Site Traffic Analysis
for Coors Blvd Panda Express

DRAFT Report

October 2021

Prepared for:

RTM Associates

Prepared By:

LEE ENGINEERING

EXECUTIVE SUMMARY

The following contains a Site Traffic Analysis (STA) for a Panada Express drive-through restaurant located on Coors Blvd in Albuquerque, NM. This report has been completed by Lee Engineering for RTM Associates. All analyses and items contained herein conform to scoping requirements set forth in a scoping meeting held on July 15th, 2021.

BACKGROUND

A Panda Express drive-through restaurant is to be located on Coors Blvd & Old Airport Ave. Nearby major intersections include Coors Blvd & Alameda Blvd, and Coors Blvd & 7 Bar Loop Rd.

In total, the site is anticipated to generate 66 ingress and 62 egress trips during the MID peak hour and 66 ingress and 63 egress trips during PM peak hour. Due to the nature of the Development, the AM peak hour was not analyzed. A detailed site plan is included in Figure 1 of this report. Access to the site is to be taken directly from Coors Blvd. The Primary driveway is located at the intersection of Coors Blvd and Old Airport Ave with a secondary shared driveway north through the parking lot of the adjacent commercial Development (Rudy's). Details and recommendations for this driveway's placement are included in the body of this report. Study intersections listed in order from north to south, as shown in Figure 2, include:

- Coors Blvd & Alameda Blvd
- Coors Blvd & Existing Shared Access Driveway (Rudy's)
- Coors Blvd & Old Airport Ave
- Coors Blvd & 7 Bar Loop Rd

Construction is anticipated to begin in 2021, with full completion of the Development in 2022. The Development is to be constructed in a single phase.

Analysis scenarios for this study include:

1. Existing (2021) – with existing signal timings and roadway network geometry
2. Opening Year Background (No Build)
3. Opening Year Build-out (Full Build) - with existing signal timings and roadway network geometry
4. Opening Year (2022) Build-out Optimized

Existing turning movement counts were collected on August 24th, 2021, for all study intersections. These volumes were used in the existing conditions analysis. Traffic volumes for opening year scenarios (2022) were projected from 2021 turning movement counts using MRCOG growth rates.

Site trips for the development site were generated based on ITE 934 - Fast-Food Restaurant with Drive-Through Window Weekday, Peak Hour Generator. Site trips were added to projected traffic volumes to create build-out traffic volumes.

SUMMARY OF RECOMMENDATIONS

Reproduced from the end of this report, the following summarizes recommendations included in this report. They are separated into recommendations relevant to the proposed Development and those outside the Development's influence or are not related to the proposed Development.

DEVELOPMENT SPECIFIC RECOMMENDATIONS

- It is recommended that access to the site be provided via shared access to the intersection of Coors Blvd & Old Airport Ave and shared access to the right-in/right-out driveway north of Coors Blvd & Old Airport.

- As detailed in the sight distance section of this report, it is recommended that intersection sight distance be provided/maintained.
- For the shared access driveway
    - A right turn lane is not warranted.
    - The driveway should remain as a right-in/right-out configuration.
- For the intersection of Coors Blvd & Old Airport Ave
    - It appears that the northbound right turn lane at Coors Blvd & Old Airport was constructed using the provision of SAMM section 18.K.b.*i* allowing for the elimination of part or all of the deceleration distance where physical or legal constraints necessitate and 18.K.b.*ii*, which states: "In urban areas, the deceleration lane length may be designed based on the greater of the required vehicle queue storage length or the required deceleration distance."
    - The deceleration distance provided by SAMM Table 18.K-1 is 250 FT for a posted speed of 35 MPH. From the capacity analysis, less than 1 vehicle is reported under full build conditions in both the AM and PM peak hours resulting in the minimum allowable vehicle queue length of 50 FT.
    - Adherence to the SAMM in the absence of other physical or legal constraints, in an urban area, would require the deceleration lane length to be calculated as a transition taper plus the longer of SAMM provided deceleration distance or the 95th percentile queue storage. The turn lane as constructed does not meet full SAMM recommendations assessed in the absence of constraints. If strict adherence to the SAMM is desired and no limiting physical or legal constraints are present, the turn lane should be lengthened to provide 250 FT of deceleration distance with a 100 FT transition taper for a total right-turn deceleration lane length of 350FT.

ANCILLARY RECOMMENDATIONS

- For the intersection of Coors Blvd & Alameda
    - It is recommended that the traffic signal be re-timed regardless of the Development. Signal timings should be performed by a registered Profession Traffic Operations Engineer (PTOE) at least one month after the opening of the Development.
    - It is recommended that an access management review be performed for driveways on the westbound approach to the intersection, and the existing two-way left-turn lane be used to extend the WBL storage lengths.
    - Remove and/or replace the anomalous 40 MPH speed limit sign located on Coors Blvd NB 265 FT north of 7 Bar Loop Rd.

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INTRODUCTION

This report details the procedures and findings of a Site Traffic Analysis (STA) performed by Lee Engineering for RTM Associates. This report and the analyses contained herein were performed for a Panda Express drive-through restaurant development, to be constructed on NM 448 (Coors Blvd) & Old Airport Ave in Albuquerque, NM. The purpose of this study is to examine the impacts of the Development on surrounding traffic conditions and discuss the impact of trips generated by the Development on the surrounding 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 July 15th, 2021, 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*.

Construction is anticipated to begin in 2021, with full completion of the Development in 2022 in one phase. As shown in Figure 1, the site is to include a fast-food restaurant with a drive-through constructed with a counterclockwise flow of operations. Traffic generated by the site is anticipated to be 66 ingress and 62 egress trips in the Midday peak hours. Due to the nature of the Development, the AM peak hour was not analyzed. Analysis procedures included in this report were performed for the following scenarios:

1. Existing (2021) – with existing signal timings and roadway network geometry
2. Opening Year Background (No Build) - with existing signal timings and roadway network geometry
3. Opening Year Build-out (Full Build) - with existing signal timings and roadway network geometry plus projected Panda Express traffic
4. Opening Year (2022) Build-out Optimized

PROJECT LOCATION & SITE PLAN

The Panda Express is to be located on the northeast corner of Coors Blvd & Old Airport Ave. Figure 1: Site Plan shows the site plan, and Figure 2 shows the site location, study intersections, and surrounding area. Surrounding major intersections include Coors Blvd & Alameda Blvd, Coors Blvd & Old Airport Ave, and Coors Blvd & 7 Bar Loop Rd. Existing commercial businesses border the project area on Coors Blvd to the north and south of the Development and an undeveloped lot south of the Development on the east side of Coors Blvd. Additionally, there is a planned retail Development of a nearby corner lot at the intersection of Coors Blvd and 7 Bar Loop Rd.

The proposed Development is to re-develop approximately 1.43 acres of land into a 2,500 SF permanent structure with 51-75 parking spaces and a drive-through facility.

SITE ACCESS

Access to the site is to be taken directly from Coors Blvd and Old Airport Ave via a full access driveway. Additionally, site access is to be connected to an existing shared driveway north of the site, accessing Coors Blvd via a right-in/right-out driveway. Appendix G details access sharing and the subdivision plat.

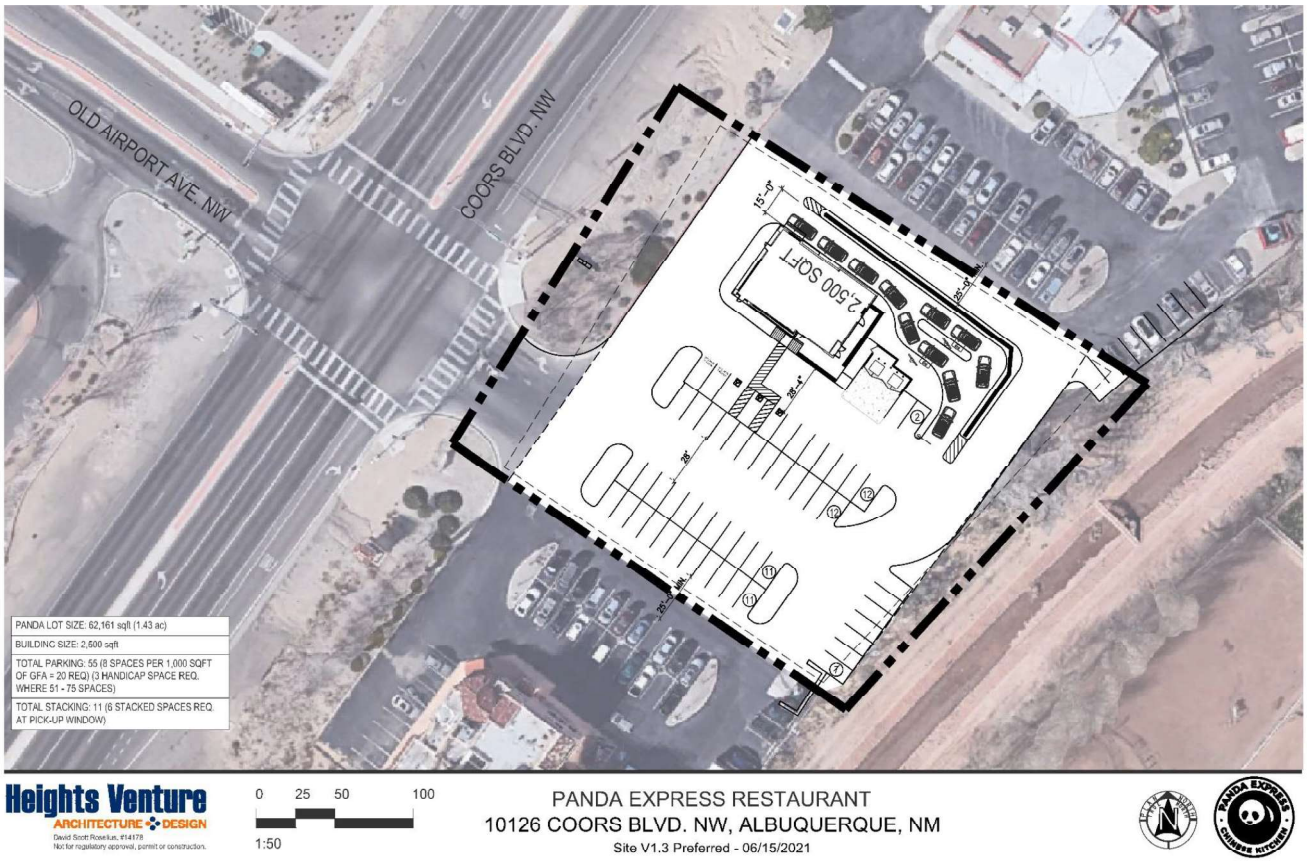

Figure 1: Site Plan

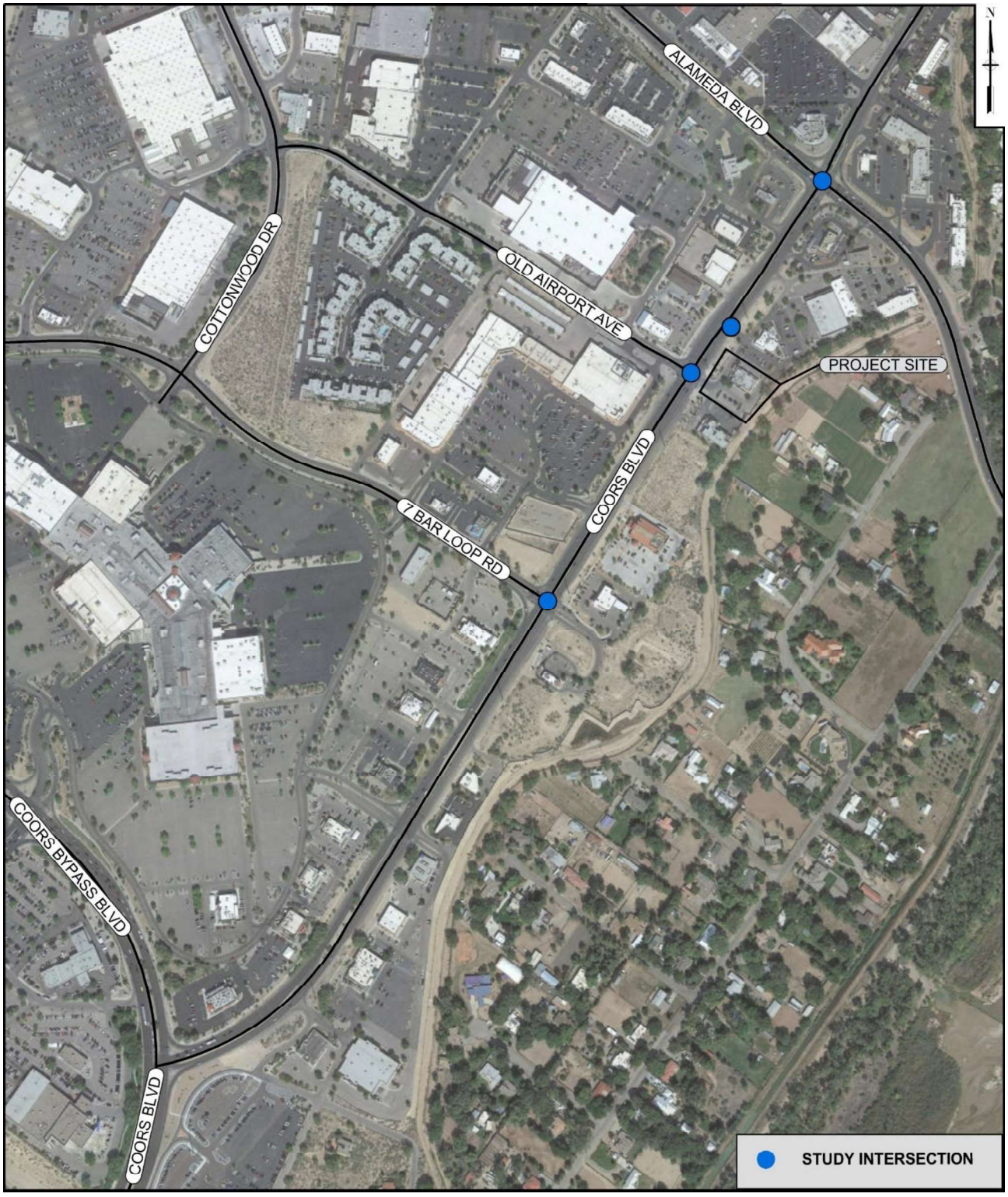

Figure 2: Vicinity Map and Study Intersections.

STUDY AREA, AREA LAND USE, AND STREETS NARRATIVE SUMMARY

STUDY AREA

The study area is defined as Coors Blvd from 7 Bar Loop Rd to Alameda Blvd. The following intersections were identified and agreed upon in the scoping meeting and will serve as the study intersections for this report:

- Coors Blvd & Alameda Blvd
- Coors Blvd & Shared Access Driveway (Rudy's)
- Coors Blvd & Old Airport Ave
- Coors Blvd & 7 Bar Loop Rd

AREA LAND USE

As described, the Development is to be located on the northeast corner of Coors Blvd & Old Airport Ave at the east end of the cottonwood commercial area. Adjacent to and surrounding the project site are land uses consisting of the following:

- Commercial: Surrounding land use is mostly commercial in nature. Immediately adjacent to the site, commercial businesses have been constructed on both sides of Coors Blvd. These developments include restaurants, small retail stores, and larger retail sites, including an Albertson's Grocery and a Lowe's Hardware.
- Residential: Large areas of single-family homes are located north, south, and west of the cottonwood commercial area. The proposed development borders an arroyo separating it from the Bernalillo County neighborhood of Bosque Dell Acres to the east.
- Undeveloped/Not Improved: There are several small undeveloped lots south of the site location and in the adjacent cottonwood commercial area.

STREETS

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

Coors Blvd is also state highway NM 448. It is an NMDOT administered four-lane roadway currently classified as a principal arterial running north and south through the northwest quadrant of Albuquerque, NM. Travel lanes are 12 feet wide, and the road is divided by a 5-foot-wide raised median. The roadway incorporates intermittent curb and gutter located near intersections within the study area. There is no sidewalk on the east side of Coors Blvd and only an intermittent sidewalk on the west side. Both sides of the road and are signed for a speed limit of 35 MPH. A dedicated bicycle lane exists on the northbound side of the roadway. Access is restricted to right turn-only driveways spaced 300 to 700 feet apart. The most recently available (2019) from the Mid-Region Council of Governments (MRCOG) traffic flow map reports the average weekday traffic (AWDT) of Coors Blvd in the study area to be approximately 18,900 vehicles per day.

Alameda Blvd, also state highway NM 528, is a City of Albuquerque maintained four-lane roadway classified as a principal arterial by the NMDOT. It runs east and west through the northwest quadrant of Albuquerque, NM. The roadway is an average of 80 feet wide with a raised dividing median of variable width. Lane and shoulder widths average 10 feet. The roadway incorporates curb, gutter, and sidewalk. However, Bicycle facilities are not present on either side of the road. Both sides of the road and are signed for a speed limit of 40 MPH. The most recently available (2019) from the Mid-Region Council of Governments (MRCOG) traffic flow map reports the average weekday traffic (AWDT) of Alameda Blvd in the study area to be approximately 48,400 vehicles per day.

Old Airport Ave is a City of Albuquerque maintained two-lane local road. It runs east and west between Coors Blvd and Cottonwood Dr in the northwest quadrant of the city. The road averages 38 feet in width with worn and intermittently visible stripping. Where median stripping is visible, it averages 10 feet in width. Curbs and gutters are present on both sides of the street within the study area. Sidewalks are present along the entirety

of the northern side of the road and along the western half of the south side. One 30 mph posted speed sign was observed facing eastbound traffic. The most recently available (2019) from the Mid-Region Council of Governments (MRCOG) traffic flow map does not report the average weekday traffic (AWDT) for Old Airport Ave.

7 Bar Loop Rd is a four-lane roadway classified as a major collector by NMDOT running east and west in the northwest quadrant of Albuquerque, NM. Travel lanes are 11 feet wide. The roadway is divided by a raised median and 10-foot-wide axillary turn lanes. It incorporates curb and gutter with sidewalk on the south side of the road. Sidewalk is intermittently present on the north side of the road. The road is signed for a speed limit of 35 mph. There are no dedicated bicycle facilities on the roadway; however, several transit stops are located on either side of the road west of Coors Blvd. The most recently available (2019) from the Mid-Region Council of Governments (MRCOG) traffic flow map reports the average weekday traffic (AWDT) of 7 Bar Loop Rd in the study area to be approximately 5,600 vehicles per day.

INTERSECTIONS

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

Coors Blvd & Alameda Blvd is a 4-legged signalized intersection of two state highways under the purview of the NMDOT. However, the intersection lies within Albuquerque city limits, and traffic signal equipment is maintained by the City of Albuquerque. The east and westbound legs consist of two through lanes, two dedicated left-turn lanes, and a dedicated right-turn lane. The westbound dedicated right turn is a slip turn. The north and southbound legs consist of two dedicated left-turn lanes and two through lanes with a shared slip right turn. Signal detection is present for all lanes and approaches. All left turns are protected turn on green arrow only movements. Pedestrian crosswalks are present on all approaches to the intersection, and U-turns are not restricted for any approach.

Coors Blvd & Shared Access Driveway (Rudy's) is a right-in/right-out driveway located approximately 700 feet south of the Coors Blvd and Alameda Blvd intersection. A dedicated northbound bicycle lane crosses the driveway, and there are no sidewalk facilities present.

Coors Blvd & Old Airport Ave is a 4-legged signalized intersection with signal equipment maintained by the City of Albuquerque. The north/south legs consist of two through lanes and dedicated right and left-turn lanes. The eastbound leg consists of a dedicated left and a shared right/through lane. The eastbound leg is driveway access to the site location with a dedicated right turn and a shared left/through lane. Signalization consists of protected/permitted left turns north and southbound with permitted left turns east and westbound. Signal detection is present on all four approaches, and there is radar advance detection on the coordinated north/south approaches. The signal operates with time-of-day coordination. Pedestrian crosswalks are present on all approaches to the intersection, and U-turns are not restricted for any approaches.

Coors Blvd & 7 Bar Loop is a 4-legged signalized intersection with signal equipment maintained by the City of Albuquerque. There are two through lanes with dedicated left and right turn lanes in the north and south directions. Eastbound lanes consist of one dedicated left turn, one through, and one shared right/through. The westbound lane configuration is two dedicated left turns and one through with a right turn slip lane. Signalization consists of a protected/permitted left turn southbound and permitted left turns on the other three approaches. There is inductive loop presence detection in the north and southbound left-turn bays and in all lanes east and westbound. There is also radar advance detection on the coordinated north/south approaches. The signal operates with time-of-day coordination. Pedestrian crosswalks are present on all approaches to the intersection, and U-turns are not restricted for any approaches.

Transit

Currently, the Albuquerque bus system (ABQ RIDE) regularly uses Coors Blvd to serve the west side of Albuquerque, NM. Route 155 Coors Blvd, Route 96 Crosstown Commuter, and Route 790 Rapid Ride Blue Line provide service along Coors Blvd. All three routes proceed east on 7 Bar Loop Rd from Coors Blvd, and no transit stops exist within the study area.

Multimodal Connectivity

Currently, limited bicycle facilities are present immediately near the Development on Coors Blvd.

Current Adjacent Projects

The northwest corner of Coors Blvd and 7 Bar Loop Rd is the site of a future retail development; however, the Development was not required to perform a traffic study. Therefore, this Development is not considered in the background traffic for this study.

DATA COLLECTION

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

Field Data Collection

RIGHT TURN ON RED

In conjunction with turning movement counts, right-turn-on-red vehicle volumes were collected at all study intersections (see Turning Movement Counts and Demand Volumes section below). Right-turn-on-red volumes were used in capacity analyses and the subsequent TransModeler simulation and are provided in Appendix B.

ON-STREET PARKING

On-street parking was not observed to occur on Old Airport Ave or 7 Bar Loop Rd near the study intersections. On-street parking is not explicitly restricted by notice or signage, but no on-street space is provided near the project site or study intersections.

HEAVY VEHICLES

Heavy vehicle proportions were collected at all study intersections in conjunction with turning movement counts (see Turning Movement Counts and Demand Volumes section below). Heavy Vehicle proportions were used in capacity analyses and TransModeler simulation and are provided in Appendix B.

LANE UTILIZATION

Video recordings were observed to determine lane utilization for movements with multiple lanes of the same movement. The observed utilization counts are shown below in Table 1 through Table 4. Lane utilization proportions were used in capacity analyses detailed in subsequent sections of this report.

Table 1: Coors Blvd & Alameda Blvd Lane Utilization Sample

Coors Blvd & Alameda Blvd								
Peak 15-minute Period	NBT Lane 1	NBT Lane 2	NBL Lane 1	NBL Lane 2	SBT Lane 1	SBT Lane 2	SBL Lane 1	SBL Lane 2
MID 12:15 to 12:30 PM	110	107	22	31	95	108	19	10
PM 4:45 to 5:00 PM	190	188	23	37	118	121	12	9
Lane Total	300	295	45	68	213	229	31	19
Movement Total	595		113		442		50	
Lane Utilization Factor (fLU)	50%		60%		52%		62%	
Peak 15-minute Period	EBT Lane 1	EBT Lane 2	EBL Lane 1	EBL Lane 2	WBT Lane 1	WBT Lane 2	WBL Lane 1	WBL Lane 2
MID 12:15 to 12:30 PM	32	19	38	38	25	45	41	47
PM 4:45 to 5:00 PM	38	19	28	27	23	35	44	51
Lane Total	70	38	66	65	48	80	85	98
Movement Total	108		131		128		183	
Lane Utilization Factor (fLU)	65%		50%		63%		54%	

Table 2: Coors Blvd & Shared Driveway

Coors Blvd & Shared Driveway		
Peak 15-minute Period	NBT Lane 1	NBT Lane 2
MID 12:15 to 12:30 PM	94	97
PM 4:45 to 5:00 PM	104	86
Lane Total	198	183
Movement Total	381	
Lane Utilization Factor (fLU)	52%	

Table 3: Coors Blvd & Old Airport Ave Lane Utilization Sample

Coors Blvd & Old Airport Ave				
Peak 15-minute Period	NBT Lane 1	NBT Lane 2	SBT Lane 1	SBT Lane 2
MID 12:15 to 12:30 PM	76	69	62	87
PM 4:45 to 5:00 PM	86	60	62	85
Lane Total	162	129	124	172
Movement Total	291		296	
Lane Utilization Factor (fLU)	56%		58%	

Table 4: Coors Blvd & 7 Bar Loop Rd

Coors Blvd & 7 Bar Loop Rd						
Peak 15-minute Period	NBT Lane 1	NBT Lane 2	SBT Lane 1	SBT Lane 2	EBL Lane 1	EBL Lane 2
MID 12:15 to 12:30 PM	99	62	59	76	10	6
PM 4:45 to 5:00 PM	103	54	68	86	18	11
Lane Total	202	116	127	162	28	17
Movement Total	318		289		45	
Lane Utilization Factor (fLU)	64%		56%		62%	

PEDESTRIANS AND BICYCLES

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

INTERSECTION LANE CONFIGURATION

Intersection lane configuration is detailed in the intersection description section of this report and is provided in detail in Figure 3.

SIGNAL TIMINGS

Signal timings for the signalized intersections of Coors Blvd with Alameda Blvd, Old Airport Ave, and 7 Bar Loop Rd were provided by the City of Albuquerque Traffic Department. Signal timing sheets used in the capacity analyses are provided in Appendix C.

SATURATION FLOW RATES

The saturation flow rates used were obtained from a previous study of Coors Blvd & Fortuna Rd using aerial drone video. Procedures for that study followed HCM chapter 31 recommendations. The study determined a saturation flow of 1,993 vehicles per lane per hour for Coors Blvd.

ARRIVAL ON "GREEN" PROPORTIONS

The primary approach into the study area from Cottonwood Loop is northbound on Coors Blvd. Northbound vehicles arriving during the green phase of the Coors Blvd at the 7 Bar Loop Rd intersection were observed during MID and PM peak hours on September 16th, 2021. The Arrival on Green (AoG) proportions were 85% for the MID peak hour and 90% for the PM peak hour. Coors Blvd is coordinated north/south at this location, and any Cottonwood Loop traffic entering the study area from the secondary eastbound 7 Bar Loop Rd approach is likely to arrive on red.

Turning Movement Counts

Turning movement counts for the study intersections were collected for three separate 3-hour periods from 6:00 AM to 9:00 AM, 11:00 AM to 2:00 PM, and 3:00 PM to 6:30 PM on August 24th, 2021. Additionally, visual observations were made during the MID and PM peak hours. Turning movement volumes collected at the study intersections show a typical commuter type distribution with observable MID and PM peak hour periods. Network peak hours were determined by summating the Turning Movement Counts from all study intersections to locate the hours with the highest total network volume.

During the observed period, queuing, representative of unserved demand was only observed during the PM peak hour on the westbound leg of Alameda Blvd at Coors Blvd. Thus, except for PM peak westbound Alameda Blvd network Turning Movement Counts and Demand Volumes are equivalent. Turning Movement Counts are shown below in Figure 3. Full turning movement count output sheets can be found in Appendix B.

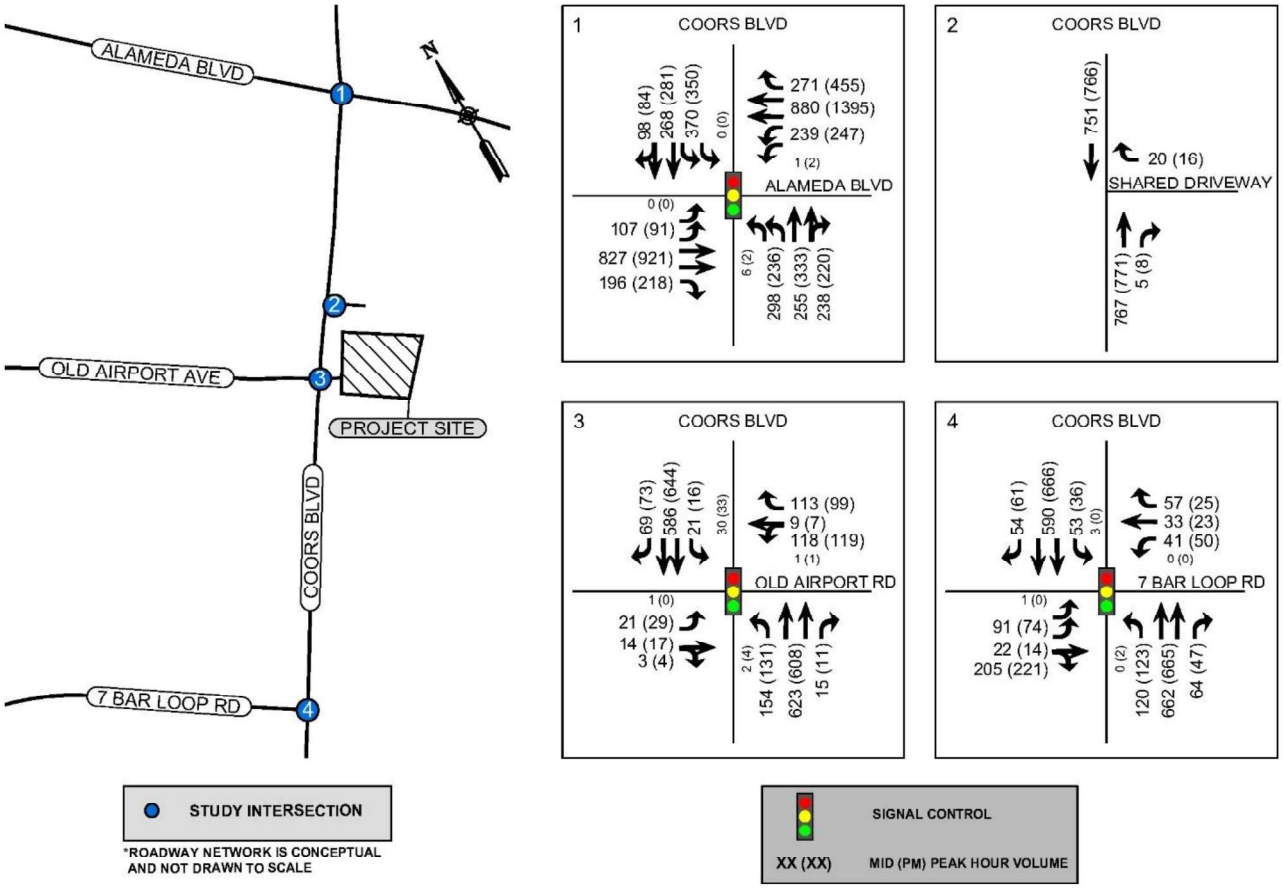

Figure 3: Peak Hour Turning Movement Counts

Demand Volumes

Per the HCM 6th Edition, turning movement counts were supplemented with video observations and counts to obtain demand volumes. A spreadsheet detailing turning movement counts, residual queueing, and resulting demand volumes included in Appendix B. Mid-Day and PM peak hour demand volumes, lane geometry, and traffic control for the study network is presented in Figure 4.

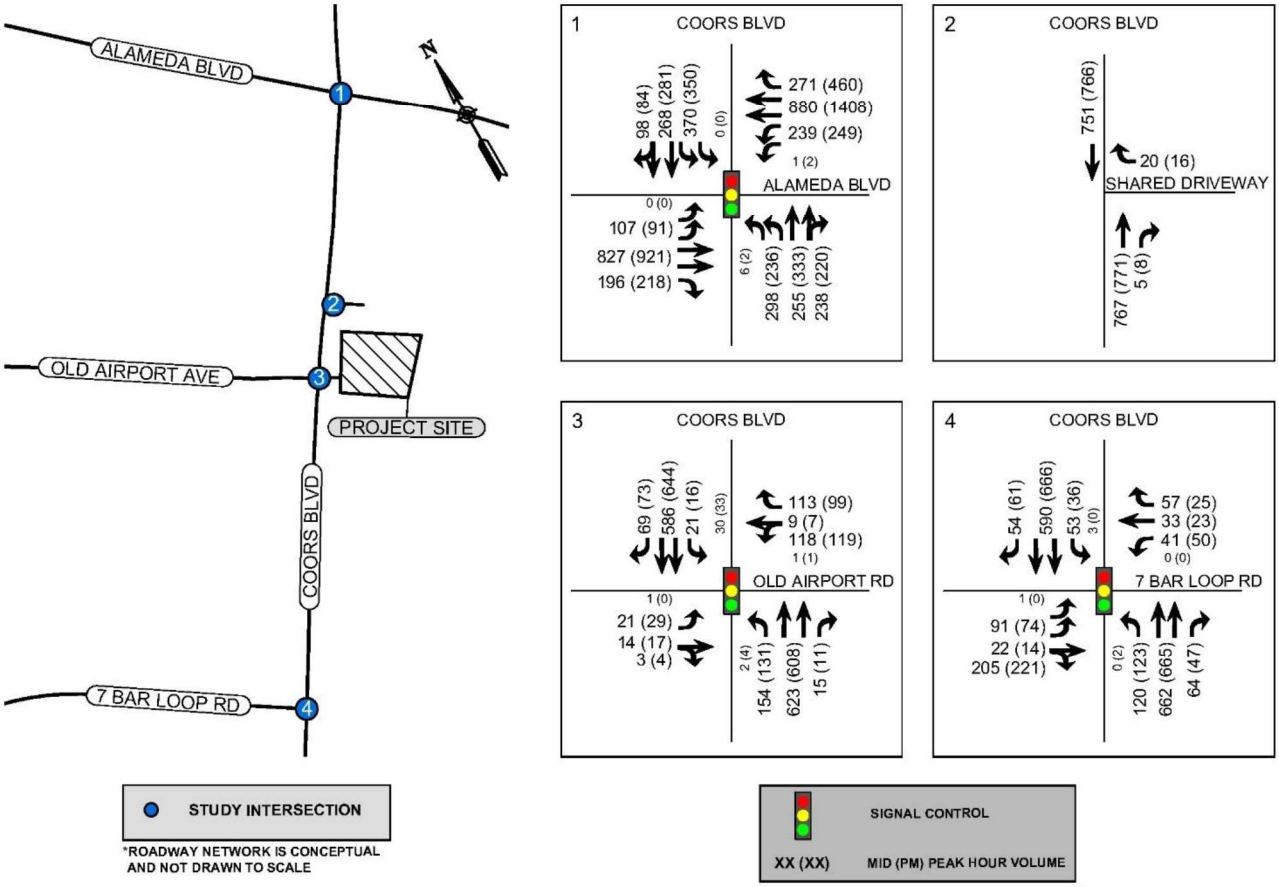

Figure 4: Alameda Blvd & Coors Blvd Peak Hour Demand Volumes

EXISTING CONDITIONS LEVEL OF SERVICE, CAPACITY, AND QUEUEING ANALYSIS

ANALYSIS VOLUMES

Due to the Development not operating during morning hours and as discussed in the scoping meeting, the AM peak hour was not analyzed, and MID and PM peak hour were analyzed for level of service, capacity, and queueing. HCM Chapter 19 Approach A (b) (peak hour volume divided by peak hour factor) was used with demand volumes of Figure 3 to determine analysis volumes.

As stated in the HCM on page 19-19: "(Approach A (b)) is preferred when hourly project volumes are used or when hourly projected volumes are added to existing volumes." Subsequent analysis in this report uses hourly project volumes, in the form of trip generations, added to existing volumes. Therefore, this approach was initially used.

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 5 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 5: 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 feet and indicates possible lengths of waiting vehicles during "red" times for specific movements. 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.

As outlined in the NMDOT State Access Management Manual (SAMM) and 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 C.

HCS ANALYSIS

Highway Capacity Software was used to analyze the study intersections for capacity and queueing conditions. Resulting from the analysis, the peak hour volumes on the south and westbound left-turn approaches to the Alameda Blvd and Coors Blvd intersection demonstrated a Queue Storage Ratio (RQ) of greater than one. This resulted in queue spillover from the turn lanes and spillback into the upstream intersections. These effects are not accounted for in the HCS procedures, and per HCS, the use of a simulation tool is advised. Therefore, TransModeler Traffic Simulation Software was chosen to continue the analysis based on its integration of HCM6 methods and procedures and its HCS compatibility.

TRANSMODELER TRAFFIC SIMULATION

As stated above, limitations of the Highway Capacity Software required the use of a simulation analysis. TransModeler traffic simulation software was used to facilitate the analysis. Table 6 through Table 10 provides results from the TransModeler Traffic Simulation for MID and PM peak hours. Simulation models are included in the Appendix.

Due to the nature of the simulation, variations and fluctuations in vehicle behaviors can be present between models. Variable interactions between vehicles can cause minor reactions that affect network operations, thereby possibly causing variations in reported delay between analysis scenarios and analysis years.

Table 6: TransModeler Results: Existing Conditions

MD Peak Hour

Coors Blvd & Alameda Blvd					Coors Blvd & Shared Driveway					Coors Blvd & Old Airort Ave					Coors Blvd & 7 Bar Loop Rd				
Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)
EBL	72.9	E	100	63.8	NBT/R	0	A	-	0	EBL	36.0	D	-	80.0	EBL	37.2	D	115	32.65
EBR	24.6	C	150	102.8	NBT	0	A	-	0	EBT/R	11.9	B	-	36.9	EBR	-	-	-	-
EBT	28.7	C	-	214.6	WBR	7.8	A	50	34.4						EBT	3.6	A	-	12.1
NBL	57.8	E	400	138.2		-	-	-	-	NBL	7.0	A	450	44.3	NBL	6.2	A	425	23.2
NBR	-	-	-	-		-	-	-	-	NBR	1.6	A	175	0.0	NBR	1.9	A	150	0.0
NBT	32.4	C	-	108.4		-	-	-	-	NBT	4.2	A	-	32.1	NBT	3.8	A	-	33.4
SBL	46.5	D	115	144.9		-	-	-	-	SBL	6.5	A	230	1.5	SBL	15.3	B	100	27.7
SBR	-	-	-	-		-	-	-	-	SBR	3.0	A	230	0.0	SBR	3.0	A	150	0.0
SBT	37.0	D	-	110.8		-	-	-	-	SBT	8.7	A	-	81.4	SBT	6.9	A	-	61.5
WBL	67.7	E	150	115.0		-	-	-	-	WBT/L	37.1	D	50	30.1	WBL	38.5	D	75	32.2
WBR	-	-	-	-		-	-	-	-						WBR	12.5	B	50	17.4
WBT	23.9	C	-	198.2		-	-	-	-	WBR	9.3	A	50	0.0	WBT	35.0	C	-	18.6

PM Peak Hour

Coors Blvd & Alameda Blvd					Coors Blvd & Shared Driveway					Coors Blvd & Old Airort Ave					Coors Blvd & 7 Bar Loop Rd				
Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)
EBL	94.4	F	100	82.1	NBT/R	0	A	-	0	EBL	37.2	D	-	83.8	EBL	35	D	115	34.05
EBR	22.9	C	150	101.0	NBT	0	A	-	0	EBT/R	12.7	B	-	37	EBR	-	-	-	-
EBT	26.1	C	-	243	WBR	7.9	A	50	33.4						EBT	3.2	A	-	11.6
NBL	82.5	F	400	193.3		-	-	-	-	NBL	6.5	A	450	41.5	NBL	5.6	A	425	21.8
NBR	-	-	-	-		-	-	-	-	NBR	1.3	A	175	0	NBR	2.1	A	150	0
NBT	53.0	D	-	195.7		-	-	-	-	NBT	4.1	A	-	34.3	NBT	3.7	A	-	27.1
SBL	71.3	E	115	243.7		-	-	-	-	SBL	7.9	A	230	4.7	SBL	15	B	100	25.6
SBR	-	-	-	-		-	-	-	-	SBR	3.4	A	230	0	SBR	2.6	A	150	0
SBT	55.0	D	-	161		-	-	-	-	SBT	9.7	A	-	89.6	SBT	7.1	A	-	63.9
WBL	85.5	F	150	155.8		-	-	-	-	WBT/L	39	D	50	36.9	WBL	38.1	D	75	37.2
WBR	-	-	-	-		-	-	-	-						WBR	11.7	B	50	17
WBT	21.1	C	-	200.7		-	-	-	-	WBR	7.4	A	50	0	WBT	37.2	D	-	19

From the above table, the following conclusions are made for the existing conditions analysis:

- For the intersection of Coors Blvd & Alameda Blvd
    - Failing levels of service are observed for the EBL, NBL, and WBL movements in the Mid-Day peak hour and for the EBL, NBL, SBL, and WBL movements PM peak hour.
    - From simulation observations and comparison with field reviews, it is noted that queued vehicles in the WBL turn bay regularly block or obstruct vehicles in the inside lane approaching the intersection resulting in vehicles being unable to access WBT movements. Therefore, actual delay is observed to be higher than delays reported by the model for the WBT movement.
    - Queue storage is observed to be exceeded for the westbound left-turn bay during PM peak hours.
- For the intersection of Coord Blvd & Shared Access Driveway
    - The intersection is observed to operate at an acceptable level of service in both the Mid-Day and PM peak hours. Individual movements are also observed to operate at an acceptable Level of Service (LOS) for the Mid-Day and PM peak.
    - Queueing is observed to be accommodated within the development sites served by the intersection.
- For the intersection of Coors Blvd & Old Airport Rd
    - The intersection is observed to operate at an acceptable level of service in both the Mid-Day and PM peak hours. Individual movements are also observed to operate at an acceptable Level of Service (LOS) for the Mid-Day and PM peak.
    - 95th percentile Queue Storage Ratios (QSR) at the intersection are observed to be accommodated by existing storage lengths during the Mid-Day and PM peak hours.
- For the intersection of Coors Blvd & 7 Bar Loop Rd
    - The intersection is observed to operate at an acceptable level of service in both the Mid-Day and PM peak hours. Individual movements are also observed to operate at an acceptable Level of Service (LOS) for the AM and PM peak.
    - 95th percentile Queue Storage Ratios (QSR) at the intersection are observed to be accommodated by existing storage lengths during the Mid-Day and PM peak hours.

BUILD YEAR ANALYSIS

The following sections detail the methods and calculations used to obtain traffic volumes for build year analysis scenarios. This process used the following tools as described below: Traffic Projections and Site Trip Distribution & Assignment. Figures at the end of this section show the resulting traffic volumes determined for future year analysis scenarios.

TRAFFIC PROJECTIONS

Construction is anticipated to begin in the current year with full completion of the Development by the end of the year. Opening year of the Development is anticipated to be in 2022. Future analysis background conditions were forecast from existing traffic volumes using values from the 2016 and 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 7, in addition to the calculated growth rates used in the analysis. Growth rates were then applied to the 2021 demand volumes to forecast future volumes.

Table 7: 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
Alameda Blvd East Side (WB)	AM	PH	1423	1740	0.84%	0.77%	1.00%
	PM	PH	2888	3673	1.01%		
Alameda Blvd East Side (EB)	AM	PH	2746	1922	-1.48%		
	PM	PH	1765	3446	2.83%		
Alameda Blvd West Side (WB)	AM	PH	1187	1444	0.82%		
	PM	PH	1959	2171	0.43%		
Alameda Blvd West SIde (EB)	AM	PH	1843	2022	0.39%		
	PM	PH	1495	1550	0.15%		
Coors Blvd North Side (NB)	AM	PH	304	333	0.38%		
	PM	PH	794	880	0.43%		
Coors Blvd North Side (SB)	AM	PH	833	1124	1.26%		
	PM	PH	361	666	2.58%		
Coors Blvd South Side (NB)	AM	PH	691	921	1.20%		
	PM	PH	672	624	-0.31%		
Coors Blvd South Side (SB)	AM	PH	554	584	0.22%		
	PM	PH	897	1300	1.56%		
Old Airport Ave (EB)	AM	PH	228	259	0.53%	0.54%	
	PM	PH	351	332	-0.23%		
Old Airport Ave (WB)	AM	PH	274	301	0.39%		
	PM	PH	284	341	0.77%		
Coors Blvd North Side (NB)	AM	PH	691	921	1.20%		
	PM	PH	672	624	-0.31%		
Coors Blvd North Side (SB)	AM	PH	554	584	0.22%		
	PM	PH	897	1300	1.56%		
Coors Blvd South Side (NB)	AM	PH	756	967	1.03%		
	PM	PH	708	698	-0.06%		
Coors Blvd South Side (SB)	AM	PH	574	589	0.11%		
	PM	PH	1001	1365	1.30%		
7 Bar Loop Rd (EB)	AM	PH	204	342	2.18%	0.71%	
	PM	PH	148	160	0.33%		
7 Bar Loop Rd (WB)	AM	PH	157	160	0.08%		
	PM	PH	324	608	2.66%		
Coors Blvd North Side (NB)	AM	PH	756	967	1.03%		
	PM	PH	708	698	-0.06%		
Coors Blvd North Side (SB)	AM	PH	574	589	0.11%		
	PM	PH	1001	1365	1.30%		
Coors Blvd South Side (NB)	AM	PH	553	625	0.51%		
	PM	PH	560	539	-0.16%		
Coors Blvd South Side (SB)	AM	PH	416	429	0.13%		
	PM	PH	677	757	0.47%		

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, 10th 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. As previously stated, the Development will not operate during the AM peak hour. Therefore, AM trips were used to analyze the Mid-Day peak hour. Total development trips and trips generated are shown below in the tables. Pass-by trips for the development site were generated using data and procedures according to the Institute of Transportation Engineer's Trip Generation Manual. The total site-generated trips were added to background traffic volumes to create the build-out traffic volumes. Table 8 below shows the trip generation and associated calculations.

Table 8: Trip Generation

Use	Units		TRIP GENERATION							PEAK HOUR TRIPS			
			Weekday	AM Peak			PM Peak			AM Peak		PM Peak	
			Trips	Rate	Enter	Exit	Rate	Enter	Exit	In	Out	In	Out
ITE 934 - Fast-Food Restaurant with Drive-Through Window	2.5	1,000 sq. ft. FGA	1177	50.97	52%	48%	51.36	51%	49%	66	62	66	63

Pass-By Trips Calculation						
Use	AM Peak	PM Peak	AM Peak		PM Peak	
	% Pass-by Trips	% Pass-by Trips	In	Out	In	Out
ITE 934 - Fast-Food Restaurant with Drive-Through Window	**49%**	**50%**	**33**	**33**	**33**	**33**
	Remaining Direct Trips:		33	29	33	30

Notes:

ITE Trip Generation Manual Rates
Daily Rate: Weekday
Average Rate: 470.95
AM Peak: Peak Hour of Generator
Average Rate: 50.97
PM Peak: Peak Hour of Generator
Average Rate: 51.36

*Average rates used as fitted curves not provided.

Trip Distribution and Assignment

Trip Distribution was determined based on the analysis of existing intersection demand characteristics within the study area. Overall, trips were distributed within the roadway network to and from the Development based on the proportions of existing turning movement counts/demands. Trip routing was based on logical trip attractions and destinations for residential-based trips. The figures below show the trip distribution and assignment for the Development of each analysis scenario. Trips were then assigned to the background roadway networks to create build-out volumes and are shown in the figures below. Figure 5 and Figure 6 show the direct and pass-by trip distributions and assignments.

Traffic Volume Calculations

Traffic volumes used in the analysis were calculated based on the following:

1. Existing Conditions: demand turning movement counts from 2021
2. Background 2022: 2022 growth rate applied to existing conditions
3. Full Build-out 2022: Background 2022 traffic volumes plus site trips

Figure 7 and Figure 8 show the traffic volumes used for the 2022 analysis scenarios.

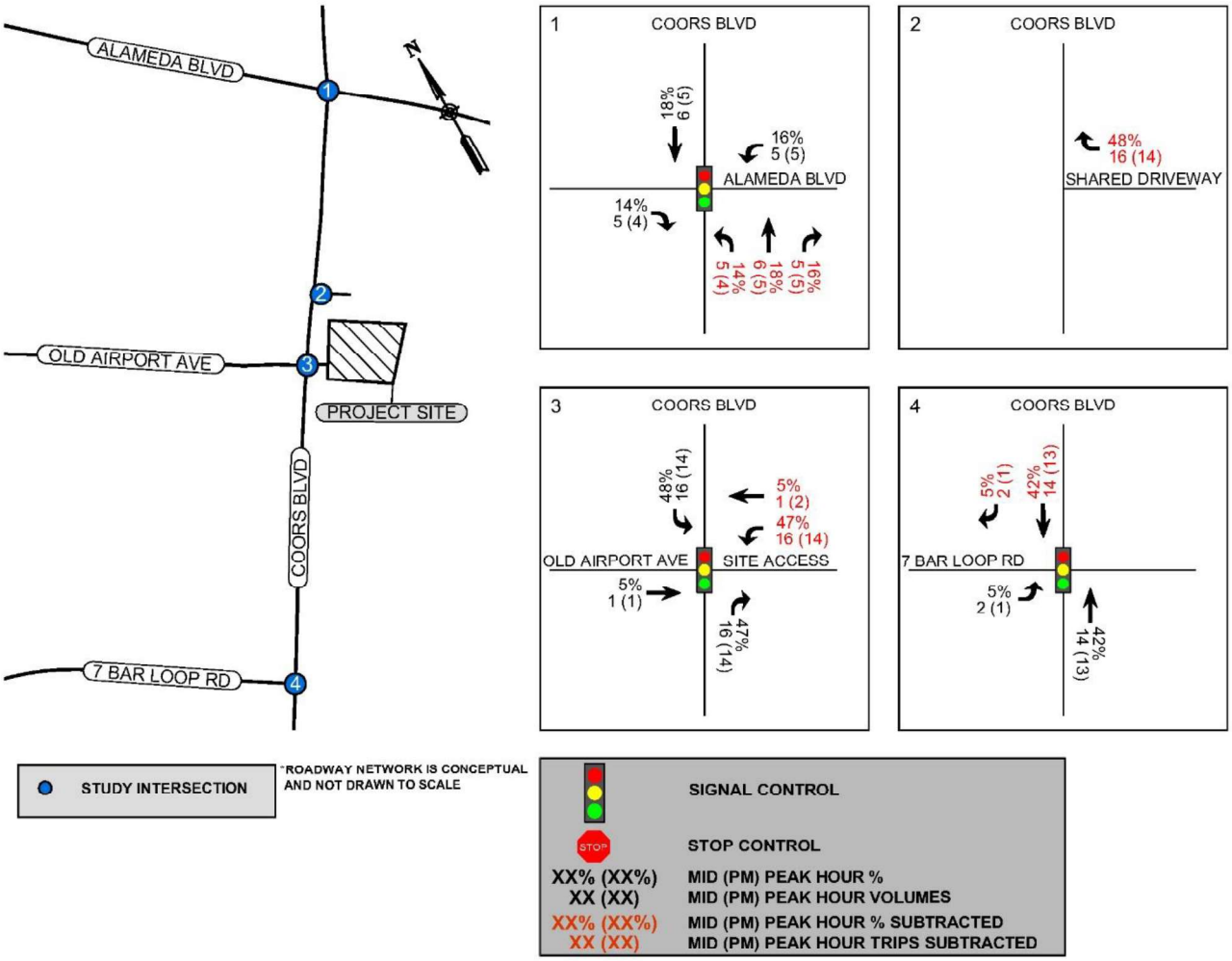

Figure 5: Direct Trips Distribution and Assignment

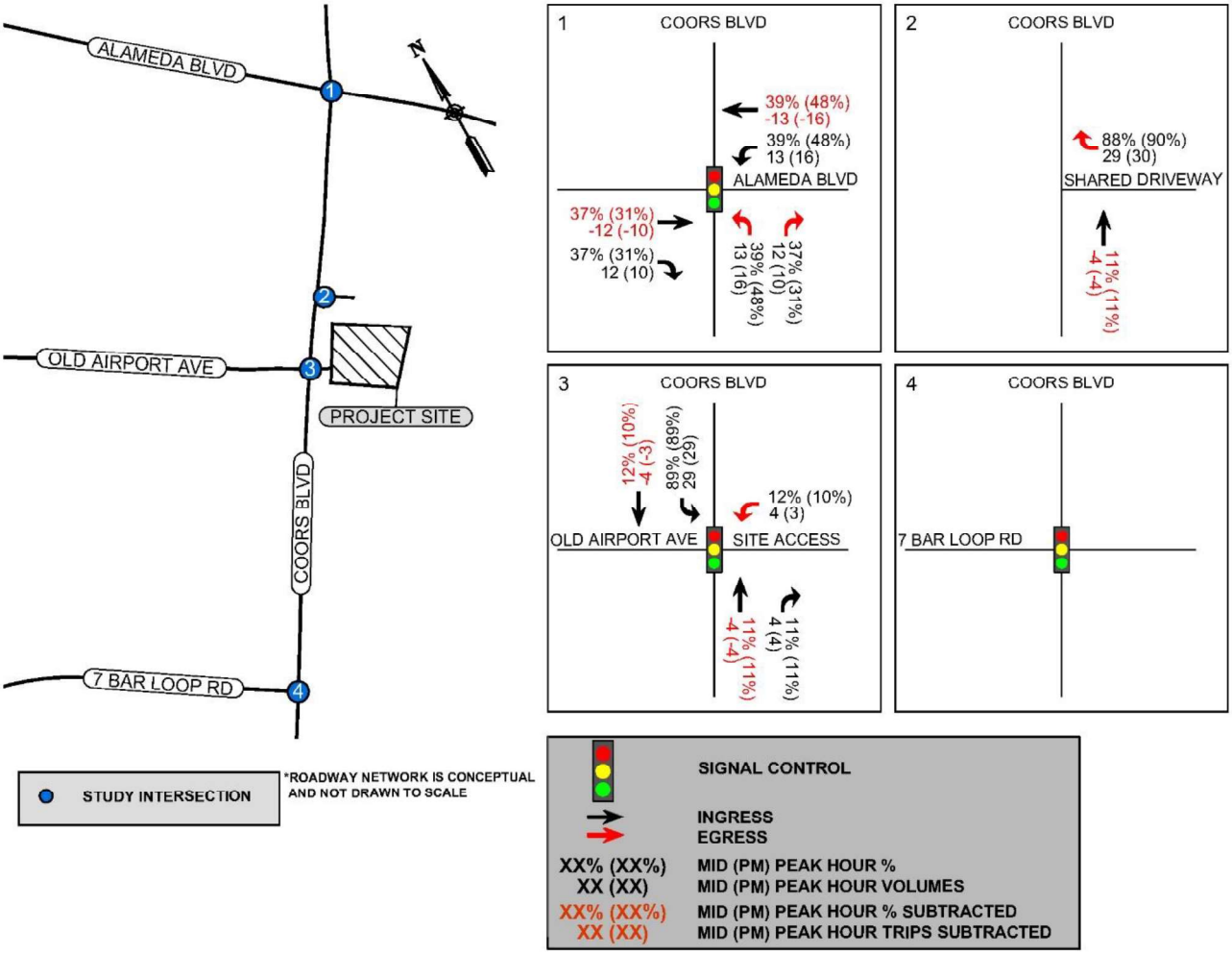

Figure 6: Pass-By Trip Distribution and Assignment

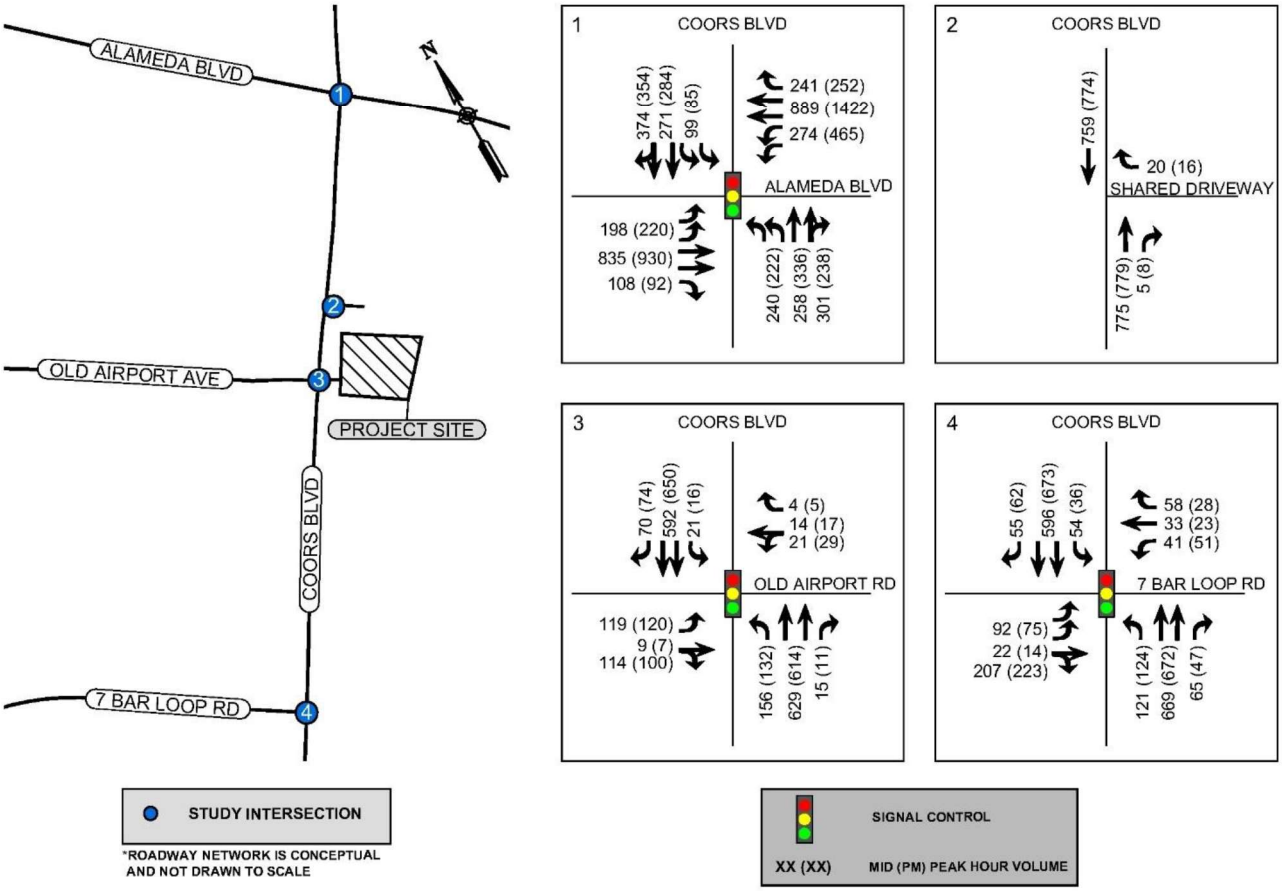

Figure 7: 2022 Background Volumes

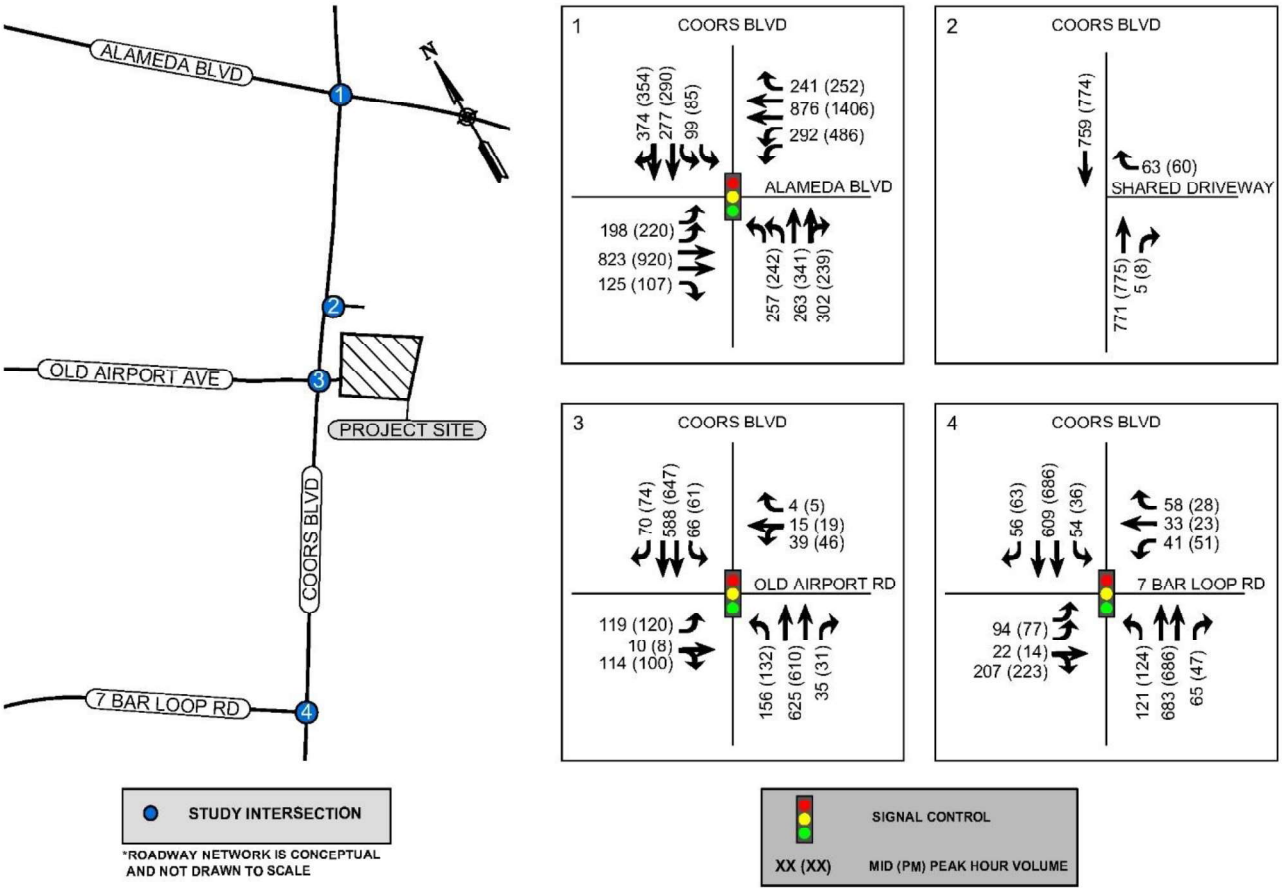

Figure 8: 2022 Build-out Volumes

TRAFFIC ANALYSIS OF BUILD-OUT YEARS

As performed for existing conditions, a Level of Service (LOS) and queueing was performed for all build-out analysis scenarios using the same procedures, field data, and assumptions. Signal timings used in the existing conditions analysis were retained and used for the build-out conditions analysis.

2022 Background and Build-out Conditions

Table 7 below summarizes the intersection delay level of service and queueing under 2022 background and build-out conditions. Detailed capacity output sheets showing all individual movements can be found in Appendix C.

Table 9: TransModeler Results: 2022 Background Conditions

	Coors Blvd & Alameda Blvd					Coors Blvd & Shared Driveway					Coors Blvd & Old Airort Ave					Coors Blvd & 7 Bar Loop Rd				
MD Peak Hour	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)
	EBL	72.3	E	100	61.7	NBT	0.0	A	-	0.0	EBL	36.9	D	-	83.9	EBL	36.1	D	115	32.2
	EBR	24.0	C	150	93.5	NBT/R	0.0	A	-	0.0	EBT/R	11.5	B	-	34.2	EBR	-	-	-	-
	EBT	28.5	C	-	217.7	WBR	8.1	A	50	40.2						EBT	3.6	A	-	11.3
	NBL	57.8	E	400	137.8		-	-	-	-	NBL	6.4	A	450	43.0	NBL	5.7	A	425	24.7
	NBR	-	-	-	-		-	-	-	-	NBR	1.6	A	175	0.0	NBR	1.8	A	150	0.0
	NBT	32.0	C	-	116.1		-	-	-	-	NBT	4.4	A	-	35.3	NBT	3.6	A	-	32.8
	SBL	46.3	D	115	143.8		-	-	-	-	SBL	8.0	A	230	3.4	SBL	14.8	B	100	25.9
	SBR	-	-	-	-		-	-	-	-	SBR	3.1	A	230	1.6	SBR	3.1	A	150	0.0
	SBT	37.4	D	-	107.0		-	-	-	-	SBT	8.6	A	-	80.9	SBT	6.6	A	-	65.5
	WBL	67.4	E	150	112.5		-	-	-	-	WBT/L	38.5	D	50	28.5	WBL	37.7	D	75	28.7
	WBR	-	-	-	-		-	-	-	-						WBR	12.5	B	50	17.9
	WBT	23.5	C	-	201.9		-	-	-	-	WBR	10.8	B	50	0.0	WBT	35.3	D	-	18.5

	Coors Blvd & Alameda Blvd					Coors Blvd & Shared Driveway					Coors Blvd & Old Airort Ave					Coors Blvd & 7 Bar Loop Rd				
PM Peak Hour	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)
	EBL	94.0	F	100	84.4	NBT	0.0	A	-	0.0	EBL	38.9	D	-	87.9	EBL	37.8	D	115	34.2
	EBR	22.8	C	150	102.6	NBT/R	0.0	A	-	0.0	EBT/R	11.6	B	-	29.2	EBR	-	-	-	-
	EBT	25.9	C	-	235.8	WBR	7.9	A	50	39.8						EBT	3.1	A	-	13.1
	NBL	80.9	F	400	183.2		-	-	-	-	NBL	6.3	A	450	42.8	NBL	6.0	A	425	22.7
	NBR	-	-	-	-		-	-	-	-	NBR	1.4	A	175	0.0	NBR	1.7	A	150	0.0
	NBT	55.6	E	-	237.6		-	-	-	-	NBT	3.9	A	-	29.8	NBT	3.6	A	-	25.7
	SBL	70.9	E	115	238.6		-	-	-	-	SBL	8.1	A	230	2.5	SBL	14.9	B	100	23.2
	SBR	-	-	-	-		-	-	-	-	SBR	3.3	A	230	0.0	SBR	2.9	A	150	0.0
	SBT	55.1	E	-	156.9		-	-	-	-	SBT	9.3	A	-	86.0	SBT	7.2	A	-	67.5
	WBL	85.0	F	150	148.4		-	-	-	-	WBT/L	39.3	D	50	35.5	WBL	39.3	D	75	25.9
	WBR	-	-	-	-		-	-	-	-						WBR	12.4	B	50	18.8
	WBT	21.1	C	-	201.5		-	-	-	-	WBR	7.5	A	50	0.0	WBT	36.6	D	-	19.6

Table 10: TransModeler Results: 2022 1st Year Build-Out Conditions

	Coors Blvd & Alameda Blvd					Coors Blvd & Shared Driveway					Coors Blvd & Old Airort Ave					Coors Blvd & 7 Bar Loop Rd				
MD Peak Hour	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)
	EBL	73.4	E	100	62.4	NBT	0.0	A	-	0.0	EBL	37.9	D	-	81.1	EBL	36.2	D	115	35.9
	EBR	24.0	C	150	95.5	NBT/R	0.0	A	-	0.0	EBT/R	12.6	B	-	37.1	EBR	-	-	-	-
	EBT	28.6	C	-	221.6	WBR	7.9	A	50	36.4						EBT	3.1	A	-	11.4
	NBL	57.9	E	400	136.6		-	-	-	-	NBL	6.2	A	450	45.3	NBL	5.8	A	425	26.7
	NBR	-	-	-	-		-	-	-	-	NBR	1.6	A	175	0.0	NBR	1.8	A	150	0.0
	NBT	31.5	C	-	109.4		-	-	-	-	NBT	4.2	A	-	35.2	NBT	3.5	A	-	29.4
	SBL	46.9	D	115	146.3		-	-	-	-	SBL	8.2	A	230	4.2	SBL	14.2	B	100	22.9
	SBR	-	-	-	-		-	-	-	-	SBR	2.8	A	230	0.1	SBR	2.4	A	150	0.0
	SBT	36.7	D	-	111.0		-	-	-	-	SBT	8.4	A	-	77.7	SBT	6.7	A	-	68.2
	WBL	65.2	E	150	120.1		-	-	-	-	WBT/L	39.6	D	50	38.8	WBL	39.2	D	75	32.5
	WBR	-	-	-	-		-	-	-	-						WBR	12.1	B	50	17.6
	WBT	23.9	C	-	198.5		-	-	-	-	WBR	8.6	A	50	0.0	WBT	36.9	D	-	18.8

	Coors Blvd & Alameda Blvd					Coors Blvd & Shared Driveway					Coors Blvd & Old Airort Ave					Coors Blvd & 7 Bar Loop Rd				
PM Peak Hour	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)	Movement	Delay (s/veh)	LOS	Storage Length (ft)	95th% Length (ft)
	EBL	93.5	F	100	86.7	NBT	0.0	A	-	0.0	EBL	36.2	D	-	81.4	EBL	34.6	C	115	26.9
	EBR	22.7	C	150	102.6	NBT/R	0.0	A	-	0.0	EBT/R	11.0	B	-	31.2	EBR	-	-	-	-
	EBT	25.9	C	-	236.8	WBR	8.0	A	50	34.1						EBT	3.7	A	-	12.0
	NBL	81.0	F	400	183.2		-	-	-	-	NBL	7.0	A	450	46.7	NBL	5.8	A	425	24.0
	NBR	-	-	-	-		-	-	-	-	NBR	1.7	A	175	0.0	NBR	2.0	A	150	0.0
	NBT	50.4	D	-	187.8		-	-	-	-	NBT	4.3	A	-	37.5	NBT	3.6	A	-	29.0
	SBL	71.2	E	115	226.9		-	-	-	-	SBL	9.0	A	230	3.0	SBL	15.0	B	100	23.8
	SBR	-	-	-	-		-	-	-	-	SBR	3.4	A	230	0.0	SBR	2.8	A	150	0.0
	SBT	54.1	D	-	152.9		-	-	-	-	SBT	9.1	A	-	75.6	SBT	6.5	A	-	64.2
	WBL	84.4	F	150	153.3		-	-	-	-	WBT/L	39.6	D	50	27.6	WBL	41.0	D	75	32.0
	WBR	-	-	-	-		-	-	-	-						WBR	11.9	B	50	17.2
	WBT	20.8	C	-	194.0		-	-	-	-	WBT	8.2	A	50	0.0	WBT	36.0	D	-	26.7

From the above table, the following conclusions are made for the Build-out conditions analysis:

- For the intersection of Coors Blvd & Alameda Blvd
  - Capacity Analysis
    - Failing levels of service are observed for the EBL, NBL, and WBL movements in the Mid-Day peak hour and for the EBL, NBL, SBL, and WBL movements PM peak hour.
    - From simulation observations and comparison with field reviews, it is noted that queued vehicles in the WBL turn bay regularly block or obstruct vehicles in the inside lane approaching the intersection resulting in vehicles being unable to access WBT movements. Therefore, actual delay is observed to be higher than delays reported by the model for the WBT movement.
  - Queueing Analysis
    - Under background conditions, queue storage is observed to be exceeded for the westbound left turn.
    - Under build-out conditions, similar queueing issues are observed for the abovementioned movements.
- For the intersection of Coord Blvd & Shared Access Driveway
  - Capacity Analysis
    - For both background and build-out conditions, the intersection is observed to operate at an acceptable level of service in both the Mid-Day and PM peak hours. Individual movements are also observed to operate at an acceptable Level of Service (LOS) for the Mid-Day and PM peak.
  - Queueing Analysis
    - For both background and build-out conditions, queueing is observed to be accommodated within the development sites served by the intersection.
- For the intersection of Coors Blvd & Old Airport Rd
  - Capacity Analysis
    - For both background and build-out conditions, the intersection is observed to operate at an acceptable level of service in both the Mid-Day and PM peak hours. Individual movements are also observed to operate at an acceptable Level of Service (LOS) for the Mid-Day and PM peak.
  - Queueing Analysis
    - For both background and build-out conditions, 95th percentile Queue Storage Ratios (QSR) at the intersection are observed to be accommodated by existing storage lengths during the Mid-Day and PM peak hours.
- For the intersection of Coors Blvd & 7 Bar Loop Rd
  - Capacity Analysis
    - For both background and build-out conditions, the intersection is observed to operate at an acceptable level of service in both the Mid-Day and PM peak hours. Individual movements are also observed to operate at an acceptable Level of Service (LOS) for the Mid-Day and PM peak.
  - Queueing Analysis
    - For both background and build-out conditions, 95th percentile Queue Storage Ratios (QSR) at the intersection are observed to be accommodated by existing storage lengths during the Mid-Day and PM peak hours.

Capacity Mitigations and Street Improvements

As shown in the above section, capacity issues and queueing issues are observed for the following movements:

- Coors Blvd & Alameda Blvd
  - Northbound left turn
  - Southbound left turn
  - Eastbound left turn
  - Westbound left turn
  - Westbound Through (blocking from left-turn)

It is recommended that the westbound left turns be lengthened to provide adequate storage and prevent blocking of the inside lane approaching the intersection. Cursory observations of the driveway access configurations on the westbound approach to the Alameda Blvd & Coors Blvd intersection indicates that several full access driveways do not meet SAMM recommended spacing. To lengthen the westbound left-turns an access management review should be performed, and the two-way left-turn lane be removed to extend the left-turn lanes.

Additionally, it is recommended that the signal be re-timed. Signal timings should be performed by a registered Profession Traffic Operations Engineer (PTOE) at least one month after the opening of the Development.

Development Site-Specific Observations and Recommendations

Site Access Sight Distance

The following presents recommended intersection sight distance requirements for the shared access driveway serving the Development. Intersection sight distance requirements were calculated based on the 2018 AASHTO "Green Book" chapter 9.5. For the driveway's right-in/right-out access configuration, one sight distance case was used for this analysis:

- 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 on Coors Blvd was calculated based on the design vehicle crossing into the first lane of the roadway.

Values shown below in Table 11 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 11: Sight Distance Requirements

Case	Roadway	Speed	Sight Distance
Case B2 – Turning Right	Coors Blvd	35 MPH	250 Feet

Although the site plan is currently in the preliminary stages, pending the position of the site's access driveway as detailed in a subsequent section, 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.

Turn Lane Warrant Analysis

The following presents a review of NMDOT turn lane warrant criteria performed for the shared access driveway on Coors Blvd. It is noted that turn lanes exist at the signalized intersection of Coors Blvd & Old Airport Ave. Guidelines in NMDOT's State Access Management Manual (SAMM) Table 17.B-2 Criteria were used to determine the need for turn lane(s). The results of this analysis are shown in the table below. Full-Build turning movement volumes were used in the analysis.

Table 12: Turn Lane Warrants

Location	Posted Speed Limit	Approximate Adjacent Through Lane Volume MID(PM)	Right Turning Volume MID(PM)	Right Turn Warrant Result (17.B-2)
Coors Blvd & Shared Access NBR	35 MPH	386 (388)	5 (8)	Not Required

Based on the above criteria, a right turn deceleration is not warranted for the shared access driveway on Coors Blvd.

Deceleration Lane Lengths

Guidelines in NMDOT's *State Access Management Manual (SAMM) Table 18.K-1 Deceleration and Acceleration Lengths* state that:

- For roadways with a posted speed limit of 35 mph, a right turn deceleration lane is required to have a deceleration distance of 250 feet and a deceleration taper of 100 feet.

Table 13. Table 18.K-1 – Deceleration and Acceleration Lengths (feet)

Table 18.K-1
Deceleration and Acceleration Lengths (feet)

Speed Change Lane Condition	Posted Speed (mph)									
	25	30	35	40	45	50	55	60	65	70
Deceleration Distance										
Stop Condition	150	200	250	325	400	475	550	650	725	850
Slow to 15 mph	130	175	230	300	370	450	525	620	700	820
Deceleration Taper										
Length for 12-foot Lane	50	75	100	125	150	175	200	225	250	250
Straight Line Ratios (L:W)	4:1	6:1	8:1	10.5:1	12.5:1	14.5:1	16.5:1	18.5:1	21:1	21:1
Acceleration Lane Length	NA	190	270	380	550	760	960	1,170	1,380	1,590
Acceleration Taper										
Length for 12-foot Lane	NA	100	120	150	170	180	230	270	300	300
Straight Line Ratios (L:W)	NA	8:1	10:1	12.5:1	14:1	15:1	19:1	22.5:1	25:1	25:1

This table assumes level terrain and acceleration distances for the passenger car/pickup design vehicle. Refer to the text discussion of Sub-Section 18.K for additional guidance regarding the design of speed change lanes.

Using the information in Table 13, the following is assessed:

Table 14: Deceleration Lengths

Location	Posted Speed Limit	Estimated Provided Deceleration Length	SAMM Recommended Deceleration Lengths
Coors Blvd & Old Airport Ave NBR	35 MPH	250 FT	250 FT + 100 FT Taper

Based on the above table, it appears that the northbound right turn lane at Coors Blvd & Old Airport was constructed using the provisions of SAMM section 18.K.b allowing for the elimination of part or all of the deceleration distance where physical or legal constraints necessitate. Adherence to the SAMM in absence of constraints would require the deceleration lane length to be calculated as the greater of the deceleration distance storage or storage queue length plus a separate transition taper. From the capacity analysis it is noted that a queue of less than 1 vehicle is reported under full build conditions in both the AM and PM peak hours resulting in the minimum allowable vehicle queue length of 50 FT.

The turn lane as constructed does not meet SAMM recommendations in the absence of constraints If strict adherence to the SAMM is desired and no limiting physical or legal constraints are present, the turn lane should be lengthened to provide 250 FT of deceleration distance with a 100 FT transition taper for a total right-turn deceleration lane length of 350FT.

CRASH DATA SUMMARY

At the request of the NMDOT, a crash summary for the signalized 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 15: Crash Summary

Crash Summary		COORS BLVD & 7 BAR LOOP RD	COORS BLVD & OLD AIRPORT AVE	COORS BLVD & SHARED DRIVEWAY	COORS BLVD & ALAMEDA BLVD
	Total Crashes	113	43	1	268
By Year	2015	29	9	0	64
	2016	33	11	1	49
	2017	15	7	0	59
	2018	11	10	0	43
	2019	25	6	0	53
By Type	Fixed Object	2	2	0	8
	Invalid Code/Left Blank	11	2	0	19
	Other (Non-Collision)	3	0	0	3
	Other (Object)	0	0	0	5
	Other Vehicle - All Other	25	15	0	79
	Other Vehicle - All Others/Entering At Angle	2	1	0	1
	Other Vehicle - Both Going Straight/Entering At Angle	12	6	0	32
	Other Vehicle - Both Turning/Entering At Angle	6	0	0	5
	Other Vehicle - From Opposite Direction	15	7	1	38
	Other Vehicle - From Same Direction/All Others	34	10	0	67
	Overturn/Rollover	1	0	0	2
	Parked Vehicle	0	0	0	2
	Pedalcyclist	0	0	0	1
	Pedestrian	1	0	0	0
	Vehicle On Other Roadway	1	0	0	6
	%Other Vehicle - All Other	22%	35%	0%	29%
	%Other Vehicle - From Same Direction/All Others	30%	23%	0%	25%
	%Other Vehicle - From Opposite Direction	13%	16%	100%	14%
By Lighting Conditions	Day	70	31	1	202
	Dawn/Dusk	5	1	0	12
	Dark	23	9	0	42
	Invalid Code/Not Specified	15	2	0	12
	%Day	62%	72%	100%	75%
	%Dark	20%	21%	0%	16%
By Severity	PDO	75	28	1	213
	Injury	37	14	0	55
	Fatality	1	1	0	0
	%PDO	66%	65%	100%	79%
	%Injury	33%	33%	0%	21%
By Contributing Factors	Alcohol/Drug Involved	2	1	0	5
	Avoid No Contact	3	2	0	10
	Disregarded Traffic Signal	9	5	0	8
	Driver Inattention	31	6	0	61
	Driverless Moving Vehicle	0	0	0	2
	Drove Left Of Center	0	0	0	1
	Excessive Speed	7	3	0	14
	Failed to Yield Right of Way	18	11	1	40
	Following Too Closely	19	1	0	38
	Improper Backing	0	0	0	4
	Improper Lane Change	0	3	0	10
	Improper Overtaking	1	1	0	6
	Made Improper Turn	0	1	0	7
	Mechanical Defect	1	1	0	4
	None/Missing Data	17	6	0	42
	Other - No Driver Error	1	0	0	4
	Other Improper Driving	0	1	0	4
	Pedestrian Error	0	0	0	2
	Speed Too Fast for Conditions	4	1	0	6
	%Driver Inattention	27%	14%	0%	23%
	%Failed to Yield Right of Way	16%	26%	100%	15%
	%None/Missing Data	15%	14%	0%	16%
	%Excessive Speed	17%	2%	0%	14%

From the above table, the following observations are made:

- For the intersection of Coors Blvd and 7 Bar Loop Rd:
  - Within the years 2015 to 2019, a total of 113 crashes were reported.
  - The most common classification of the crash is observed to be Other Vehicle – From Same Direction/All Others.
  - Most of the crashes at this intersection occurred during daylight hours, with 20% occurring at night or during dawn/dusk.
  - One fatal crash was reported from 2015 to 2019.
    - This crash was reported on October 13th, 2018, and occurred at approximately 7:00 PM. The crash was classified as a pedestrian crash and listed with a crash analysis as "Pedestrian Collision – Vehicle Going Straight". The highest contributing factor was listed to be "Alcohol/Drug Involved" with clear weather and Dark-Not Lighted conditions.
  - The most common cause of crashes, other than None/Missing Information or Other – No Driver Error, is observed to be Driver Inattention.
- For the intersection of Coors Blvd and Old Airport Ave:
  - Within the years of 2015 to 2019, a total of 43 crashes were reported.
  - The most common classification of crash is observed to be Other Vehicle – All Other.
  - Most of the crashes at this intersection occurred during daylight hours, with 21% occurring at night or during dawn/dusk.
  - One fatal crash was reported from 2015 to 2019.
    - This crash was reported on May 24th, 2019, and occurred at approximately 2:00 PM. The crash was classified as a vehicle crash and listed with a crash analysis as "Other Vehicle – Both Going Straight/Entering At Angle". The highest contributing factor was listed to be "Alcohol/Drug Involved" and a second contributing factor of "Disregarded Traffic Signal" with clear weather and Dark-Not Lighted conditions.
  - The most common cause of crashes, other than None/Missing Information or Other – No Driver Error, is observed to be Failed to Yield Right of Way.
- For the Shared Access Driveway, only one crash was reported for the years 2015 to 2019. The crash was classified as an "Other Vehicle – From Opposite Direction", occurred during daylight conditions, resulted in Property Damage Only, and had a top contributing factor of Failed to Yield the Right of Way.
- For the intersection of Coors Blvd and Alameda Blvd:
  - Within the years of 2015 to 2019, total of 268 crashes were reported.
  - The most common classification of crash is observed to be Other Vehicle – From Same Direction/All Others.
  - Most of the crashes at this intersection occurred during daylight hours with 16% occurring at night or during dawn/dusk.
  - No fatal crashes were reported from 2015 to 2019.
  - The most common cause of crashes, other than None/Missing Information or Other – No Driver Error, is observed to be Driver Inattention.

SUMMARY OF RECOMMENDATIONS

The following presents a summary of recommendations included in this report. They are separated into recommendations relevant to the proposed Development and those outside the Development's influence or are not related to the proposed Development.

DEVELOPMENT SPECIFIC RECOMMENDATIONS

- It is recommended that access to the site be provided via shared access to the intersection of Coors Blvd & Old Airport Ave and shared access to the right-in/right-out driveway north of Coors Blvd & Old Airport.
- It is recommended that intersection sight distance, as detailed in the sight distance section of this report, be provided/maintained.
- For the shared access driveway
    - A right turn lane is not warranted.
    - The driveway should remain as right-in/right-out configuration.
- For the intersection of Coors Blvd & Old Airport Ave
    - It appears that the northbound right turn lane at Coors Blvd & Old Airport was constructed using the provision of SAMM section 18.K.b.*i* allowing for the elimination of part or all of the deceleration distance where physical or legal constraints necessitate and 18.K.b.*ii*, which states: "In urban areas, the deceleration lane length may be designed based on the greater of the required vehicle queue storage length or the required deceleration distance."
    - The deceleration distance provided by SAMM Table 18.K-1 is 250 FT for a posted speed of 35 MPH. From the capacity analysis, less than 1 vehicle is reported under full build conditions in both the AM and PM peak hours resulting in the minimum allowable vehicle queue length of 50 FT.
    - Adherence to the SAMM in the absence of other physical or legal constraints, in an urban area, would require the deceleration lane length to be calculated as a transition taper plus the longer of SAMM provided deceleration distance or the 95th percentile queue storage. The turn lane as constructed does not meet full SAMM recommendations assessed in the absence of constraints. If strict adherence to the SAMM is desired and no limiting physical or legal constraints are present, the turn lane should be lengthened to provide 250 FT of deceleration distance with a 100 FT transition taper for a total right-turn deceleration lane length of 350FT.

ANCILLARY RECOMMENDATIONS

- For the intersection of Coors Blvd & Alameda
    - It is recommended that the traffic signal be re-timed regardless of the Development. Signal timings should be performed by a registered Profession Traffic Operations Engineer (PTOE) at least one month after the opening of the Development.
    - It is recommended that an access management review be performed for driveways on the westbound approach to the intersection, and the existing two-way left-turn lane be used to extend the WBL storage lengths.
    - Remove and/or replace the anomalous 40 MPH speed limit sign located on Coors Blvd NB 265 FT north of 7 Bar Loop Rd.