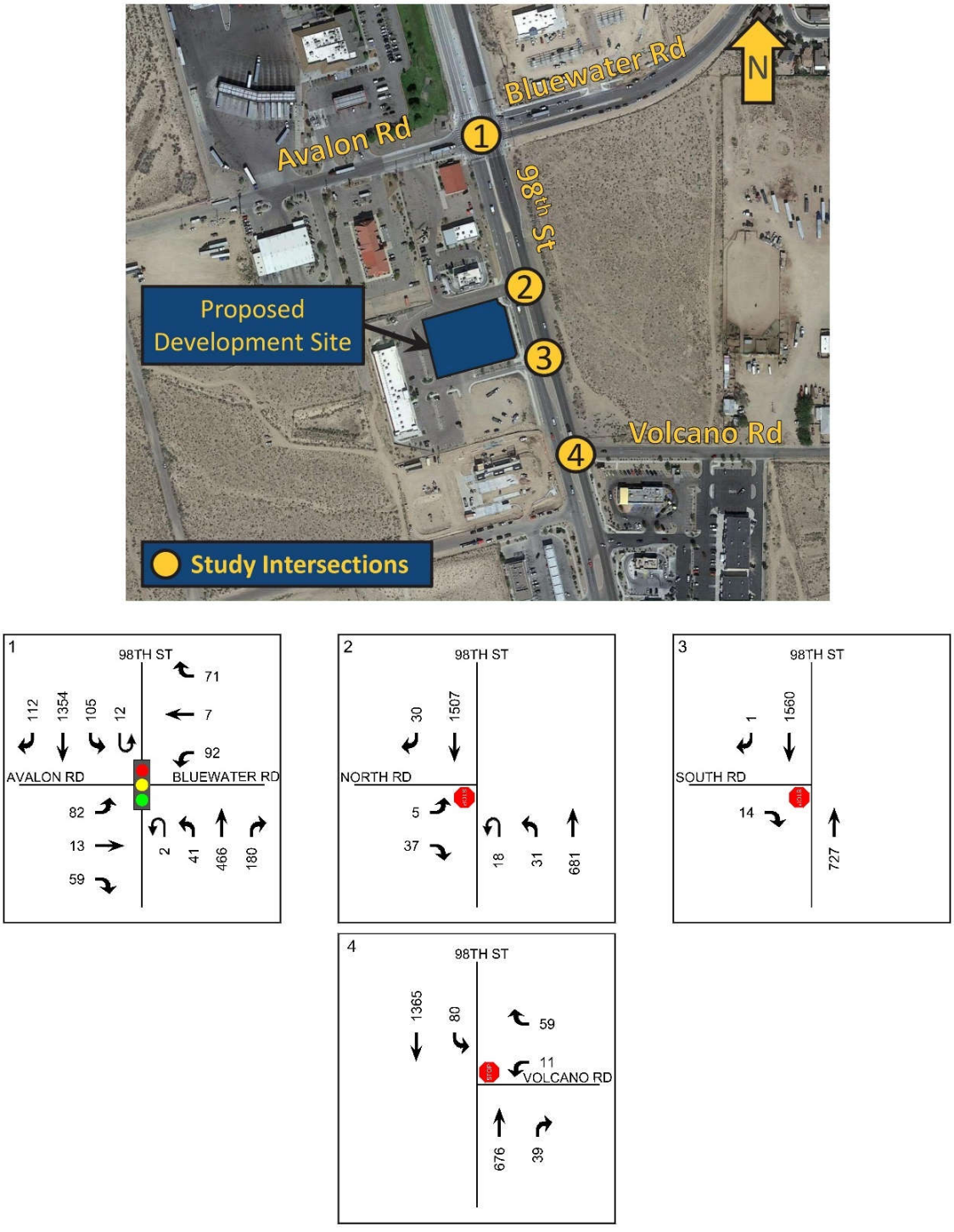


Figure 3: Existing PM Peak Hour Turning Movement Counts

CAPACITY ANALYSIS: LEVEL OF SERVICE AND QUEUING

ANALYSIS VOLUMES

EXISTING YEAR

For the Existing Year traffic volumes, video collected turning movement counts (TMCs) were used. PM peak hour was analyzed for level of service, capacity, and queueing.

BUILD-OUT YEAR (2023) BACKGROUND

Existing TMCs were used with an applied annual growth rate developed from the MRCOG Metropolitan Transportation Plan (MTP) CUBE/2 Regional Model for the Build-Out Year Background volumes. Further The ITE site generated trips from the completion of nearby Westpointe 40 Development construction Phase 1 are added.

BUILD-OUT YEAR (2023) TOTAL

Site trips generated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition, were added to the Build-Out Year Background volumes for analysis.

BUILD-OUT YEAR (2023) OPTIMIZED – RE-STRIPED RIGHT TURN LANE

This scenario analyzes the effects of re-striping the right turn lane southbound on 98th St at Bluewater as a right turn only lane. Traffic volumes used in this scenario are identical to the Build-Out Year Total volumes.

CAPACITY ANALYSIS

Per the Highway Capacity Manual, LOS is presented as a letter grade (A through F) based on the calculated average delay for an intersection or movement. Delay is calculated as a function of several variables, including signal phasing operations, cycle length, traffic volumes, and opposing traffic volumes, but is a measurement of the average wait time a driver can expect when moving through an intersection. Factors such as total cycle time (for all movements), queueing restrictions, and vehicle volumes can affect measurements of delay, especially for lower volume movements and side streets. Generally, these factors are only realized when delays reach or exceed LOS E thresholds. In such cases, a narrative is offered in subsequent sections specific to the individual movement in question.

Table 1 below, reproduced from the Highway Capacity Manual, shows delay thresholds and the associated Level of Service assigned to delay ranges. Generally, a LOS of D or better is considered an acceptable level of service.

Table 1: LOS Criteria and Descriptions

Level of Service	Average Control Delay (sec/vehicle)	General Description (Signalized Intersections)
A	≤10	Free flow
B	>10 – 20	Stable flow (slight delays)
C	>10 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Queueing is reported in vehicles, with a base assumption of 20 feet queue length per vehicle, for Two-Way Stop Controlled intersections, including the proposed site access points. Queues are reported for queue

measurements falling within the 95th percentile. It should be noted that 95th percentile queues are statistically expected to occur during only 5% of the peak hour's sign cycles. It is also noted that un-reported average queueing at an intersection would statistically be much shorter than 95th percentile queueing.

For the purposes of this analysis, acceptable levels of service (LOS) are defined to be a LOS D or better. Based on procedures outlined in the Highway Capacity Manual, intersection delay and level of service for stop-controlled intersections are reported as the delay and level of service for the worst-case movement at each intersection. Detailed output sheets can be found in Appendix D.

HCS ANALYSIS

Highway Capacity Software was used to analyze the study intersections for Level of Service (LOS) and queueing conditions. All intersection approaches operate at a LOS of C or better during PM peak hour under the Existing scenario. The results of the HCS analysis for the Existing conditions are shown in Table 2.

Table 2: HCS Result Summary for Existing (2022) Conditions

		98th & Avalon					98th & N Access Rd					98th & S Access Rd					98th & Volcano				
		Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Back of Queue (ft/ln)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)
Existing	PM Peak Hour	EBL	46.8	D	215.0	157.8	EBL	34.4	D	---	0.1										
		EBR	---	---	---	---	EBR	16.8	C	---	0.4	EBR	16.7	C	---	0.1					
		EBT	45.8	D	---	77.8															
		NBL	7.8	A	165.0	15.1	NBL	24.6	C	7.6	0.8										
		NBR	9.0	A	---	107.8	NBR	---	---	---	---	NBR	---	---	---	---	NBR	---	---	---	---
		NBT	8.7	A	---	115.9	NBT	---	---	---	---	NBT	---	---	---	---	NBT	---	---	---	---
		SBL	6.2	A	215.0	37.6	SBL	---	---	---	---						SBL	9.5	A	4.4	0.3
		SBR	10.0	A	---	234.2	SBR	---	---	---	---	SBR	---	---	---	---					
		SBT	9.4	A	---	234.8	SBT	---	---	---	---	SBT	---	---	---	---	SBT	---	---	---	---
		WBL	42.8	D	360.0	79.0											WBL	22.3	C	8.0	0.2
		WBR	---	---	---	---											WBR	11.3	B	8.0	0.3
		WBT	52.2	D	---	144.7															

From the above table, the following conclusions are made from the Existing Year analysis:

- LOS performance varies A-C at the three stop-controlled intersections.
- At 98th St and Bluewater Rd, the signalized intersection operates at LOS A for all primary north and southbound movements and LOS D for all secondary east and westbound movements.
- The overall intersection LOS at 98th St and Bluewater is B

BUILD YEAR (2023) ANALYSES

The following sections detail the methods and calculations used to obtain traffic volumes for Build-Out Year analysis scenarios. This process used the following tools as described below: Traffic Projections and Site Trip Distribution & Assignment including trips generated by the construction of a neihboring developement. Figures at the end of this section show the resulting traffic volumes determined for the Build-Out Year (2023) analysis scenarios.

TRAFFIC PROJECTIONS

Development construction is anticipated to begin in the current year (2022), with full completion expected in 2023. Build-Out Year (2023) volumes were forecast from existing traffic volumes using counted values from 2016 and the 2040 (updated) travel demand models provided by MRCOG. These models were then compared using AM and PM peak hour direction volumes (AMPH LOAD and PMPH LOAD) to calculate anticipated growth rates for individual roadways near the study area. Roadways calculated to have a yearly growth rate of less than 1% were analyzed with a 1% per year growth rate to facilitate a conservative analysis. Growth rates were then converted to growth factors for specific analysis scenarios. Values provided by MRCOG are reproduced verbatim in Table 3: Growth Rates, in addition to the calculated growth rates used in the analysis. Growth rates were then applied to the 2022 existing volumes to forecast future volumes.

Table 3: Growth Rates

Roadway			MRCOG 2016 Model "Peak Hour Load"	MRCOG 2040 Model "Peak Hour Load"	Yearly Growth Rate	Average Yearly Growth	Growth Rate for Analysis
98th St North of Avalon/Bluewater Rd	AM	PH	979	967	-0.05%	-0.70%	1.00%
	PM	PH	1601	1326	-0.78%		
98th St Between Avalon Rd & Volcano Rd	AM	PH	885	859	-0.12%		
	PM	PH	1522	1229	-0.89%		
98th St Between Volcano Rd & Central Ave	AM	PH	885	791	-0.47%		
	PM	PH	1522	1071	-1.45%		
98th St South of Central Ave	AM	PH	476	412	-0.60%		
	PM	PH	828	615	-1.23%		

Projected turning movement volumes were used for the Build-Out Year Background scenario. Projected turning movement volumes plus the site-generated trips were used for the Build-Out Year Total scenario.

NEIHBORING DEVELOPEMENT SITE TRIP TRIP OVERLAY

Two neighnoring developments were discussed during the Scoping Meeting. The first was the 98th & Bluewater Commercial Development, planned with one construction phase. . The second was Westpoint 40 Industrial Park Development with three planned construction phases. Lee Engineering was provided with Traffic Impact Studies for both developments. Expected phase completion with the assosated ITE Land Uses are provided below.

98th & Bluewater Commercial Development:

- Development to commence construction 2021

- Phase 1 expected completion 2025
    - Four: Fast-Food Restaurant with Drive-Through Window (ITE 934)
    - One : Automobile Care Center (ITE 942)
    - One: Coffee/Donut Shop with Drive-Through Window and No Indoor Seating (ITE 938)

Westpoint 40 Industrial Park Development:

- Development to commence construction 2022
- Phase 1 expected completion 2022
    - Tire Superstore (ITE 849)
- Phase 2 expected completion 2025
    - Industrial Park (ITE 130)
- Phase 3 expected completion 2030
    - Industrial Park (ITE 130)

The Westpoint 40 Industrial Park Development Phase 1 construction is the only portion of either nearby development scheduled for completion with this studiy's scope. As such, the trips generated by the Tire Superstore ITE 849 have been added to and routed through the Panda Express study area system based on the the trip generation and distribution presented in the Westpoint 40 Industrial Park Development Traffic Impact Study provided in Appendix E.

Panda Express Site Trip Generation

Trip generation for the Development was performed using the procedures and methodologies provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. The land use category Fast-Food Restaurant with Drive-Through Window (ITE 934) was used to generate trips for the Development. Trips were calculated using rates for daily, AM peak hour, and PM peak hour generators. Trips generated by the proposed development are shown below in the tables. Only PM peak hour was analyzed because the Panda Express development does not operate during AM peak hour. Pass-by trips for the development site were generated using data and procedures according to the Institute of Transportation Engineer's Trip Generation Manual. Site-generated trips were added to the Background traffic volumes to create the Total Build-Out traffic volumes. Table 4 below shows the trip generation and associated calculations.

Table 4: Trip Generation

Use	Units		TRIP GENEERATION				PEAK HOUR TRIPS	
			Weekday	PM Peak			PM Peak	
			Trips	Rate	Enter	Exit	In	Out
ITE 934 - Fast-Food Restaurant with Drive-Through Window	2.6	SQ FT GFA	1215	50.94	51%	49%	68	65

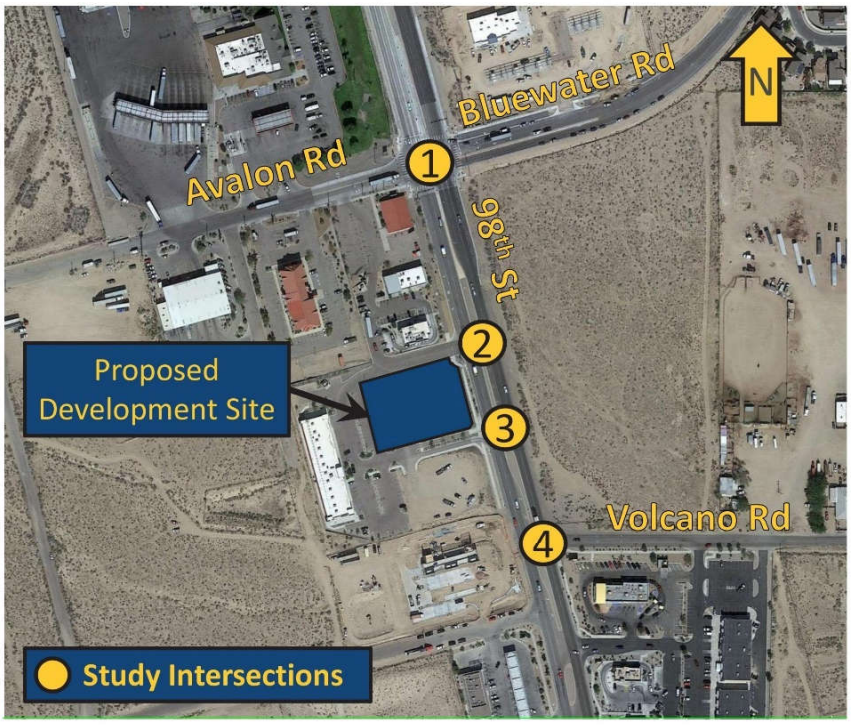
Trip Distribution and Assignment

The proposed site-generated traffic distribution was broken into two categories: Direct and Pass-by Trips. From the ITE Trip Generation Manual, 55% of generated trips can be expected to be Pass-by trips for proposed land use. Pass-by trips were routed based on movement proportion percentages of the Existing TMC data. Direct trip distribution was determined based on the analysis of existing intersection demand characteristics within the study area. These direct trips were routed within the roadway network to and from the Development based on the proportions of existing turning movement counts/demands.

The routing was based on logical trip attractions and destinations for residential-based trips. Direct and Pass-By Trips are shown in Table 5. Figure 4 contains the trips generated by the Tire Superstore constructed during Phase 1 of the Westpointe 40 Industrial Park development and routed via Bluewater Rd into the study area. Figure 5 shows the Direct trip distribution and routing percentages generated by the Development, Figure 6 shows Pass-by trips. When the applied distribution percentages did not result in whole vehicles or did not summate equal the total generated trips rounding preference was assigned to the movement with the highest existing turning movement count volumes.

Table 5: Direct & Pass-By Trip Volumes

Site Trips Generation for the Development	PM PEAK HOUR TRIPS			
	Direct Trips		Pass-By Trips	
	In	Out	In	Out
	31	29	37	36



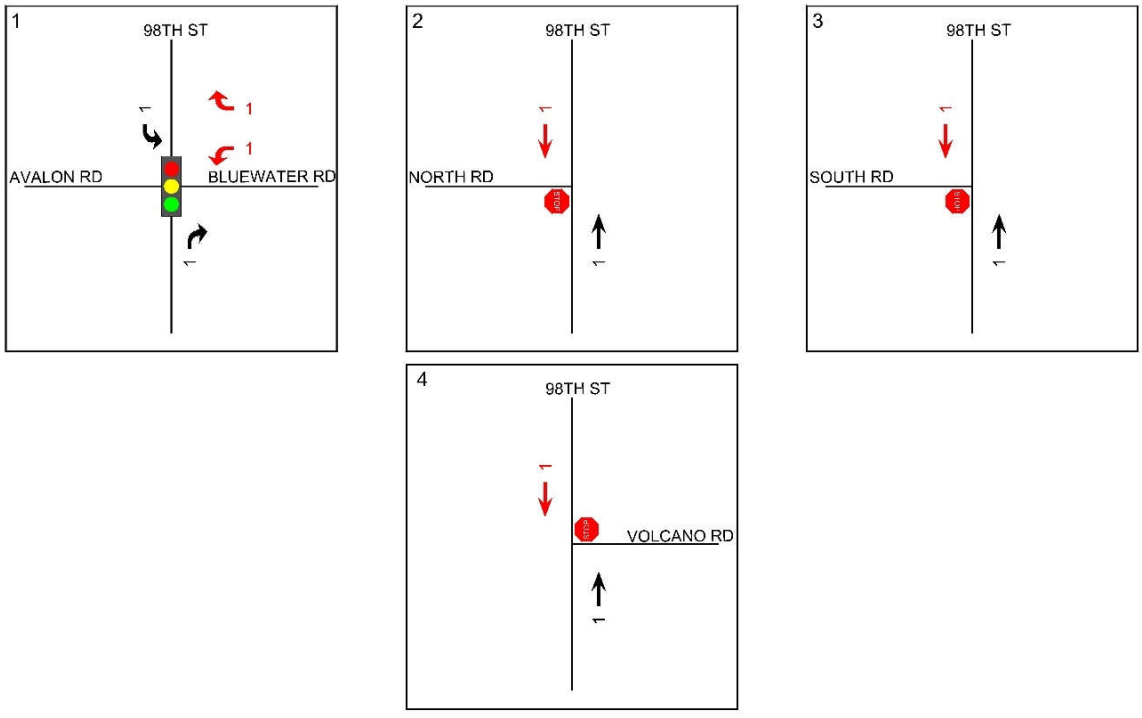
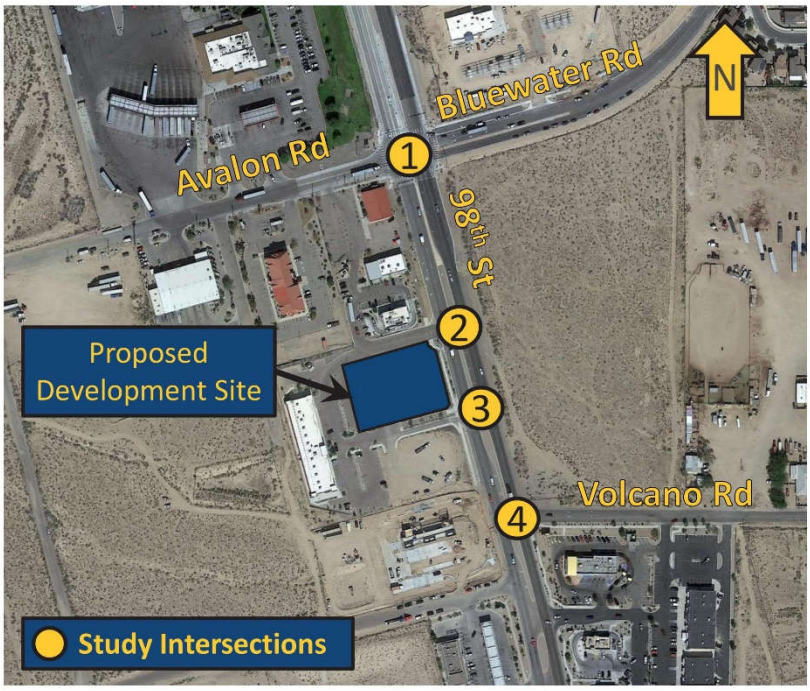


Figure 4: Westpointe 40 Industrial Park Phase 1 Generated Trips



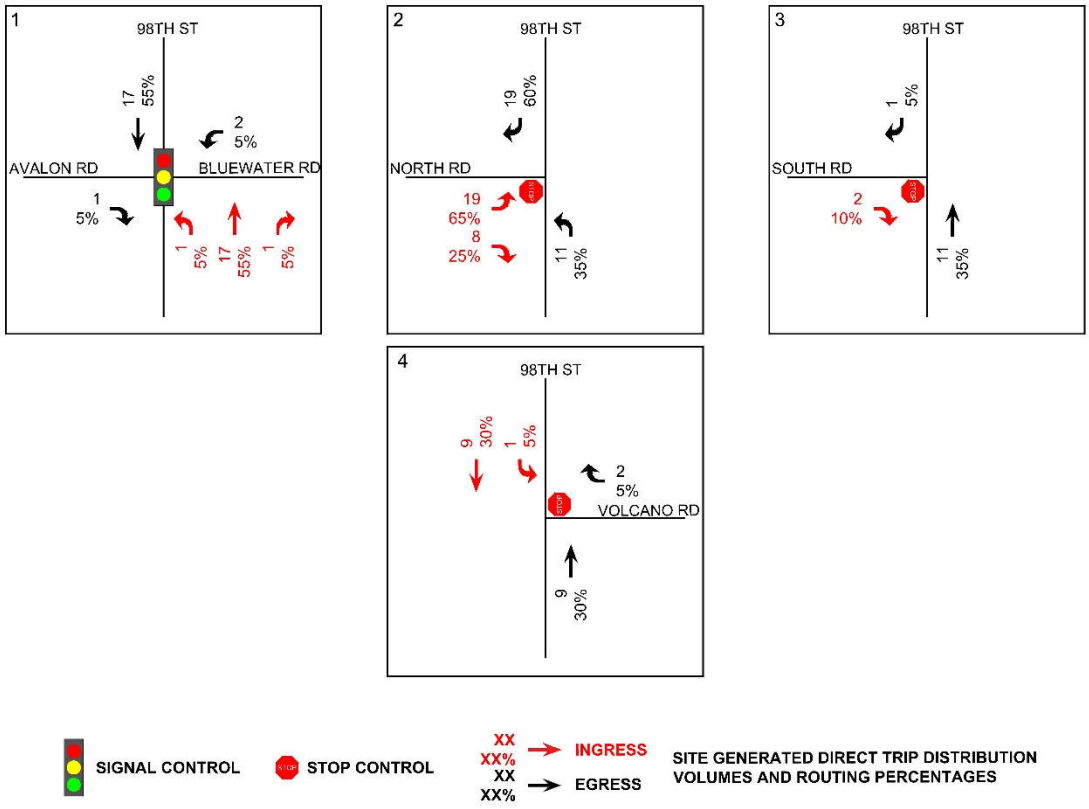


Figure 5: Site Generated Direct Trips & Routing Percentages

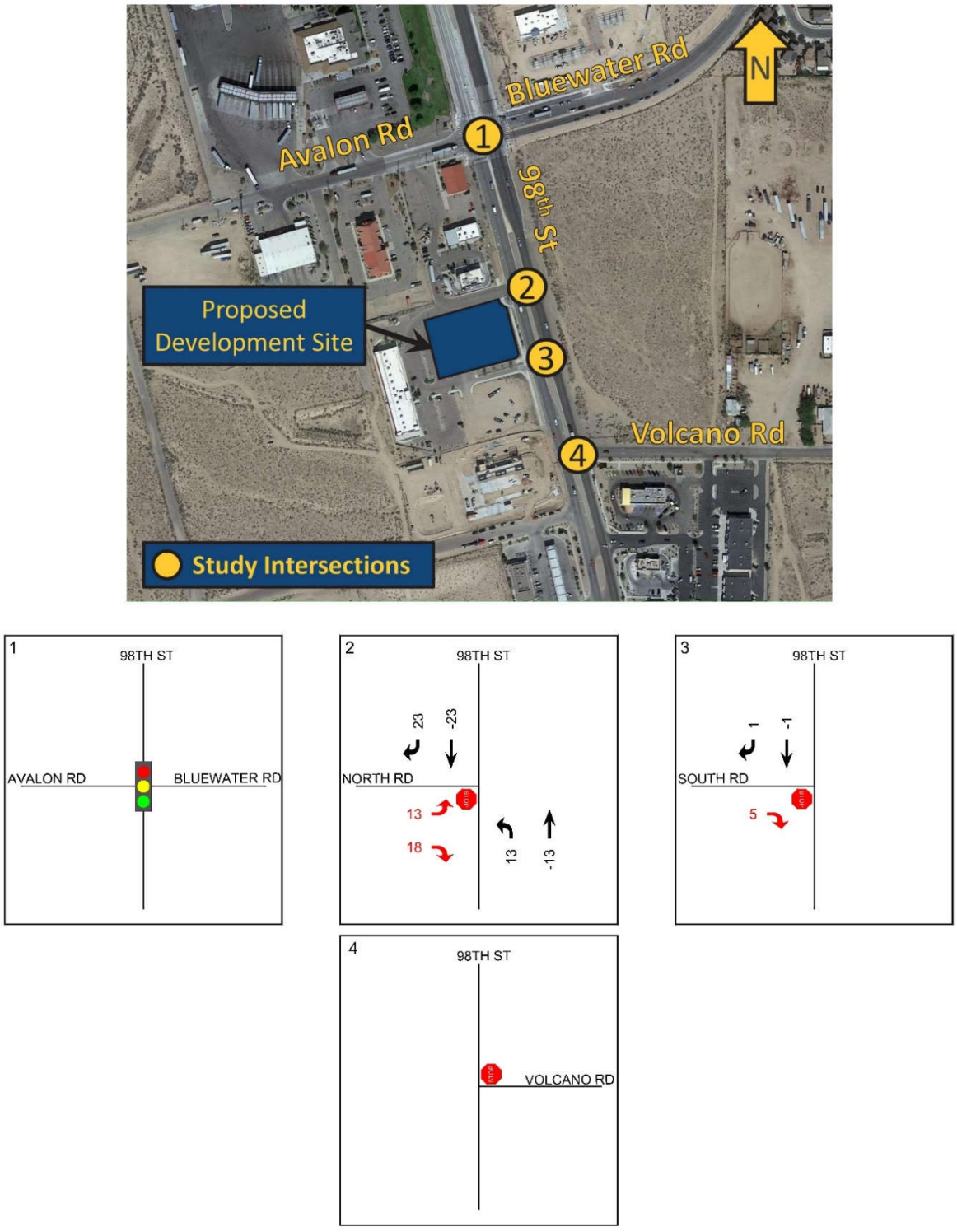


Figure 6: Site Generated Pass-By Trips

Traffic Volume Calculations

Traffic volumes used in the Build-Out Years analyses were calculated as follows:

- Build-Out Year (2023) Background –Existing traffic volumes with an applied annual growth rate and the addition of traffic volumes generated by the nearby development of a Tire Superstore ITE code 846.
- Build-Out Year (2023) Total – Build-Out Year Background volumes plus Panada Express site-generated Direct and Pass-By trips.
- Build-Out Year (2023) Optimized – Traffic volumes used are identical to Build-Out Year (2023) Total. Scenario analyzes optimization of 98th St right turn lane configuration at Bluewater Rd.

Figure 7 shows the Build-Out Year Background (2023) and Figure 8 shows Build-Out Year (2023) Total volumes.

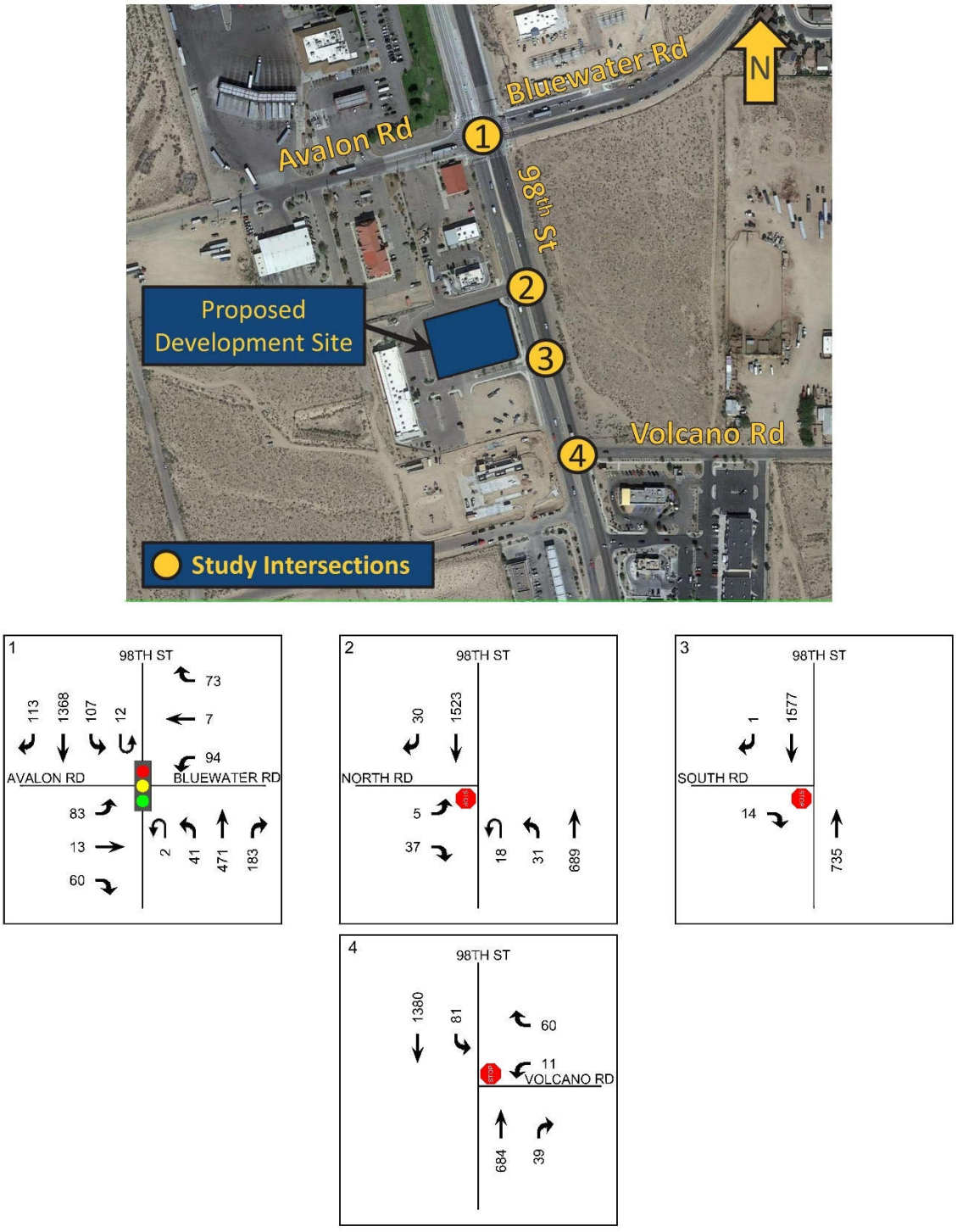


Figure 7: Build-Out Year (2023) Background

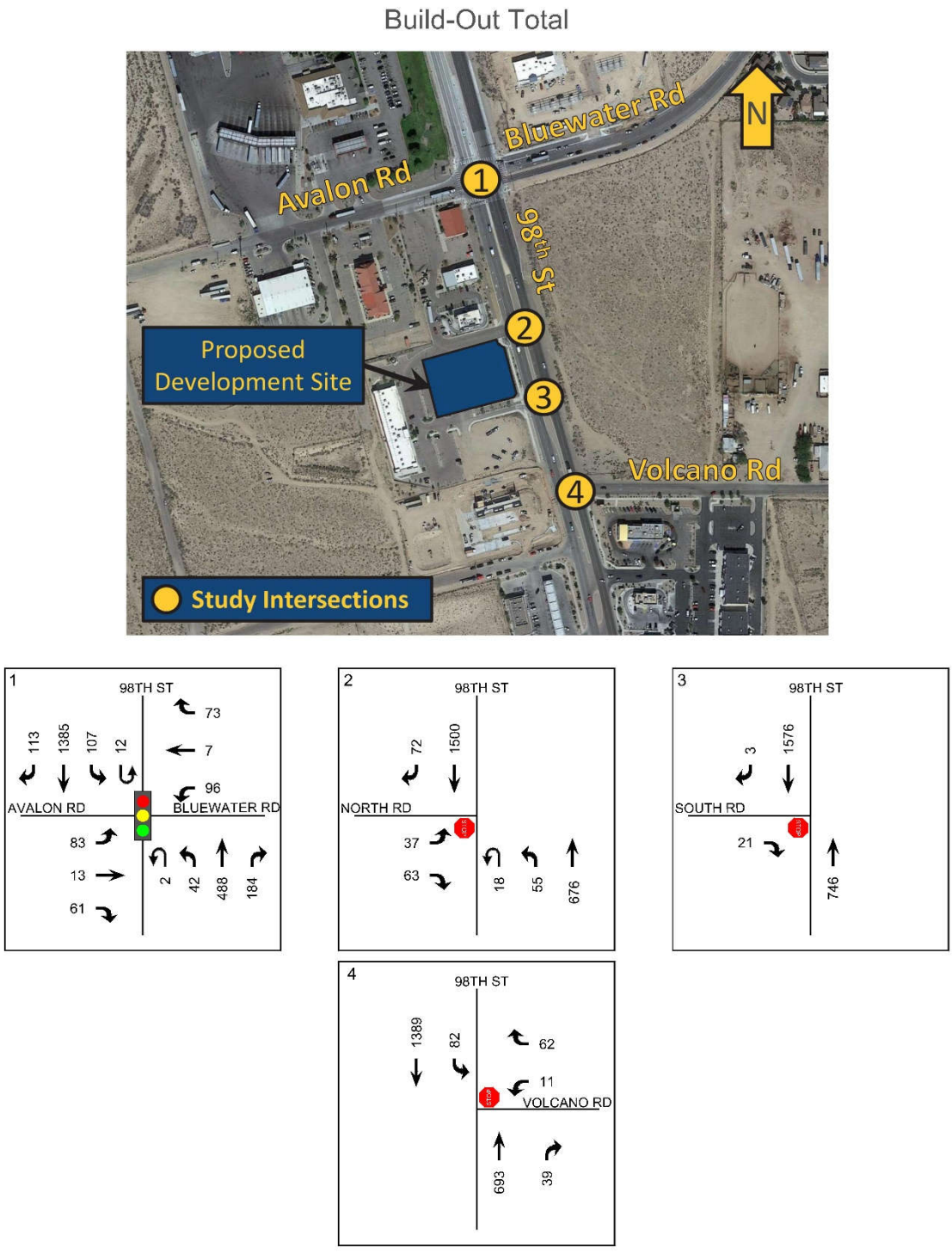


Figure 8: Build-Out Year Total

TRAFFIC ANALYSIS OF BUILD-OUT BACKGROUND AND TOTAL

As performed for Existing Background conditions, a Level of Service (LOS) and queueing analysis was performed for all Build-Out analysis scenarios using the same procedures, field data, and assumptions.

2023 Build-out Total Conditions

Table 6 below summarizes the intersection delay, level of service, and queueing under 2023 build-out conditions. Detailed capacity output sheets showing all individual movements can be found in Appendix D. Table 7 displays the HCS Analysis results for the 98th St and Bluewater Rd / Avalon Rd under identical loading conditions to the Build-Out Year (2023) Total, but with the southbound outermost lane converted from right/through to right turn only.

Table 6: HCS Result Summary for Build-Out Year (2023) Backgroud & Total Conditions

		98th & Avalon					98th & N Access Rd					98th & S Access Rd					98th & Volcano				
		Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Back of Queue (ft/ln)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)
Build-Out Background	PM Peak Hour	EBL	43.0	D	215.0	136.1	EBL	35.0	E	---	0.1										
		EBR	---	---	---	---	EBR	16.8	C	---	0.4	EBR	16.8	C	---	0.1					
		EBT	48.6	D	---	95.3															
		NBL	8.1	A	165.0	17.9	NBL	24.6	C	7.6	0.8										
		NBR	9.1	A	---	99.5	NBR	---	---	---	---	NBR	---	---	---	---	NBR	---	---	---	---
		NBT	8.7	A	---	107.0	NBT	---	---	---	---	NBT	---	---	---	---	NBT	---	---	---	---
		SBL	6.2	A	215.0	42.6	SBL	---	---	---	---						SBL	9.5	A	4.4	0.3
		SBR	10.4	B	---	247.8	SBR	---	---	---	---	SBR	---	---	---	---					
		SBT	9.8	A	---	249.0	SBT	---	---	---	---	SBT	---	---	---	---	SBT	---	---	---	---
		WBL	42.2	D	360.0	113.1											WBL	22.5	C	8.0	0.2
		WBR	---	---	---	---											WBR	11.3	B	8.0	0.3
		WBT	49.4	D	---	105.8															

		98th & Avalon					98th & N Access Rd					98th & S Access Rd					98th & Volcano				
		Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Back of Queue (ft/ln)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)	Movement	Delay (s/veh)	LOS	Storage Length (veh)	95th% Length (veh)
Build-Out Total	PM Peak Hour	EBL	43.0	D	215.0	136.1	EBL	47.2	E	---	1.3										
		EBR	---	---	---	---	EBR	17.6	C	---	0.7	EBR	17.1	C	---	0.2					
		EBT	48.9	D	---	97.0															
		NBL	8.2	A	165.0	18.3	NBL	24	C	7.6	1.2										
		NBR	9.1	A	---	102.7	NBR	---	---	---	---	NBR	---	---	---	---	NBR	---	---	---	---
		NBT	8.8	A	---	110.4	NBT	---	---	---	---	NBT	---	---	---	---	NBT	---	---	---	---
		SBL	6.3	A	215.0	42.4	SBL	---	---	---	---						SBL	9.6	A	4.4	0.3
		SBR	10.5	B	---	250.7	SBR	---	---	---	---	SBR	---	---	---	---					
		SBT	9.8	A	---	251.8	SBT	---	---	---	---	SBT	---	---	---	---	SBT	---	---	---	---
		WBL	42.2	D	360.0	115.4											WBL	22.8	C	8.0	0.2
		WBR	---	---	---	---											WBR	11.4	B	8.0	0.3
		WBT	49.4	D	---	105.8															

Table 7: HCS Result Summary for Buil-Out Year (2023) Right Turn Lane Reconfiguration Condition at 98th St & Bluewater Rd

		98th & Avalon				
		Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Back of Queue (ft/ln)
Build-Out Total	PM Peak Hour	EBL	43.0	D	215.0	136.1
		EBR	---	---	---	---
		EBT	48.9	D	---	97.0
		NBL	10.9	B	165.0	18.3
		NBR	9.1	A	---	102.7
		NBT	8.8	A	---	110.4
		SBL	6.3	A	215.0	42.4
		SBR	7.3	A	---	250.7
		SBT	12.7	B	---	251.8
		WBL	42.2	D	360.0	115.4
		WBR	---	---	---	---
		WBT	49.4	D	---	105.8

From the above tables, the following conclusions are made for the Build-Out Year analyses:

- For the intersection of 98th St and BluewaterRd / Avalon Rd
  - Capacity Analysis
    - The intersection Operates at LOS A/B in the coordinated north and southbound directions and LOS D in the east and westbound directions. These results are consistent throughout all analysis scenarios, including Existing Year.
  - Queueing Analysis
    - Where HCS results for queue lengths are present, all existing storage lengths are sufficient to accommodate 95th percentile quelengths
  - Optimized Scenario (southbound right/through to right turn only at Bluewater)
    - No significant change in LOS due to altered lane configuration
- For the intersection of 98th St and North Access Rd
  - Capacity Analysis
    - Operates at LOS E or higher, the eastbound left turn changed from Existing LOS D to LOS E under all Build-Out conditions. It is noted that the v/c ratio for this movement indicates that the movement does not exceed capacity and is therefore attributed to gap delays for the movement.
  - Queueing Analysis
    - Where HCS results are present, all queue lengths are < 1 vehicle (20 feet).
- For the intersection of 98th St and South Access Rd
  - Capacity Analysis
    - Operates at LOS C and is unchanged from the Existing operating LOS to Build-Out conditions.
  - Queueing Analysis
    - Where HCS results are present, all queue lengths are < 1 vehicle (20 feet).
- For the intersection of 98th St and Volcano Rd
  - Capacity Analysis

        - Operates at LOS C or better and LOS by approach remains consistent throughout all analysis scenarios, including Existing Conditions
    - Queueing Analysis
        - Where HCS results are present, all queue lengths are < 1 vehicle (20 feet).

Site Related Capacity Mitigations and Street Improvements

The above section shows that capacity and queueing issues are not observed during the study peak hours. No capacity mitigations or street improvements are required based on the HCS Analysis results pertaining to the proposed site development.

Site Access Sight Distance

The following presents recommended intersection sight distance requirements for the access driveway serving the Development. Intersection sight distance requirements were calculated based on the 2018 AASHTO "Green Book" chapter 9.5. The design vehicle used was a passenger vehicle.

- Case B1 – A stopped vehicle turning left turn from a minor street approach onto a major road.
- Case B2 – A stopped vehicle turning right from a minor street approach onto a major road.

Intersection sight distances were calculated based on the following assumptions:

- Required intersection sight distance for Case B2 was calculated based on the design vehicle crossing into the first lane of the roadway.

Values shown below in Table 8 were rounded up to the nearest 5-foot increment. Formulas, values, and calculations used in the sight distance analysis can be found in the Appendix.

Table 8: Site Distance Requirements

Case	Roadway	Speed	Sight Distance
Case B1 – Turning Left from North Access Rd	98th St	45 MPH	645 Ft
Case B2 – Turning Right from North Access Rd	98th St	45 MPH	500 FT
Case B2 – Turning Right from South Access Rd	98th St	45 MPH	500 Ft

It is recommended that all development driveways adhere to the sight distance provisions detailed in the AASHTO "Green Book". An area bounded by the above sight distances with the decision point placed 14.5 feet back from the edge of the shoulder midway between the outbound driving lane should be maintained clear of any obstructions.

AUXILIARY LANE ANALYSIS

CABQ DPM auxiliary lane warrants were reviewed for the site access driveways. It should be noted that auxiliary right and left-turn lanes already exist at the full-access driveway located at North Access Rd. DPM Table 7.4.67 was used to determine if right turn auxiliary lanes would be warranted for site access points on 98th St. DPM Tables 7.4.68 and 7.4.69 were used to determine deceleration length and taper length, if

applicable. It is important to note 2023 Full Build-Out traffic volumes were used in the analysis. The results of this analysis are shown in Table 9.

Table 9: Auxiliary Turn Lane Warrant

Location	Access/Turn Type	Design Speed	Turning Volume per Hour	Warrant Result	DPM Tables 7.4.68/70 Minimum Storage Length (ft)	DPM Tables 7.4.68/70 Lane Transition Length (ft)	Existing Storage Length (ft)	Existing Lane Transition Length (ft)
98th St at North Access Rd	Full Access (Right Turn)	45 MPH	72	Required	350-405	600-300 Reverse Curve	---	330
98th St at North Access Rd	Full Access (Left Turn)	45 MPH	73	Required	160*	600-300 Reverse Curve	170	80
98th St at South Access Rd	RIRO Only (Right Turn)	45 MPH	3	Not Required	---	---	---	---

** Based on 95th % Queue Length HCS Results*

Based on the above criteria, right and left turn deceleration lanes are warranted for North Access Rd, and a right turn lane was not warranted for the South Access Rd. A left turn lane warrant was not performed for South Access Rd due to its nature as a Right-In /Right-Out Only access point.

For the southbound right turn lane on 98th St at North Access Rd, It is important to note that it is unlikely right turn queues would develop since a full and complete stop is not required due to the lack of stop or signal control. The existing auxiliary lane can safely accommodate deceleration to a turning speed of 15 mph for the right turn into North Access Rd.

The HCS results indicate a 95th % Queue Length of 7.6 vehicles for the left turning movement into the site at the North Access Rd. This Queue Length (Veh/ln) translates into a Queue Storage Length of 160 feet, which is provided by the existing left turn auxiliary lane. The taper length was likely designed to a previous standard and is constrained by the existing left turn lane in the opposing direction from 98th St to Volcano Rd, and a manhole located in the median. Based on these factors, adjusting the taper of the existing left turn lane is not recommended.

No change to existing auxiliary lanes or addition of new auxiliary lanes is recommended for either site access point.

DRIVE-THRU QUEUING ANALYSIS

DRIVE-THRU DESCRIPTION

Based on the development site plan, the Panda Express Drive-Thru Fast-Food Restaurant will be located on a 42,367 square foot lot. 24,654 square feet will be developed of that square footage, including the 2,600 square foot building. The 17,713 square foot portion of the lot, which would remain unchanged, contains an approximately 20-foot-wide parking lot travel lane and 32 parking spaces west of the building and drive-thru queue.

Per the site plan presented in Figure 1, queue storage is provided for 12 passenger vehicles. The queue processes counterclockwise around the building and exits into the existing parking lot travel lane adjacent to the North Access Rd. Further, there appears to be room within the parking lot travel lane to accommodate an additional six passenger cars without blocking the site's northern entrance or entering the North Access Rd.

QUEUING VARIABLES

Queue extension analysis is presented using the following variables:

- **The Arrival Rate (λ)** is measured in vehicles per hour (vph). This rate determines how many vehicles enter the system in an hour. The value used in this analysis for λ was the ITE Trip Generation PM peak

hour ingress volume for land use Fast-Food Restaurant with Drive-Thru Window- ITE 934 presented previously in Table 4.

- The site includes interior dining facilities, and presumably, some portion of the total inbound traffic would be dining on-site rather than using the drive-thru. No data related to the dine-in percentage was available. Thus, the conservative approach of routing 100% of ITE PM peak hour ingress traffic through the drive-thru was used.

- **Average Time in System (E_v) is** measured in seconds and converted to hours for calculation purposes. The variable represents the average amount of time individual vehicles spend in the queue from entry to exit. It is used to calculate the service rate in conjunction with the arrival rate.
  - Panda Express provided an Average Time in System determined from three Panda Express locations using three days' worth of operations data.
  - For verification purposes, Lee Engineering compared the Panada Express data to a national study conducted in 2021. The Average Time in System provided by Panda Express was less than one standard deviation from the national average. The Panada Express Average Time in System of 207 seconds was used for the pruposes of this analysis. Panda Express provided data as well as the national study are provided in Appendix H.
- **The Service Rate (μ)** is also measured in vph; this is the rate at which vehicles are processed through the drive-thru. The value for the Service Rate used in this analysis was calculated from the Average Time in System in conjunction with the Arrival Rate based on the Queuing Performance Equations for Random Arrival-Random Service Single Channel Systems presented in Traffic Flow Fundamentals by Adolf D. May.

$$\boldsymbol{\mu = \lambda + \frac{1}{E_v}}$$

Queuing Analysis

The queuing analysis assumed a single-channel queuing model where arrivals occur according to a Poisson process and service times have an exponential distribution (M/M/1 model). The following equation for M/M/1 queuing was used to determine a certain queue length's probability. The results for the probabilities of 0 through 25 vehicles are presented in Table 10.

$$Probability\ of\ More\ Than\ \text{“k” Vehicles in Queue} = \left(\frac{\boldsymbol{\lambda}}{\boldsymbol{\mu}}\right)^{k+1}$$

Table 10: Probability of "k" Vehicles in Queue

Number of Vehicles in Queue (k)	Probability of the Number of Vehicles	Cummulative Probability of the Number of Vehicles
0	22%	22%
1	17%	39%
2	13%	52%
3	10%	63%
4	8%	71%
5	6%	77%
6	5%	82%
7	4%	86%
8	3%	89%
9	2%	92%
10	2%	93%
11	1%	95%
12	**1%**	**96%**

Table 10

Table 10 shows that exceeding the planned storage capacity of 12 vehicles by one or more vehicles is a 96th percentile probability event during the PM peak hour. Further, as discussed in the Drive-Thru Description section, there is potential for up to six additional vehicles to join the queue in the parking lot travel lane without interfering with the operation of the North Access Rd. The probability of queued vehicles extending beyond the queue storage and entering the parking lot travel lane is low. The likelihood of the queue interfering with operations at the North Access Rd is very low. This outcome is a 99th+ percentile event during PM peak hours. The results of the Queuing Analysis for the PM peak hour are further summarized in Table 11.

Table 11: Queuing Analysis Summary

Probability of Exceeding Queue Storage	Probability of Queue Spillback to North Access Rd	PM PH Average Number of Vehicles in Queue
4%	1%	4

Therefore, drive-through queues are expected to be accommodated by provided on-site storage.

REVIEW OF LONG-RANGE BIKE PLAN

REVIEW SOURCES

This review included a site field visit to confirm existing conditions and a comparison of those facilities with the MRCOG, Mid-Region Metropolitan Planning Organization's (MRMPO) Long Range Bikeway System (LRBS) map and documentation. The LRBS map was published in the Connections 2040 Metropolitan Transportation Plan (MTP), which was adopted by the Metropolitan Transportation Board of the Mid-Region Metropolitan Planning Organization (MRMPO) on April 17th, 2020.

The LRBS map depicts the locations of both existing and planned bicycle facilities and was used as the primary reference. It is shown in Figure 9. Additional references included the Bikeways & Trails Facilities Plan Albuquerque NM adopted May 2015 and the NMDOT New Mexico Prioritized Statewide Bicycle Network Plan Draft 2018.

Examination of the above sources produced no specific reference to future bicycle facility plans located within the study area except by the LRBS Map's present and future bike lanes seen in Figure 9.

EXISTING AND PLANNED BICYCLE FACILITIES

As previously described, an existing 10-foot-wide bike lane runs adjacent to the Proposed Panda Express development within the study area on the west side of 98th St. This southbound bike lane begins on the southside of North Access Rd and continues south to Central Ave. A narrower existing northbound bike lane on the east side of 98th St terminates with appropriate signage at Volcano Rd. A 6-foot bike lane is present on Bluewater Rd, running in both directions. Recent satellite data, confirmed by a site field visit, show these bike lanes along Bluewater Rd are regularly occupied by parked vehicles.

Comparing the existing bicycle facilities with those depicted by the MRMPO LRBS Map reveals inconsistencies. The LRBS Map shows a continuous bike lane running the length of the study area. The field visit and satellite imagery show that the 98th St eastside northbound bike lane terminates at Volcano Rd and resumes north of Bluewater Rd. The westside 98th St southbound bike lane exists north of Bluewater Rd and south of the North Access Rd. A further inconsistency between the MRMPO LRBS Map and the existing conditions is that bicycle facilities depicted as future planned for Bluewater Rd have been installed.

Based on the presence of an adequate existing bike lane adjacent to the proposed development and the absence of planned future bicycle facilities adjacent to the development, there are no development site specific recommendations regarding bicycle facilities. However, closing the existing gaps in the bike lanes northbound between Volcano Rd and Bluewater and southbound between North Access Rd and Avalon Rd on 98th St should be considered.

Figure 9: MRMPO Long Range Bikeway System Map

CRASH DATA SUMMARY

At the request of the NMDOT, a crash summary for the intersections within the study area has been completed. The purpose of this analysis is to highlight trends and observations from summarized crash data. Crash data was provided by NMDOT for the years 2015 to 2019 in aggregate form and is summarized in the table below.

Table 12: Crash Summary

Crash Summary		98th St & Avalon Rd	98th St & North Rd	98th St & South Rd	98th St & Volcano Rd
Total Crashes		**178**	**1**	**0**	**101**
By Year	2015	34	0	0	15
	2016	26	0	0	15
	2017	41	1	0	23
	2018	48	0	0	20
	2019	29	0	0	28
By Type	Fixed Object	6	0	0	4
	Unknown/Non-Collision	0	0	0	2
	Other Vehicle - All Others/Entering At Angle	2	0	0	1
	Other Vehicle - Both Going Straight/Entering At Angle	16	0	0	16
	Other Vehicle - Both Turn Left/Entering At Angle	3	0	0	0
	Other Vehicle - From Opposite Direction	8	0	0	9
	Other Vehicle - From Opposite Direction/Both Going	0	0	0	2
	Other Vehicle - From Opposite Direction/Head-On	0	0	0	1
	Other Vehicle - From Opposite Direction/One Left Turn	3	0	0	4
	Other Vehicle - From Opposite Direction/One Right Turn	1	0	0	2
	Other Vehicle - From Opposite Direction/Sideswipe	0	0	0	1
	Other Vehicle - From Same Direction/All Others	2	0	0	1
	Other Vehicle - From Same Direction/Both Going Straight	34	0	0	6
	Other Vehicle - From Same Direction/Both Turn Right	1	0	0	0
	Other Vehicle - From Same Direction/One Left Turn	0	0	0	1
	Other Vehicle - From Same Direction/One Right Turn	0	0	0	1
	Other Vehicle - From Same Direction/One Stopped	9	0	0	0
	Other Vehicle - From Same Direction/Rear End Collision	37	1	0	3
	Other Vehicle - From Same Direction/Sideswipe Collision	3	0	0	0
	Other Vehicle - From Same Direction/Vehicle Backing	1	0	0	0
	Other Vehicle - One Left Turn/Entering At Angle	12	0	0	23
	Other Vehicle - One Right Turn/Entering At Angle	3	0	0	7
	Other Vehicle - One Stopped/Entering At Angle	3	0	0	0
	Other Vehicle - One Vehicle/Making A U-Turn	0	0	0	1
	Other Vehicle - One Vehicle/Stopped Traffic	0	0	0	1
	Other Vehicle - One Vehicle/Forward From Parked Position	2	0	0	0
	Invalid Code	1	0	0	1
	Overturn/Rollover	1	0	0	0
	Parked Vehicle	5	0	0	0
	Pedestrian	1	0	0	4
	Left Blank	24	0	0	10
	% Other Vehicle - From Same Direction/Rear End Collision	*21%*	*100%*	*0%*	*3%*
	% Other Vehicle - From Same Direction/Both Going	*19%*	*0%*	*0%*	*6%*
	% Other Vehicle - One Left Turn/Entering At Angle	*7%*	*0%*	*0%*	*23%*
By Lighting Conditions	Daylight	114	0	0	61
	Dawn/Dusk	8	0	0	2
	Dark	35	1	0	27
	Left Blank	21	0	0	11
	% Day	*64%*	*0%*	*0%*	*60%*
By Severity	Property Damage Only	118	0	0	52
	Injury	60	1	0	47
	Fatality	0	0	0	2
	% Property Damage Only	*66%*	*0%*	*0%*	*51%*
	% Injury	*34%*	*100%*	*0%*	*47%*
By Cause	Alcohol/Drug Involved	3	0	0	5
	Avoid No Contact - Other	1	0	0	1
	Avoid No Contact - Vehicle	3	0	0	1
	Disregarded Traffic Signal	5	0	0	2
	Driver Inattention	48	0	0	16
	Drove Left Of Center	0	0	0	1
	Excessive Speed	11	0	0	4
	Failed to Yield Right of Way	19	0	0	37
	Following Too Closely	29	0	0	7
	Improper Backing	6	0	0	0
	Improper Lane Change	2	0	0	2
	Improper Overtaking	3	0	0	0
	Inadequate Brakes	3	0	0	0
	Made Improper Turn	3	0	0	3
	Missing Data	24	0	0	11
	None	5	0	0	3
	Other - No Driver Error	2	0	0	0
	Other Improper Driving	4	1	0	2
	Other Mechanical Defect	2	0	0	1
	Passed Stop Sign	0	0	0	2
	Pedestrian Error	0	0	0	3
	Speed Too Fast for Conditions	4	0	0	0
	Vehicle Skidded Before Brake	1	0	0	0
	% Driver Inattention	*27%*	*0%*	*0%*	*16%*
	% Failed to Yield Right of Way	*11%*	*0%*	*0%*	*37%*
	% Following Too Closely	*16%*	*0%*	*0%*	*7%*

From the above table, the following observations are made:

- For the intersection of 98th St and Avalon Rd/Bluewater Rd:
  - Within the years 2015 to 2019, 178 crashes were reported.
  - The most common crash classification was Other Vehicle – From Same Direction/Rear-End Collision.
  - The majority of crashes at this intersection occurred during daylight hours.
  - No fatal crashes were reported from 2015 to 2019. Injuries were reported in 34% of crashes.
  - The most common cause of the crash was Driver Inattention.

- For the intersection of 98th St and North Access Rd:
  - Within the years 2015 to 2019, One crash was reported.
  - The crash was classified as Other Vehicle – From Same Direction/Rear-End Collision.
  - The crash occurred under dark lighting conditions.
  - The crash was not fatal, but injuries were reported.
  - The cause of the crash was Other Improper Driving.

- For the intersection of 98th St and South Access Rd:
  - Within the years 2015 to 2019, no crashes were reported.

- For the intersection of 98th St and Volcano Rd:
  - Within the years 2015 to 2019, 101 crashes were reported.
  - The most common crash classification was Other Vehicle – One Left turn/Entering at Angle.
  - The majority of collisions at this intersection occurred during daylight hours.
  - Two fatal crashes were reported from 2015 to 2019. Injuries were reported in 47% of crashes.
    - The first fatal crash was reported on June 8th, 2019, and occurred at approximately 3:00 PM. The listed classification was Pedestrian, and the highest contributing factor was Alcohol/Drug Involved. The weather was clear, with daylight conditions.
    - The second fatal crash was reported on December 24th, 2019, and occurred at approximately 6:00 AM. The listed classification was Pedestrian, and the highest contributing factor was Pedestrian Error. The weather was clear, with dark lighting conditions.
  - The most common cause of crashes was Failed to Yield Right of Way.

SUMMARY OF RECOMMENDATIONS

The following presents a summary of recommendations included in this report.

CONCLUSIONS

- All study intersections operate at an acceptable LOS throughout all study scenarios
- 95th % Queue Lengths do not exceed queue storage at any intersection for any scenario
- HCS results do not suggest the need for capacity mitigation measures or street improvements related to the proposed development
- No change to existing auxiliary lanes or addition of new auxiliary lanes is recommended for either site access point.

- Proposed Drive-Through Queue Storage can accommodate 95th % vehicle queues as designed.
- There are no site-specific Bicycle Facility recommendations based on the review of the Long Range Bikeway System

DEVELOPMENT SPECIFIC RECOMMENDATIONS

- There are no site specific recomendations

ANCILLARY RECOMMENDATIONS

- Convert the existing Right/Through lane southbound on 98th St at Avalon Rd / Bluewater Rd into a Right Turn Only Lane.
- Restripe the outer southbound lane on 98th St that would have previously continued through from the north side of Avalon Rd to provide an auxiliary right turn lane into North Access Rd.
- Close existing gaps in the bike lanes between Volcano Rd and Bluewater Rd / Avalon Rd