



HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

Date: January 31, 2024

To: Mr. Philip Vitale, Jr., City of South San Francisco

From: Trisha Dudala
Katie Riutta

Subject: Transportation Analysis for Linden Park in South San Francisco, California

Hexagon Transportation Consultants, Inc. has completed an assessment of traffic impacts from the proposed Linden Park in South San Francisco. The project site (see Figure 1) is located on the east side of Linden Avenue, between 8th Lane to the north and 7th Lane to the south. The site is comprised of two parcels (616 Linden Avenue and 700 Linden Avenue) and a section of Pine Avenue that bisects the project site. 616 Linden Avenue is currently an active parking lot and 700 Linden Avenue is a vacant grass lot. The two parcels would be redeveloped into a park with a children's play area, a space for recreation, a sports court, spaces for community gathering and public art.

In accordance with Senate Bill (SB) 743 and the City's Transportation Analysis Guidelines, vehicle miles traveled (VMT) has replaced level of service (LOS) for use in transportation analyses pursuant to the California Environmental Quality Act (CEQA). This memorandum evaluates the project's potential impact on vehicle miles traveled (VMT) and analyzes the traffic operational effects of park development alternatives that would potentially close Pine Avenue.

Vehicle Miles Traveled

According to the City's Transportation Analysis Guidelines, October 2022, prepared for the General Plan Update, some projects may be screened out, or assumed to have a less-than-significant impact on VMT, if they fall within the following categories:

1. Projects located within ½-mile walkshed around major transit stops.
2. 50% affordable housing projects.
3. Small projects that generate less than 100 new trips per day, and do not exceed square footage thresholds.
4. Locally serving public facilities that encompass government, civic, cultural, health, and infrastructure uses and activity which contribute to and support community needs.
5. Neighborhood-serving retail projects that are less than 50,000 square.
6. Hotels designed to serve business travelers or individuals flying in or out of SFO.
7. Residential and office projects in low VMT areas.

The potential new daily vehicle trips that may be generated by the proposed project were estimated by applying trip rates for public parks published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* (0.78 daily vehicle trips per acre) to the size of the project site (0.7 acres). Based on the ITE trip rate, the proposed project is expected to generate an average of fewer than 10 vehicle trips each day.

Therefore, according to the South San Francisco's VMT policy, the project would qualify as a small project that may be screened out of a detailed VMT analysis and assumed to have a less than significant impact on VMT. Also, the proposed park would be local serving and would generate activity that would contribute to and support community needs.

Project Alternatives

The following park development alternatives are being considered by the City of South San Francisco.

1. **Speed Table** – Under this alternative, Pine Avenue would be kept open and a speed table on Pine Avenue would slow down vehicles near the park. Speed tables are traffic calming devices that raise the entire wheelbase of a vehicle to reduce its speed. They are longer than speed humps and are flat on the top, with a height of 3 – 3.5 inches and a length of at least 22 feet. According to National Association of City Transportation Officials (NACTO), speed tables may be used on collector streets and/or transit and emergency response routes.
2. **Pine Avenue Closure (see Figure 2)** – The intersection of Linden Avenue and Pine Avenue would operate as a three-legged intersection without the east leg. Pine Avenue, east of Linden Avenue would be closed off to vehicular traffic and a small roundabout would be installed on the east end of the park for vehicles on westbound Pine Avenue to turn around. The roundabout would be designed to accommodate large trucks including firetrucks. Through traffic on Pine Avenue would be diverted to the parallel streets of California Avenue and Aspen Avenue.
3. **Pine Avenue Closure with a new alley (see Figure 3)** – Under this alternative, Pine Avenue would be closed off to vehicular traffic like in alternative 2 but instead of providing a roundabout for westbound traffic on Pine Avenue to turn around, a one-way alley would be provided along the eastern boundary of the park that would connect to 7th Lane. Westbound vehicles on Pine Avenue would be able to make a left turn onto the new alley and a right turn onto 7th Lane to connect to Linden Avenue. Similar to alternative 2, the through traffic on Pine Avenue near the park is expected to use the parallel streets of California Avenue and Aspen Avenue to get to their destinations. The one-way alley would be designed to accommodate large trucks, including fire apparatus.
4. **Pine Avenue Partial Closure** – Under this alternative, Pine Avenue would be kept open except when special events are conducted at the park.

Traffic Analysis

Alternative 1 – Speed Table

Under this alternative, Pine Avenue would be kept open, and a speed table would be installed to slow down vehicular traffic. The daily traffic on Pine Avenue is relatively low, with less than 1,300 vehicles per day. The delay caused by the speed table would be minimal, so the amount of traffic that may be diverted to adjacent roadways would be very small and is not expected to cause any significant operational delays or queues on the surrounding streets.

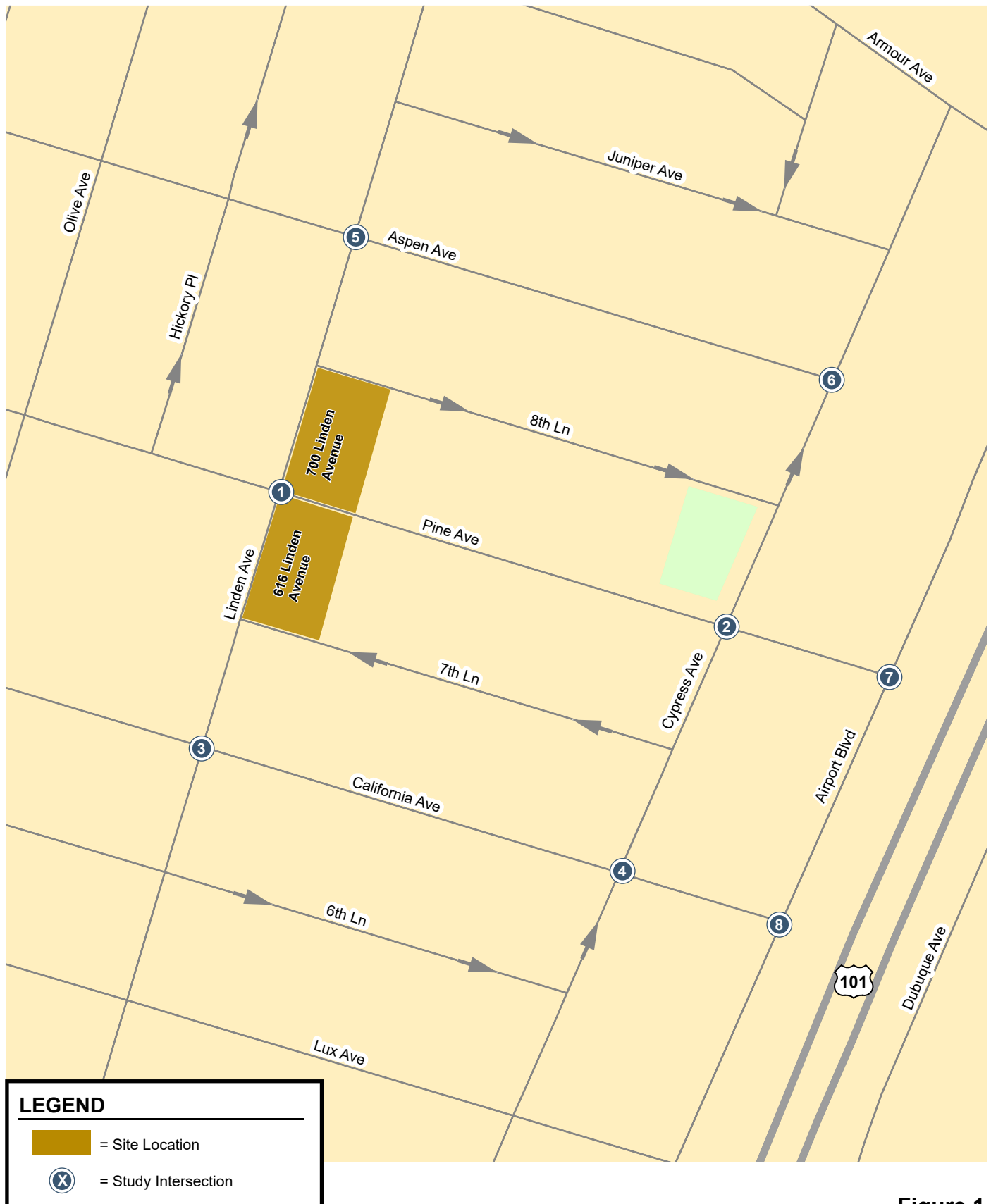


Figure 1
Study Area

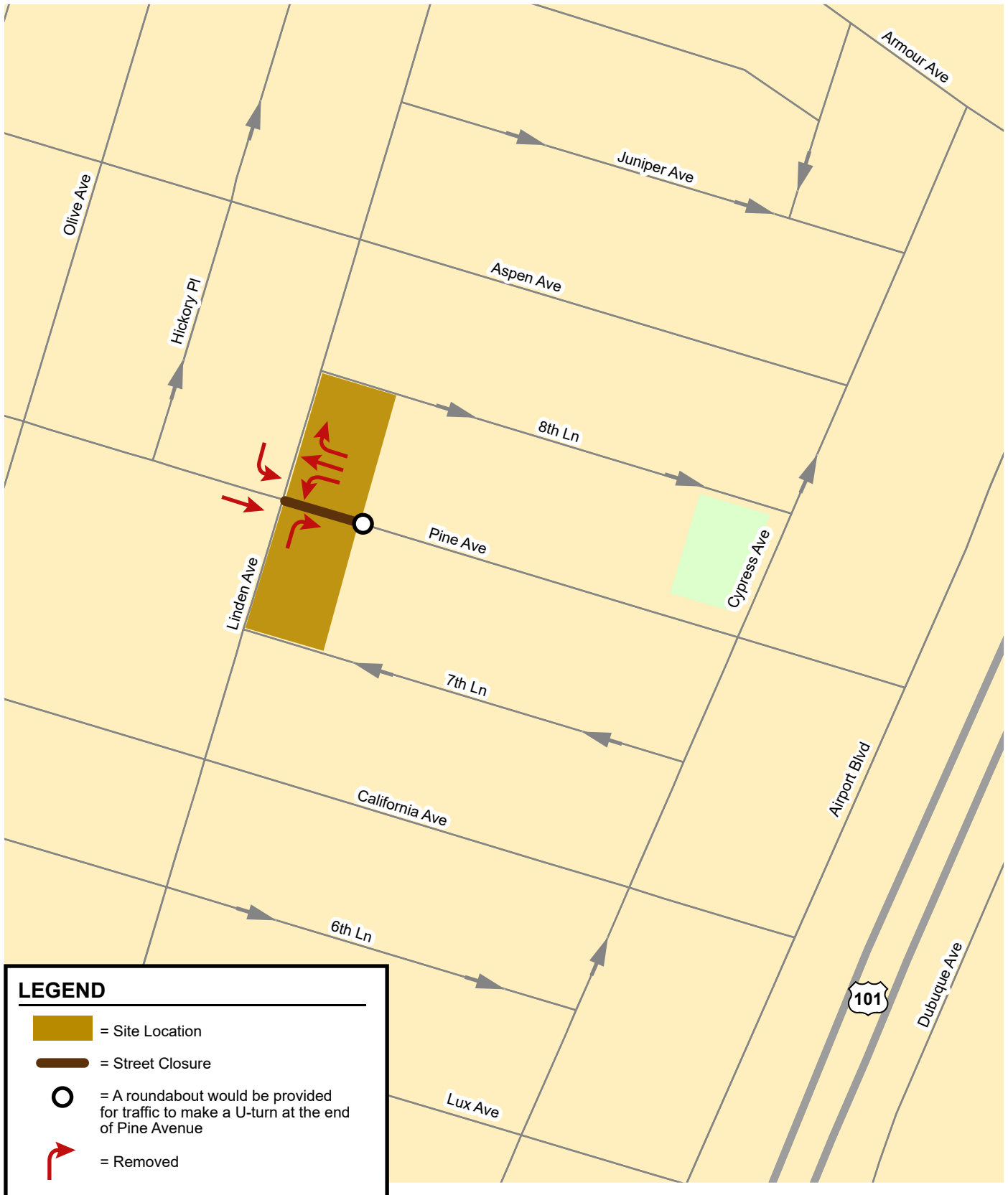


Figure 2
Alternative 2 - Pine Avenue Closure



Figure 3
Alternative 3 - Pine Avenue Closure with Alley

Alternative 2 – Pine Avenue Closure

Under this alternative, the two park parcels and the section of Pine Avenue that bisects the two parcels would be combined to create one large rectangular park. Pine Avenue, east of Linden Avenue would be closed off to vehicular traffic, and a small roundabout would be installed on the east end of the park for vehicles on westbound Pine Avenue to turn around. Through traffic on Pine Avenue would be diverted to the parallel streets of California Avenue and Aspen Avenue.

The impact of the Pine Avenue closure on the adjacent roadways was analyzed based on the diverted traffic. The origins and destinations of traffic using Pine Avenue were determined with traffic pattern information collected by the StreetLight data platform. StreetLight data track cell phone pings to determine traffic patterns. Cell phone companies supply anonymized data about the origins, destinations, and routes of people using cell phones. Any time a geo-based app on the phone is enabled, the movement of that phone is tracked. While not all people have cell phones or apps running, the data are aggregated from thousands of users over time and provide a good representation of travel patterns. The analysis herein is based on 2019 data, as the years following 2019 were disrupted by COVID conditions. The 2023 data are still low compared to 2019 volumes.

Roadway operations were evaluated using Level of Service (LOS) measures. The *Highway Capacity Manual*, Transportation Research Board, 2000 provides the following LOS threshold volumes for collector and local roads. Pine Avenue and its parallel streets are classified as local streets.

Table 1
Level of Service Threshold Volumes for Roadways

Roadway Type	LOS A	LOS B	LOS C	LOS D	LOS E
2- Lane Arterial (w/left-turn lane)	11,000	12,500	14,500	16,000	18,000
2- Lane Collector	6,000	7,500	9,000	10,500	12,000
2 - Lane Local	1,200	1,400	1,600	1,800	2,000
Notes 1. Based on <i>Highway Capacity Manual</i> , Transportation Research Board, 2000. 2. Two-lane collectors assume approximately three-fourths of the capacity of a two-lane arterial with left-turn lanes. This is based on the assumption that left-turn channelization is not provided on a two-lane collector. 3. Local street level of service thresholds are based upon “Neighborhood Traffic Related Quality-of-Life Considerations” which assumes a standard suburban neighborhood, 40-foot roadway width, and 25 mile per hour speed limit with normal speed violation rates.					

Table 2 (also see Figure 4) below summarizes the daily volume for the roadways near the project site.

Table 2
Annual Average Daily Traffic (AADT)

#	Roadway	# Total Lanes	Direction	Classification ¹	2019 AADT ²	LOS ³
1	Linden Avenue	2	North/South	Collector	4,076	A
2	Pine Avenue	2	East/West	Local	1,238	B
3	California Avenue	2	East/West	Local	1,275	B
4	Aspen Avenue	2	East/West	Local	589	A
5	8th Lane	1	Eastbound	Local	195	A
6	7th Lane	1	Westbound	Local	284	A
7	Cypress Avenue	1	Northbound	Local	463	A

Notes

¹ Based on the "Mobility Network" in ShapeSSF 2040 General Plan.

² Based on "AADT" analysis in the StreetLight data platform.

³ Based on *Highway Capacity Manual*, Transportation Research Board, 2000.

With the closure of Pine Avenue near the proposed Linden Park, its traffic would be diverted to the surrounding streets of Aspen Avenue and California Avenue. Based on StreetLight data, most of the traffic on Pine Avenue is through traffic. Some of the roadways in the study area, such as Cypress Avenue, 8th Lane and 7th Lane are one-way streets. Westbound traffic on Pine Avenue coming from Airport Boulevard or Cypress Avenue would divert to Aspen Avenue to connect to Linden Avenue. Eastbound traffic on Pine Avenue would divert to California Avenue via Linden Avenue.

The roadways around the proposed park are currently operating at LOS A/B and therefore would be able to accommodate the additional traffic that would be diverted from Pine Avenue. It is unlikely that traffic diverted from Pine Avenue would cause significant traffic delays/congestion along these roadways.

Table 3 below summarizes the AM and PM peak hour delays at intersections around the proposed park (also see Figure 5). The AM and PM peak hour volumes were obtained from the StreetLight 2019 database, excluding weekends. All intersections surrounding the project site are unsignalized intersections that are operating at level of service (LOS) C or better. These intersections are operating below their capacity, and thus have additional capacity to accommodate traffic that would be diverted from the Pine Avenue closure.

Table 3
Intersection Level of Service

#	Intersection	Control ¹	Peak Hour	Existing Conditions ²	
				Avg. Delay ³ (sec)	LOS ⁴
1	Pine Avenue & Linden Avenue	AWSC	AM	8.0	A
			PM	8.6	A
2	Pine Avenue & Cypress Avenue	OWSC	AM	8.6	A
			PM	8.6	A
3	California Avenue & Linden Avenue	AWSC	AM	8.3	A
			PM	8.8	A
4	California Avenue & Cypress Avenue	OWSC	AM	8.5	A
			PM	8.8	A
5	Aspen Avenue & Linden Avenue	AWSC	AM	7.8	A
			PM	8.2	A
6	Aspen Avenue & Cypress Avenue	OWSC	AM	8.7	A
			PM	8.9	A
7	Pine Avenue & Airport Boulevard	OWSC	AM	14.1	B
			PM	19.1	C
8	California Avenue & Airport Boulevard	OWSC	AM	15.1	C
			PM	18.0	C

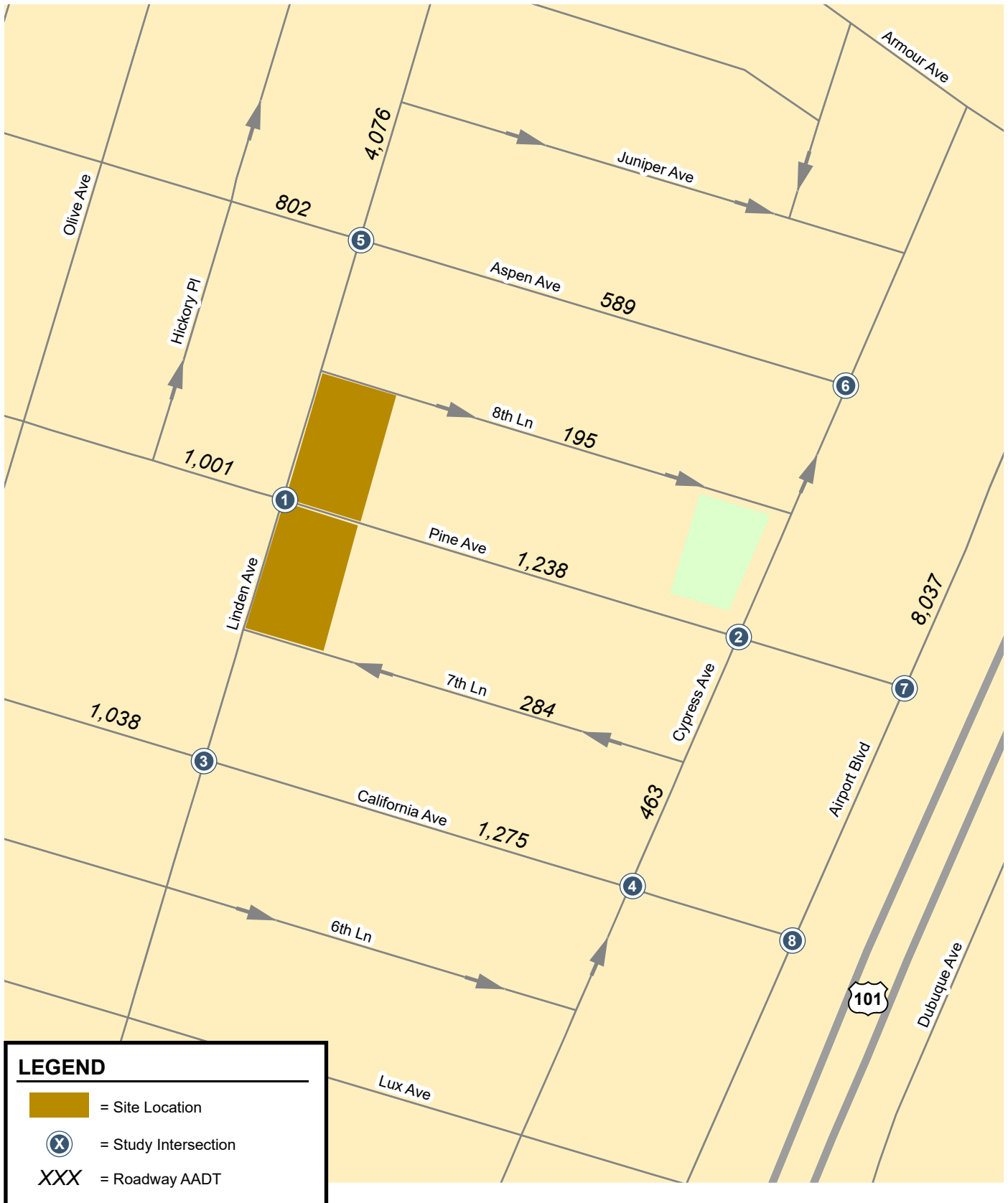
Note:

¹ AWSC = All-way stop control, OWSC = One-way stop control.

² Existing traffic counts are based on 2019 turning movement counts from StreetLight to reflect pre-COVID conditions.

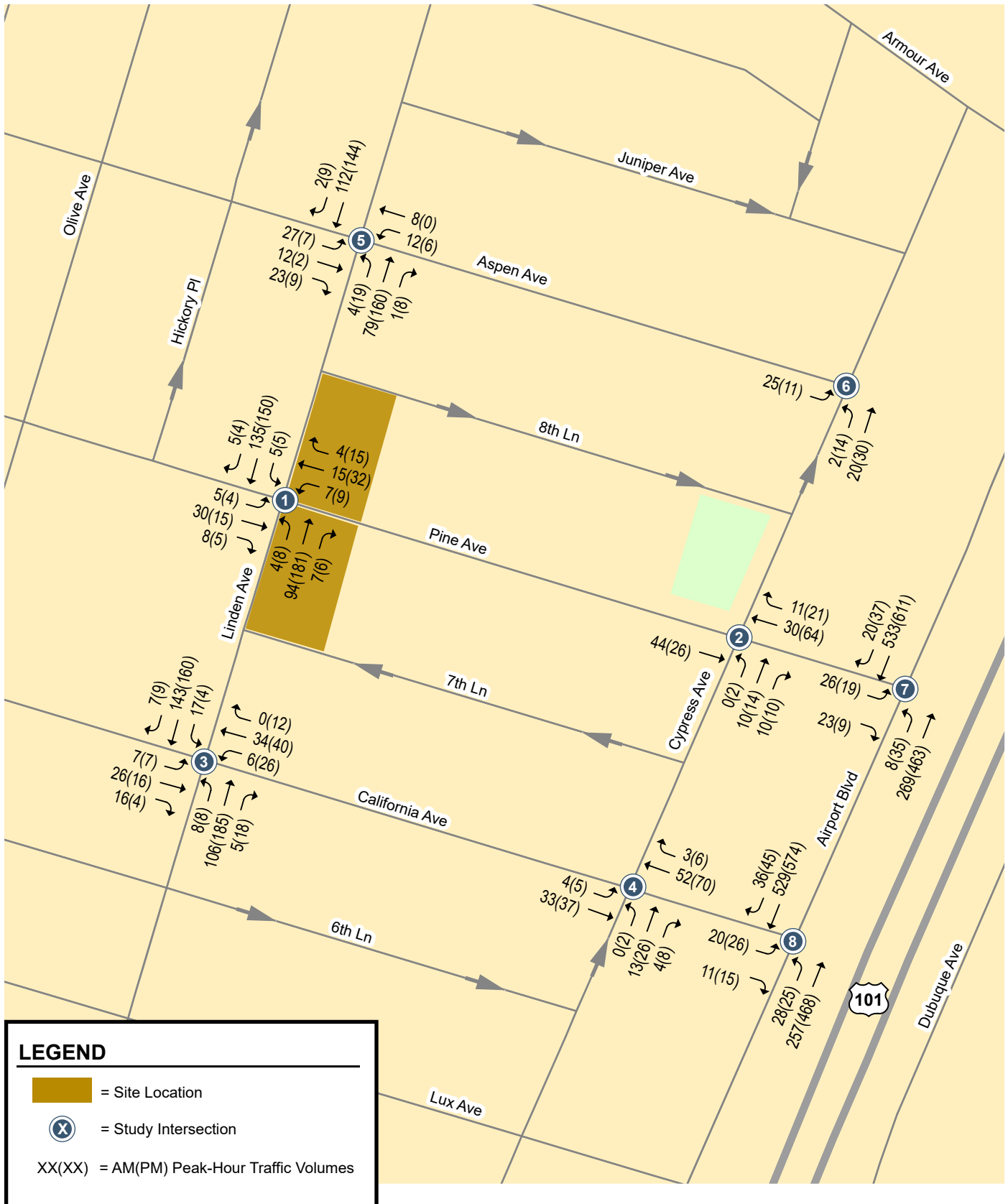
³ Delay reported as seconds per vehicle. The delay shown is the weighted average delay for all movements at AWSC intersections. At OWSC intersections, delay for the stop controlled approach is shown.

⁴ LOS is based on Highway Capacity Manual Methodology for unsignalized intersections.



Estimated Roadway AADT is from Street Light Data

Figure 4
2019 Roadway AADT



2019 Intersection Volumes are from Street Light Data

Figure 5
2019 Intersection Volumes

Alternative 3 – Pine Avenue Closure with Alley

Under this alternative, Pine Avenue would be closed off to vehicular traffic like in alternative 2 but instead of providing a roundabout for westbound traffic on Pine Avenue to turn around, a one-way alley would be provided along the eastern boundary of the park that would connect to 7th Lane. Westbound vehicles on Pine Avenue would make a left-turn onto the new alley and a right-turn onto 7th Lane to connect to Linden Avenue. It is likely that use of the alley, connecting to another alley would add delay for westbound traffic, so some traffic may divert. Also, eastbound through traffic on Pine Avenue would divert to California Avenue. Even if all traffic is diverted, as with alternative 2, traffic operations would be fine along the roadways near the proposed park. Traffic diversion under this alternative would be similar to alternative 2.

Alternative 4 – Partial Closure of Pine Avenue

Under this alternative, Pine Avenue would be kept open except when special events are conducted at the park. During special events, Pine Avenue near the park would be closed to vehicular traffic using temporary barricades. As special events would primarily be conducted during holidays or weekends, partial closure of Pine Avenue is not expected to cause any significant operational delays or queues on adjacent roadways. Emergency access to properties on Pine Avenue east of Linden Park was evaluated. Emergency vehicles would need to make a U-turn on Pine Avenue near the closure after responding to an emergency. The current roadway width on Pine Avenue is 32 feet curb-to-curb and a turn-around would not be possible for emergency vehicles. However, since temporary barricades would be used to close Pine Avenue during special events, the barricades could be moved if necessary.

Conclusions

Traffic analysis of the proposed Linden Park alternatives shows that all alternatives would be feasible to implement. The option with the raised speed table would have the least impact on traffic on adjacent streets. Alternatives 2 and 3 with closure of Pine Avenue with a roundabout or a one-way alley, respectively, on the east end of the park would cause through traffic on Pine Avenue to detour to the surrounding streets. Analysis of the existing roadway volumes and intersection operations during weekday peak hours showed that the roadways and intersections surrounding the park are operating well below capacity and therefore could accommodate additional traffic that would be diverted from Pine Avenue. No significant operational issues are anticipated for the Pine Avenue closure alternatives. The roundabout and the one-way alley that would be provided on the east end of the park on Pine Avenue should be designed to accommodate large trucks including fire apparatus under both these alternatives. Under the Pine Avenue partial closure alternative, Pine Avenue would be closed to through traffic only during special events, during which traffic would be diverted to adjacent streets. As special events would be conducted during holidays and weekends, no significant operational delays are expected to occur in the study area. However, the feasibility of maintaining access to emergency vehicles during special events to properties along Pine Avenue should be evaluated under the partial closure alternative.

Appendix A

LOS Calculations

HCM 7th AWSC
1: Linden Avenue & Pine Avenue

01/17/2024

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	30	8	7	15	4	4	94	7	5	135	5
Future Vol, veh/h	5	30	8	7	15	4	4	94	7	5	135	5
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	33	9	8	16	4	4	102	8	5	147	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	7.8	7.7	7.9	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	12%	27%	3%
Vol Thru, %	90%	70%	58%	93%
Vol Right, %	7%	19%	15%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	43	26	145
LT Vol	4	5	7	5
Through Vol	94	30	15	135
RT Vol	7	8	4	5
Lane Flow Rate	114	47	28	158
Geometry Grp	1	1	1	1
Degree of Util (X)	0.132	0.058	0.036	0.181
Departure Headway (Hd)	4.153	4.477	4.548	4.138
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	850	805	792	856
Service Time	2.243	2.478	2.55	2.219
HCM Lane V/C Ratio	0.134	0.058	0.035	0.185
HCM Control Delay, s/veh	7.9	7.8	7.7	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.2	0.1	0.7

HCM 7th TWSC
2: Cypress Avenue & Pine Avenue

01/17/2024

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	44	0	0	30	11	0	10	10	0	0	0
Future Vol, veh/h	0	44	0	0	30	11	0	10	10	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	48	0	0	33	12	0	11	11	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	45	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1564	-	0
Stage 1	-	0	0
Stage 2	-	0	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1564	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	8.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	1021	1564	-	-	-
HCM Lane V/C Ratio	0.021	-	-	-	-
HCM Control Delay (s/veh)	8.6	0	-	-	-
HCM Lane LOS	A	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Intersection

Intersection Delay, s/veh 8.3

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	26	16	6	34	0	8	106	5	17	143	7
Future Vol, veh/h	7	26	16	6	34	0	8	106	5	17	143	7
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	28	17	7	37	0	9	115	5	18	155	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	7.9	8	8.2	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	14%	15%	10%
Vol Thru, %	89%	53%	85%	86%
Vol Right, %	4%	33%	0%	4%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	119	49	40	167
LT Vol	8	7	6	17
Through Vol	106	26	34	143
RT Vol	5	16	0	7
Lane Flow Rate	129	53	43	182
Geometry Grp	1	1	1	1
Degree of Util (X)	0.156	0.067	0.057	0.217
Departure Headway (Hd)	4.341	4.513	4.721	4.309
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	828	795	760	839
Service Time	2.356	2.532	2.741	2.309
HCM Lane V/C Ratio	0.156	0.067	0.057	0.217
HCM Control Delay, s/veh	8.2	7.9	8	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.2	0.2	0.8

HCM 7th TWSC

4: California Avenue & Cypress Avenue

01/17/2024

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	4	33	0	0	52	3	0	13	4	0	0	0
Future Vol, veh/h	4	33	0	0	52	3	0	13	4	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	4	36	0	0	57	3	0	14	4	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	60	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1544	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1544	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0.79	0	8.54
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	1037	195	-	-	-
HCM Lane V/C Ratio	0.018	0.003	-	-	-
HCM Control Delay (s/veh)	8.5	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

HCM 7th AWSC

5: Linden Avenue & Aspen Avenue

01/17/2024

Intersection												
Intersection Delay, s/veh	7.8											
Intersection LOS	A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	27	12	23	12	8	0	4	79	1	0	112	2
Future Vol, veh/h	27	12	23	12	8	0	4	79	1	0	112	2
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	13	25	13	9	0	4	86	1	0	122	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	7.7	7.7	7.8	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	44%	60%	0%
Vol Thru, %	94%	19%	40%	98%
Vol Right, %	1%	37%	0%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	84	62	20	114
LT Vol	4	27	12	0
Through Vol	79	12	8	112
RT Vol	1	23	0	2
Lane Flow Rate	91	67	22	124
Geometry Grp	1	1	1	1
Degree of Util (X)	0.106	0.081	0.028	0.143
Departure Headway (Hd)	4.186	4.301	4.607	4.148
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	844	838	781	853
Service Time	2.275	2.302	2.61	2.229
HCM Lane V/C Ratio	0.108	0.08	0.028	0.145
HCM Control Delay, s/veh	7.8	7.7	7.7	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.3	0.1	0.5

Intersection

Int Delay, s/veh 4.6

Movement EBL EBR NBL NBT SBT SBRLane Configurations  

Traffic Vol, veh/h 25 0 2 20 0 0

Future Vol, veh/h 25 0 2 20 0 0

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - - - - - -

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 27 0 2 22 0 0

Major/Minor Minor2 Major1

Conflicting Flow All 26 - 0 0

Stage 1 0 - - -

Stage 2 26 - - -

Critical Hdwy 6.42 - 4.12 -

Critical Hdwy Stg 1 - - - -

Critical Hdwy Stg 2 5.42 - - -

Follow-up Hdwy 3.518 - 2.218 -

Pot Cap-1 Maneuver 989 0 - -

Stage 1 - 0 - -

Stage 2 996 0 - -

Platoon blocked, % -

Mov Cap-1 Maneuver 989 - - -

Mov Cap-2 Maneuver 989 - - -

Stage 1 - - - -

Stage 2 996 - - -

Approach EB NB

HCM Control Delay, s/v 8.74

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1

Capacity (veh/h) - - 989

HCM Lane V/C Ratio - - 0.027

HCM Control Delay (s/veh) - - 8.7

HCM Lane LOS - - A

HCM 95th %tile Q(veh) - - 0.1

HCM 7th TWSC
7: Airport Boulevard & Pine Avenue

01/17/2024

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	23	8	269	533	20
Future Vol, veh/h	26	23	8	269	533	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	-	-
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	28	25	9	292	579	22

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	754	301	601	0	-	0
Stage 1	590	-	-	-	-	-
Stage 2	164	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	345	696	972	-	-	-
Stage 1	517	-	-	-	-	-
Stage 2	849	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	342	696	972	-	-	-
Mov Cap-2 Maneuver	342	-	-	-	-	-
Stage 1	512	-	-	-	-	-
Stage 2	849	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v14.09		0.25	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	972	-	449	-	-
HCM Lane V/C Ratio	0.009	-	0.119	-	-
HCM Control Delay (s/veh)	8.7	-	14.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection

Int Delay, s/veh 0.8

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 20 11 28 257 529 36

Future Vol, veh/h 20 11 28 257 529 36

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - - 80 - - -

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 22 12 30 279 575 39

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 795 307 614 0 - 0

Stage 1 595 - - - - -

Stage 2 201 - - - - -

Critical Hdwy 6.84 6.94 4.14 - - -

Critical Hdwy Stg 1 5.84 - - - - -

Critical Hdwy Stg 2 5.84 - - - - -

Follow-up Hdwy 3.52 3.32 2.22 - - -

Pot Cap-1 Maneuver 325 689 961 - - -

Stage 1 514 - - - - -

Stage 2 813 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 315 689 961 - - -

Mov Cap-2 Maneuver 315 - - - - -

Stage 1 498 - - - - -

Stage 2 813 - - - - -

Approach EB NB SB

HCM Control Delay, s/v15.11 0.87 0

HCM LOS C

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 961 - 390 - -

HCM Lane V/C Ratio 0.032 - 0.086 - -

HCM Control Delay (s/veh) 8.9 - 15.1 - -

HCM Lane LOS A - C - -

HCM 95th %tile Q(veh) 0.1 - 0.3 - -

HCM 7th AWSC
1: Linden Avenue & Pine Avenue

01/17/2024

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	15	5	9	32	15	8	181	6	5	150	4
Future Vol, veh/h	4	15	5	9	32	15	8	181	6	5	150	4
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	16	5	10	35	16	9	197	7	5	163	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	8	8.1	8.8	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	17%	16%	3%
Vol Thru, %	93%	63%	57%	94%
Vol Right, %	3%	21%	27%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	195	24	56	159
LT Vol	8	4	9	5
Through Vol	181	15	32	150
RT Vol	6	5	15	4
Lane Flow Rate	212	26	61	173
Geometry Grp	1	1	1	1
Degree of Util (X)	0.254	0.035	0.079	0.209
Departure Headway (Hd)	4.315	4.773	4.689	4.356
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	835	751	765	826
Service Time	2.33	2.798	2.713	2.372
HCM Lane V/C Ratio	0.254	0.035	0.08	0.209
HCM Control Delay, s/veh	8.8	8	8.1	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.1	0.3	0.8

HCM 7th TWSC
2: Cypress Avenue & Pine Avenue

01/17/2024

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	26	0	0	64	21	2	14	10	0	0	0
Future Vol, veh/h	0	26	0	0	64	21	2	14	10	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	28	0	0	70	23	2	15	11	0	0	0

Major/Minor	Major1		Major2		Minor1					
Conflicting Flow All	92	0	-	-	-	0	98	121	28	
Stage 1	-	-	-	-	-	-	28	28	-	
Stage 2	-	-	-	-	-	-	70	92	-	
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-	
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318	
Pot Cap-1 Maneuver	1502	-	0	0	-	-	901	770	1047	
Stage 1	-	-	0	0	-	-	994	872	-	
Stage 2	-	-	0	0	-	-	953	818	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	1502	-	-	-	-	-	901	0	1047	
Mov Cap-2 Maneuver	-	-	-	-	-	-	901	0	-	
Stage 1	-	-	-	-	-	-	994	0	-	
Stage 2	-	-	-	-	-	-	953	0	-	

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	8.63
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	1019	1502	-	-	-
HCM Lane V/C Ratio	0.028	-	-	-	-
HCM Control Delay (s/veh)	8.6	0	-	-	-
HCM Lane LOS	A	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Intersection

Intersection Delay, s/veh 8.8

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	16	4	26	40	12	8	185	18	4	160	9
Future Vol, veh/h	7	16	4	26	40	12	8	185	18	4	160	9
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	17	4	28	43	13	9	201	20	4	174	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	8.2	8.5	9.1	8.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	26%	33%	2%
Vol Thru, %	88%	59%	51%	92%
Vol Right, %	9%	15%	15%	5%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	211	27	78	173
LT Vol	8	7	26	4
Through Vol	185	16	40	160
RT Vol	18	4	12	9
Lane Flow Rate	229	29	85	188
Geometry Grp	1	1	1	1
Degree of Util (X)	0.279	0.04	0.115	0.232
Departure Headway (Hd)	4.377	4.944	4.877	4.436
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	821	723	734	810
Service Time	2.401	2.982	2.91	2.46
HCM Lane V/C Ratio	0.279	0.04	0.116	0.232
HCM Control Delay, s/veh	9.1	8.2	8.5	8.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.1	0.1	0.4	0.9

HCM 7th TWSC
4: California Avenue & Cypress Avenue

01/17/2024

Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	5	37	0	0	70	6	2	26	8	0	0	0
Future Vol, veh/h	5	37	0	0	70	6	2	26	8	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	5	40	0	0	76	7	2	28	9	0	0	0

Major/Minor	Major1		Major2		Minor1				
Conflicting Flow All	83	0	-	-	-	0	127	134	40
Stage 1	-	-	-	-	-	-	51	51	-
Stage 2	-	-	-	-	-	-	76	83	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1515	-	0	0	-	-	867	757	1031
Stage 1	-	-	0	0	-	-	971	852	-
Stage 2	-	-	0	0	-	-	947	826	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1515	-	-	-	-	-	864	0	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	864	0	-
Stage 1	-	-	-	-	-	-	968	0	-
Stage 2	-	-	-	-	-	-	947	0	-

Approach	EB	WB	NB
HCM Control Delay, s/v 0.88		0	8.78
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	993	214	-	-	-
HCM Lane V/C Ratio	0.039	0.004	-	-	-
HCM Control Delay (s/veh)	8.8	7.4	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

HCM 7th AWSC
5: Linden Avenue & Aspen Avenue

01/17/2024

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	2	9	6	0	0	19	160	8	0	144	9
Future Vol, veh/h	7	2	9	6	0	0	19	160	8	0	144	9
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	2	10	7	0	0	21	174	9	0	157	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	7.6	8	8.4	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	39%	100%	0%
Vol Thru, %	86%	11%	0%	94%
Vol Right, %	4%	50%	0%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	187	18	6	153
LT Vol	19	7	6	0
Through Vol	160	2	0	144
RT Vol	8	9	0	9
Lane Flow Rate	203	20	7	166
Geometry Grp	1	1	1	1
Degree of Util (X)	0.231	0.025	0.009	0.189
Departure Headway (Hd)	4.098	4.513	4.954	4.096
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	870	798	727	868
Service Time	2.155	2.513	2.955	2.161
HCM Lane V/C Ratio	0.233	0.025	0.01	0.191
HCM Control Delay, s/veh	8.4	7.6	8	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.1	0	0.7

Intersection

Int Delay, s/veh 1.8

Movement EBL EBR NBL NBT SBT SBRLane Configurations  

Traffic Vol, veh/h 11 0 14 30 0 0

Future Vol, veh/h 11 0 14 30 0 0

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - - - - - -

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 12 0 15 33 0 0

Major/Minor Minor2 Major1

Conflicting Flow All 63 - 0 0

Stage 1 0 - - -

Stage 2 63 - - -

Critical Hdwy 6.42 - 4.12 -

Critical Hdwy Stg 1 - - - -

Critical Hdwy Stg 2 5.42 - - -

Follow-up Hdwy 3.518 - 2.218 -

Pot Cap-1 Maneuver 943 0 - -

Stage 1 - 0 - -

Stage 2 960 0 - -

Platoon blocked, % - - - -

Mov Cap-1 Maneuver 943 - - -

Mov Cap-2 Maneuver 943 - - -

Stage 1 - - - -

Stage 2 960 - - -

Approach EB NB

HCM Control Delay, s/v 8.87

HCM LOS A

Minor Lane/Major Mvmt NBL NBT EBLn1

Capacity (veh/h) - - 943

HCM Lane V/C Ratio - - 0.013

HCM Control Delay (s/veh) - - 8.9

HCM Lane LOS - - A

HCM 95th %tile Q(veh) - - 0

HCM 7th TWSC
7: Airport Boulevard & Pine Avenue

01/17/2024

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	19	9	35	463	611	37
Future Vol, veh/h	19	9	35	463	611	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	-	-
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	21	10	38	503	664	40

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1012	352	704	0	-	0
Stage 1	684	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	236	644	889	-	-	-
Stage 1	462	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	225	644	889	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	443	-	-	-	-	-
Stage 2	702	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v19.14		0.65	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	889	-	285	-	-
HCM Lane V/C Ratio	0.043	-	0.107	-	-
HCM Control Delay (s/veh)	9.2	-	19.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection

Int Delay, s/veh 0.8

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 26 15 25 468 574 45

Future Vol, veh/h 26 15 25 468 574 45

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - - 80 - - -

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 28 16 27 509 624 49

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 957 336 673 0 - 0

Stage 1 648 - - - - -

Stage 2 309 - - - - -

Critical Hdwy 6.84 6.94 4.14 - - -

Critical Hdwy Stg 1 5.84 - - - - -

Critical Hdwy Stg 2 5.84 - - - - -

Follow-up Hdwy 3.52 3.32 2.22 - - -

Pot Cap-1 Maneuver 256 659 914 - - -

Stage 1 482 - - - - -

Stage 2 718 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 248 659 914 - - -

Mov Cap-2 Maneuver 248 - - - - -

Stage 1 468 - - - - -

Stage 2 718 - - - - -

Approach EB NB SB

HCM Control Delay, s/v 18 0.46 0

HCM LOS C

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 914 - 321 - -

HCM Lane V/C Ratio 0.03 - 0.139 - -

HCM Control Delay (s/veh) 9.1 - 18 - -

HCM Lane LOS A - C - -

HCM 95th %tile Q(veh) 0.1 - 0.5 - -