



TRAFFIC IMPACT STUDY

AMBLESIDE SCHOOL

Lone Tree, Colorado

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Executive Summary

Site Location and Study Area

The property that comprises the application area for the proposed development is approximately 7.39 acres in size and is identified as Douglas County Parcel Number 2231-162-02-164. It is located at on the southwest quadrant of the Lincoln Avenue/Lone Tree Parkway intersection in Lone Tree, Colorado. It is zoned Planned Development Districts – Centennial Ridge PD and is currently occupied by a church use.

The study area is generally bounded by Lincoln Avenue to the north, Lone Tree Parkway to the east, and property lines to the west and south. The study area for the project includes those intersections that could be affected by the proposed development:

- Lincoln Avenue/Lone Tree Parkway (W)
- Lincoln Avenue/Lone Tree Parkway (E)
- Site Access/Lone Tree Parkway

Description of Proposed Development

The Applicant, Ambleside School, seeks to redevelop the property with a Private School (K-12) use. Site access is being proposed via the existing full movement on Lone Tree Parkway.

Conclusions and Recommendations

Conclusions

Based on the results of this traffic impact study, the following may be concluded:

- Under existing traffic conditions, the signalized intersection within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours, and queues remain within their respective storage lengths.
- Under existing traffic conditions, the unsignalized intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours, with the exception of the northbound movement at the Lincoln Avenue/Lone Tree Parkway (E) intersection. V/C ratio remains under 1.0 for this movement, and all queues remain within their respective storage lengths.
- Under background future 2025 and 2045 traffic conditions, without the development of the subject site, the signalized intersection within the study area would operate at overall acceptable LOS “D” or better during the weekday AM and PM peak hours.
- Under background future 2025 and 2045 traffic conditions, without the development of the subject site, the unsignalized intersections within the study area would operate at levels of service consistent with existing conditions.
- The proposed site development would generate, upon completion and full occupancy, 175 new weekday AM and 38 new weekday PM peak hour vehicle trips as well as 548 new weekday daily trips.

- Under total future 2025 and 2045 traffic conditions, with development of the site, the intersections within the study area would operate consistent with background conditions.
- All forecasted queues would be contained within their effective storage.

Recommendations

- The Applicant should provide access consistent with the site plan contained herein.

I. Introduction

Overview

This report presents the results of a Traffic Impact Study (TIS) conducted in support of a site plan to develop a private school use in the City of Lone Tree, Colorado, as requested by the City. Currently, the site is occupied by a church use.

Per the request of the City of Lone Tree, a Transportation Impact Study is required to support the proposed development.

Site Location and Study Area

The property that comprises the application area for the proposed development is approximately 7.39 acres in size and is identified as Douglas County Parcel Number 2231-162-02-164. It is located at on the southwest quadrant of the Lincoln Avenue/Lone Tree Parkway intersection in Lone Tree, Colorado, as shown on Figure 1-1. It is zoned Planned Development Districts – Centennial Ridge PD and is currently occupied by a church use. Site access is being proposed via the existing full movement access on Lone Tree Parkway.

The Applicant, Ambleside School, seeks to redevelop the property with a Private School (K-12) use. A reduction of the Applicant's proposed conceptual site plan is provided on Figure 1-2. A full-size copy of the plan is provided in Appendix A.

The study area is generally bounded by Lincoln Avenue to the north, Lone Tree Parkway to the east, and property lines to the west and south.

Tasks undertaken in the course of this study included the following:

1. Reviewed the Applicant's proposed development plans and other background data.
2. Conducted a virtual field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits.
3. Conducted weekday AM/PM peak hour turning movement counts at the key intersections.
4. Analyzed existing levels of service at each of the key study intersections based on the methodologies set forth in the Highway Capacity Guidelines (HCM) 7th as reported by Synchro version 12.
5. Forecasted background future traffic volumes based on baseline traffic counts and regional traffic growth for 2025 build-out and 2045 long-range conditions.
6. Calculated background levels of service at each of the key study intersections for the projected build-out and long-range years based on background future traffic forecasts, regional growth, and the existing lane use and traffic controls.
7. Estimated the number of AM and PM weekday peak hour trips that would be generated by the proposed use based on the Institute of Transportation Engineers (ITE) Trip Generation Manual 11th Edition rates/equations and methodologies.

8. Prepared AM and PM weekday peak hour total future traffic forecasts based on background traffic forecasts plus site traffic assignments for the 2025 buildout-year as well as 2045 long-range conditions.
9. Calculated total future levels of service for each of the key study intersections based on projected total future traffic forecasts, existing/future traffic controls and intersection geometries.
10. Identified roadway improvements required to accommodate future traffic volumes as necessary.

Sources of data for this analysis included the Institute of Transportation Engineers (ITE), Trip Generation 11th edition, the Highway Capacity Guidelines HCM 7th, Synchro 12, Ambleside School, City of Lone Tree, Colorado, and the files/library of Galloway.

Site Description and Access

Site Conditions

The terrain proximate to and surrounding the site is generally classified as “level”.

Hazardous Conditions

Based on the field reconnaissance in the vicinity of the subject site, no hazardous features or constraints were identified.

Proposed Site Access

Access to the site is being proposed via the existing full movement access on Lone Tree Parkway.

Existing Zoning

The subject site is currently Planned Development Districts – Centennial Ridge PD and is currently occupied by a church use. Figure 1-3 depicts the existing zoning associated with the subject property, as well as neighboring properties as shown on the City of Lone Tree zoning map.

Nearby Uses

The properties surrounding the subject site are generally developed with residential uses.

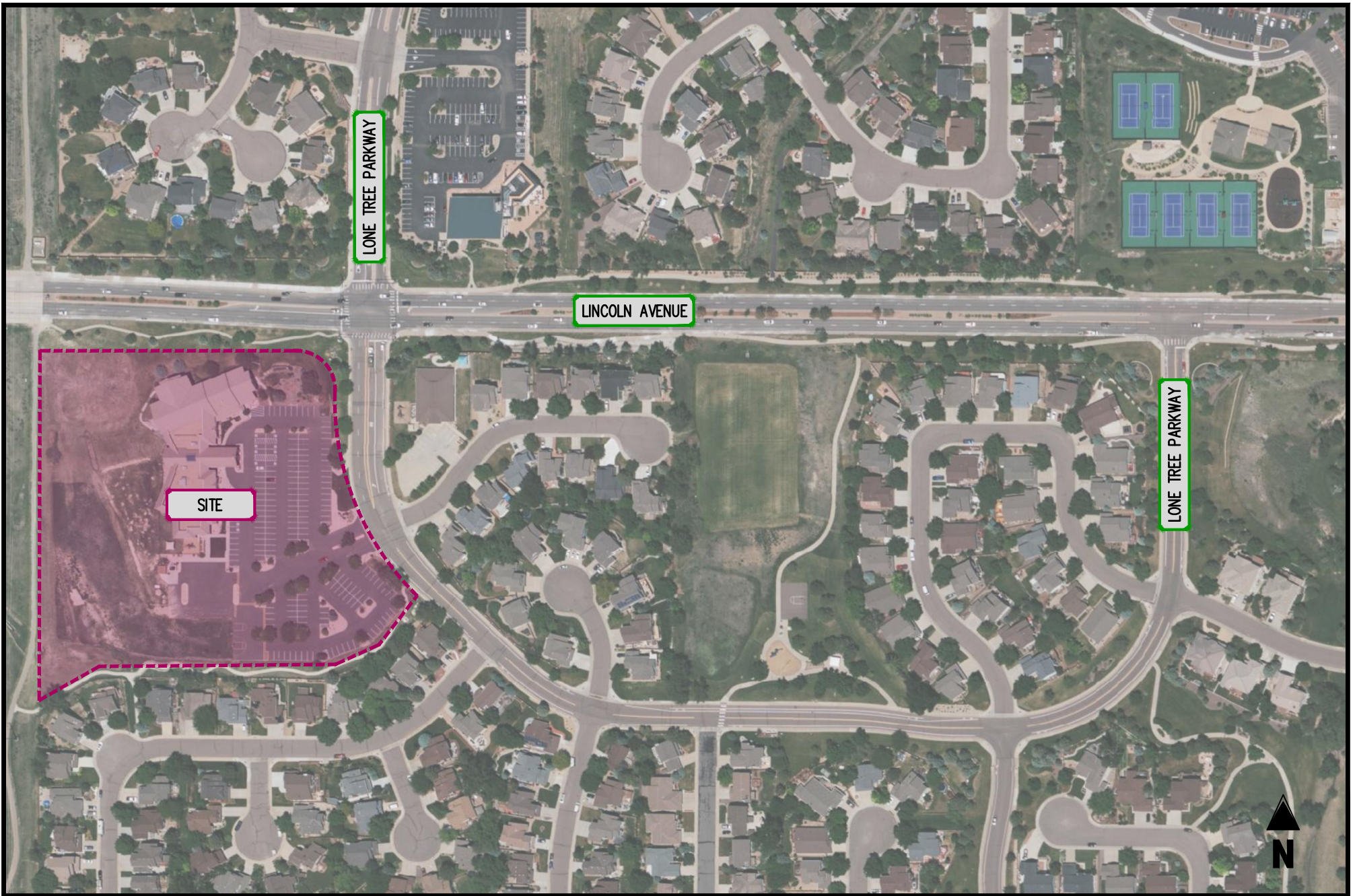


FIGURE 1-1
SITE LOCATION



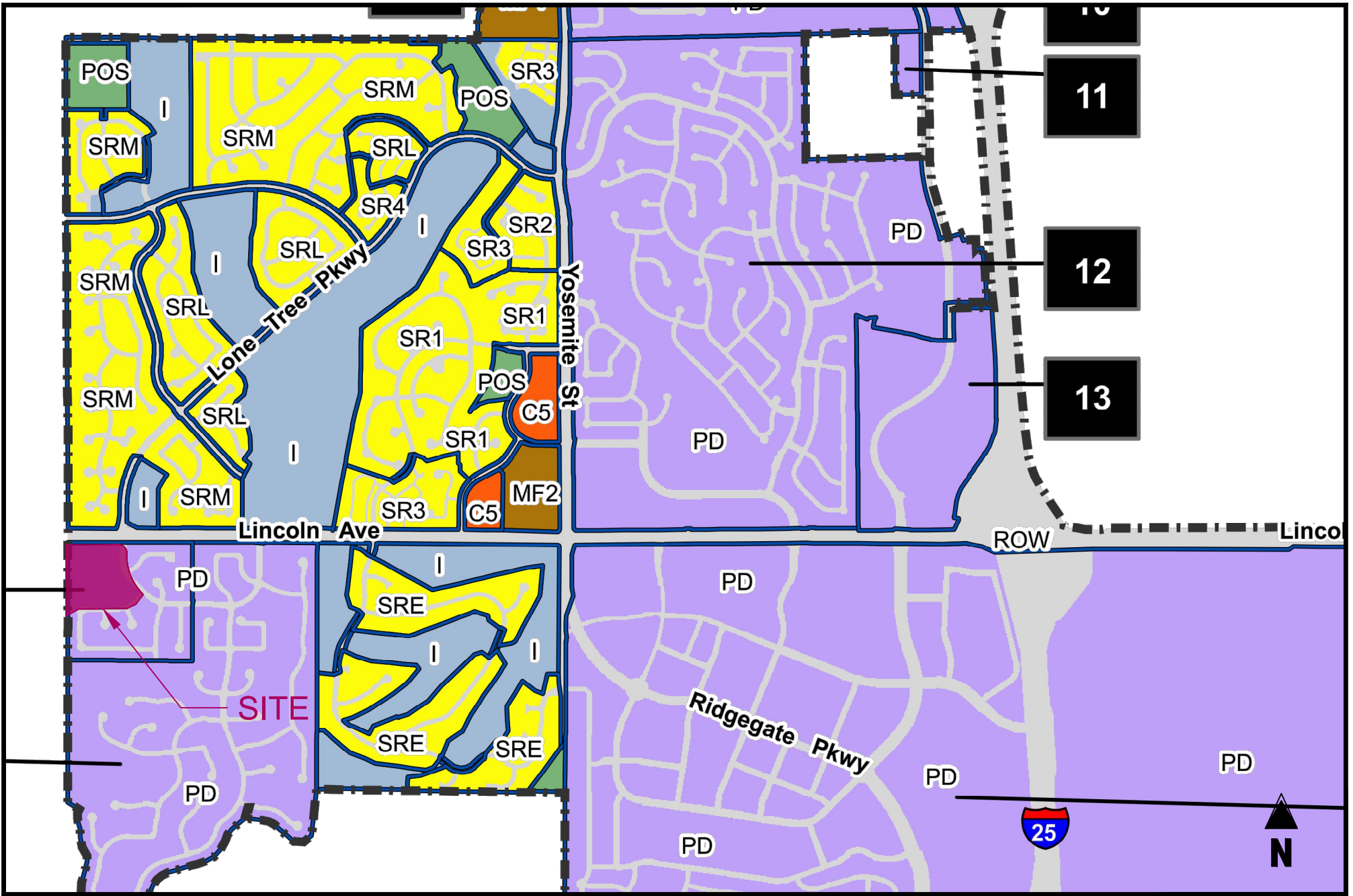


FIGURE 1-3
EXISTING ZONING



II. Background Information

Study Area

The study area was determined by a review of intersection that would experience a significant portion of turning movement volumes generated by the site. As such, the traffic study focuses primarily on the following intersections:

Study Intersections

- Lincoln Avenue/Lone Tree Parkway (W)
- Lincoln Avenue/Lone Tree Parkway (E)
- Site Access/Lone Tree Parkway

Study Assumptions

For purposes of this analysis only, the proposed uses are assumed to be built and occupied in one distinct phase. It was assumed that the use would be built and operational in study year 2025. A long-range analysis of 2045 was also provided.

Study Methodology

Synchro software version 12 was used to evaluate levels of service at each of the study intersections during the Sunday peak hour. Synchro is a macroscopic model used for optimizing traffic signal timing and performing capacity analyses. The software can model existing traffic signal timings or optimize splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro allows the user to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings as well as optimize traffic signal timings.

The levels of service reported for the signalized and unsignalized intersections analyzed herein were taken from the Highway Capacity Manual (HCM) 7th reports generated by Synchro 12 for unsignalized and signalized intersections. Level of service descriptions are included in Appendix B. A default percent heavy vehicle (%HV) factor of 2% was used for all movements in the study area.

Existing Roadway Network

Regional access to the subject site is provided by Lincoln Avenue and local access is provided via Lone Tree Parkway. Figure 2-1 depicts existing lane use and traffic controls in the vicinity of the subject site. The following provides a description of each of the roadways within the study network.

Lincoln Avenue

Lincoln Avenue is constructed as a four-lane section with turn lanes at major intersections and a posted speed limit of 45 mph in the vicinity of the subject site. The City classifies the roadway as a Major Arterial. The intersection with Lone Tree Parkway (W) operates under SIGNALIZED control and the intersection with Lone Tree Parkway (E) operates under STOP control.

Lone Tree Parkway

Lone Tree Parkway is constructed as a two-lane section with turn lanes at major intersections and a posted speed limit of 30 mph in the vicinity of the subject site. The City classifies the roadway as a Collector. The west intersection with Lincoln Avenue operates under SIGNALIZED control and the east intersection with Lincoln Avenue operates under STOP control.

Assumed Improvements

No funded/programmed roadway improvements were identified at the study intersections.

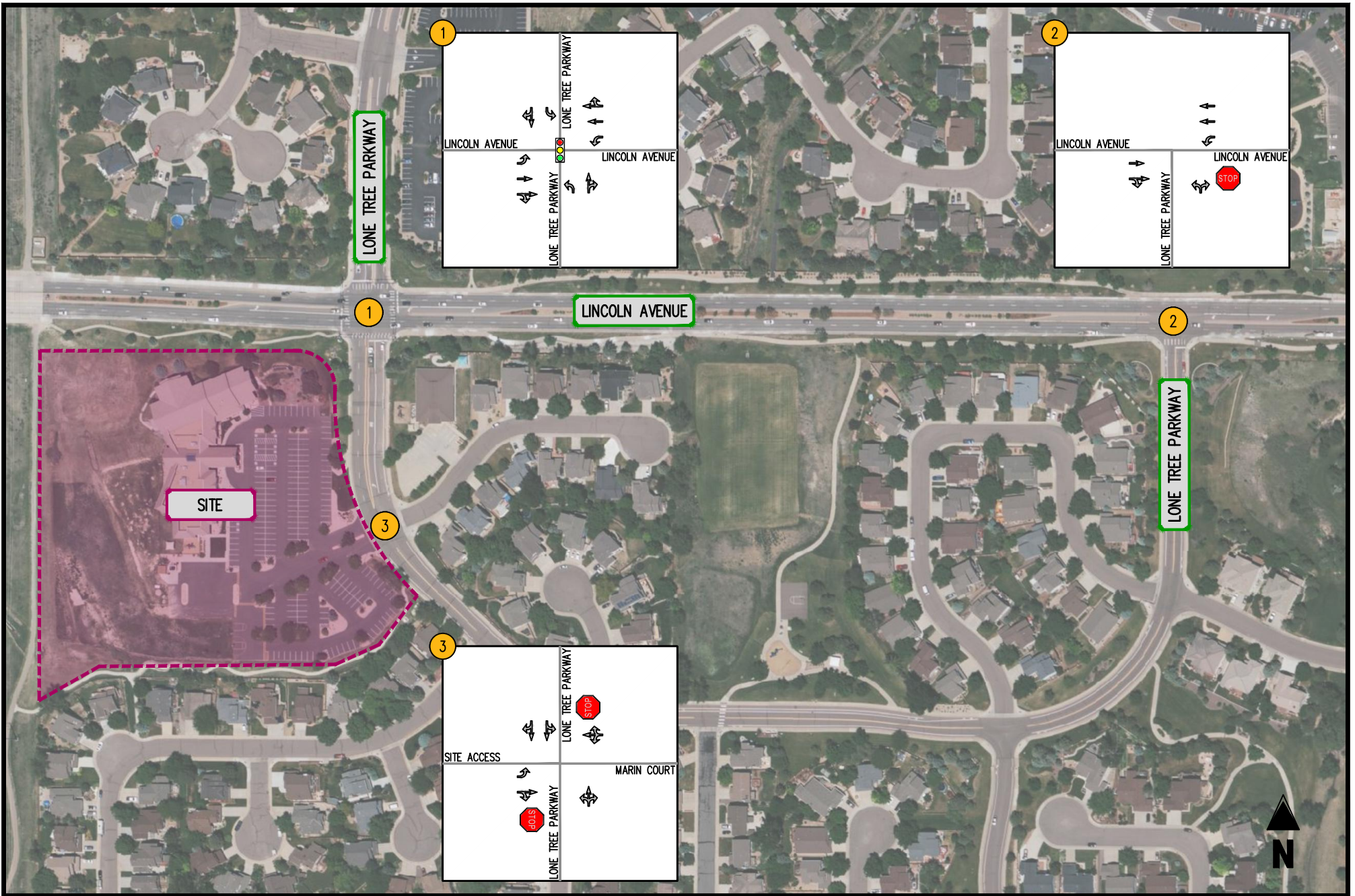


FIGURE 2-1
EXISTING LANE USE AND TRAFFIC CONTROL

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



III. Analysis of Existing Conditions

Traffic Volumes

Weekday AM and PM peak hour traffic volumes counts were conducted on Tuesday, December 12, 2023 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the study intersections by IDAX Data Solutions.

The existing volumes are summarized on Figure 3-1. Copies of traffic counts are included in Appendix C. Existing peak hour factors (PHF) were also computed by approach from the traffic counts and applied to the analysis with a minimum of 0.85 and a maximum of 0.92.

Operational Analysis

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic controls shown on Figure 2-1 and existing baseline vehicular traffic volumes shown on Figure 3-1. The capacity analysis results are presented in Appendix D and summarized in Table 3-1 and on Figure 3-2.

As shown in Table 3-1, the signalized intersection within the study area currently operates at overall acceptable LOS "C" or better during the weekday peak hours.

Unsignalized intersections within the study area currently operate at overall acceptable LOS "C" or better during the weekday peak hours with the exception of the northbound movement at the Lincoln Avenue/Lone Tree Parkway intersection which is operating at LOS "E" during the AM peak hour and LOS "F" during the PM peak hour. Further review of this intersection shows the approach has a volume to capacity ratio (V/C) of less than 1.0, suggesting additional capacity available for this movement.

Existing Intersection Queues

An analysis of intersection 95th-percentile queues was performed at key locations. The results of the queuing analysis, as reported by Synchro, are summarized in Table 3-2. As shown in the table, the existing queues are contained within the effective storage within the study area.

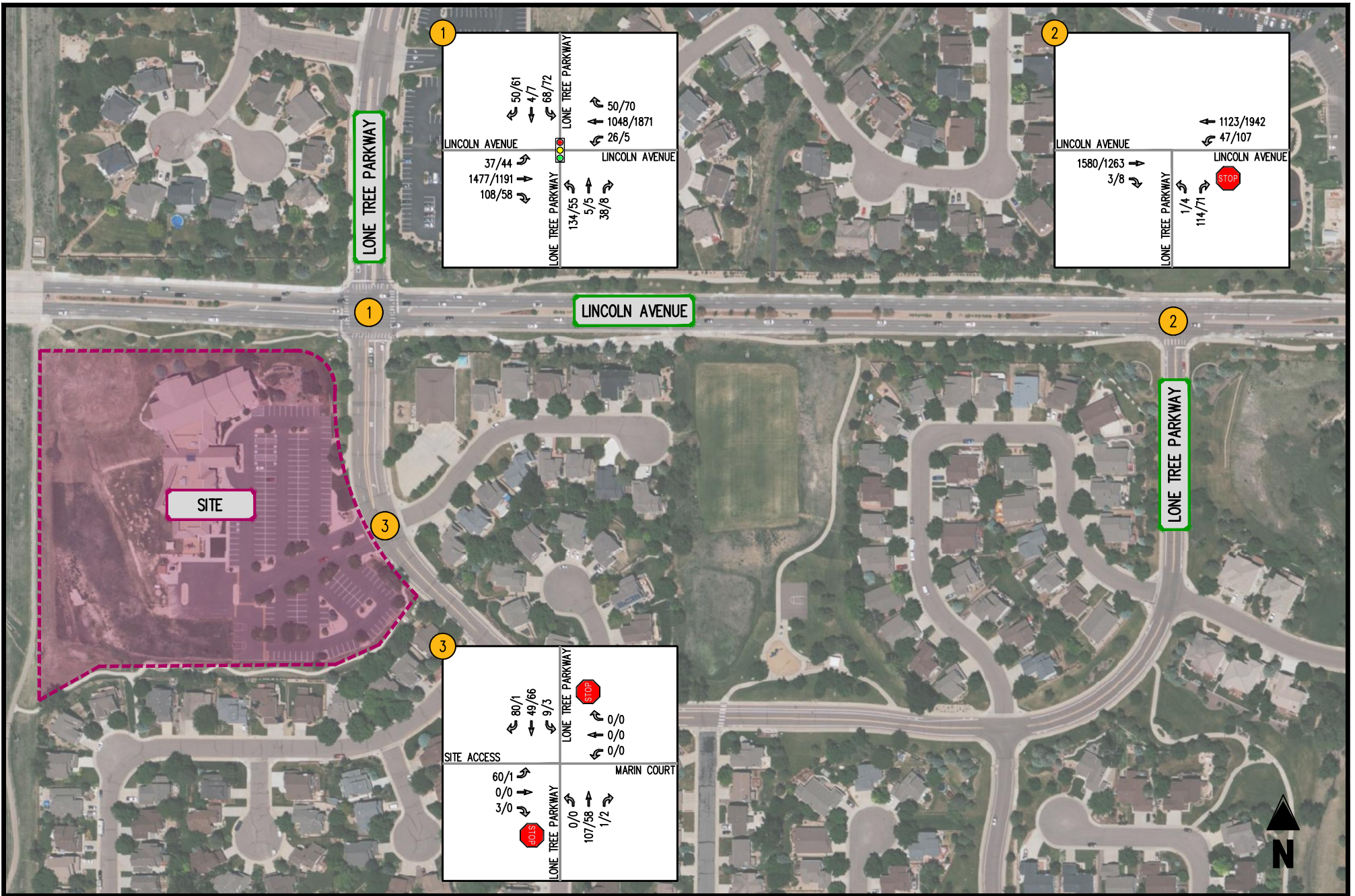


FIGURE 3-1
EXISTING VOLUMES



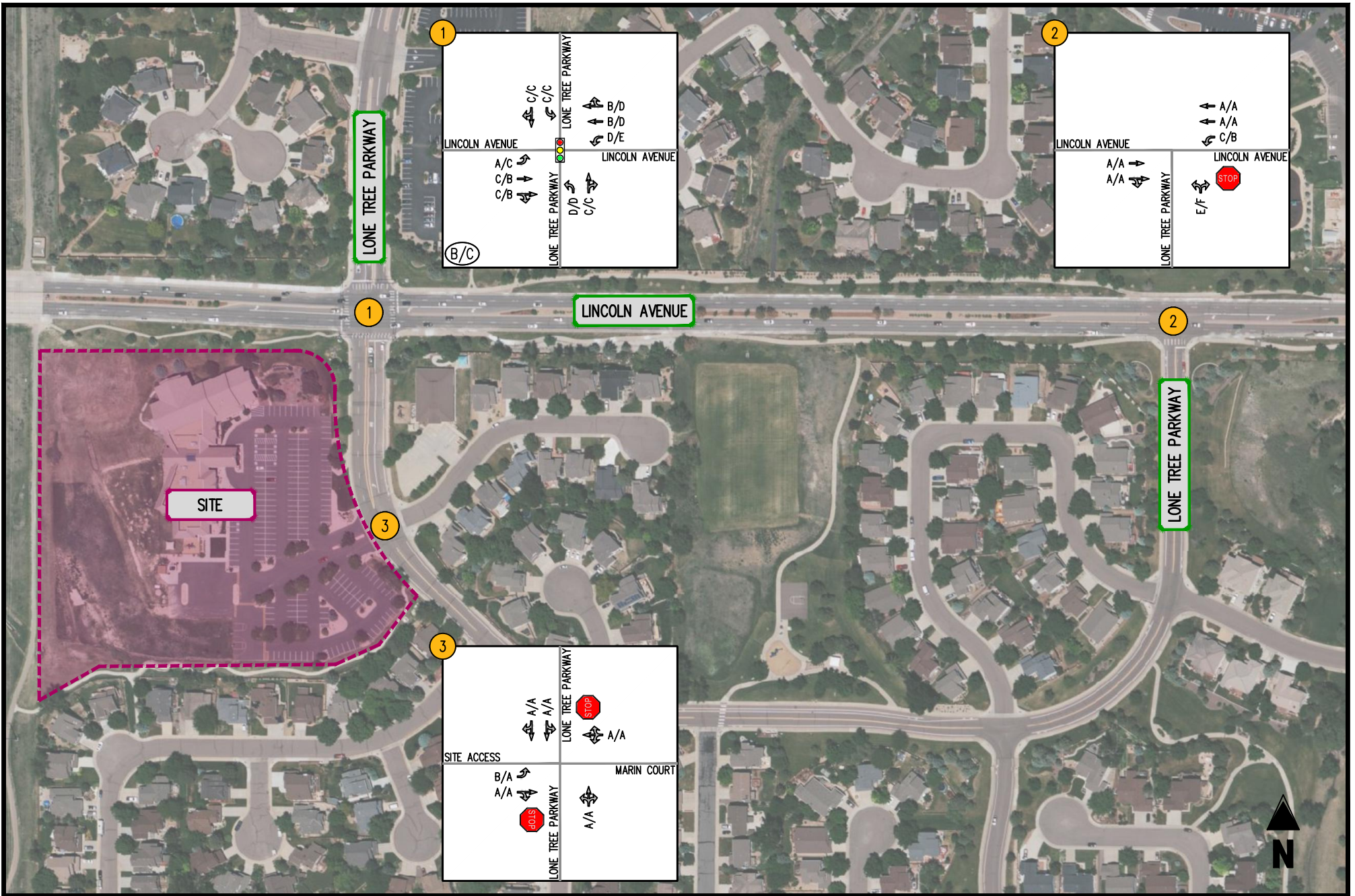


FIGURE 3-2
EXISTING LOS

AMBLESIDE SCHOOL
LONE TREE, CO

(A/A) INTERSECTION LOS

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT

🚦 SIGNALIZED INTERSECTION

🛑 STOP SIGN

🚧 YIELD SIGN



Table 3-1
 Ambleside School - Lone Tree, CO
 Existing Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2023	
				AM Peak Hour	PM Peak Hour
1 Lincoln Avenue/Lone Tree Parkway (W)	SIGNAL	Lincoln Avenue	EBL	A (7.8)	C (23.0)
			EBTR	C (21.5)	B (11.4)
		Lincoln Avenue	WBL	D (52.8)	E (67.7)
			WBTR	B (12.2)	D (35.3)
		Lone Tree Parkway	NBL	D (41.1)	D (35.1)
			NBTR	C (30.5)	C (29.2)
		Lone Tree Parkway	SBL	C (34.2)	C (32.6)
SBTR	<u>C (31.1)</u>		<u>C (31.9)</u>		
		Overall	B (19.6)	C (25.9)	
2 Lincoln Avenue/Lone Tree Parkway (E)	STOP	Lincoln Avenue	EBTR	A [0.0]	A [0.0]
			WBL	C [18.1]	B [14.6]
		Lone Tree Parkway	WBT	A [0.0]	A [0.0]
			NBLR	E [36.0]	F [52.7]
3 Site Access/Lone Tree Parkway	STOP	Site Access	EBL	B [10.9]	A [9.5]
			EBTR	A [8.7]	A [0.0]
		Marin Court	WBLTR	A [8.9]	A [8.7]
			NBLTR	A [0.0]	A [0.0]
		Lone Tree Parkway	SBLT	A [7.5]	A [7.4]
			SBTR	A [0.0]	A [0.0]

Notes (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.

(2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 3-2
 Ambleside School - Lone Tree, CO
 Existing Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2023	
					AM Peak Hour	PM Peak Hour
1 Lincoln Avenue/Lone Tree Parkway (W)	SIGNAL	Lincoln Avenue	EBL	180	15	17
			EBTR	-	505	315
		Lincoln Avenue	WBL	180	43	14
			WBTR	-	260	810
		Lone Tree Parkway	NBL	-	138	64
			NBTR	-	29	18
			SBL	115	75	80
		Lone Tree Parkway	SBTR	-	31	38
2 Lincoln Avenue/Lone Tree Parkway (E)	STOP	Lincoln Avenue	EBTR	-	0	0
			WBL	180	12.5	22.5
		Lincoln Avenue	WBT	-	0	0
			Lone Tree Parkway	NBLR	-	72.5
3 Site Access/Lone Tree Parkway	STOP	Site Access	EBL	-	7.5	0
			EBTR	-	0	0
		Marin Court	WBLTR	-	0	0
			Lone Tree Parkway	NBLTR	-	0
		Lone Tree Parkway	SBLT	-	0	0
			SBTR	-	0	0

Notes : (1) Queue length, in feet, is based on the 95th percentile queue as reported by Synchro, Version 12.

IV. Analysis of Future Conditions without Site Development

Methodology

The future traffic forecasts, without the proposed new use, were developed for 2025 and 2045 conditions based on a composite of existing baseline traffic volumes and regional traffic. DRCOG traffic data were referenced to define regional growth in the vicinity of the subject site. Available data suggested a decrease in growth in the area. In order to maintain a conservative analysis, a 0.5% growth per year rate was applied to existing though traffic along Lincoln Avenue.

Regional Growth

Increases in traffic associated with regional growth were estimated at 0.5 percent per year compounded for through movements along Lincoln Avenue up to 2025 as well as to 2045. This growth accounts for increases in traffic resulting from influences outside of the immediate study area. The resulting increases in traffic within the study area are reflected on Figure 4-1 for 2025 build-out year conditions and Figure 4-2 for 2045 long-range conditions.

Background Traffic Forecasts

The existing traffic forecasts depicted on Figure 3-1 and the regional growth shown on Figure 4-1 (2025) and Figure 4-2 (2045) were added together to yield the background future traffic forecasts shown on Figure 4-3 for 2025 conditions, and Figure 4-4 for 2045 conditions.

Background Future Levels of Service

Capacity analyses of 2025 and 2045 future traffic conditions without the proposed development are provided in Appendix E and summarized in Table 4-1. The forecasted levels of service are also depicted graphically on Figure 4-5 for 2025 conditions and Figure 4-6 for 2045 conditions.

As shown in Table 4-1, the signalized intersection within the study area is forecasted to operate at overall acceptable LOS "D" or better during the weekday peak hours for all background conditions.

Unsignalized intersections within the study area are forecasted to operate consistent with existing conditions.

Background Future Queueing

An analysis of intersection queues was performed at key locations under background future traffic conditions. The results of the queuing analysis are summarized in Table 4-2.

As shown in the table, forecasted queues within the study network would be contained within their effective storage, consistent with existing conditions.

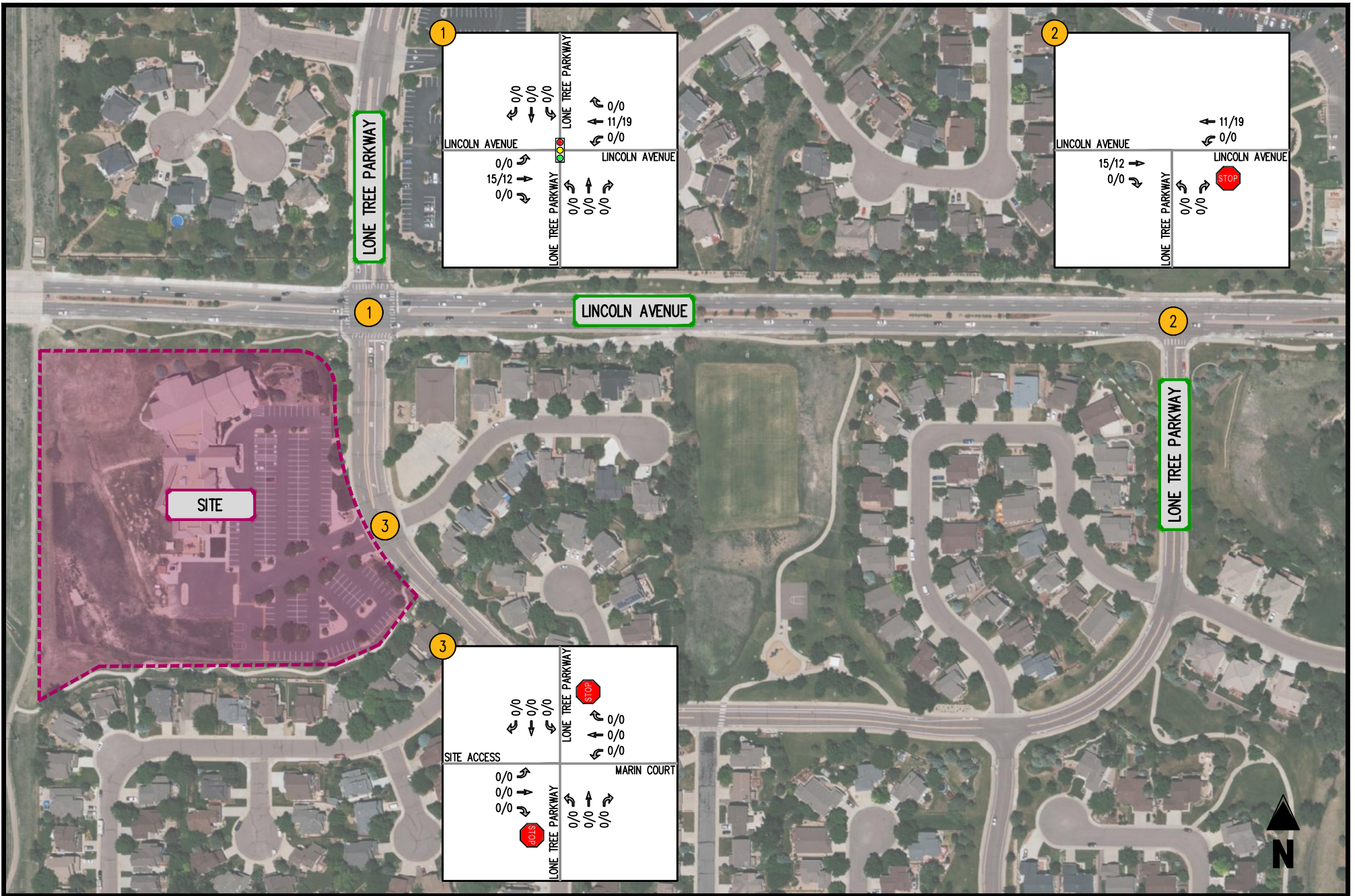
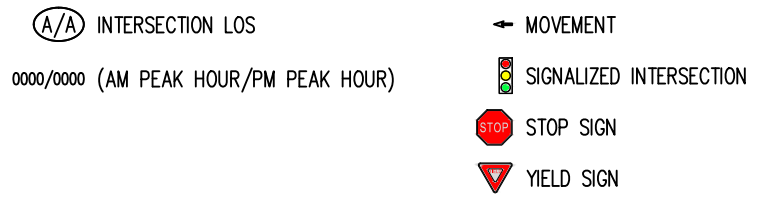


FIGURE 4-1
BACKGROUND 2025 GROWTH

AMBLESIDE SCHOOL
LONE TREE, CO



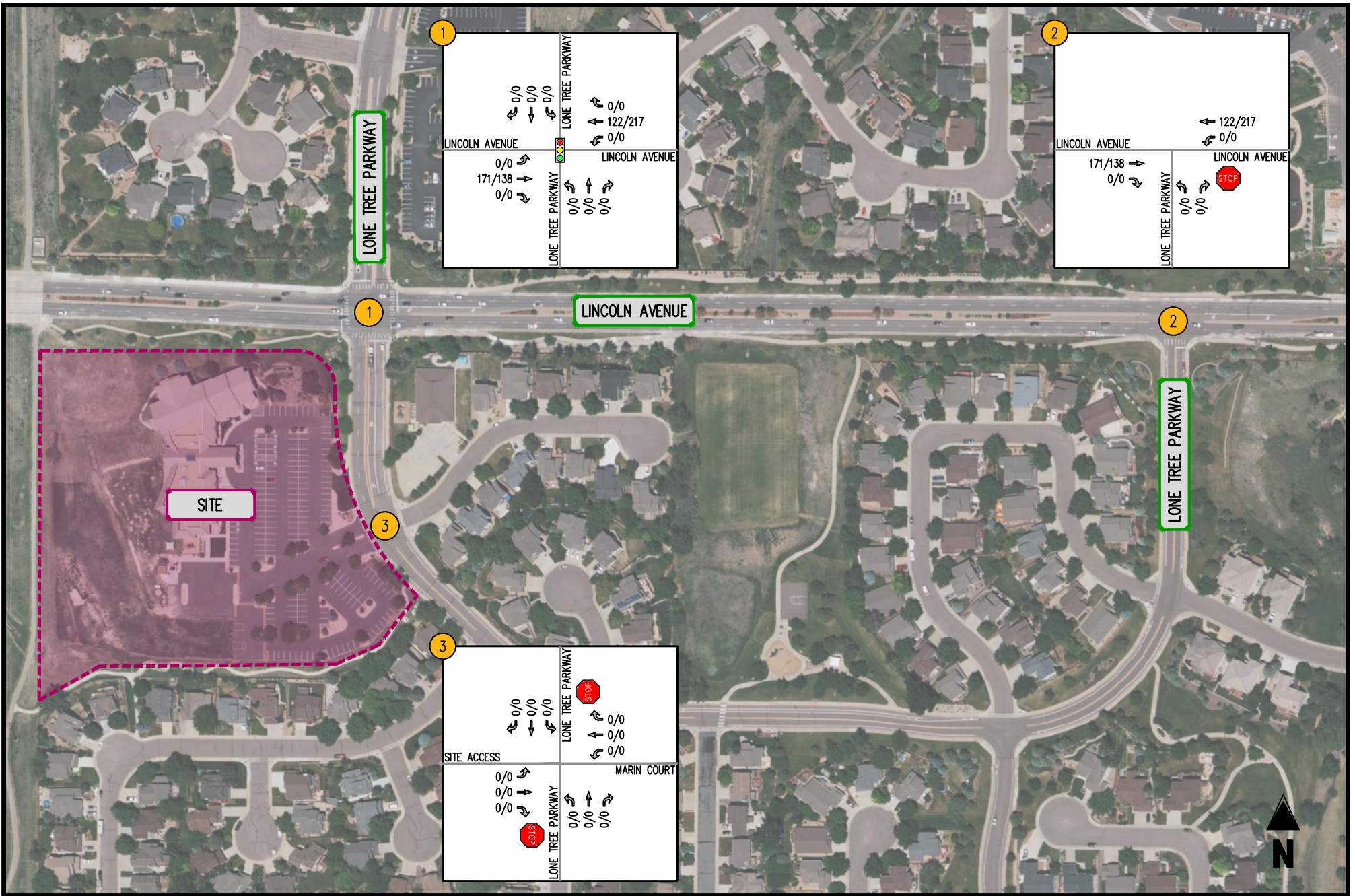


FIGURE 4-2
BACKGROUND 2045 GROWTH



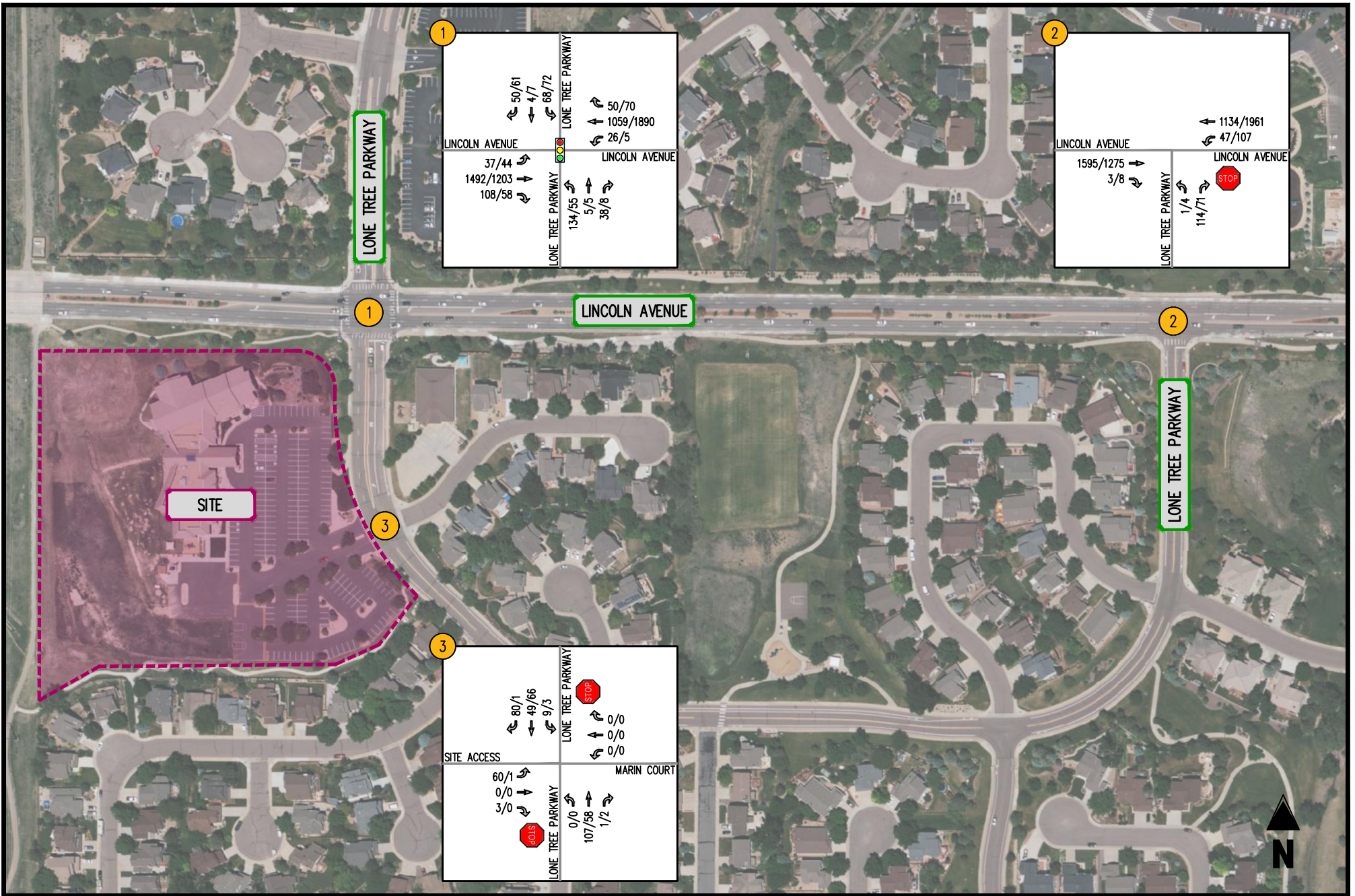


FIGURE 4-3
BACKGROUND 2025 FORECASTS

AMBLESIDE SCHOOL
LONE TREE, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT

🚦 SIGNALIZED INTERSECTION

🛑 STOP SIGN

🚧 YIELD SIGN



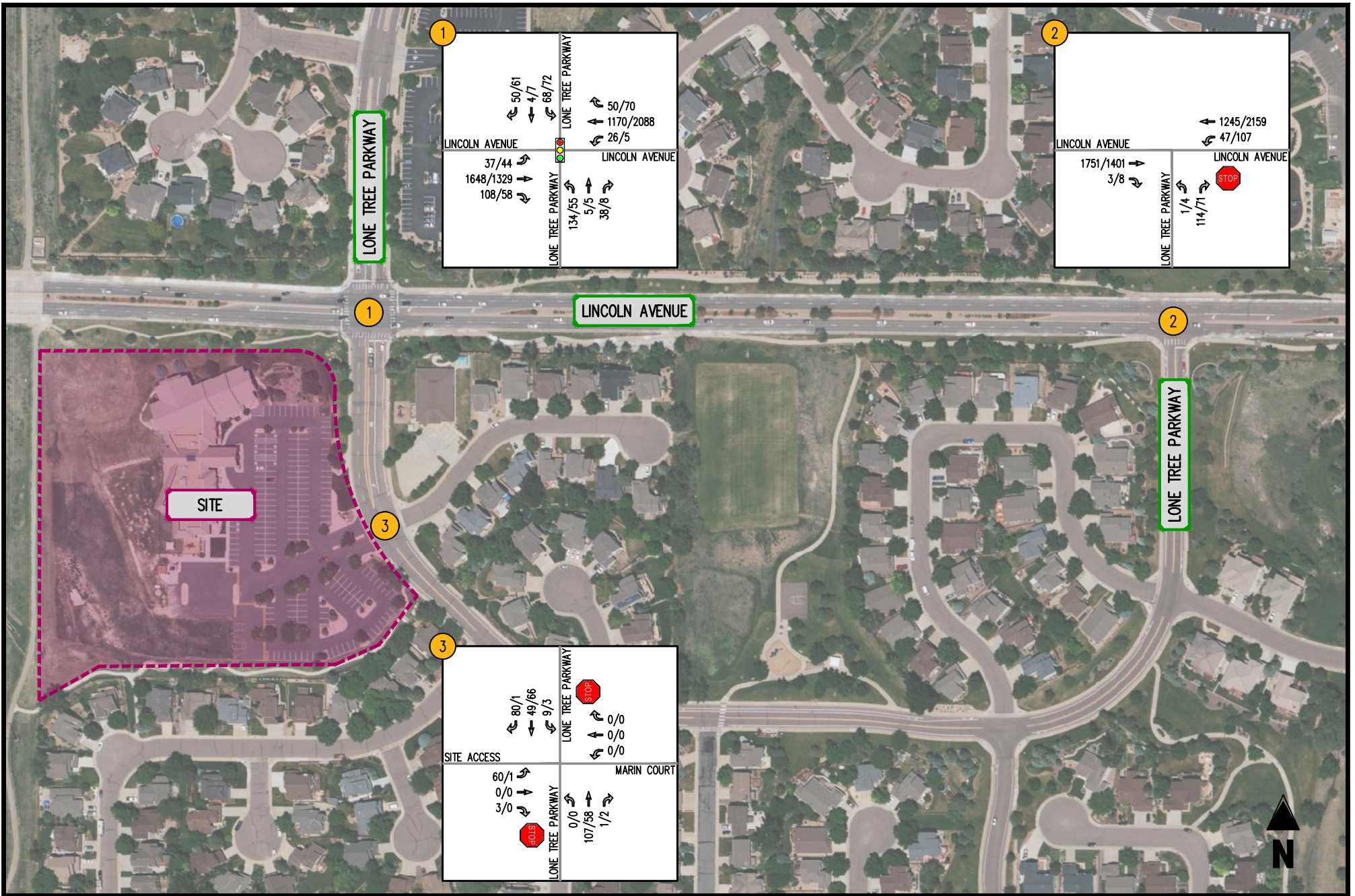


FIGURE 4-4
BACKGROUND 2045 FORECASTS

AMBLESIDE SCHOOL
LONE TREE, CO

A/A INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



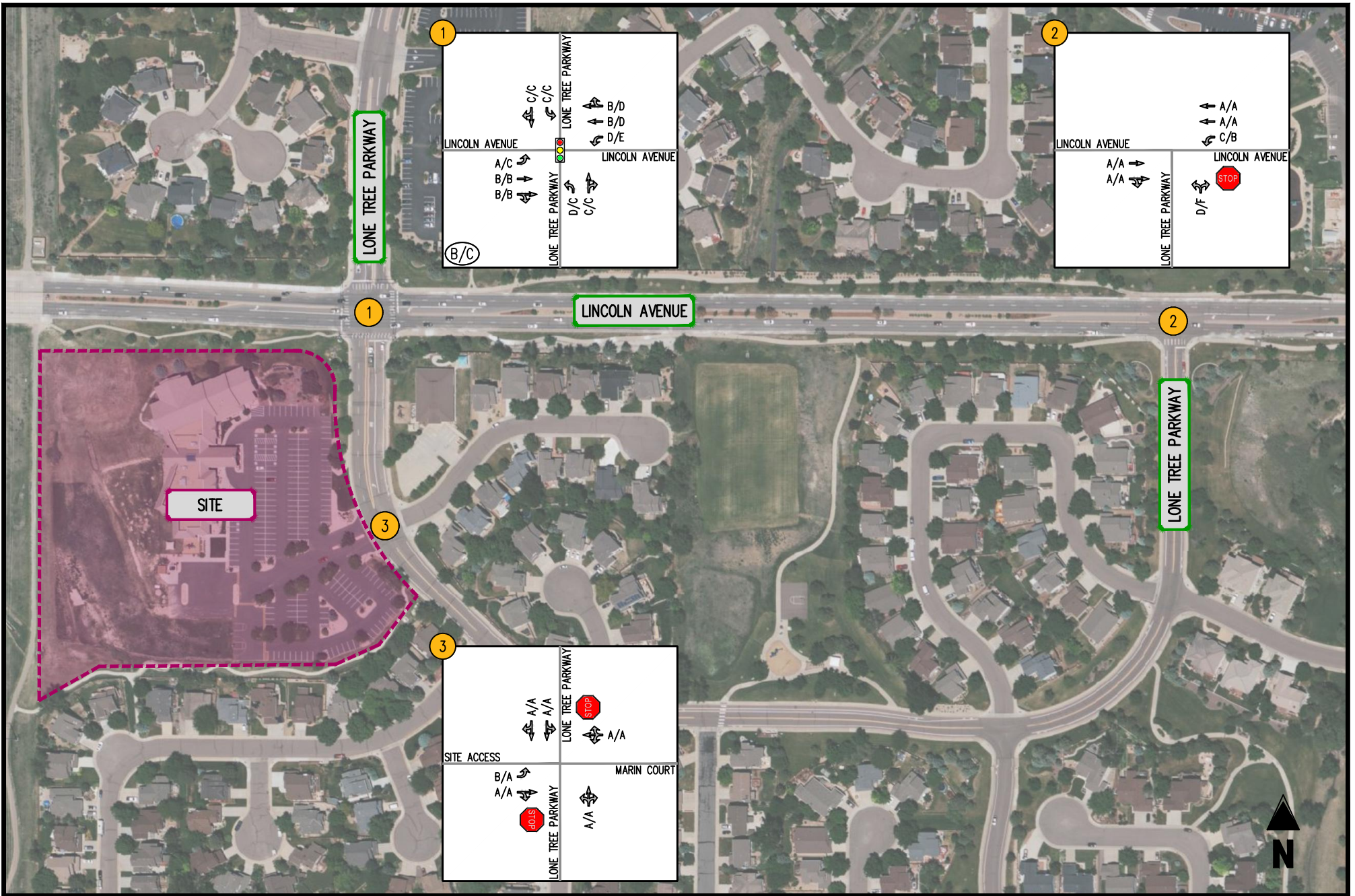


FIGURE 4-5
BACKGROUND 2025 LOS

AMBLESIDE SCHOOL
LONE TREE, CO

(A/A) INTERSECTION LOS

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT

🚦 SIGNALIZED INTERSECTION

🛑 STOP SIGN

🚧 YIELD SIGN



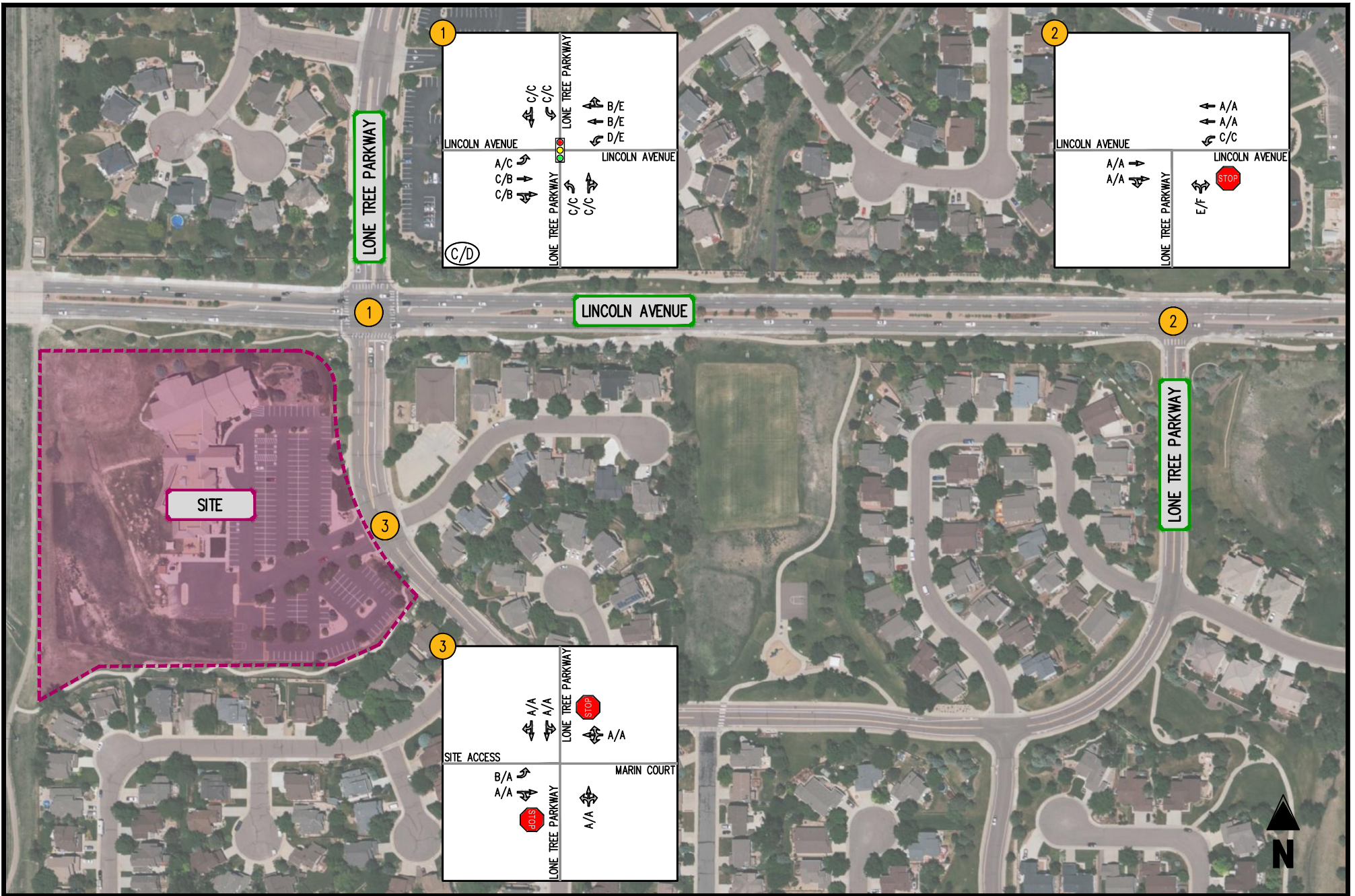


FIGURE 4-6
BACKGROUND 2045 LOS

AMBLESIDE SCHOOL
LONE TREE, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



Table 4-1
 Ambleside School - Lone Tree, CO
 Background Future Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2023		Background 2025		Background 2045	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Lincoln Avenue/Lone Tree Parkway (W)	SIGNAL	Lincoln Avenue	EBL	A (7.8)	C (23.0)	A (7.9)	C (23.3)	A (8.5)	C (23.8)
			EBTR	C (21.5)	B (11.4)	B (18.5)	B (11.5)	C (22.8)	B (12.6)
		Lincoln Avenue	WBL	D (52.8)	E (67.7)	D (52.8)	E (67.7)	D (52.8)	E (67.7)
			WBTR	B (12.2)	D (35.3)	B (12.3)	D (37.1)	B (13.1)	E (63.2)
		Lone Tree Parkway	NBL	D (41.1)	D (35.1)	D (39.1)	C (34.6)	C (29.4)	C (34.7)
			NBTR	C (30.5)	C (29.2)	C (30.1)	C (29.2)	C (30.3)	C (29.3)
		Lone Tree Parkway	SBL	C (34.2)	C (32.6)	C (33.4)	C (32.4)	C (33.6)	C (32.5)
			SBTR	<u>C (31.1)</u>	<u>C (31.9)</u>	<u>C (30.6)</u>	<u>C (31.7)</u>	<u>C (30.8)</u>	<u>C (31.8)</u>
Overall			B (19.6)	C (25.9)	B (17.9)	C (26.9)	C (20.2)	D (41.6)	
2 Lincoln Avenue/Lone Tree Parkway (E)	STOP	Lincoln Avenue	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			WBL	C [18.1]	B [14.6]	C [16.7]	B [14.7]	C [19.0]	C [16.4]
		Lone Tree Parkway	WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			NBLR	E [36.0]	F [52.7]	D [29.9]	F [51.7]	E [38.8]	F [95.3]
3 Site Access/Lone Tree Parkway	STOP	Site Access	EBL	B [10.9]	A [9.5]	B [10.7]	A [9.4]	B [10.7]	A [9.4]
			EBTR	A [8.7]	A [0.0]	A [8.7]	A [0.0]	A [8.7]	A [0.0]
		Marin Court	WBLTR	A [8.9]	A [8.7]	A [8.9]	A [8.6]	A [8.9]	A [8.6]
		Lone Tree Parkway	NBLTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Lone Tree Parkway	SBLT	A [7.5]	A [7.4]	A [7.5]	A [7.3]	A [7.5]	A [7.3]
			SBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]

Notes (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 4-2
 Ambleside School - Lone Tree, CO
 Background Future Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2023		Background 2025		Background 2045	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Lincoln Avenue/Lone Tree Parkway (W)	SIGNAL	Lincoln Avenue	EBL	180	15	17	15	17	15	17
			EBTR	-	505	315	502	320	686	374
		Lincoln Avenue	WBL	180	43	14	43	14	43	17
			WBTR	-	260	810	267	823	307	960
		Lone Tree Parkway	NBL	-	138	64	137	64	137	64
			NBTR	-	29	18	30	18	30	18
		Lone Tree Parkway	SBL	115	75	80	75	79	75	79
			SBTR	-	31	38	33	39	33	39
2 Lincoln Avenue/Lone Tree Parkway (E)	STOP	Lincoln Avenue	EBTR	-	0	0	0	0	0	0
			WBL	180	12.5	22.5	12.5	22.5	15	27.5
		Lone Tree Parkway	WBT	-	0	0	0	0	0	0
			NBLR	-	72.5	70	57.5	65	75	97.5
3 Site Access/Lone Tree Parkway	STOP	Site Access	EBL	-	7.5	0	7.5	0	7.5	0
			EBTR	-	0	0	0	0	0	0
		Marin Court	WBLTR	-	0	0	0	0	0	0
			NBLTR	-	0	0	0	0	0	0
		Lone Tree Parkway	SBLT	-	0	0	0	0	0	0
			SBTR	-	0	0	0	0	0	0

Notes : (1) Queue length, in feet, is based on the 95th percentile queue as reported by Synchro, Version 12.

V. Site Analysis

Overview

The Applicant is proposing to redevelop the approximately 7.39 acre site with a private school use. For purposes of this study, the site will be developed in one phase. For analysis purposes it was assumed that the development would be complete and operational by 2025. The following use and development program was analyzed:

Build Out - 2025

221 STUDENTS Private School (K-12)

Proposed Site Access and Circulation

As shown on the Applicant's conceptual plan (Figure 1-2), access to the development is being proposed via the existing full movement access on Lone Tree Parkway. The Applicant has provided an operational plan within the narrative. An excerpt from the narrative describing operations is provided within Appendix A. This operation plan seeks to ensure that drop-off/pick-up operations will not spill into the public ROW. This plan is provided in Appendix G.

Trip Generation

Overview

Trip generation estimates for the weekday AM and PM peak hours, as well as the weekday average daily traffic (ADT), were derived from the standard Institute of Transportation Engineers (ITE) Trip Generation Manual rates/equations, as published in the 11th edition. The trip generation analysis is presented in Table 5-1.

Site Trips

The vehicle trips that would be generated by the proposed development plan are summarized in Table 5-1. As shown in Table 5-1, the site would generate upon completion and full occupancy 175 new weekday AM and 38 new weekday PM peak hour vehicle trips, as well as 548 new weekday daily trips.

Site Trip Distributions

The distribution of the anticipated trips generated by the completion of the proposed development was based on an examination of existing traffic counts and the current enrollment zip code data the school has available. The data as described provides the following distributions. A heat map of the zip code data is provided supporting the below distributions in Appendix C:

- To/from the west on Lincoln Avenue: 70%
- To/from the east on Lincoln Avenue: 25%
- To/from the north on Lone Tree Parkway: 5%

Site Trip Assignments

The assignment of the new vehicle trips generated upon the future build-out of the development project was based on the above distribution. The trips assignments and distributions are depicted on Figure 5-1.

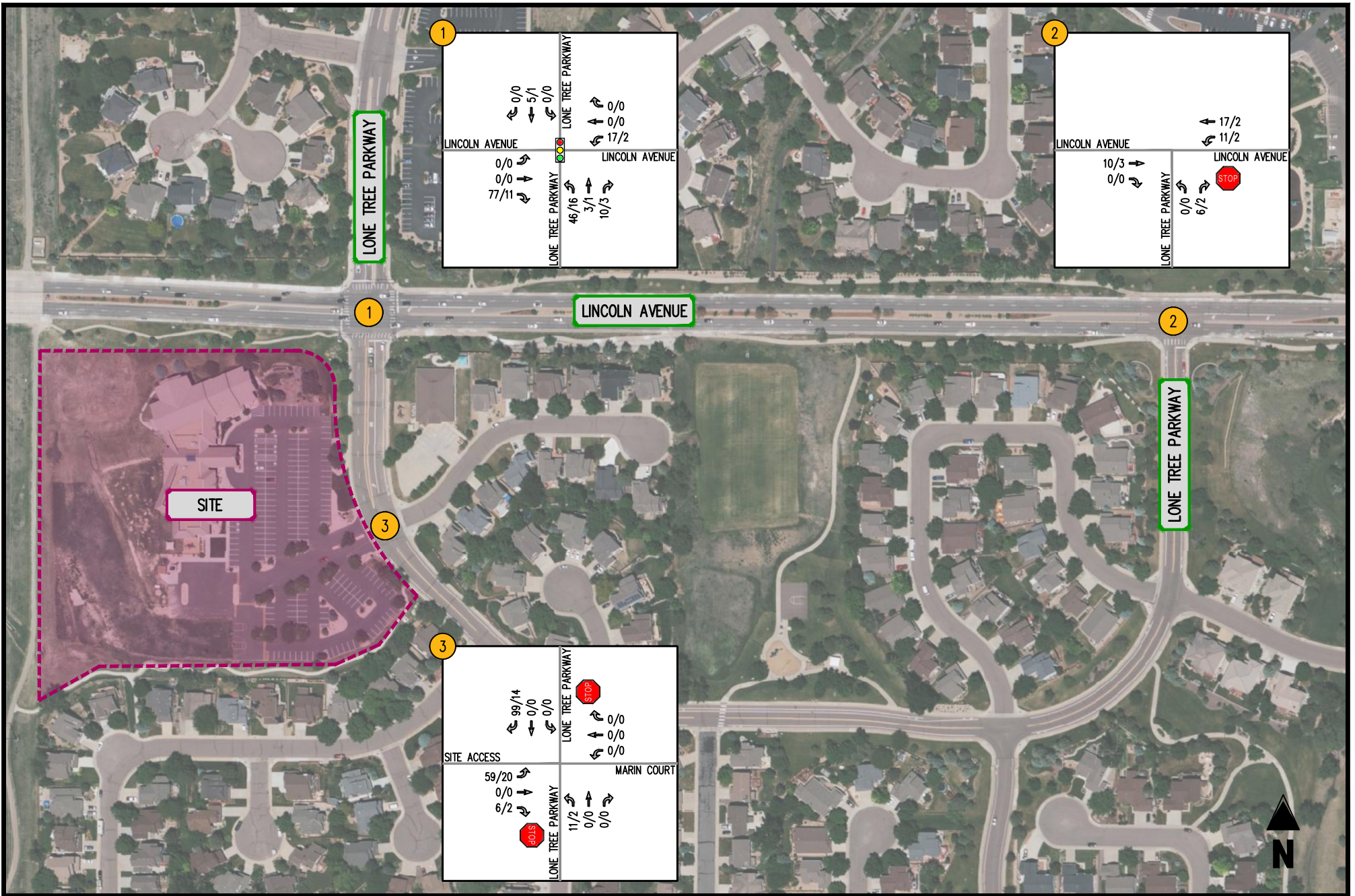


FIGURE 5-1
SITE TRIPS

AMBLESIDE SCHOOL
LONE TREE, CO

- A/A INTERSECTION LOS
- 0000/0000 (AM PEAK HOUR/PM PEAK HOUR)
- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



Table 5-1

Ambleside School - Lone Tree, CO

Site Trip Generation

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<i>Proposed</i> ⁽¹⁾ Private School (K-12)	532	221	Students	110	65	175	16	22	38	548

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition

VI. Analysis of Future Conditions with Site Development

Total Future Traffic Forecasts

The 2025 and 2045 total future traffic forecasts associated with the proposed development were developed by combining background future forecasts shown on Figure 4-3 (2025) and Figure 4-4 (2045), and the site trip assignments shown on Figure 5-1. The resulting total future traffic forecasts are provided on Figure 6-1 for 2025 conditions and Figure 6-2 for 2045 conditions.

Total Future Levels of Service with Proposed Development

Total future levels of service with the proposed development plan were estimated at key study intersections based on the future traffic volumes shown on Figures 6-1 and Figure 6-2, the lane use on Figure 5-1, and the HCM 7th methodologies for unsignalized intersections and signalized intersections. The results of these analyses are provided in Appendix F and presented in Table 6-1. Total future levels of service are also presented graphically on Figure 6-3 (2025) and Figure 6-4 (2045).

As shown in Table 6-1, levels of service under future site development conditions would remain consistent with future background conditions (i.e., without site development).

Total Future Queuing

Total future queues were forecasted using Synchro software. The results of the queuing analysis are summarized in Table 6-2. Forecasted queues at the signalized intersection would be contained within their effective storage, consistent with background conditions. Said differently, within the public ROW at the signalized intersection, the proposed use would not require the lengthening of any turn lanes at the studied intersections.

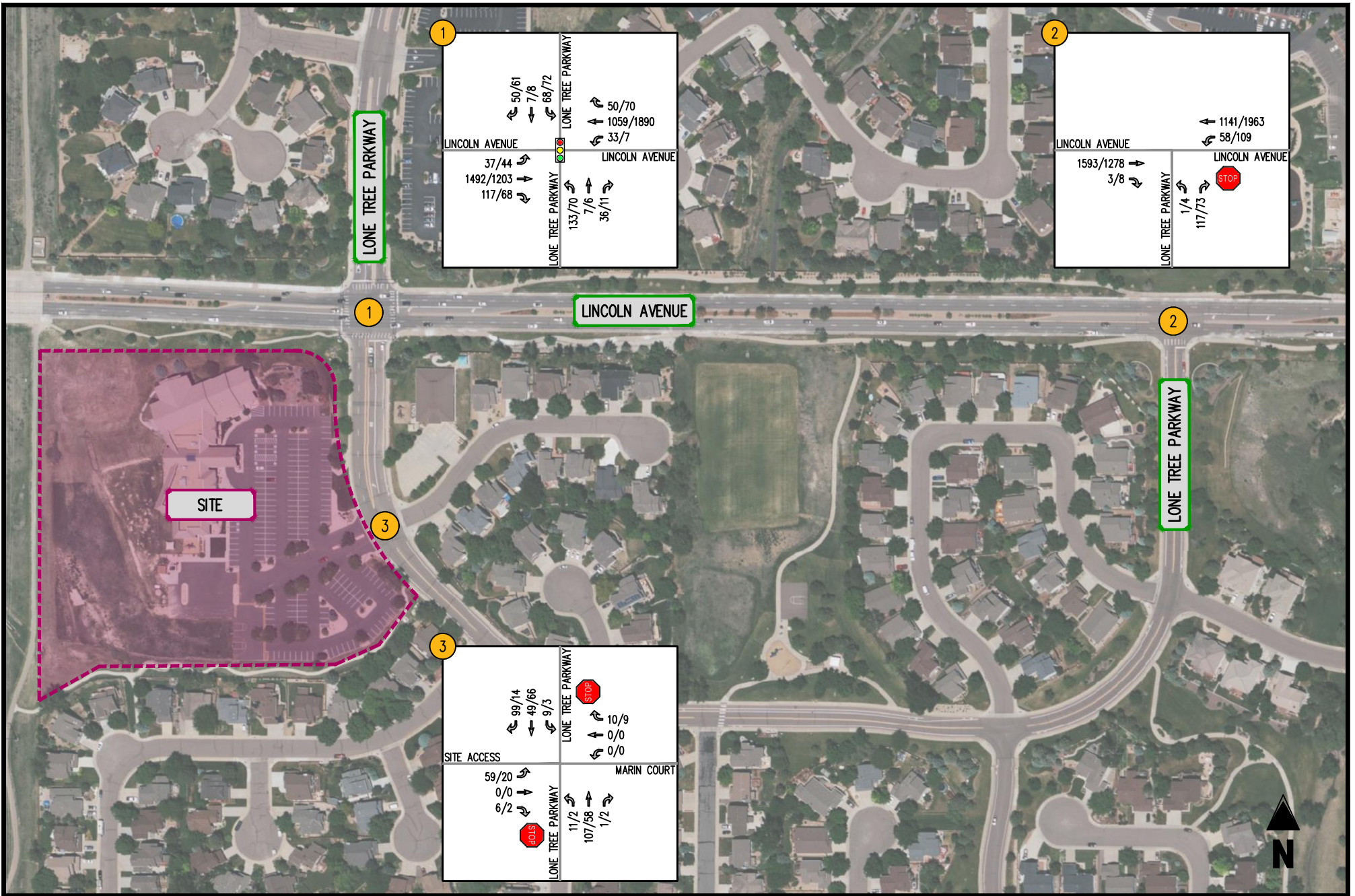
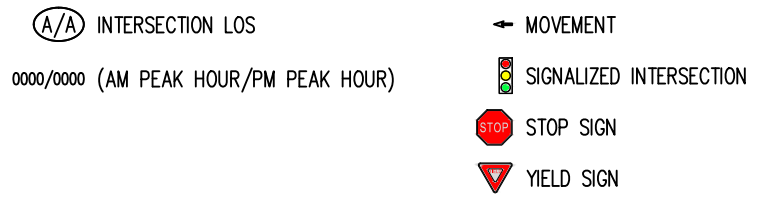


FIGURE 6-1
TOTAL FUTURE 2025 FORECASTS



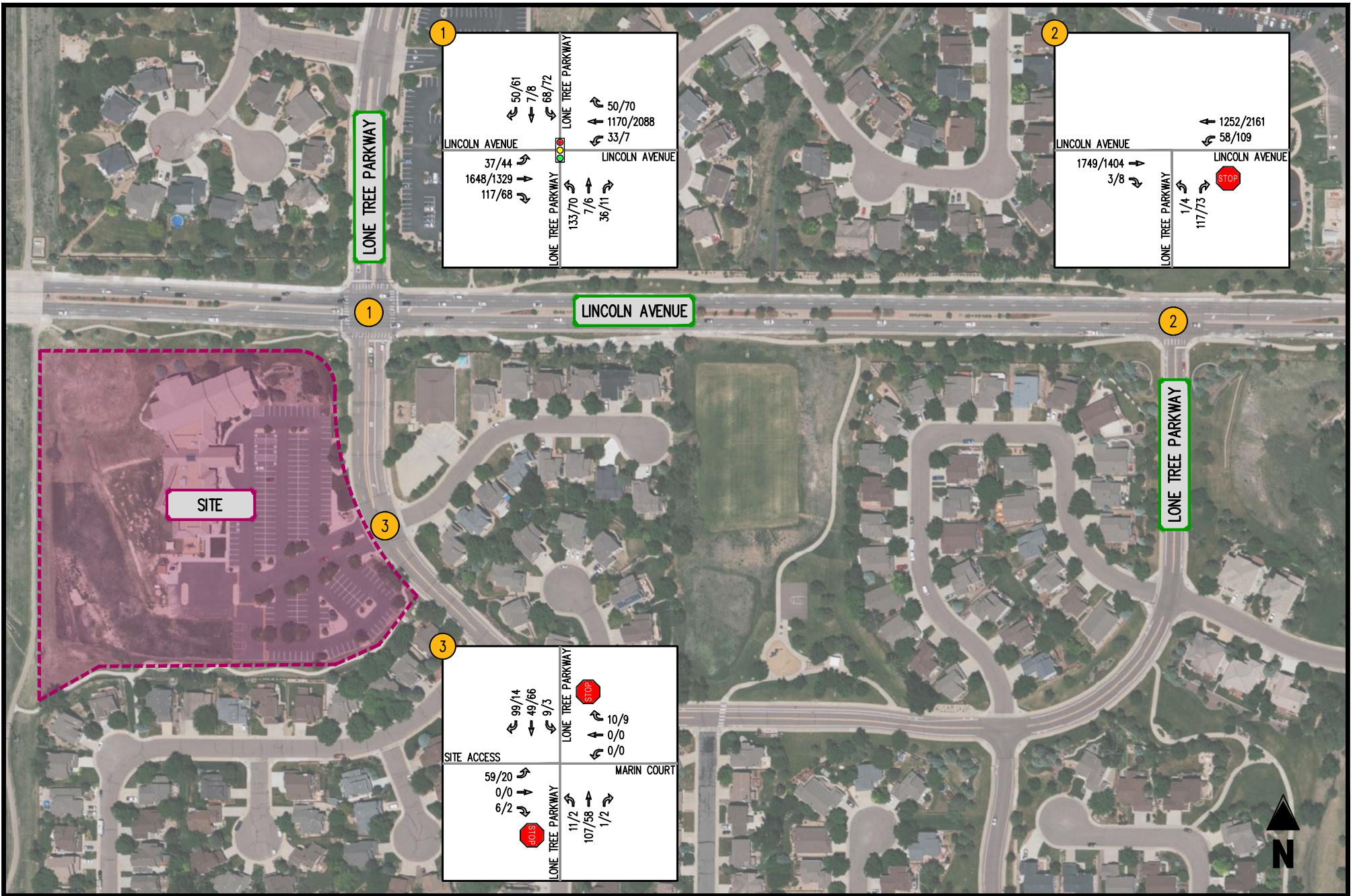
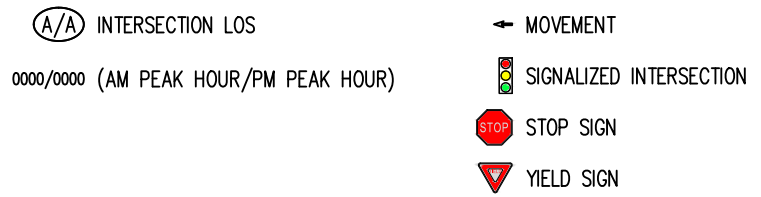


FIGURE 6-2
TOTAL FUTURE 2045 FORECASTS

AMBLESIDE SCHOOL
LONE TREE, CO



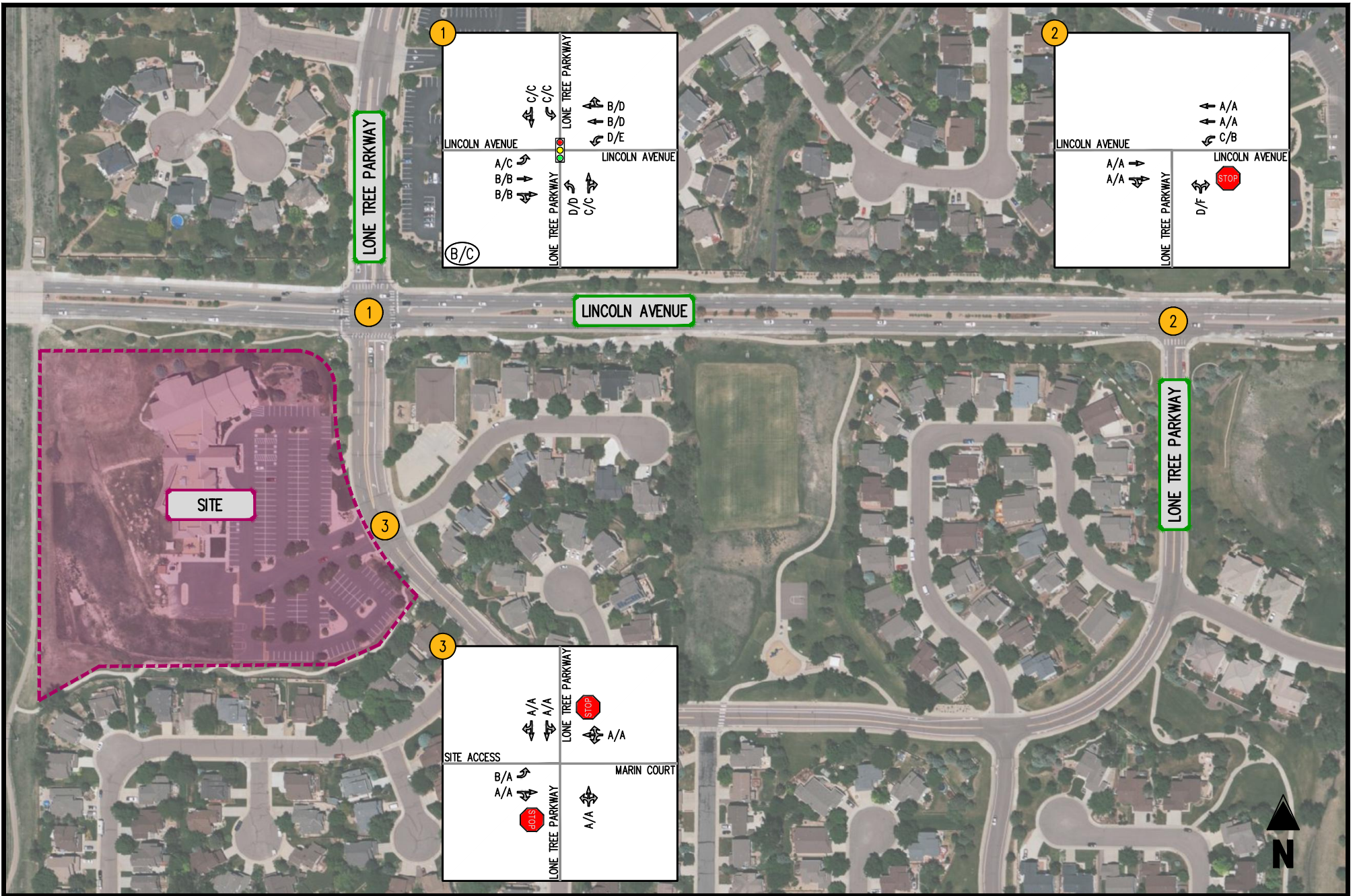


FIGURE 6-3
TOTAL FUTURE 2025 LOS

AMBLESIDE SCHOOL
LONE TREE, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



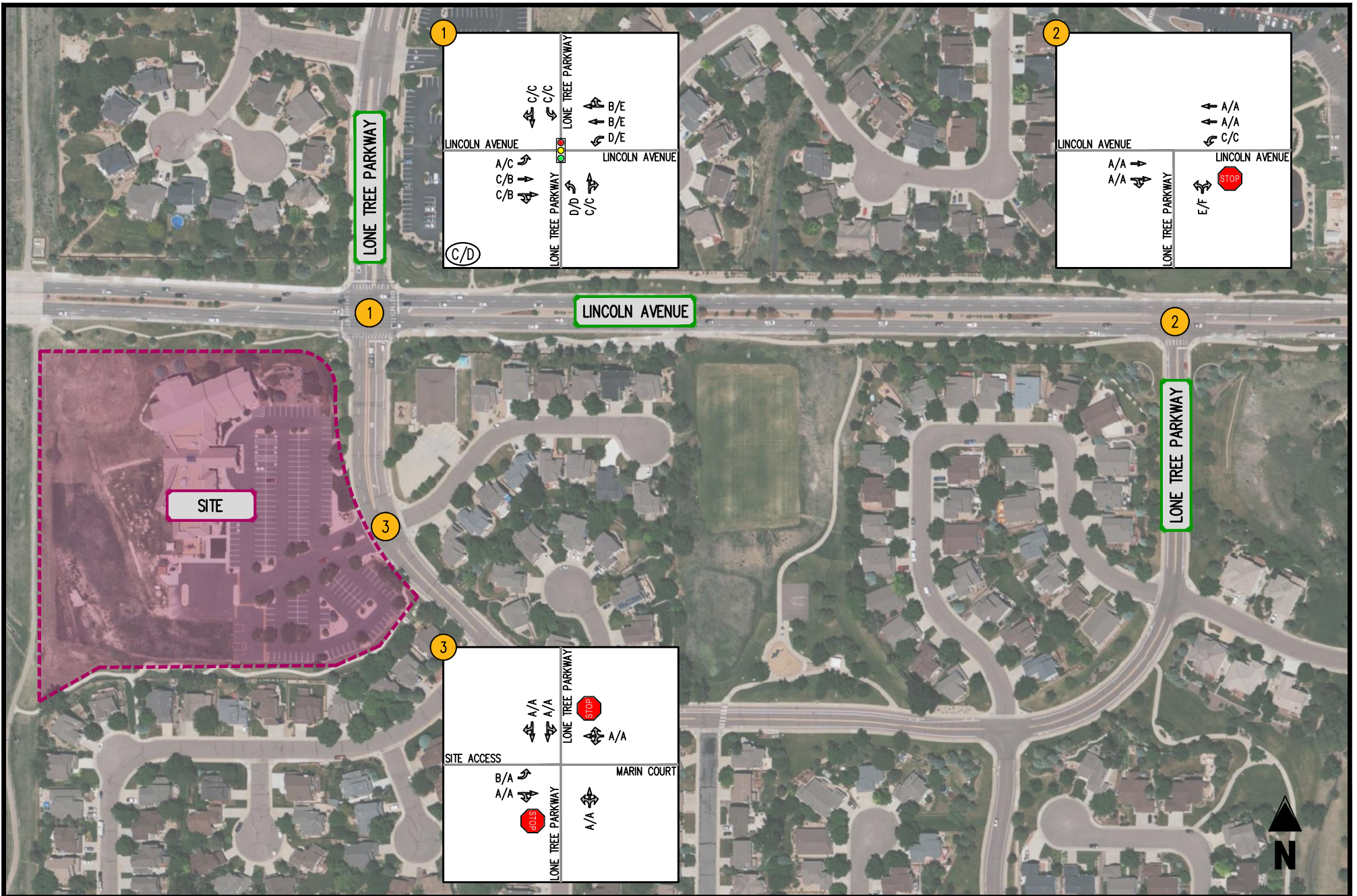


FIGURE 6-4
TOTAL FUTURE 2045 LOS

AMBLESIDE SCHOOL
LONE TREE, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚧 YIELD SIGN



Table 6-1
 Ambleside School - Lone Tree, CO
 Total Future Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2025		Background 2045		Total Future 2025		Total Future 2045	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Lincoln Avenue/Lone Tree Parkway (W)	SIGNAL	Lincoln Avenue	EBL	A (7.9)	C (23.3)	A (8.5)	C (23.8)	A (7.9)	C (23.2)	A (8.5)	C (23.7)
			EBTR	B (18.5)	B (11.5)	C (22.8)	B (12.6)	B (19.4)	B (11.8)	C (24.4)	B (13.0)
		Lincoln Avenue	WBL	D (52.8)	E (67.7)	D (52.8)	E (67.7)	D (52.9)	E (60.7)	D (52.9)	E (60.7)
			WBTR	B (12.3)	D (37.1)	B (13.1)	E (63.2)	B (12.3)	D (37.1)	B (13.1)	E (63.2)
		Lone Tree Parkway	NBL	D (39.1)	C (34.6)	C (29.4)	C (34.7)	D (39.3)	D (35.6)	D (39.6)	D (35.7)
			NBTR	C (30.1)	C (29.2)	C (30.3)	C (29.3)	C (30.1)	C (29.4)	C (30.3)	C (29.5)
		Lone Tree Parkway	SBL	C (33.4)	C (32.4)	C (33.6)	C (32.5)	C (33.5)	C (32.6)	C (33.7)	C (32.7)
			SBTR	<u>C (30.6)</u>	<u>C (31.7)</u>	<u>C (30.8)</u>	<u>C (31.8)</u>	<u>C (30.8)</u>	<u>C (31.8)</u>	<u>C (31.0)</u>	<u>C (31.9)</u>
Overall			B (17.9)	C (26.9)	C (20.2)	D (41.6)	B (18.5)	C (27.1)	C (21.0)	D (41.7)	
2 Lincoln Avenue/Lone Tree Parkway (E)	STOP	Lincoln Avenue	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			WBL	C [16.7]	B [14.7]	C [19.0]	C [16.4]	C [17.1]	B [14.8]	C [19.6]	C [16.5]
		Lone Tree Parkway	WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			NBLR	D [29.9]	F [51.7]	E [38.8]	F [95.3]	D [30.7]	F [52.7]	E [40.3]	F [98.3]
3 Site Access/Lone Tree Parkway	STOP	Site Access	EBL	B [10.7]	A [9.4]	B [10.7]	A [9.4]	B [11.1]	A [9.7]	B [11.1]	A [9.7]
			EBTR	A [8.7]	A [0.0]	A [8.7]	A [0.0]	A [8.8]	A [8.5]	A [8.8]	A [8.5]
		Marin Court	WBLTR	A [8.9]	A [8.6]	A [8.9]	A [8.6]	A [8.9]	A [8.6]	A [8.9]	A [8.6]
		Lone Tree Parkway	NBLTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [7.6]	A [7.4]	A [7.6]	A [7.4]
			SBLT	A [7.5]	A [7.3]	A [7.5]	A [7.3]	A [7.5]	A [7.3]	A [7.5]	A [7.3]
		Lone Tree Parkway	SBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]

Notes (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 6-2
 Ambleside School - Lone Tree, CO
 Total Future Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/Movement	Available Storage	Background 2025		Background 2045		Total Future 2025		Total Future 2045	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Lincoln Avenue/Lone Tree Parkway (W)	SIGNAL	Lincoln Avenue	EBL	180	15	17	15	17	15	17	15	17
			EBTR	-	502	320	686	374	508	324	693	380
		Lincoln Avenue	WBL	180	43	14	43	17	51	18	51	18
			WBTR	-	267	823	307	960	267	823	307	960
		Lone Tree Parkway	NBL	-	137	64	137	64	135	77	136	78
			NBTR	-	30	18	30	18	32	22	32	22
		Lone Tree Parkway	SBL	115	75	79	75	79	75	79	75	79
			SBTR	-	33	39	33	39	36	40	36	40
2 Lincoln Avenue/Lone Tree Parkway (E)	STOP	Lincoln Avenue	EBTR	-	0	0	0	0	0	0	0	0
			WBL	180	12.5	22.5	15	27.5	15	25	20	27.5
		Lone Tree Parkway	WBT	-	0	0	0	0	0	0	0	0
			NBLR	-	57.5	65	75	97.5	62.5	67.5	80	102.5
3 Site Access/Lone Tree Parkway	STOP	Site Access	EBL	-	7.5	0	7.5	0	7.5	2.5	7.5	2.5
			EBTR	-	0	0	0	0	0	0	0	0
		Lone Tree Parkway	WBLTR	-	0	0	0	0	0	0	0	0
			NBLTR	-	0	0	0	0	0	0	0	0
		Lone Tree Parkway	SBLT	-	0	0	0	0	0	0	0	0
			SBTR	-	0	0	0	0	0	0	0	0

Notes : (1) Queue length, in feet, is based on the 95th percentile queue as reported by Synchro, Version 12.

VII. Conclusions and Recommendations

Conclusions

Based on the results of this traffic impact study, the following may be concluded:

- Under existing traffic conditions, the signalized intersection within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours, and queues remain within their respective storage lengths.
- Under existing traffic conditions, the unsignalized intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours, with the exception of the northbound movement at the Lincoln Avenue/Lone Tree Parkway (E) intersection. V/C ratio remains under 1.0 for this movement, and all queues remain within their respective storage lengths.
- Under background future 2025 and 2045 traffic conditions, without the development of the subject site, the signalized intersection within the study area would operate at overall acceptable LOS “D” or better during the weekday AM and PM peak hours.
- Under background future 2025 and 2045 traffic conditions, without the development of the subject site, the unsignalized intersections within the study area would operate at levels of service consistent with existing conditions.
- The proposed site development would generate, upon completion and full occupancy, 175 new weekday AM and 38 new weekday PM peak hour vehicle trips as well as 548 new weekday daily trips.
- Under total future 2025 and 2045 traffic conditions, with development of the site, the intersections within the study area would operate consistent with background conditions.
- All forecasted queues would be contained within their effective storage.

Recommendations

- The Applicant should provide access consistent with the site plan contained herein.

APPENDIX A – Full Sized Conceptual Plan

APPENDIX B – LOS Descriptions

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in Exhibit 16-2. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Exhibit 16-2. Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Table 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. To remain consistent with the AWSC intersection analysis procedure described later in this chapter, a total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

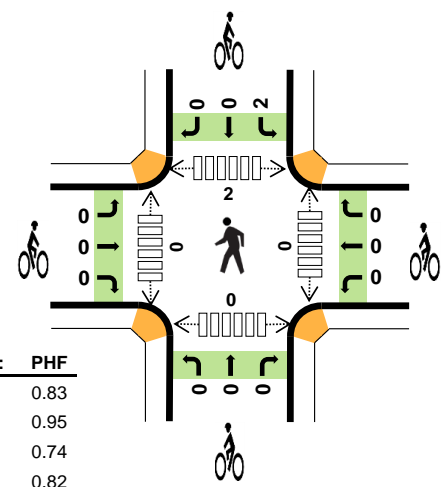
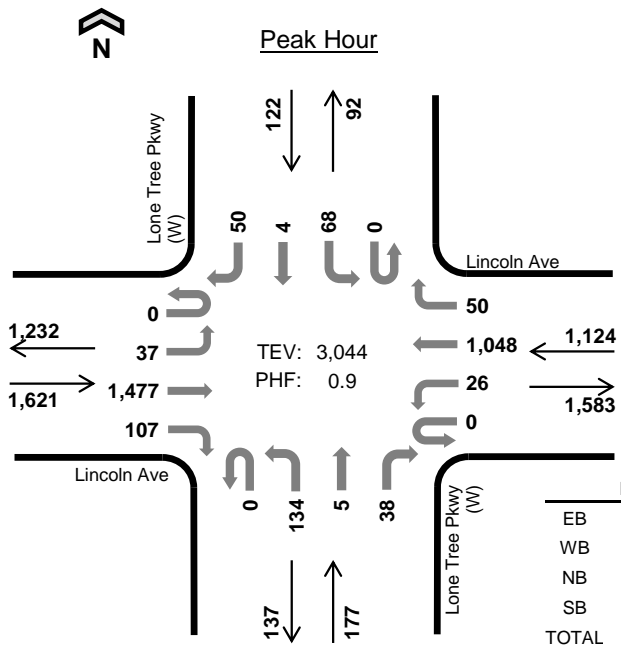
Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

APPENDIX C –Traffic Counts and Heat Map

Lone Tree Pkwy (W) Lincoln Ave



Date: 12/12/2023
 Count Period: 7:00 AM to 9:00 AM
 Peak Hour: 7:15 AM to 8:15 AM



	HV %:	PHF
EB	0.6%	0.83
WB	0.7%	0.95
NB	0.6%	0.74
SB	0.0%	0.82
TOTAL	0.6%	0.90

Two-Hour Count Summaries

Interval Start	Lincoln Ave Eastbound				Lincoln Ave Westbound				Lone Tree Pkwy (W) Northbound				Lone Tree Pkwy (W) Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	5	260	6	0	1	271	11	0	32	1	2	0	14	1	17	621	0	
7:15 AM	0	12	363	13	0	1	274	7	0	33	1	1	0	20	0	17	742	0	
7:30 AM	0	11	394	17	0	8	279	10	0	25	1	5	0	16	0	14	780	0	
7:45 AM	0	8	427	52	0	10	247	15	0	37	2	12	0	20	1	12	843	2,986	
8:00 AM	0	6	293	25	0	7	248	18	0	39	1	20	0	12	3	7	679	3,044	
8:15 AM	0	6	327	18	0	2	221	43	0	20	5	6	0	16	1	12	677	2,979	
8:30 AM	0	11	354	15	0	4	215	26	0	15	4	3	0	63	3	12	725	2,924	
8:45 AM	0	5	272	9	0	1	238	18	0	20	0	5	0	31	2	9	610	2,691	
Count Total	0	64	2,690	155	0	34	1,993	148	0	221	15	54	0	192	11	100	5,677	0	
Peak Hour	All	0	37	1,477	107	0	26	1,048	50	0	134	5	38	0	68	4	50	3,044	0
	HV	0	0	8	1	0	0	8	0	0	1	0	0	0	0	0	0	18	0
	HV%	-	0%	1%	1%	-	0%	1%	0%	-	1%	0%	0%	-	0%	0%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	4	1	1	8	0	0	0	0	0	0	0	0	0	0
7:15 AM	2	1	0	0	3	0	0	0	1	1	0	0	2	0	2
7:30 AM	2	2	0	0	4	0	0	0	0	0	0	0	0	0	0
7:45 AM	4	3	0	0	7	0	0	0	1	1	0	0	0	0	0
8:00 AM	1	2	1	0	4	0	0	0	0	0	0	0	0	0	0
8:15 AM	5	6	0	0	11	0	0	0	0	0	0	0	1	0	1
8:30 AM	2	3	0	0	5	0	0	0	0	0	0	0	0	1	1
8:45 AM	3	4	0	0	7	0	0	0	0	0	0	0	0	0	0
Count Total	21	25	2	1	49	0	0	0	2	2	0	0	3	1	4
Peak Hour	9	8	1	0	18	0	0	0	2	2	0	0	2	0	2

Two-Hour Count Summaries - Heavy Vehicles																			
Interval Start	Lincoln Ave				Lincoln Ave				Lone Tree Pkwy (W)				Lone Tree Pkwy (W)				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	2	0	0	0	3	1	0	1	0	0	0	0	0	0	1	8	0
7:15 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0
7:30 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4	0
7:45 AM	0	0	3	1	0	0	3	0	0	0	0	0	0	0	0	0	0	7	22
8:00 AM	0	0	1	0	0	0	2	0	0	1	0	0	0	0	0	0	0	4	18
8:15 AM	0	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	0	11	26
8:30 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	5	27
8:45 AM	0	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	7	27
Count Total	0	0	20	1	0	0	24	1	0	2	0	0	0	0	0	0	1	49	0
Peak Hour	0	0	8	1	0	0	8	0	0	1	0	0	0	0	0	0	0	18	0

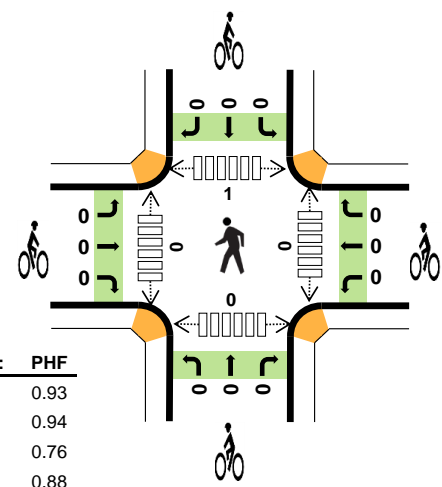
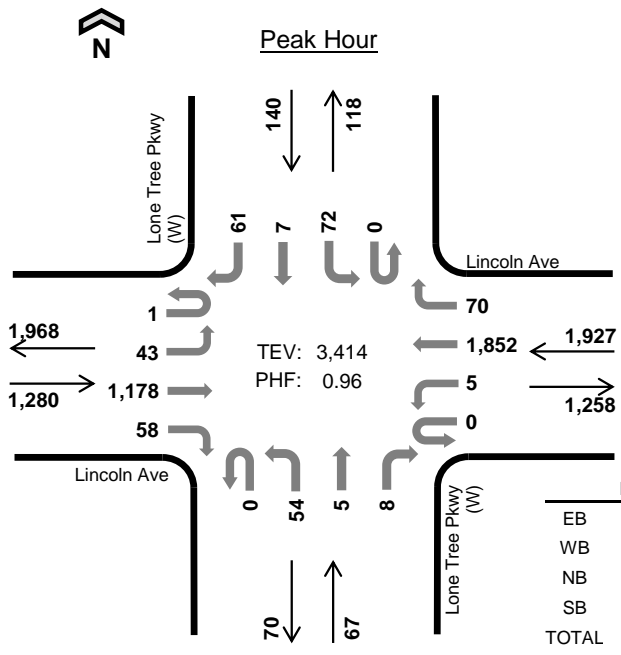
Two-Hour Count Summaries - Bikes																			
Interval Start	Lincoln Ave			Lincoln Ave			Lone Tree Pkwy (W)			Lone Tree Pkwy (W)			15-min Total	Rolling One Hour					
	Eastbound			Westbound			Northbound			Southbound									
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT							
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	2
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Lone Tree Pkwy (W) Lincoln Ave



Date: 12/12/2023
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	0.6%	0.93
WB	0.2%	0.94
NB	1.5%	0.76
SB	1.4%	0.88
TOTAL	0.4%	0.96

Two-Hour Count Summaries

Interval Start	Lincoln Ave Eastbound				Lincoln Ave Westbound				Lone Tree Pkwy (W) Northbound				Lone Tree Pkwy (W) Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	11	310	12	1	4	381	10	0	7	1	4	0	14	4	16	775	0	
4:15 PM	0	12	307	17	0	2	415	14	0	18	1	4	0	14	3	18	825	0	
4:30 PM	0	11	313	6	0	2	497	15	0	15	0	3	0	15	2	11	890	0	
4:45 PM	0	6	301	14	0	1	483	10	0	9	2	0	0	18	3	15	862	3,352	
5:00 PM	1	8	256	19	0	2	433	20	0	11	1	4	0	20	1	19	795	3,372	
5:15 PM	0	18	308	19	0	0	439	25	0	19	2	1	0	19	1	16	867	3,414	
5:30 PM	1	11	282	10	0	1	356	18	0	12	0	3	0	15	0	13	722	3,246	
5:45 PM	0	10	233	13	0	0	327	16	0	17	1	2	0	12	0	12	643	3,027	
Count Total	2	87	2,310	110	1	12	3,331	128	0	108	8	21	0	127	14	120	6,379	0	
Peak Hour	All	1	43	1,178	58	0	5	1,852	70	0	54	5	8	0	72	7	61	3,414	0
	HV	0	0	8	0	0	0	3	0	0	1	0	0	0	1	0	1	14	0
	HV%	0%	0%	1%	0%	-	0%	0%	0%	-	2%	0%	0%	-	1%	0%	2%	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	4	5	1	0	10	0	0	0	0	0	0	0	1	0	1
4:15 PM	4	1	0	1	6	0	0	0	0	0	0	1	3	0	4
4:30 PM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0
4:45 PM	3	2	0	2	7	0	0	0	0	0	0	0	1	0	1
5:00 PM	2	1	0	0	3	0	0	0	0	0	0	0	0	0	0
5:15 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0
Count Total	17	11	2	3	33	0	0	0	0	0	0	1	5	0	6
Peak Hour	8	3	1	2	14	0	0	0	0	0	0	0	1	0	1

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Lincoln Ave				Lincoln Ave				Lone Tree Pkwy (W)				Lone Tree Pkwy (W)				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	3	1	0	0	5	0	0	1	0	0	0	0	0	0	10	0
4:15 PM	0	1	3	0	0	0	1	0	0	0	0	0	0	0	1	0	6	0
4:30 PM	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0
4:45 PM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	1	0	7	25
5:00 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	18
5:15 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	14
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
5:45 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	3	8
Count Total	0	1	15	1	0	0	11	0	0	2	0	0	0	0	2	0	33	0
Peak Hour	0	0	8	0	0	0	3	0	0	1	0	0	0	0	1	0	14	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Lincoln Ave			Lincoln Ave			Lone Tree Pkwy (W)			Lone Tree Pkwy (W)			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

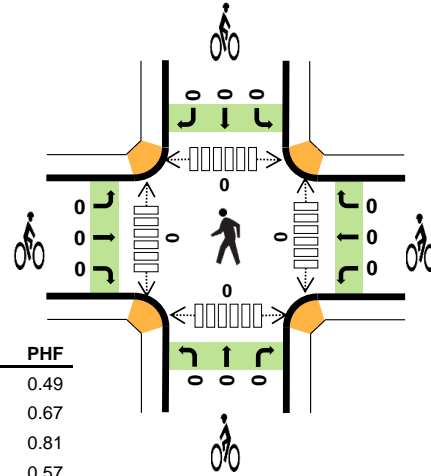
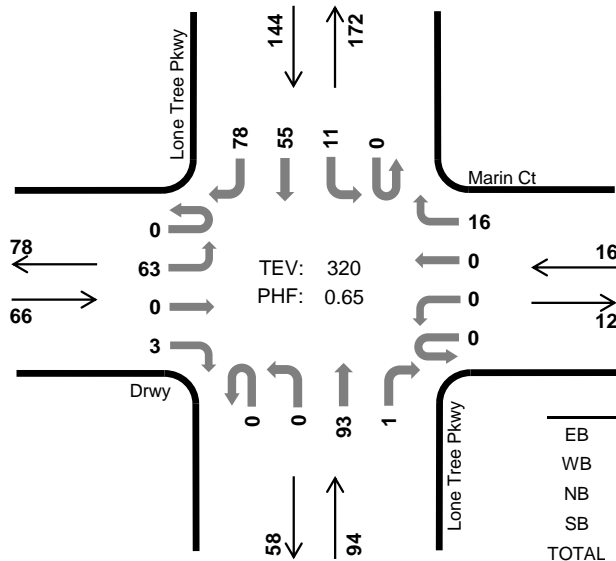
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Lone Tree Pkwy Marin Ct



Peak Hour

Date: 12/12/2023
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:30 AM to 8:30 AM



	HV %:	PHF
EB	0.0%	0.49
WB	0.0%	0.67
NB	1.1%	0.81
SB	0.7%	0.57
TOTAL	0.6%	0.65

Two-Hour Count Summaries

Interval Start	Drwy				Marin Ct				Lone Tree Pkwy				Lone Tree Pkwy				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	0	0	0	0	0	3	0	0	38	0	0	0	5	3	49	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	29	1	0	0	10	5	45	0	
7:30 AM	0	1	0	1	0	0	0	0	0	0	29	0	0	1	12	12	56	0	
7:45 AM	0	32	0	2	0	0	0	4	0	0	23	0	0	3	14	46	124	274	
8:00 AM	0	27	0	0	0	0	0	6	0	0	23	0	0	5	13	17	91	316	
8:15 AM	0	3	0	0	0	0	0	6	0	0	18	1	0	2	16	3	49	320	
8:30 AM	0	3	0	0	0	0	0	2	0	0	18	0	1	2	16	3	45	309	
8:45 AM	0	1	0	1	0	0	0	1	0	0	21	0	0	3	7	2	36	221	
Count Total	0	67	0	4	0	0	0	22	0	0	199	2	1	16	93	91	495	0	
Peak Hour	All	0	63	0	3	0	0	0	16	0	0	93	1	0	11	55	78	320	0
	HV	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0
	HV%	-	0%	-	0%	-	-	-	0%	-	-	1%	0%	-	0%	2%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	1	0	1	0	0	0	0	0	1	1	0	0	2
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	2	1	3	0	0	0	0	0	1	1	0	0	2
Peak Hour	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Drwy				Marin Ct				Lone Tree Pkwy				Lone Tree Pkwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Drwy			Marin Ct			Lone Tree Pkwy			Lone Tree Pkwy			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Drwy				Marin Ct				Lone Tree Pkwy				Lone Tree Pkwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	4	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Drwy			Marin Ct			Lone Tree Pkwy			Lone Tree Pkwy			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

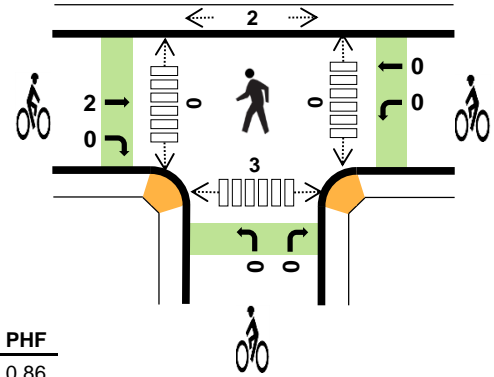
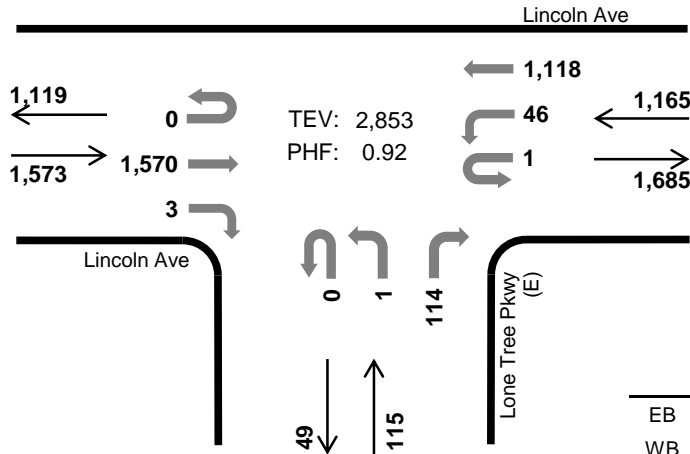
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Lone Tree Pkwy (E) Lincoln Ave



Peak Hour

Date: 12/12/2023
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:15 AM to 8:15 AM



	HV %:	PHF
EB	0.5%	0.86
WB	0.9%	0.97
NB	0.0%	0.87
SB	-	-
TOTAL	0.6%	0.92

Two-Hour Count Summaries

Interval Start	Lincoln Ave Eastbound				Lincoln Ave Westbound				Lone Tree Pkwy (E) Northbound				N/A Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	282	2	0	4	290	0	0	1	0	14	0	0	0	0	593	0	
7:15 AM	0	0	399	1	1	9	283	0	0	0	0	25	0	0	0	0	718	0	
7:30 AM	0	0	381	1	0	9	291	0	0	1	0	29	0	0	0	0	712	0	
7:45 AM	0	0	456	1	0	12	279	0	0	0	0	27	0	0	0	0	775	2,798	
8:00 AM	0	0	334	0	0	16	265	0	0	0	0	33	0	0	0	0	648	2,853	
8:15 AM	0	0	337	3	0	15	269	0	0	0	0	33	0	0	0	0	657	2,792	
8:30 AM	0	0	426	1	1	13	242	0	0	0	0	28	0	0	0	0	711	2,791	
8:45 AM	0	0	312	2	0	23	256	0	0	0	0	27	0	0	0	0	620	2,636	
Count Total	0	0	2,927	11	2	101	2,175	0	0	2	0	216	0	0	0	0	5,434	0	
Peak Hour	All	0	0	1,570	3	1	46	1,118	0	0	1	0	114	0	0	0	0	2,853	0
	HV	0	0	8	0	0	1	9	0	0	0	0	0	0	0	0	0	18	0
	HV%	-	-	1%	0%	0%	2%	1%	-	-	0%	-	0%	-	-	-	-	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	4	0	0	6	0	0	0	0	0	0	0	1	0	1
7:15 AM	2	1	0	0	3	1	0	0	0	1	0	0	2	1	3
7:30 AM	2	2	0	0	4	0	0	0	0	0	0	0	0	1	1
7:45 AM	3	4	0	0	7	1	0	0	0	1	0	0	0	1	1
8:00 AM	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0
8:15 AM	5	8	0	0	13	0	0	0	0	0	0	0	0	0	0
8:30 AM	2	1	0	0	3	0	0	0	0	0	0	0	1	1	2
8:45 AM	3	5	0	0	8	0	0	0	0	0	0	0	0	0	0
Count Total	20	28	0	0	48	2	0	0	0	2	0	0	4	4	8
Peak Hr	8	10	0	0	18	2	0	0	0	2	0	0	2	3	5

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Lincoln Ave				Lincoln Ave				Lone Tree Pkwy (E)				N/A				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	6	0
7:15 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0
7:30 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	4	0
7:45 AM	0	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	7	20
8:00 AM	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	4	18
8:15 AM	0	0	5	0	0	1	7	0	0	0	0	0	0	0	0	0	13	28
8:30 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	27
8:45 AM	0	0	3	0	0	1	4	0	0	0	0	0	0	0	0	0	8	28
Count Total	0	0	20	0	0	3	25	0	0	0	0	0	0	0	0	0	48	0
Peak Hour	0	0	8	0	0	1	9	0	0	0	0	0	0	0	0	0	18	0

Two-Hour Count Summaries - Bikes

Interval Start	Lincoln Ave			Lincoln Ave			Lone Tree Pkwy (E)			N/A			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	1	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	1	2
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	2	0	0	0	0	0	0	0	0	0	0	2	0
Peak Hour	0	2	0	0	0	0	0	0	0	0	0	0	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Two-Hour Count Summaries - Heavy Vehicles

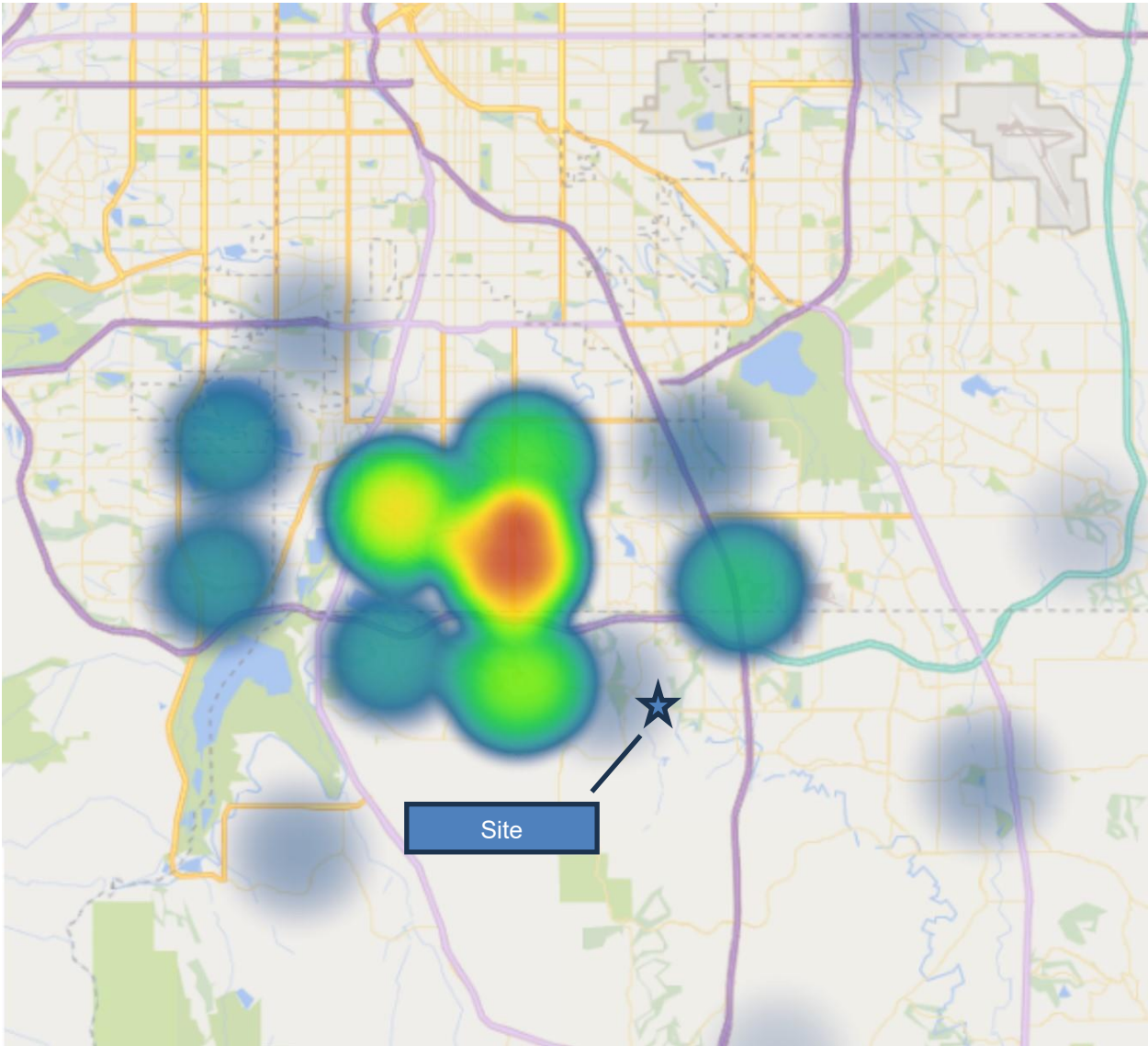
Interval Start	Lincoln Ave				Lincoln Ave				Lone Tree Pkwy (E)				N/A				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	4	0	0	0	5	0	0	0	0	1	0	0	0	0	10	0
4:15 PM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	4	0
4:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4:45 PM	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	7	22
5:00 PM	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	3	15
5:15 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	13
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13
5:45 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	8
Count Total	0	0	17	0	0	1	11	0	0	0	0	1	0	0	0	0	30	0
Peak Hour	0	0	9	0	0	1	3	0	0	0	0	0	0	0	0	0	13	0

Two-Hour Count Summaries - Bikes

Interval Start	Lincoln Ave			Lincoln Ave			Lone Tree Pkwy (E)			N/A			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Heatmap of student zip code data as provided by the school:

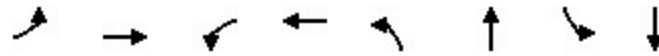


APPENDIX D – Existing Synchro Outputs

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



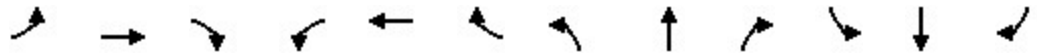
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	44	1865	28	1193	158	51	80	64
v/c Ratio	0.15	0.81	0.27	0.54	0.59	0.14	0.29	0.17
Control Delay (s/veh)	5.5	16.5	47.3	10.9	42.3	12.0	33.8	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.5	16.5	47.3	10.9	42.3	12.0	33.8	10.9
Queue Length 50th (ft)	7	308	16	202	82	3	39	2
Queue Length 95th (ft)	15	505	43	260	138	29	75	31
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	298	2293	104	2226	270	364	274	373
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.81	0.27	0.54	0.59	0.14	0.29	0.17

Intersection Summary

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↷		↶	↷	
Traffic Volume (veh/h)	37	1477	108	26	1048	50	134	5	38	68	4	50
Future Volume (veh/h)	37	1477	108	26	1048	50	134	5	38	68	4	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	44	1738	127	28	1139	54	158	6	45	80	5	59
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	342	2079	150	50	2106	100	308	39	290	320	25	301
Arrive On Green	0.04	0.62	0.62	0.03	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3360	243	1781	3454	164	1338	190	1424	1354	125	1479
Grp Volume(v), veh/h	44	910	955	28	586	607	158	0	51	80	0	64
Grp Sat Flow(s),veh/h/ln	1781	1777	1827	1781	1777	1841	1338	0	1614	1354	0	1604
Q Serve(g_s), s	0.8	36.1	37.6	1.4	17.3	17.3	10.0	0.0	2.3	4.7	0.0	3.0
Cycle Q Clear(g_c), s	0.8	36.1	37.6	1.4	17.3	17.3	13.0	0.0	2.3	7.0	0.0	3.0
Prop In Lane	1.00		0.13	1.00		0.09	1.00		0.88	1.00		0.92
Lane Grp Cap(c), veh/h	342	1099	1130	50	1083	1122	308	0	328	320	0	326
V/C Ratio(X)	0.13	0.83	0.84	0.56	0.54	0.54	0.51	0.00	0.16	0.25	0.00	0.20
Avail Cap(c_a), veh/h	377	1099	1130	105	1083	1122	308	0	328	320	0	326
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.6	13.4	13.7	43.2	10.2	10.2	35.1	0.0	29.5	32.4	0.0	29.7
Incr Delay (d2), s/veh	0.2	7.2	7.8	9.6	1.9	1.9	6.0	0.0	1.0	1.9	0.0	1.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	13.4	14.4	0.7	6.0	6.2	3.7	0.0	1.0	1.7	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.8	20.6	21.5	52.8	12.2	12.1	41.1	0.0	30.5	34.2	0.0	31.1
LnGrp LOS	A	C	C	D	B	B	D		C	C		C
Approach Vol, veh/h		1909			1221			209				144
Approach Delay, s/veh		20.8			13.1			38.5				32.8
Approach LOS		C			B			D				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.8	7.0	60.2		22.8	7.8	59.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.3	5.3	52.9		18.3	5.1	53.1				
Max Q Clear Time (g_c+I1), s		15.0	3.4	39.6		9.0	2.8	19.3				
Green Ext Time (p_c), s		0.2	0.0	9.7		0.3	0.0	8.7				
Intersection Summary												
HCM 7th Control Delay, s/veh			19.6									
HCM 7th LOS			B									

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	1580	3	47	1123	1	114
Future Vol, veh/h	1580	3	47	1123	1	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	92	92	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1837	3	51	1221	1	131

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1841	0	2551
Stage 1	-	-	-	-	1839
Stage 2	-	-	-	-	713
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	327	-	22
Stage 1	-	-	-	-	112
Stage 2	-	-	-	-	447
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	327	-	18
Mov Cap-2 Maneuver	-	-	-	-	18
Stage 1	-	-	-	-	112
Stage 2	-	-	-	-	377

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.73	36.03
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	244	-	-	327	-
HCM Lane V/C Ratio	0.543	-	-	0.156	-
HCM Control Delay (s/veh)	36	-	-	18.1	-
HCM Lane LOS	E	-	-	C	-
HCM 95th %tile Q(veh)	2.9	-	-	0.5	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	0	3	0	0	10	0	107	1	9	49	80
Future Vol, veh/h	60	0	3	0	0	10	0	107	1	9	49	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	71	0	4	0	0	12	0	126	1	11	58	94

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	252	253	76	176	299	126	152	0	0	127	0	0
Stage 1	126	126	-	126	126	-	-	-	-	-	-	-
Stage 2	126	127	-	50	173	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	691	650	970	778	612	923	1428	-	-	1458	-	-
Stage 1	865	791	-	877	791	-	-	-	-	-	-	-
Stage 2	877	790	-	957	755	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	677	645	970	769	608	923	1428	-	-	1458	-	-
Mov Cap-2 Maneuver	677	645	-	769	608	-	-	-	-	-	-	-
Stage 1	859	785	-	877	791	-	-	-	-	-	-	-
Stage 2	866	790	-	947	749	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v10.83			8.95		0		0.5	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1428	-	-	677	970	923	126	-	-
HCM Lane V/C Ratio	-	-	-	0.104	0.004	0.013	0.007	-	-
HCM Control Delay (s/veh)	0	-	-	10.9	8.7	8.9	7.5	0	-
HCM Lane LOS	A	-	-	B	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1358	5	2110	65	15	82	77
v/c Ratio	0.26	0.57	0.05	0.94	0.25	0.04	0.29	0.20
Control Delay (s/veh)	8.0	9.3	41.4	26.9	33.2	20.2	33.9	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.0	9.3	41.4	26.9	33.2	20.2	33.9	10.8
Queue Length 50th (ft)	7	169	3	~606	31	3	40	4
Queue Length 95th (ft)	17	315	14	#810	64	18	80	38
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	182	2383	100	2238	264	348	280	379
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.57	0.05	0.94	0.25	0.04	0.29	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary
 1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	44	1191	58	5	1871	70	55	5	8	72	7	61
Future Volume (veh/h)	44	1191	58	5	1871	70	55	5	8	72	7	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	1295	63	5	2034	76	65	6	9	82	8	69
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	2216	108	12	2132	79	293	136	204	351	34	290
Arrive On Green	0.04	0.64	0.64	0.01	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3449	168	1781	3494	130	1322	675	1013	1398	167	1443
Grp Volume(v), veh/h	48	666	692	5	1028	1082	65	0	15	82	0	77
Grp Sat Flow(s),veh/h/ln	1781	1777	1840	1781	1777	1847	1322	0	1688	1398	0	1611
Q Serve(g_s), s	0.9	19.3	19.4	0.3	48.2	49.6	3.9	0.0	0.6	4.5	0.0	3.6
Cycle Q Clear(g_c), s	0.9	19.3	19.4	0.3	48.2	49.6	7.5	0.0	0.6	5.2	0.0	3.6
Prop In Lane	1.00		0.09	1.00		0.07	1.00		0.60	1.00		0.90
Lane Grp Cap(c), veh/h	160	1141	1182	12	1084	1127	293	0	339	351	0	324
V/C Ratio(X)	0.30	0.58	0.59	0.43	0.95	0.96	0.22	0.00	0.04	0.23	0.00	0.24
Avail Cap(c_a), veh/h	192	1141	1182	101	1084	1127	293	0	339	351	0	324
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.9	9.2	9.2	44.5	16.2	16.5	33.3	0.0	29.0	31.1	0.0	30.2
Incr Delay (d2), s/veh	1.0	2.2	2.1	23.1	17.4	18.8	1.7	0.0	0.2	1.6	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.4	6.7	0.2	20.3	22.0	1.4	0.0	0.3	1.7	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.0	11.4	11.3	67.7	33.7	35.3	35.1	0.0	29.2	32.6	0.0	31.9
LnGrp LOS	C	B	B	E	C	D	D		C	C		C
Approach Vol, veh/h		1406			2115			80				159
Approach Delay, s/veh		11.8			34.6			34.0				32.3
Approach LOS		B			C			C				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.6	5.1	62.3		22.6	8.0	59.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.1	5.1	53.3		18.1	5.1	53.3				
Max Q Clear Time (g_c+I1), s		9.5	2.3	21.4		7.2	2.9	51.6				
Green Ext Time (p_c), s		0.1	0.0	10.5		0.4	0.0	1.5				
Intersection Summary												
HCM 7th Control Delay, s/veh				25.9								
HCM 7th LOS				C								

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	1263	8	107	1942	4	71
Future Vol, veh/h	1263	8	107	1942	4	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1373	9	116	2111	5	84

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1382	0	2665
Stage 1	-	-	-	-	1377
Stage 2	-	-	-	-	1288
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	492	-	18
Stage 1	-	-	-	-	199
Stage 2	-	-	-	-	223
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	492	-	14
Mov Cap-2 Maneuver	-	-	-	-	14
Stage 1	-	-	-	-	199
Stage 2	-	-	-	-	170

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.76	52.67
HCM LOS			F

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	159	-	-	492	-
HCM Lane V/C Ratio	0.555	-	-	0.236	-
HCM Control Delay (s/veh)	52.7	-	-	14.6	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	2.8	-	-	0.9	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	0	0	0	9	0	58	2	3	66	1
Future Vol, veh/h	1	0	0	0	0	9	0	58	2	3	66	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	0	0	0	11	0	68	2	4	78	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	154	156	39	115	155	69	79	0	0	71	0	0
Stage 1	85	85	-	69	69	-	-	-	-	-	-	-
Stage 2	68	71	-	46	86	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	806	736	1024	855	736	993	1518	-	-	1529	-	-
Stage 1	913	824	-	940	837	-	-	-	-	-	-	-
Stage 2	942	836	-	963	823	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	795	734	1024	853	734	993	1518	-	-	1529	-	-
Mov Cap-2 Maneuver	795	734	-	853	734	-	-	-	-	-	-	-
Stage 1	911	822	-	940	837	-	-	-	-	-	-	-
Stage 2	931	836	-	960	821	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	9.53		8.66		0		0.33	
HCM LOS	A		A					

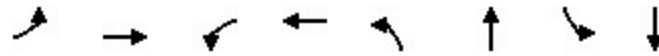
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1518	-	-	795	-	993	151	-	-
HCM Lane V/C Ratio	-	-	-	0.001	-	0.011	0.002	-	-
HCM Control Delay (s/veh)	0	-	-	9.5	0	8.7	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-	0	0	-	-

APPENDIX E – Background (without site development) Synchro Outputs

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



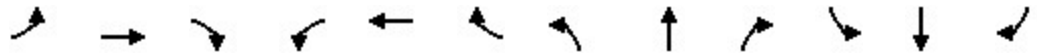
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	1739	28	1205	146	46	74	58
v/c Ratio	0.13	0.76	0.27	0.54	0.53	0.13	0.27	0.16
Control Delay (s/veh)	5.4	14.7	47.3	11.2	39.9	12.1	33.1	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.4	14.7	47.3	11.2	39.9	12.1	33.1	10.8
Queue Length 50th (ft)	6	268	16	208	75	2	36	2
Queue Length 95th (ft)	15	502	43	267	137	30	75	33
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	297	2285	104	2214	275	364	278	372
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.76	0.27	0.54	0.53	0.13	0.27	0.16

Intersection Summary

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	37	1492	108	26	1059	50	134	5	38	68	4	50
Future Volume (veh/h)	37	1492	108	26	1059	50	134	5	38	68	4	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	1622	117	28	1151	54	146	5	41	74	4	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	335	2073	148	50	2106	99	316	36	295	328	23	307
Arrive On Green	0.04	0.62	0.62	0.03	0.61	0.61	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1781	3363	241	1781	3456	162	1345	175	1437	1360	110	1491
Grp Volume(v), veh/h	40	851	888	28	592	613	146	0	46	74	0	58
Grp Sat Flow(s),veh/h/ln	1781	1777	1827	1781	1777	1841	1345	0	1612	1360	0	1602
Q Serve(g_s), s	0.7	31.7	32.6	1.4	17.5	17.6	9.0	0.0	2.1	4.2	0.0	2.7
Cycle Q Clear(g_c), s	0.7	31.7	32.6	1.4	17.5	17.6	11.7	0.0	2.1	6.3	0.0	2.7
Prop In Lane	1.00		0.13	1.00		0.09	1.00		0.89	1.00		0.93
Lane Grp Cap(c), veh/h	335	1095	1126	50	1083	1122	316	0	331	328	0	329
V/C Ratio(X)	0.12	0.78	0.79	0.56	0.55	0.55	0.46	0.00	0.14	0.23	0.00	0.18
Avail Cap(c_a), veh/h	377	1095	1126	105	1083	1122	316	0	331	328	0	329
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.7	12.7	12.9	43.2	10.3	10.3	34.3	0.0	29.2	31.8	0.0	29.5
Incr Delay (d2), s/veh	0.2	5.4	5.6	9.6	2.0	1.9	4.8	0.0	0.9	1.6	0.0	1.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	11.5	12.2	0.7	6.1	6.3	3.3	0.0	0.9	1.5	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.9	18.1	18.5	52.8	12.3	12.2	39.1	0.0	30.1	33.4	0.0	30.6
LnGrp LOS	A	B	B	D	B	B	D		C	C		C
Approach Vol, veh/h		1779			1233			192				132
Approach Delay, s/veh		18.1			13.2			36.9				32.2
Approach LOS		B			B			D				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.0	7.0	60.0		23.0	7.7	59.3				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.5	5.3	52.7		18.5	5.3	52.7				
Max Q Clear Time (g_c+1), s		13.7	3.4	34.6		8.3	2.7	19.6				
Green Ext Time (p_c), s		0.3	0.0	11.3		0.3	0.0	8.8				
Intersection Summary												
HCM 7th Control Delay, s/veh				17.9								
HCM 7th LOS				B								

HCM 7th TWSC
2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	1595	3	47	1134	1	114
Future Vol, veh/h	1595	3	47	1134	1	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1734	3	51	1233	1	124

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1737	0	2454
Stage 1	-	-	-	-	1735
Stage 2	-	-	-	-	718
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	358	-	25
Stage 1	-	-	-	-	127
Stage 2	-	-	-	-	444
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	358	-	22
Mov Cap-2 Maneuver	-	-	-	-	22
Stage 1	-	-	-	-	127
Stage 2	-	-	-	-	381

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.66	29.91
HCM LOS			D

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	266	-	-	358	-
HCM Lane V/C Ratio	0.469	-	-	0.143	-
HCM Control Delay (s/veh)	29.9	-	-	16.7	-
HCM Lane LOS	D	-	-	C	-
HCM 95th %tile Q(veh)	2.3	-	-	0.5	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	0	3	0	0	10	0	107	1	9	49	80
Future Vol, veh/h	60	0	3	0	0	10	0	107	1	9	49	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	65	0	3	0	0	11	0	116	1	10	53	87

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	233	234	70	163	277	117	140	0	0	117	0	0
Stage 1	116	116	-	117	117	-	-	-	-	-	-	-
Stage 2	116	117	-	46	160	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	712	666	979	794	630	935	1442	-	-	1470	-	-
Stage 1	876	799	-	887	798	-	-	-	-	-	-	-
Stage 2	888	798	-	962	765	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	699	661	979	786	626	935	1442	-	-	1470	-	-
Mov Cap-2 Maneuver	699	661	-	786	626	-	-	-	-	-	-	-
Stage 1	870	793	-	887	798	-	-	-	-	-	-	-
Stage 2	878	798	-	952	760	-	-	-	-	-	-	-

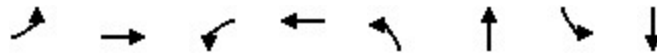
Approach	EB	WB	NB	SB
HCM Control Delay, s/v10.58		8.9	0	0.5
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1442	-	-	699	979	935	126	-	-
HCM Lane V/C Ratio	-	-	-	0.093	0.003	0.012	0.007	-	-
HCM Control Delay (s/veh)	0	-	-	10.7	8.7	8.9	7.5	0	-
HCM Lane LOS	A	-	-	B	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1371	5	2130	60	14	78	74
v/c Ratio	0.26	0.58	0.05	0.95	0.23	0.04	0.28	0.20
Control Delay (s/veh)	8.0	9.4	41.4	28.1	32.8	19.5	33.6	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.0	9.4	41.4	28.1	32.8	19.5	33.6	11.1
Queue Length 50th (ft)	7	172	3	~638	29	2	38	4
Queue Length 95th (ft)	17	320	14	#823	64	18	79	39
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	182	2383	100	2238	265	345	280	377
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.58	0.05	0.95	0.23	0.04	0.28	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

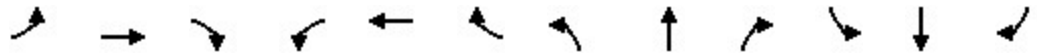
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary
 1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	44	1203	58	5	1890	70	55	5	8	72	7	61
Future Volume (veh/h)	44	1203	58	5	1890	70	55	5	8	72	7	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	1308	63	5	2054	76	60	5	9	78	8	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	2217	107	12	2133	78	296	120	217	352	35	289
Arrive On Green	0.04	0.64	0.64	0.01	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3451	166	1781	3496	129	1326	599	1078	1400	174	1437
Grp Volume(v), veh/h	48	673	698	5	1038	1092	60	0	14	78	0	74
Grp Sat Flow(s),veh/h/ln	1781	1777	1840	1781	1777	1847	1326	0	1676	1400	0	1612
Q Serve(g_s), s	0.9	19.6	19.7	0.3	49.3	50.8	3.6	0.0	0.6	4.3	0.0	3.5
Cycle Q Clear(g_c), s	0.9	19.6	19.7	0.3	49.3	50.8	7.0	0.0	0.6	4.9	0.0	3.5
Prop In Lane	1.00		0.09	1.00		0.07	1.00		0.64	1.00		0.89
Lane Grp Cap(c), veh/h	158	1141	1182	12	1084	1127	296	0	337	352	0	324
V/C Ratio(X)	0.30	0.59	0.59	0.43	0.96	0.97	0.20	0.00	0.04	0.22	0.00	0.23
Avail Cap(c_a), veh/h	190	1141	1182	101	1084	1127	296	0	337	352	0	324
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.2	9.3	9.3	44.5	16.4	16.7	33.0	0.0	29.0	30.9	0.0	30.1
Incr Delay (d2), s/veh	1.1	2.2	2.2	23.1	18.8	20.4	1.5	0.0	0.2	1.4	0.0	1.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.5	6.8	0.2	21.1	22.9	1.3	0.0	0.3	1.6	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.3	11.5	11.4	67.7	35.3	37.1	34.6	0.0	29.2	32.4	0.0	31.7
LnGrp LOS	C	B	B	E	D	D	C		C	C		C
Approach Vol, veh/h		1419			2135			74				152
Approach Delay, s/veh		11.9			36.3			33.6				32.1
Approach LOS		B			D			C				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.6	5.1	62.3		22.6	8.0	59.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.1	5.1	53.3		18.1	5.1	53.3				
Max Q Clear Time (g_c+I1), s		9.0	2.3	21.7		6.9	2.9	52.8				
Green Ext Time (p_c), s		0.1	0.0	10.7		0.4	0.0	0.5				
Intersection Summary												
HCM 7th Control Delay, s/veh			26.9									
HCM 7th LOS			C									

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	1275	8	107	1961	4	71
Future Vol, veh/h	1275	8	107	1961	4	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1386	9	116	2132	4	77

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1395	0	2689
Stage 1	-	-	-	-	1390
Stage 2	-	-	-	-	1298
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	486	-	18
Stage 1	-	-	-	-	196
Stage 2	-	-	-	-	220
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	486	-	13
Mov Cap-2 Maneuver	-	-	-	-	13
Stage 1	-	-	-	-	196
Stage 2	-	-	-	-	167

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.76	51.72
HCM LOS			F

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	155	-	-	486	-
HCM Lane V/C Ratio	0.528	-	-	0.239	-
HCM Control Delay (s/veh)	51.7	-	-	14.7	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	2.6	-	-	0.9	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	0	0	0	9	0	58	2	3	66	1
Future Vol, veh/h	1	0	0	0	0	9	0	58	2	3	66	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	0	0	0	10	0	63	2	3	72	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	142	144	36	107	143	64	73	0	0	65	0	0
Stage 1	79	79	-	64	64	-	-	-	-	-	-	-
Stage 2	63	65	-	42	79	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	821	747	1028	867	747	1000	1526	-	-	1536	-	-
Stage 1	921	829	-	946	841	-	-	-	-	-	-	-
Stage 2	947	840	-	967	829	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	811	745	1028	865	746	1000	1526	-	-	1536	-	-
Mov Cap-2 Maneuver	811	745	-	865	746	-	-	-	-	-	-	-
Stage 1	919	827	-	946	841	-	-	-	-	-	-	-
Stage 2	938	840	-	965	827	-	-	-	-	-	-	-

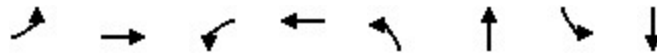
Approach	EB	WB	NB	SB
HCM Control Delay, s/v	9.45	8.64	0	0.33
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1526	-	-	811	-	1000	151	-	-
HCM Lane V/C Ratio	-	-	-	0.001	-	0.01	0.002	-	-
HCM Control Delay (s/veh)	0	-	-	9.4	0	8.6	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	1908	28	1326	146	46	74	58
v/c Ratio	0.15	0.83	0.27	0.60	0.54	0.13	0.27	0.16
Control Delay (s/veh)	5.6	17.3	47.3	11.9	40.4	12.2	33.4	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.6	17.3	47.3	11.9	40.4	12.2	33.4	10.8
Queue Length 50th (ft)	6	323	16	240	75	2	36	2
Queue Length 95th (ft)	15	#686	43	307	137	30	75	33
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	263	2295	104	2224	272	360	275	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.83	0.27	0.60	0.54	0.13	0.27	0.16

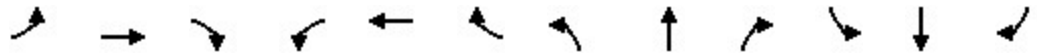
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↷		↶	↷	
Traffic Volume (veh/h)	37	1648	108	26	1170	50	134	5	38	68	4	50
Future Volume (veh/h)	37	1648	108	26	1170	50	134	5	38	68	4	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	1791	117	28	1272	54	146	5	41	74	4	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	302	2097	136	50	2124	90	313	36	292	325	22	303
Arrive On Green	0.04	0.62	0.62	0.03	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3389	219	1781	3473	147	1345	175	1437	1360	110	1491
Grp Volume(v), veh/h	40	930	978	28	650	676	146	0	46	74	0	58
Grp Sat Flow(s),veh/h/ln	1781	1777	1831	1781	1777	1844	1345	0	1612	1360	0	1602
Q Serve(g_s), s	0.7	37.7	39.3	1.4	20.2	20.2	9.1	0.0	2.1	4.2	0.0	2.7
Cycle Q Clear(g_c), s	0.7	37.7	39.3	1.4	20.2	20.2	11.8	0.0	2.1	6.4	0.0	2.7
Prop In Lane	1.00		0.12	1.00		0.08	1.00		0.89	1.00		0.93
Lane Grp Cap(c), veh/h	302	1099	1133	50	1087	1128	313	0	328	325	0	326
V/C Ratio(X)	0.13	0.85	0.86	0.56	0.60	0.60	0.47	0.00	0.14	0.23	0.00	0.18
Avail Cap(c_a), veh/h	345	1099	1133	105	1087	1128	313	0	328	325	0	326
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.3	13.7	14.0	43.2	10.7	10.7	34.5	0.0	29.4	32.0	0.0	29.6
Incr Delay (d2), s/veh	0.2	8.1	8.8	9.6	2.4	2.4	4.9	0.0	0.9	1.6	0.0	1.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	14.2	15.3	0.7	7.1	7.3	3.3	0.0	0.9	1.5	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	8.5	21.8	22.8	52.8	13.1	13.1	39.4	0.0	30.3	33.6	0.0	30.8
LnGrp LOS	A	C	C	D	B	B	D		C	C		C
Approach Vol, veh/h		1948			1354			192				132
Approach Delay, s/veh		22.0			13.9			37.2				32.4
Approach LOS		C			B			D				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.8	7.0	60.2		22.8	7.7	59.5				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.3	5.3	52.9		18.3	5.3	52.9				
Max Q Clear Time (g_c+I1), s		13.8	3.4	41.3		8.4	2.7	22.2				
Green Ext Time (p_c), s		0.3	0.0	8.9		0.3	0.0	10.0				
Intersection Summary												
HCM 7th Control Delay, s/veh				20.2								
HCM 7th LOS				C								

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	1751	3	47	1245	1	114
Future Vol, veh/h	1751	3	47	1245	1	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1903	3	51	1353	1	124

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1907	0	2684
Stage 1	-	-	-	-	1905
Stage 2	-	-	-	-	779
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	308	-	18
Stage 1	-	-	-	-	103
Stage 2	-	-	-	-	413
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	308	-	15
Mov Cap-2 Maneuver	-	-	-	-	15
Stage 1	-	-	-	-	103
Stage 2	-	-	-	-	344

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.69	38.81
HCM LOS			E

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	227	-	-	308	-
HCM Lane V/C Ratio	0.551	-	-	0.166	-
HCM Control Delay (s/veh)	38.8	-	-	19	-
HCM Lane LOS	E	-	-	C	-
HCM 95th %tile Q(veh)	3	-	-	0.6	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	0	3	0	0	10	0	107	1	9	49	80
Future Vol, veh/h	60	0	3	0	0	10	0	107	1	9	49	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	65	0	3	0	0	11	0	116	1	10	53	87

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	233	234	70	163	277	117	140	0	0	117	0	0
Stage 1	116	116	-	117	117	-	-	-	-	-	-	-
Stage 2	116	117	-	46	160	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	712	666	979	794	630	935	1442	-	-	1470	-	-
Stage 1	876	799	-	887	798	-	-	-	-	-	-	-
Stage 2	888	798	-	962	765	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	699	661	979	786	626	935	1442	-	-	1470	-	-
Mov Cap-2 Maneuver	699	661	-	786	626	-	-	-	-	-	-	-
Stage 1	870	793	-	887	798	-	-	-	-	-	-	-
Stage 2	878	798	-	952	760	-	-	-	-	-	-	-

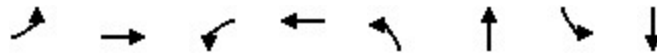
Approach	EB	WB	NB	SB
HCM Control Delay, s/v10.58		8.9	0	0.5
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1442	-	-	699	979	935	126	-	-
HCM Lane V/C Ratio	-	-	-	0.093	0.003	0.012	0.007	-	-
HCM Control Delay (s/veh)	0	-	-	10.7	8.7	8.9	7.5	0	-
HCM Lane LOS	A	-	-	B	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1508	5	2346	60	14	78	74
v/c Ratio	0.27	0.63	0.05	1.05	0.23	0.04	0.28	0.20
Control Delay (s/veh)	8.0	10.2	41.4	51.2	32.9	19.6	33.8	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.0	10.2	41.4	51.2	32.9	19.6	33.8	11.1
Queue Length 50th (ft)	7	201	3	~819	29	2	38	4
Queue Length 95th (ft)	17	374	14	#960	64	18	79	39
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	181	2390	100	2244	264	344	278	375
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.63	0.05	1.05	0.23	0.04	0.28	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

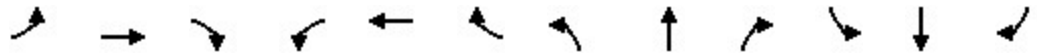
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1329	58	5	2088	70	55	5	8	72	7	61
Future Volume (veh/h)	44	1329	58	5	2088	70	55	5	8	72	7	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	1445	63	5	2270	76	60	5	9	78	8	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	149	2232	97	12	2145	71	294	120	216	351	35	287
Arrive On Green	0.04	0.64	0.64	0.01	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3469	151	1781	3509	117	1326	599	1078	1400	174	1437
Grp Volume(v), veh/h	48	739	769	5	1143	1203	60	0	14	78	0	74
Grp Sat Flow(s),veh/h/ln	1781	1777	1843	1781	1777	1849	1326	0	1676	1400	0	1612
Q Serve(g_s), s	0.9	22.8	23.0	0.3	55.0	55.0	3.6	0.0	0.6	4.3	0.0	3.5
Cycle Q Clear(g_c), s	0.9	22.8	23.0	0.3	55.0	55.0	7.0	0.0	0.6	4.9	0.0	3.5
Prop In Lane	1.00		0.08	1.00		0.06	1.00		0.64	1.00		0.89
Lane Grp Cap(c), veh/h	149	1143	1186	12	1086	1130	294	0	335	351	0	322
V/C Ratio(X)	0.32	0.65	0.65	0.43	1.05	1.06	0.20	0.00	0.04	0.22	0.00	0.23
Avail Cap(c_a), veh/h	179	1143	1186	101	1086	1130	294	0	335	351	0	322
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.6	9.8	9.8	44.5	17.5	17.5	33.1	0.0	29.0	31.0	0.0	30.2
Incr Delay (d2), s/veh	1.2	2.8	2.8	23.1	42.2	45.7	1.6	0.0	0.2	1.5	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	7.6	8.0	0.2	29.9	32.2	1.3	0.0	0.3	1.6	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.8	12.6	12.6	67.7	59.7	63.2	34.7	0.0	29.3	32.5	0.0	31.8
LnGrp LOS	C	B	B	E	F	F	C		C	C		C
Approach Vol, veh/h		1556			2351			74				152
Approach Delay, s/veh		12.9			61.5			33.7				32.2
Approach LOS		B			E			C				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.5	5.1	62.4		22.5	8.0	59.5				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.0	5.1	53.4		18.0	5.0	53.5				
Max Q Clear Time (g_c+I1), s		9.0	2.3	25.0		6.9	2.9	57.0				
Green Ext Time (p_c), s		0.1	0.0	11.9		0.4	0.0	0.0				
Intersection Summary												
HCM 7th Control Delay, s/veh			41.6									
HCM 7th LOS			D									

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	1401	8	107	2159	4	71
Future Vol, veh/h	1401	8	107	2159	4	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1523	9	116	2347	4	77

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1532	0	2933
Stage 1	-	-	-	-	1527
Stage 2	-	-	-	-	1406
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	431	-	12
Stage 1	-	-	-	-	165
Stage 2	-	-	-	-	192
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	431	-	9
Mov Cap-2 Maneuver	-	-	-	-	9
Stage 1	-	-	-	-	165
Stage 2	-	-	-	-	140

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.78	95.31
HCM LOS			F

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	112	-	-	431	-
HCM Lane V/C Ratio	0.728	-	-	0.27	-
HCM Control Delay (s/veh)	95.3	-	-	16.4	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	3.9	-	-	1.1	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	0	0	0	9	0	58	2	3	66	1
Future Vol, veh/h	1	0	0	0	0	9	0	58	2	3	66	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	0	0	0	10	0	63	2	3	72	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	142	144	36	107	143	64	73	0	0	65	0	0
Stage 1	79	79	-	64	64	-	-	-	-	-	-	-
Stage 2	63	65	-	42	79	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	821	747	1028	867	747	1000	1526	-	-	1536	-	-
Stage 1	921	829	-	946	841	-	-	-	-	-	-	-
Stage 2	947	840	-	967	829	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	811	745	1028	865	746	1000	1526	-	-	1536	-	-
Mov Cap-2 Maneuver	811	745	-	865	746	-	-	-	-	-	-	-
Stage 1	919	827	-	946	841	-	-	-	-	-	-	-
Stage 2	938	840	-	965	827	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	9.45	8.64	0	0.33
HCM LOS	A	A		

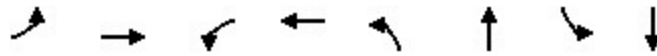
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1526	-	-	811	-	1000	151	-	-
HCM Lane V/C Ratio	-	-	-	0.001	-	0.01	0.002	-	-
HCM Control Delay (s/veh)	0	-	-	9.4	0	8.6	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-	0	0	-	-

APPENDIX F – Future (with site development) Synchro Outputs

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



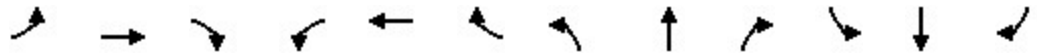
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	1749	36	1205	145	47	74	62
v/c Ratio	0.13	0.79	0.35	0.54	0.53	0.13	0.27	0.17
Control Delay (s/veh)	5.4	16.7	50.2	11.2	39.9	13.1	33.1	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.4	16.7	50.2	11.2	39.9	13.1	33.1	11.7
Queue Length 50th (ft)	6	396	20	208	74	4	36	4
Queue Length 95th (ft)	15	508	51	267	135	32	75	36
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	297	2207	104	2214	274	366	277	375
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.79	0.35	0.54	0.53	0.13	0.27	0.17

Intersection Summary

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↘		↗	↘	
Traffic Volume (veh/h)	37	1492	117	33	1059	50	133	7	36	68	7	50
Future Volume (veh/h)	37	1492	117	33	1059	50	133	7	36	68	7	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	1622	127	36	1151	54	145	8	39	74	8	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	335	2043	159	59	2106	99	313	57	278	327	43	289
Arrive On Green	0.04	0.61	0.61	0.03	0.61	0.61	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1781	3341	259	1781	3456	162	1340	277	1350	1359	209	1408
Grp Volume(v), veh/h	40	856	893	36	592	613	145	0	47	74	0	62
Grp Sat Flow(s),veh/h/ln	1781	1777	1824	1781	1777	1841	1340	0	1627	1359	0	1617
Q Serve(g_s), s	0.7	32.5	33.5	1.8	17.5	17.6	9.0	0.0	2.1	4.2	0.0	2.9
Cycle Q Clear(g_c), s	0.7	32.5	33.5	1.8	17.5	17.6	11.9	0.0	2.1	6.4	0.0	2.9
Prop In Lane	1.00		0.14	1.00		0.09	1.00		0.83	1.00		0.87
Lane Grp Cap(c), veh/h	335	1086	1115	59	1083	1122	313	0	335	327	0	332
V/C Ratio(X)	0.12	0.79	0.80	0.61	0.55	0.55	0.46	0.00	0.14	0.23	0.00	0.19
Avail Cap(c_a), veh/h	377	1086	1115	105	1083	1122	313	0	335	327	0	332
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.7	13.1	13.3	42.9	10.3	10.3	34.4	0.0	29.2	31.9	0.0	29.5
Incr Delay (d2), s/veh	0.2	5.8	6.1	9.9	2.0	1.9	4.9	0.0	0.9	1.6	0.0	1.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	11.9	12.6	0.9	6.1	6.3	3.3	0.0	0.9	1.5	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.9	18.9	19.4	52.9	12.3	12.2	39.3	0.0	30.1	33.5	0.0	30.8
LnGrp LOS	A	B	B	D	B	B	D		C	C		C
Approach Vol, veh/h		1789			1241			192				136
Approach Delay, s/veh		18.9			13.4			37.1				32.2
Approach LOS		B			B			D				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.0	7.5	59.5		23.0	7.7	59.3				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.5	5.3	52.7		18.5	5.3	52.7				
Max Q Clear Time (g_c+11), s		13.9	3.8	35.5		8.4	2.7	19.6				
Green Ext Time (p_c), s		0.3	0.0	11.0		0.3	0.0	8.8				
Intersection Summary												
HCM 7th Control Delay, s/veh			18.5									
HCM 7th LOS			B									

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	1593	3	58	1141	1	117
Future Vol, veh/h	1593	3	58	1141	1	117
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1732	3	63	1240	1	127

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1735	0	2479
Stage 1	-	-	-	-	1733
Stage 2	-	-	-	-	746
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	359	-	24
Stage 1	-	-	-	-	128
Stage 2	-	-	-	-	429
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	359	-	20
Mov Cap-2 Maneuver	-	-	-	-	20
Stage 1	-	-	-	-	128
Stage 2	-	-	-	-	354

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.83	30.66
HCM LOS			D

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	265	-	-	359	-
HCM Lane V/C Ratio	0.484	-	-	0.176	-
HCM Control Delay (s/veh)	30.7	-	-	17.1	-
HCM Lane LOS	D	-	-	C	-
HCM 95th %tile Q(veh)	2.5	-	-	0.6	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	0	6	0	0	10	11	107	1	9	49	99
Future Vol, veh/h	59	0	6	0	0	10	11	107	1	9	49	99
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	0	7	0	0	11	12	116	1	10	53	108

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	267	268	80	187	321	117	161	0	0	117	0	0
Stage 1	127	127	-	141	141	-	-	-	-	-	-	-
Stage 2	140	141	-	46	180	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	675	637	964	765	595	935	1417	-	-	1470	-	-
Stage 1	864	791	-	862	780	-	-	-	-	-	-	-
Stage 2	862	779	-	962	750	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	657	627	964	748	586	935	1417	-	-	1470	-	-
Mov Cap-2 Maneuver	657	627	-	748	586	-	-	-	-	-	-	-
Stage 1	858	785	-	854	773	-	-	-	-	-	-	-
Stage 2	844	772	-	949	744	-	-	-	-	-	-	-

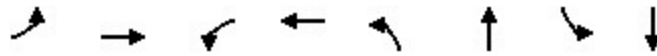
Approach	EB	WB	NB	SB
HCM Control Delay, s/v10.86		8.9	0.7	0.44
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	166	-	-	657	964	935	107	-	-
HCM Lane V/C Ratio	0.008	-	-	0.098	0.007	0.012	0.007	-	-
HCM Control Delay (s/veh)	7.6	0	-	11.1	8.8	8.9	7.5	0	-
HCM Lane LOS	A	A	-	B	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1382	8	2130	76	19	78	75
v/c Ratio	0.26	0.58	0.08	0.95	0.29	0.05	0.28	0.20
Control Delay (s/veh)	8.0	9.4	42.1	28.1	34.0	18.8	33.7	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.0	9.4	42.1	28.1	34.0	18.8	33.7	11.2
Queue Length 50th (ft)	7	173	4	~638	37	3	38	4
Queue Length 95th (ft)	17	324	18	#823	77	22	79	40
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	182	2382	100	2238	265	348	279	377
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.58	0.08	0.95	0.29	0.05	0.28	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	44	1203	68	7	1890	70	70	6	11	72	8	61
Future Volume (veh/h)	44	1203	68	7	1890	70	70	6	11	72	8	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	1308	74	8	2054	76	76	7	12	78	9	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	2184	123	18	2133	78	295	124	213	347	39	286
Arrive On Green	0.04	0.64	0.64	0.01	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3419	193	1781	3496	129	1325	619	1061	1393	194	1421
Grp Volume(v), veh/h	48	679	703	8	1038	1092	76	0	19	78	0	75
Grp Sat Flow(s),veh/h/ln	1781	1777	1836	1781	1777	1847	1325	0	1679	1393	0	1615
Q Serve(g_s), s	0.9	20.1	20.2	0.4	49.3	50.8	4.6	0.0	0.8	4.3	0.0	3.5
Cycle Q Clear(g_c), s	0.9	20.1	20.2	0.4	49.3	50.8	8.1	0.0	0.8	5.1	0.0	3.5
Prop In Lane	1.00		0.11	1.00		0.07	1.00		0.63	1.00		0.88
Lane Grp Cap(c), veh/h	158	1135	1173	18	1084	1127	295	0	338	347	0	325
V/C Ratio(X)	0.30	0.60	0.60	0.45	0.96	0.97	0.26	0.00	0.06	0.22	0.00	0.23
Avail Cap(c_a), veh/h	190	1135	1173	101	1084	1127	295	0	338	347	0	325
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.1	9.5	9.5	44.3	16.4	16.7	33.5	0.0	29.0	31.1	0.0	30.1
Incr Delay (d2), s/veh	1.1	2.3	2.3	16.4	18.8	20.4	2.1	0.0	0.3	1.5	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.7	7.0	0.3	21.1	22.9	1.6	0.0	0.4	1.6	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.2	11.8	11.8	60.7	35.3	37.1	35.6	0.0	29.4	32.6	0.0	31.8
LnGrp LOS	C	B	B	E	D	D	D		C	C		C
Approach Vol, veh/h		1430			2138			95				153
Approach Delay, s/veh		12.2			36.3			34.4				32.2
Approach LOS		B			D			C				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.6	5.4	62.0		22.6	8.0	59.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.1	5.1	53.3		18.1	5.1	53.3				
Max Q Clear Time (g_c+I1), s		10.1	2.4	22.2		7.1	2.9	52.8				
Green Ext Time (p_c), s		0.1	0.0	10.7		0.4	0.0	0.5				
Intersection Summary												
HCM 7th Control Delay, s/veh				27.1								
HCM 7th LOS				C								

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	1278	8	109	1963	4	73
Future Vol, veh/h	1278	8	109	1963	4	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1389	9	118	2134	4	79

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1398	0	2697
Stage 1	-	-	-	-	1393
Stage 2	-	-	-	-	1304
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	485	-	17
Stage 1	-	-	-	-	195
Stage 2	-	-	-	-	218
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	485	-	13
Mov Cap-2 Maneuver	-	-	-	-	13
Stage 1	-	-	-	-	195
Stage 2	-	-	-	-	165

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.78	52.71
HCM LOS			F

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	155	-	-	485	-
HCM Lane V/C Ratio	0.541	-	-	0.244	-
HCM Control Delay (s/veh)	52.7	-	-	14.8	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	2.7	-	-	1	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↕			↕			↕↗	
Traffic Vol, veh/h	20	0	2	0	0	9	2	58	2	3	66	14
Future Vol, veh/h	20	0	2	0	0	9	2	58	2	3	66	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	2	0	0	10	2	63	2	3	72	15

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	153	155	43	111	162	64	87	0	0	65	0	0
Stage 1	86	86	-	68	68	-	-	-	-	-	-	-
Stage 2	67	70	-	42	93	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	806	736	1018	861	730	1000	1508	-	-	1536	-	-
Stage 1	913	823	-	941	838	-	-	-	-	-	-	-
Stage 2	942	837	-	967	817	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	795	733	1018	856	727	1000	1508	-	-	1536	-	-
Mov Cap-2 Maneuver	795	733	-	856	727	-	-	-	-	-	-	-
Stage 1	911	821	-	940	836	-	-	-	-	-	-	-
Stage 2	932	835	-	963	815	-	-	-	-	-	-	-

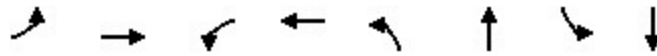
Approach	EB	WB	NB	SB
HCM Control Delay, s/v	9.55	8.64	0.24	0.28
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	58	-	-	795	1018	1000	105	-	-
HCM Lane V/C Ratio	0.001	-	-	0.027	0.002	0.01	0.002	-	-
HCM Control Delay (s/veh)	7.4	0	-	9.7	8.5	8.6	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	1918	36	1326	145	47	74	62
v/c Ratio	0.15	0.87	0.35	0.60	0.54	0.13	0.27	0.17
Control Delay (s/veh)	5.7	20.1	50.2	11.9	40.3	13.2	33.4	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.7	20.1	50.2	11.9	40.3	13.2	33.4	11.8
Queue Length 50th (ft)	6	477	20	240	74	4	36	4
Queue Length 95th (ft)	15	#693	51	307	136	32	75	36
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	262	2217	104	2224	271	362	274	372
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.87	0.35	0.60	0.54	0.13	0.27	0.17

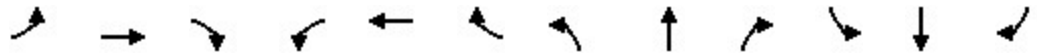
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	37	1648	117	33	1170	50	133	7	36	68	7	50
Future Volume (veh/h)	37	1648	117	33	1170	50	133	7	36	68	7	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	1791	127	36	1272	54	145	8	39	74	8	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	302	2067	145	59	2124	90	310	56	275	324	42	286
Arrive On Green	0.04	0.61	0.61	0.03	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3369	236	1781	3473	147	1340	277	1350	1359	209	1408
Grp Volume(v), veh/h	40	935	983	36	650	676	145	0	47	74	0	62
Grp Sat Flow(s),veh/h/ln	1781	1777	1828	1781	1777	1844	1340	0	1627	1359	0	1617
Q Serve(g_s), s	0.7	38.6	40.4	1.8	20.2	20.2	9.0	0.0	2.1	4.3	0.0	2.9
Cycle Q Clear(g_c), s	0.7	38.6	40.4	1.8	20.2	20.2	11.9	0.0	2.1	6.4	0.0	2.9
Prop In Lane	1.00		0.13	1.00		0.08	1.00		0.83	1.00		0.87
Lane Grp Cap(c), veh/h	302	1090	1122	59	1087	1128	310	0	331	324	0	329
V/C Ratio(X)	0.13	0.86	0.88	0.61	0.60	0.60	0.47	0.00	0.14	0.23	0.00	0.19
Avail Cap(c_a), veh/h	345	1090	1122	105	1087	1128	310	0	331	324	0	329
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.3	14.2	14.5	42.9	10.7	10.7	34.6	0.0	29.4	32.0	0.0	29.7
Incr Delay (d2), s/veh	0.2	8.7	9.7	9.9	2.4	2.4	5.0	0.0	0.9	1.6	0.0	1.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	14.7	16.0	0.9	7.1	7.3	3.3	0.0	0.9	1.5	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	8.5	22.9	24.2	52.9	13.1	13.1	39.6	0.0	30.3	33.7	0.0	31.0
LnGrp LOS	A	C	C	D	B	B	D		C	C		C
Approach Vol, veh/h		1958			1362			192				136
Approach Delay, s/veh		23.3			14.2			37.3				32.4
Approach LOS		C			B			D				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.8	7.5	59.7		22.8	7.7	59.5				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.3	5.3	52.9		18.3	5.3	52.9				
Max Q Clear Time (g_c+I1), s		13.9	3.8	42.4		8.4	2.7	22.2				
Green Ext Time (p_c), s		0.2	0.0	8.2		0.3	0.0	10.0				
Intersection Summary												
HCM 7th Control Delay, s/veh				21.0								
HCM 7th LOS				C								

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	1749	3	58	1252	1	117
Future Vol, veh/h	1749	3	58	1252	1	117
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1901	3	63	1361	1	127

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1904	0	2709
Stage 1	-	-	-	-	1903
Stage 2	-	-	-	-	807
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	308	-	17
Stage 1	-	-	-	-	103
Stage 2	-	-	-	-	400
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	308	-	13
Mov Cap-2 Maneuver	-	-	-	-	13
Stage 1	-	-	-	-	103
Stage 2	-	-	-	-	318

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.87	40.28
HCM LOS			E

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	225	-	-	308	-
HCM Lane V/C Ratio	0.57	-	-	0.204	-
HCM Control Delay (s/veh)	40.3	-	-	19.6	-
HCM Lane LOS	E	-	-	C	-
HCM 95th %tile Q(veh)	3.2	-	-	0.8	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	0	6	0	0	10	11	107	1	9	49	99
Future Vol, veh/h	59	0	6	0	0	10	11	107	1	9	49	99
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	0	7	0	0	11	12	116	1	10	53	108

Major/Minor	Minor2		Minor1			Major1		Major2				
Conflicting Flow All	267	268	80	187	321	117	161	0	0	117	0	0
Stage 1	127	127	-	141	141	-	-	-	-	-	-	-
Stage 2	140	141	-	46	180	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	675	637	964	765	595	935	1417	-	-	1470	-	-
Stage 1	864	791	-	862	780	-	-	-	-	-	-	-
Stage 2	862	779	-	962	750	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	657	627	964	748	586	935	1417	-	-	1470	-	-
Mov Cap-2 Maneuver	657	627	-	748	586	-	-	-	-	-	-	-
Stage 1	858	785	-	854	773	-	-	-	-	-	-	-
Stage 2	844	772	-	949	744	-	-	-	-	-	-	-

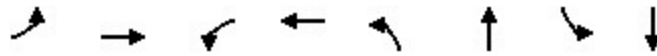
Approach	EB		WB		NB		SB	
HCM Control Delay, s/v10.86				8.9		0.7		0.44
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	166	-	-	657	964	935	107	-	-
HCM Lane V/C Ratio	0.008	-	-	0.098	0.007	0.012	0.007	-	-
HCM Control Delay (s/veh)	7.6	0	-	11.1	8.8	8.9	7.5	0	-
HCM Lane LOS	A	A	-	B	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	0	0	-	-

Queues

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1519	8	2346	76	19	78	75
v/c Ratio	0.27	0.64	0.08	1.05	0.29	0.05	0.28	0.20
Control Delay (s/veh)	8.0	10.3	42.1	51.2	34.1	18.8	33.8	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.0	10.3	42.1	51.2	34.1	18.8	33.8	11.3
Queue Length 50th (ft)	7	203	4	~819	37	3	38	4
Queue Length 95th (ft)	17	380	18	#960	78	22	79	40
Internal Link Dist (ft)		355		1347		306		319
Turn Bay Length (ft)	180		180				115	
Base Capacity (vph)	181	2387	100	2244	263	346	277	376
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.64	0.08	1.05	0.29	0.05	0.28	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

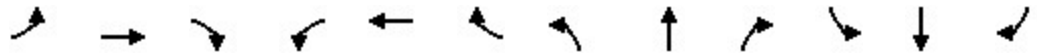
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	44	1329	68	7	2088	70	70	6	11	72	8	61
Future Volume (veh/h)	44	1329	68	7	2088	70	70	6	11	72	8	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	1445	74	8	2270	76	76	7	12	78	9	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	149	2201	112	18	2145	71	293	124	212	346	39	284
Arrive On Green	0.04	0.64	0.64	0.01	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	3440	176	1781	3509	117	1325	619	1061	1393	194	1421
Grp Volume(v), veh/h	48	744	775	8	1143	1203	76	0	19	78	0	75
Grp Sat Flow(s),veh/h/ln	1781	1777	1839	1781	1777	1849	1325	0	1679	1393	0	1615
Q Serve(g_s), s	0.9	23.4	23.6	0.4	55.0	55.0	4.6	0.0	0.8	4.3	0.0	3.5
Cycle Q Clear(g_c), s	0.9	23.4	23.6	0.4	55.0	55.0	8.1	0.0	0.8	5.1	0.0	3.5
Prop In Lane	1.00		0.10	1.00		0.06	1.00		0.63	1.00		0.88
Lane Grp Cap(c), veh/h	149	1137	1177	18	1086	1130	293	0	336	346	0	323
V/C Ratio(X)	0.32	0.65	0.66	0.45	1.05	1.06	0.26	0.00	0.06	0.23	0.00	0.23
Avail Cap(c_a), veh/h	179	1137	1177	101	1086	1130	293	0	336	346	0	323
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.5	10.0	10.1	44.3	17.5	17.5	33.6	0.0	29.1	31.2	0.0	30.2
Incr Delay (d2), s/veh	1.2	2.9	2.9	16.4	42.2	45.7	2.1	0.0	0.3	1.5	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	7.9	8.3	0.3	29.9	32.2	1.6	0.0	0.4	1.6	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.7	13.0	13.0	60.7	59.7	63.2	35.7	0.0	29.5	32.7	0.0	31.9
LnGrp LOS	C	B	B	E	F	F	D		C	C		C
Approach Vol, veh/h		1567			2354			95				153
Approach Delay, s/veh		13.3			61.5			34.5				32.3
Approach LOS		B			E			C				C
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.5	5.4	62.1		22.5	8.0	59.5				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.0	5.1	53.4		18.0	5.0	53.5				
Max Q Clear Time (g_c+I1), s		10.1	2.4	25.6		7.1	2.9	57.0				
Green Ext Time (p_c), s		0.1	0.0	11.9		0.4	0.0	0.0				
Intersection Summary												
HCM 7th Control Delay, s/veh			41.7									
HCM 7th LOS			D									

HCM 7th TWSC
 2: LONE TREE PKWY & LINCOLN AVENUE

12/18/2023

Intersection

Int Delay, s/veh 2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	1404	8	109	2161	4	73
Future Vol, veh/h	1404	8	109	2161	4	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	180	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1526	9	118	2349	4	79

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1535	0	2942
Stage 1	-	-	-	-	1530
Stage 2	-	-	-	-	1411
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	429	-	12
Stage 1	-	-	-	-	165
Stage 2	-	-	-	-	191
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	429	-	8
Mov Cap-2 Maneuver	-	-	-	-	8
Stage 1	-	-	-	-	165
Stage 2	-	-	-	-	138

Approach

	EB	WB	NB
HCM Control Delay, s/v	0	0.79	98.33
HCM LOS			F

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	112	-	-	429	-
HCM Lane V/C Ratio	0.746	-	-	0.276	-
HCM Control Delay (s/veh)	98.3	-	-	16.5	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	4.1	-	-	1.1	-

HCM 7th TWSC
 3: LONE TREE PKWY & SITE ACCESS/MARIN CT

12/18/2023

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	2	0	0	9	2	58	2	3	66	14
Future Vol, veh/h	20	0	2	0	0	9	2	58	2	3	66	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	2	0	0	10	2	63	2	3	72	15

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	153	155	43	111	162	64	87	0	0	65	0	0
Stage 1	86	86	-	68	68	-	-	-	-	-	-	-
Stage 2	67	70	-	42	93	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	806	736	1018	861	730	1000	1508	-	-	1536	-	-
Stage 1	913	823	-	941	838	-	-	-	-	-	-	-
Stage 2	942	837	-	967	817	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	795	733	1018	856	727	1000	1508	-	-	1536	-	-
Mov Cap-2 Maneuver	795	733	-	856	727	-	-	-	-	-	-	-
Stage 1	911	821	-	940	836	-	-	-	-	-	-	-
Stage 2	932	835	-	963	815	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	9.55		8.64		0.24		0.28	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	58	-	-	795	1018	1000	105	-	-
HCM Lane V/C Ratio	0.001	-	-	0.027	0.002	0.01	0.002	-	-
HCM Control Delay (s/veh)	7.4	0	-	9.7	8.5	8.6	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	0	-	-

APPENDIX G – Traffic Operations Plan

Traffic Operation Plan:

A traffic operations plan has been contemplated to ensure that traffic does not impact public right-of-way during pick up and drop off operations. The plan can be adjusted and iterated on as conditions and school populations change. Ambleside is committed to being flexible and making adjustments as necessary to ensure the safety of all.

As stated, the goal of the operations plan is to maintain safe circulation throughout the site while ensuring no vehicles queue out into public right of way. A number of strategies will be used, and adjusted, if necessary, to ensure this happens.

Ambleside will have school staff on site to direct traffic, provide guidance, and ensure that the operations plan is being followed. Staff are available to adjust traffic flows if needed, guide students into and out of the building, observe opportunities to improve the plan, and provide constant communication to parents.

Ambleside purposefully limits its school size (in our bylaws) to 221 students or fewer. Based on current operations average (which takes into account siblings and family ride sharing), we anticipate that the auto occupancy would be approximately 2.3 and some percentage of walking or biking from the surrounding neighborhoods. The new school anticipates 30 staff members who drive daily to school that would arrive and leave outside of the peak hours and have dedicated parking away from primary traffic flows.

School drop-off takes place from 7:20 - 7:50 a.m. M-F. The grades levels will be dropped off in a staggered scheduled:

- 9-12 at 7:20 AM
- K-5 at 7:30 AM
- 6-8 at 7:40 AM

The youngest grade levels will park and be walked into school (with additional efficiencies such as requesting vehicles be backed in for ease of egress) while the oldest grade levels will have designated parking. It is anticipated that with this operations plan fewer than 25 vehicles (max of 21 shown below) will queue at any given time. The site has stacking space for up to 31 vehicles before impacting the access driveway. The following table details the above operations plan.

<u>Vehicle</u> <u>s</u>	<u>Method</u>	<u>Grades</u>	<u>Time</u> <u>Period</u>
14	Park	11 and 12	7:20 -
14	Drop Off	9 and 10	7:30
21	Park and Escort	K, 1, 2	7:30 -
21	Drop Off	3, 4, 5	7:40
21	Drop Off	6, 7, 8	7:40 - 7:50

Auto occupancy we have to fall below 1.6 to have the possibility of impacting the public ROW. An auto occupancy of 1.6 would result in a queue of 30 vehicles while space exists to accommodate 31 vehicles. This is extremely unlikely with the combination of staff/students and student/student populations that exist

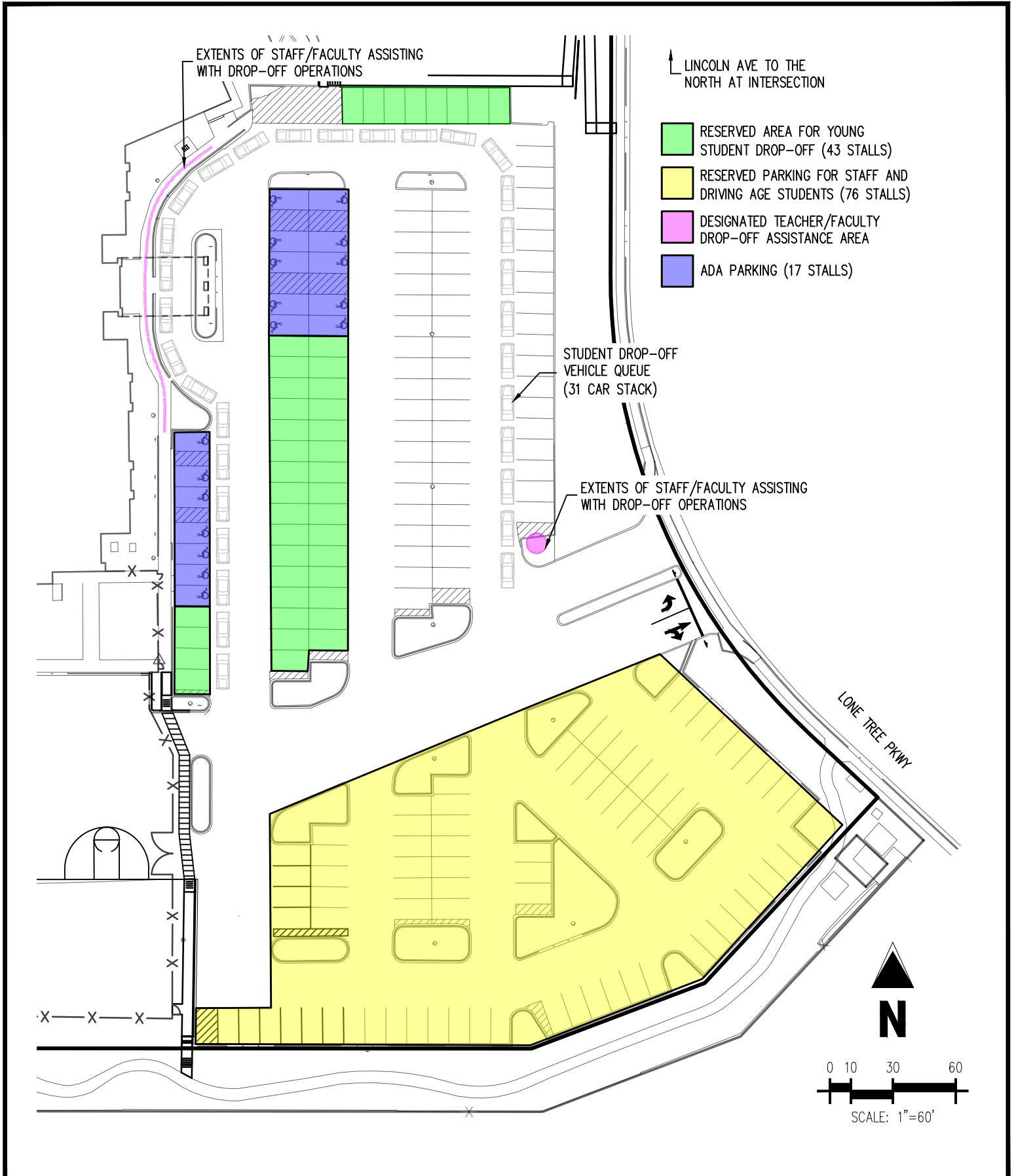
within the school. Anecdotally no queueing issues exist at the current school. It is not anticipated that the change in location would be any different.

School pick-up takes place from 3:30 - 3:45 M-Th and 12:15 - 12:30 on F. In a similar manner, vehicles will drive through and pick up their children. Staff members leave for the day at various times from 3:45 - 5:30 p.m. The PM pick-ups are spread due to various school activities. Outbound traffic from the site will be directed to the right along Lone Tree Parkway if continuing to the east and to the left along Lone Tree Parkway if heading north or west.

Staff are present at all times during pick up and drop off to ensure that plans are being followed. This also allows for unforeseen situations to be dealt with. Vehicles within fire lane areas will never be unattended and compliance with this will be ensured by Staff. In the event of an emergency staff shall ensure the fire lane is cleared of all vehicles and obstructions (including temporary signage) so that emergency services can respond in an efficient and effective manner. An Exhibit is provided herein to visualize the areas described above.

Assemblies and extra events would use the assembly space. The site would be parked for such an event and would happen off peak. There would be very little traffic on campus from late May - mid - August.

In the event that the school use and operations result in any vehicle queues backing into the Lone Tree Parkway right-of-way, or if the City determines that there are operational issues within the right-of-way surrounding the property, the owner will commit to working with the City on operational improvements at the western intersection of Lone Tree Parkway and Lincoln Avenue. An Exhibit is attached to show conceptual potential improvements.



AMBLESIDE SCHOOL

9941 LONE TREE PARKWAY
LONE TREE, CO 80124

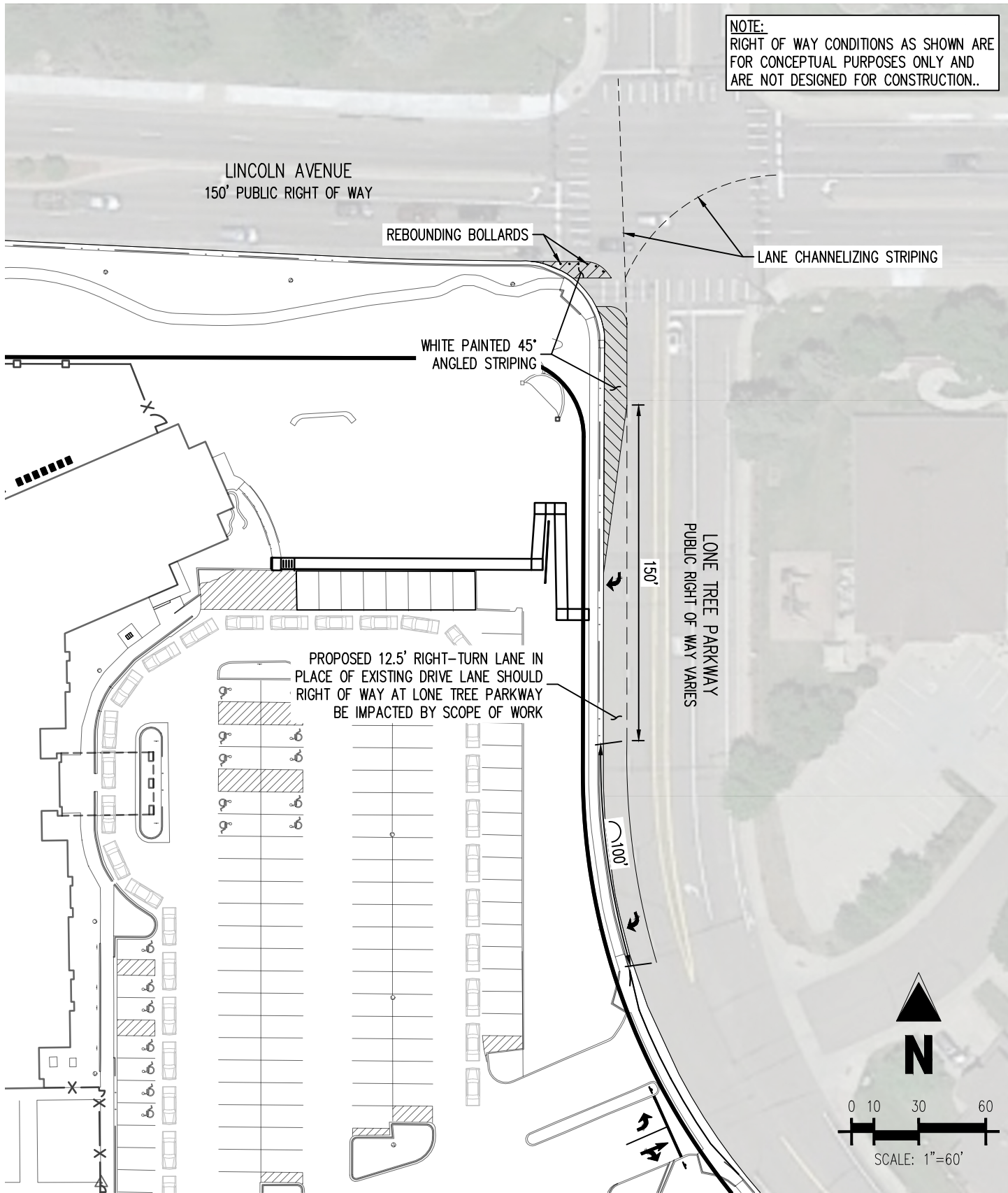
VEHICLE DROP-OFF QUEUING EXHIBIT

Project No:	AMC000002
Drawn By:	DMH
Checked By:	JSB
Date:	03/13/2024



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NOTE:
 RIGHT OF WAY CONDITIONS AS SHOWN ARE
 FOR CONCEPTUAL PURPOSES ONLY AND
 ARE NOT DESIGNED FOR CONSTRUCTION..

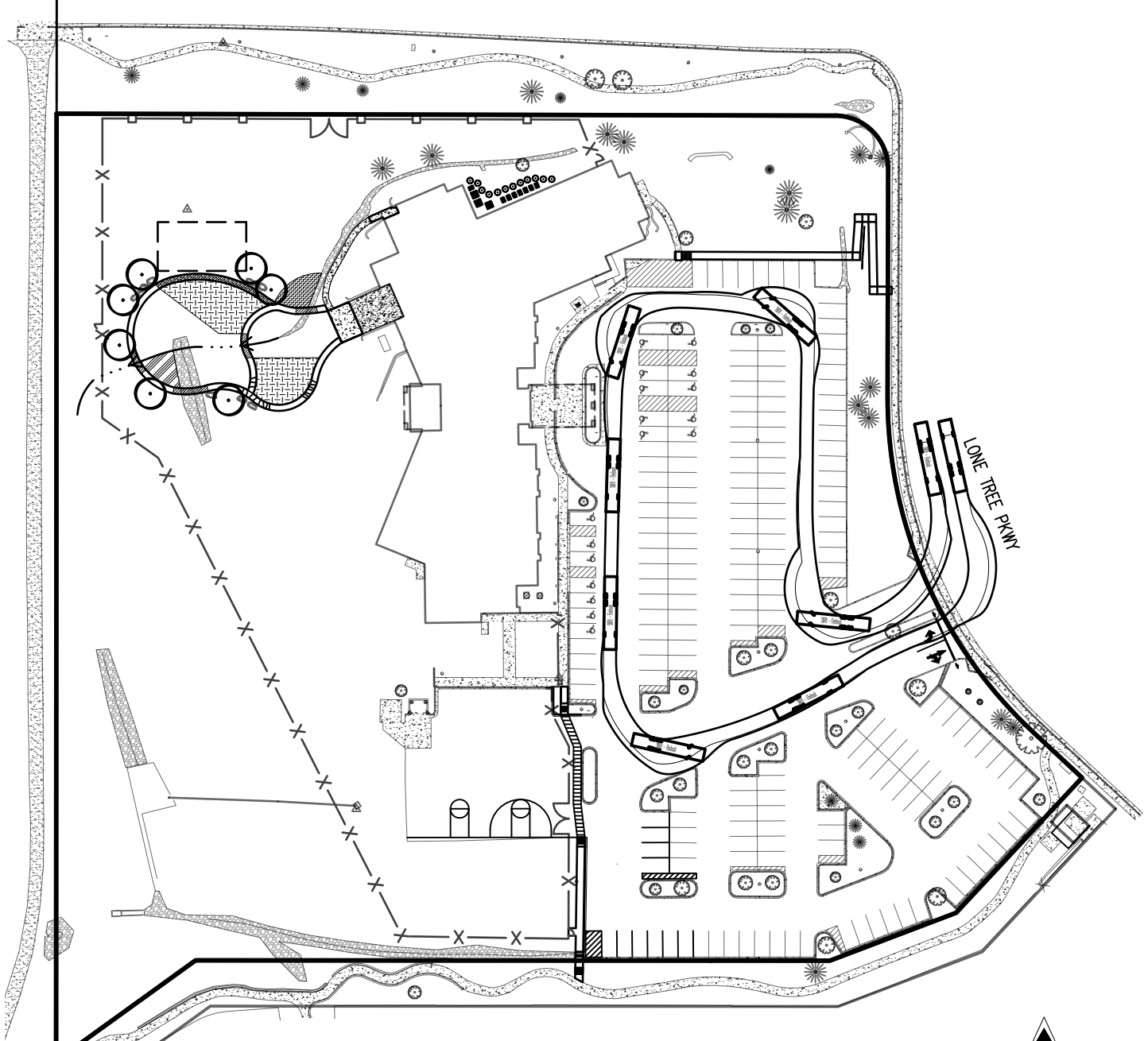


AMBLESIDE SCHOOL
LONE TREE PARKWAY & LINCOLN AVENUE
 9941 LONE TREE PARKWAY
 LONE TREE, CO 80124
CONCEPTUAL ROW CONFIGURATION

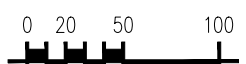
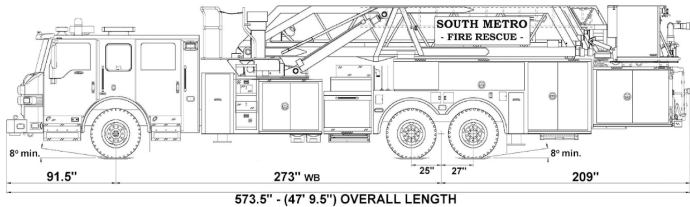
Project No:	AMC000002
Drawn By:	DMH
Checked By:	JSB
Date:	05/28/2024

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 Greenwood Village, CO 80111
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LINCOLN AVE



S0°01'50"W 1321.21'



SCALE: 1"=100'

AMBLESIDE SCHOOL

9941 LONE TREE PARKWAY
LONE TREE, CO 80124

FIRETRUCK VEHICLE TURN ANALYSIS

Project No:	AMC000002
Drawn By:	DMH
Checked By:	JSB
Date:	05/30/2024



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