TRAFFIC IMPACT STUDY

FOR

CENTERPOINT PROPERTIES
CONTAINER YARD SITES
NORTHWEST AIRPORT WAY MASTER PLAN

Manteca, CA

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TRAFFIC IMPACT STUDY FOR
CENTERPOINT CONTAINER YARD SITES
Manteca, CA

INTRODUCTION

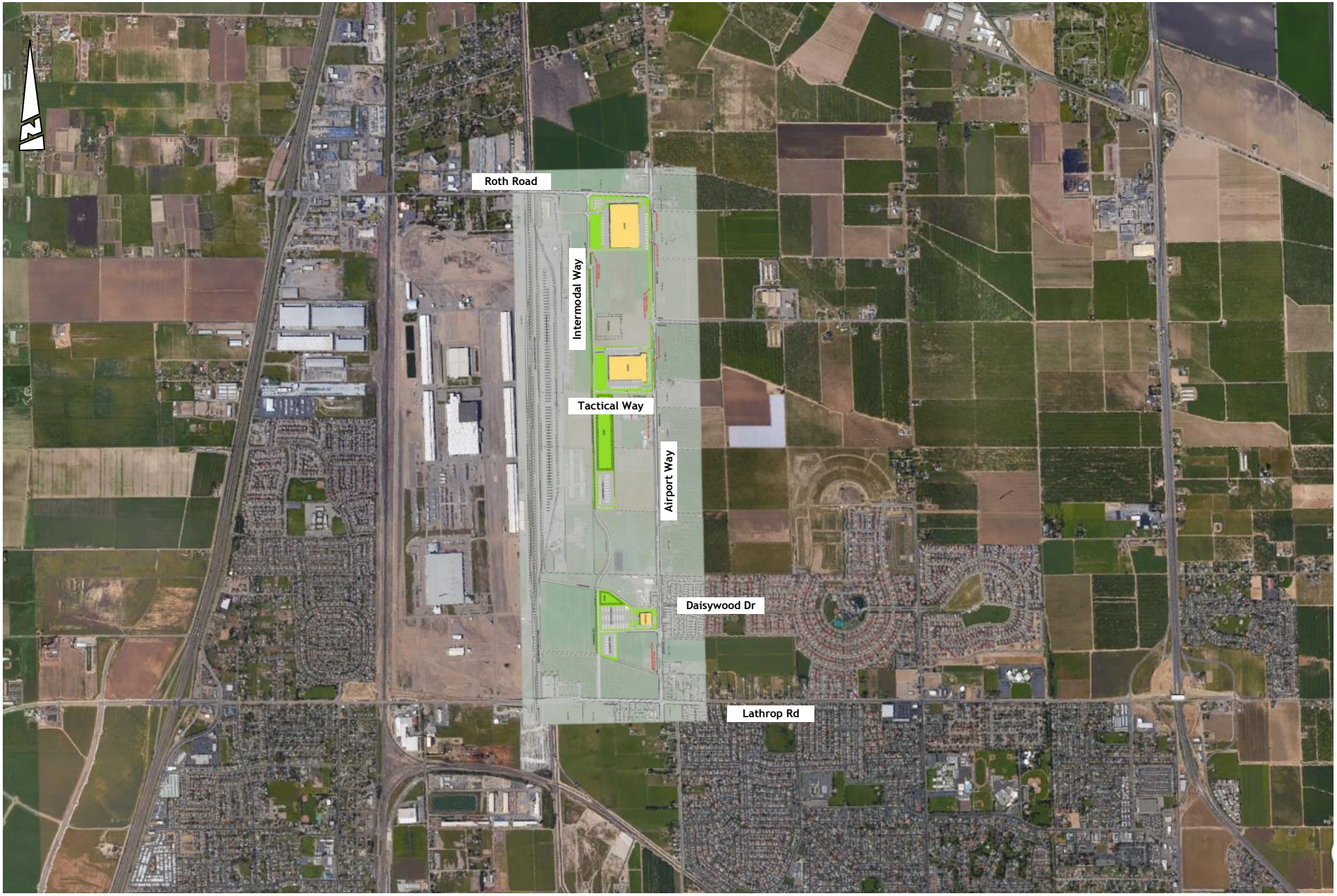
Study Purpose and Project Description

This traffic impact study presents a focused analysis of the traffic-related effects of the proposed trailer container yard sites to be located within the Centerpoint portion of the Northwest Airport Way Master Plan area in Manteca. The purpose of the analysis is to demonstrate that the trailer container yard projects are in compliance with the Master Plan EIR and to identify any roadway improvements needed to support development of the container yards. Additionally, the study analyzes projected traffic operations with the proposed street connection between Airport Way and Intermodal Way. The proposed roadway alignment will make use of the existing stub street located immediately south of the Crothall building site. This location is somewhat north of the conceptual location identified in the Northwest Airport Way Master Plan. Figure 1 displays the location of the project site. Figure 2 displays the proposed container yard sites within the master plan area. Development of three container yards is proposed, consisting of 153, 269 and 101 parking spaces for a total of 523 parking spaces.

The regional traffic impacts associated with development of the Northwest Airport Way Master Plan were previously analyzed as part of the environmental impact report prepared for the Master Plan. The scope of this study includes analysis of the following locations which will provide access to the container yard sites.

- Airport Way / East-West connector road at Crothall site
- Airport Way / Daisywood Drive
- Airport Way / Tactical Way
- Roth Road / Intermodal Way

The analysis of intersections and driveways has been conducted relative to existing traffic volumes on Airport Way and Roth Road together with traffic volume projections associated with development of the container yard sites and with the approved Gamma and Laurie development projects. Analysis of the east-west connector road between Airport Way and Intermodal Way has also been conducted using long term cumulative traffic projections contained in the Northwest Airport Way Master Plan EIR.



VICINITY MAP

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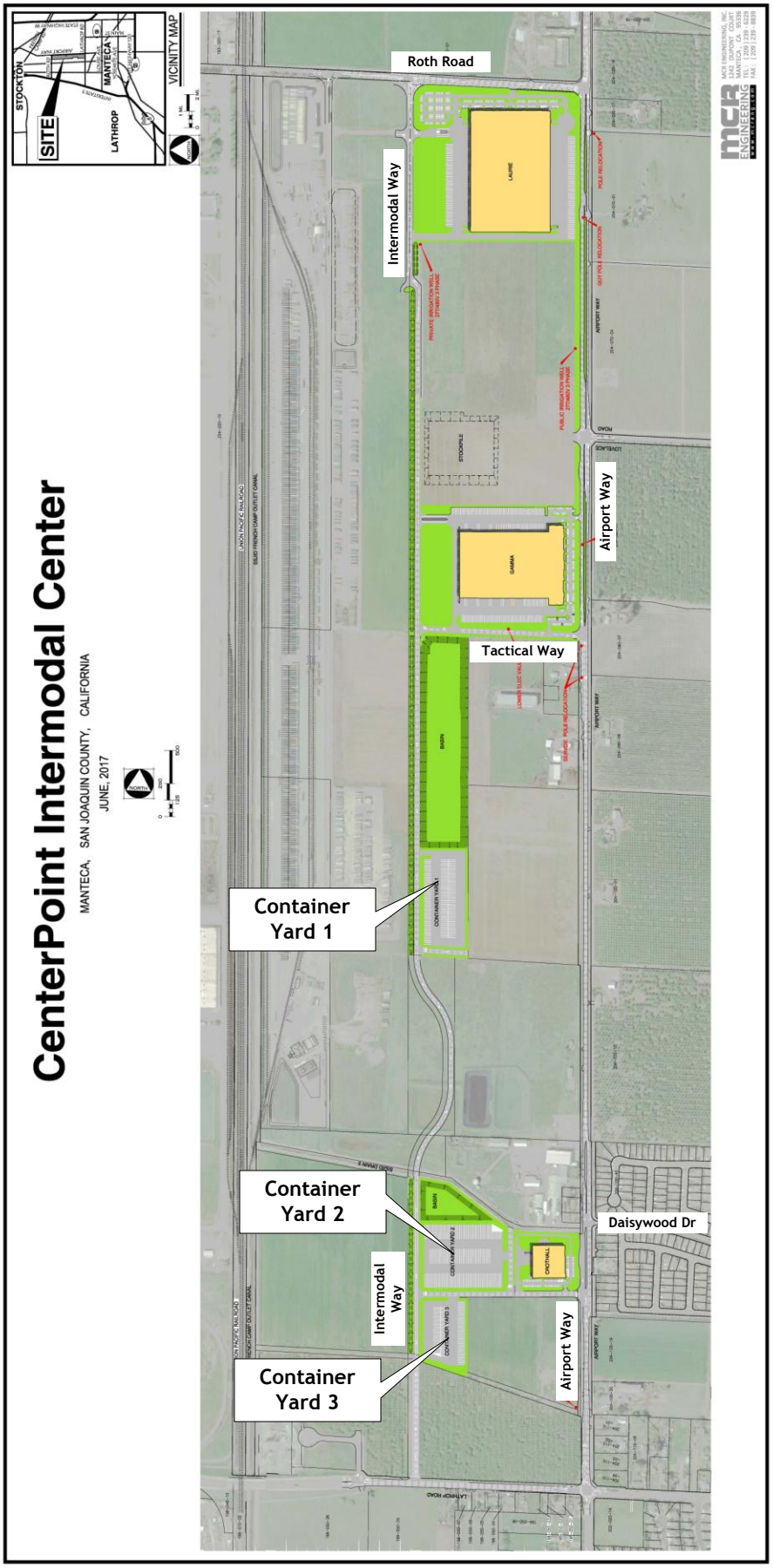
figure 1



SITE PLAN

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figure 2

EXISTING SETTING

The following is a description of area roadways and facilities that provide circulation to the project site. Roadways are shown in Figure 3.

Roadways

Airport Way is a north-south roadway that extends from Stockton south through Manteca and continues south into unincorporated San Joaquin County. The roadway is currently a 2- lane rural facility adjacent to the northerly portion of the master plan area with a posted speed limit of 55 mph. The speed limit transitions to 45 mph near the southerly portion near Daisywood Drive. Adjacent land uses are primarily agricultural with residential development immediately adjacent to Daisywood Drive. The roadway currently carries 8,000 daily vehicles adjacent to the project site.

Roadway improvements proposed as part of the approved Gamma and Laurie projects include reconstruction and widening of Airport Way to provide two southbound travel lanes, a bike lane and a center raised median from Roth Road to Tactical Way. The median will be continuous from the north side of the Tactical Way north to Roth Road. A median break will be provided at Lovelace Road and this intersection will be signalized. The outside southbound lane will terminate as a right turn lane at the Tactical Way intersection.

Roth Road is a 2-lane facility that extends east from Interstate 5 for approximately 1.5 miles to Airport Way. The roadway has a posted speed limit of 45 mph to the west of the master plan area. The Roth Road / Airport Way intersection is controlled by a traffic signal. Adjacent land uses on the north side are agricultural and transition to industrial uses into the City of Lathrop. There are two at-grade railroad crossings to the west of the project site in the City of Lathrop. The roadway currently carries 5,000 daily vehicles adjacent to the project site.

Roadway improvements proposed as part of the approved Gamma and Laurie projects include reconstruction and widening of Roth Road to provide two eastbound travel lanes and a center turn lane along the master plan area frontage from Intermodal Way to Airport Way.

Evaluation Methodology

The following is a description of the methods used in this impact study to analyze intersection operations.

Level of Service Analysis Procedures. Level of service (LOS) analysis provides a basis for describing existing traffic conditions and for evaluating the significance of project-related traffic impacts. Level of service measures the quality of traffic flow and is represented by letter designations from A to F, with a grade of A referring to the best conditions, and F representing the worst conditions. The characteristics associated with the various LOS for intersections are presented in Table 1. Intersections have been evaluated using *Highway Capacity Manual* procedures. At side street stop-sign-controlled intersections, the LOS is presented for turning movements which must yield the right of way.

Standards of Significance / Level of Service Thresholds. In this traffic impact study, the significance of the projects impact on traffic operating conditions is based on a determination of whether project generated traffic results in intersection operating conditions below acceptable standards as defined by the City of Manteca. A project's impact on traffic conditions is considered significant if implementation of the project would result in operating levels of service which are considered unacceptable. Relevant policies are contained in the City of Manteca General Plan and indicate that to the extent feasible, the City shall strive for vehicular LOS D or better, except in the Downtown area.

TABLE 1
LEVEL OF SERVICE DEFINITIONS

Level of Service	Signalized Intersection	Unsignalized Intersection	Roadway (Daily)
"A"	Uncongested operations, all queues clear in a single-signal cycle. Delay ≤ 10.0 sec	Little or no delay. Delay ≤ 10 sec/veh	Completely free flow.
"B"	Uncongested operations, all queues clear in a single cycle. Delay > 10.0 sec and ≤ 20.0 sec	Short traffic delays. Delay > 10 sec/veh and ≤ 15 sec/veh	Free flow, presence of other vehicles noticeable.
"C"	Light congestion, occasional backups on critical approaches. Delay > 20.0 sec and ≤ 35.0 sec	Average traffic delays. Delay > 15 sec/veh and ≤ 25 sec/veh	Ability to maneuver and select operating speed affected.
"D"	Significant congestions of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. Delay > 35.0 sec and ≤ 55.0 sec	Long traffic delays. Delay > 25 sec/veh and ≤ 35 sec/veh	Unstable flow, speeds and ability to maneuver restricted.
"E"	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). Delay > 55.0 sec and ≤ 80.0 sec	Very long traffic delays, failure, extreme congestion. Delay > 35 sec/veh and ≤ 50 sec/veh	At or near capacity, flow quite unstable.
"F"	Total breakdown, stop-and-go operation. Delay > 80.0 sec	Intersection blocked by external causes. Delay > 50 sec/veh	Forced flow, breakdown.
Sources: 2010 Highway Capacity Manual.			

Signal Warrants

Traffic signal warrants are a series of standards which provide guidelines for determining if a traffic signal is appropriate. Signal warrant analyses are typically conducted at intersections of

uncontrolled major streets and stop sign-controlled minor streets. If one or more signal warrants are met, signalization of the intersection may be appropriate. However, a signal should typically not be installed if none of the warrants are met, as the installation of signals may increase delays on the previously-uncontrolled major street, and may increase the occurrence of particular types of accidents.

Traffic volume data was evaluated using the signal warrant guidelines set forth in the *California Manual on Uniform Traffic Control Devices* (CA MUTCD, 2014). Warrants for traffic signals are cited in Section 4-C of the California MUTCD. The specific values used in these warrants depend upon the characteristics of the study area. Characteristics which effect traffic volume threshold levels used for the warrant evaluation include the nature and population of the surrounding community and travel speeds on the major road (at or below 40 mph, or above 40 mph). These conditions are used to define either a "rural" or "urban" setting in determining applicable warrant values. Based upon this criteria, conditions at the subject intersections on Airport Way and Roth Road would be classified as "Rural" (> 40 mph). The Peak Hour Warrant 3 has been used for this analysis.

Warrant 3: Peak Hour Volume: Warranted when the plotted point representing the vehicles per hour on the major street and the corresponding vehicles per hour on the higher of the minor street approach falls above the curve presented in Figure 4C-4 for the existing combination of approach lanes. These requirements are presented in the CA MUTCD worksheet provided in the Appendix. As shown, a minimum volume of 100 vph on a minor approach with two lanes is required to satisfy this warrant.

Existing Traffic Volumes

Peak hour traffic volume data was collected on Airport Way for this traffic impact study during July 2017. Traffic data collected on Roth Road in January 2017 has also been used. A.M. and P.M. peak hour volumes were identified using this traffic count information and have been used as the basis for this analysis. Figure 3 presents the existing peak hour traffic volumes.

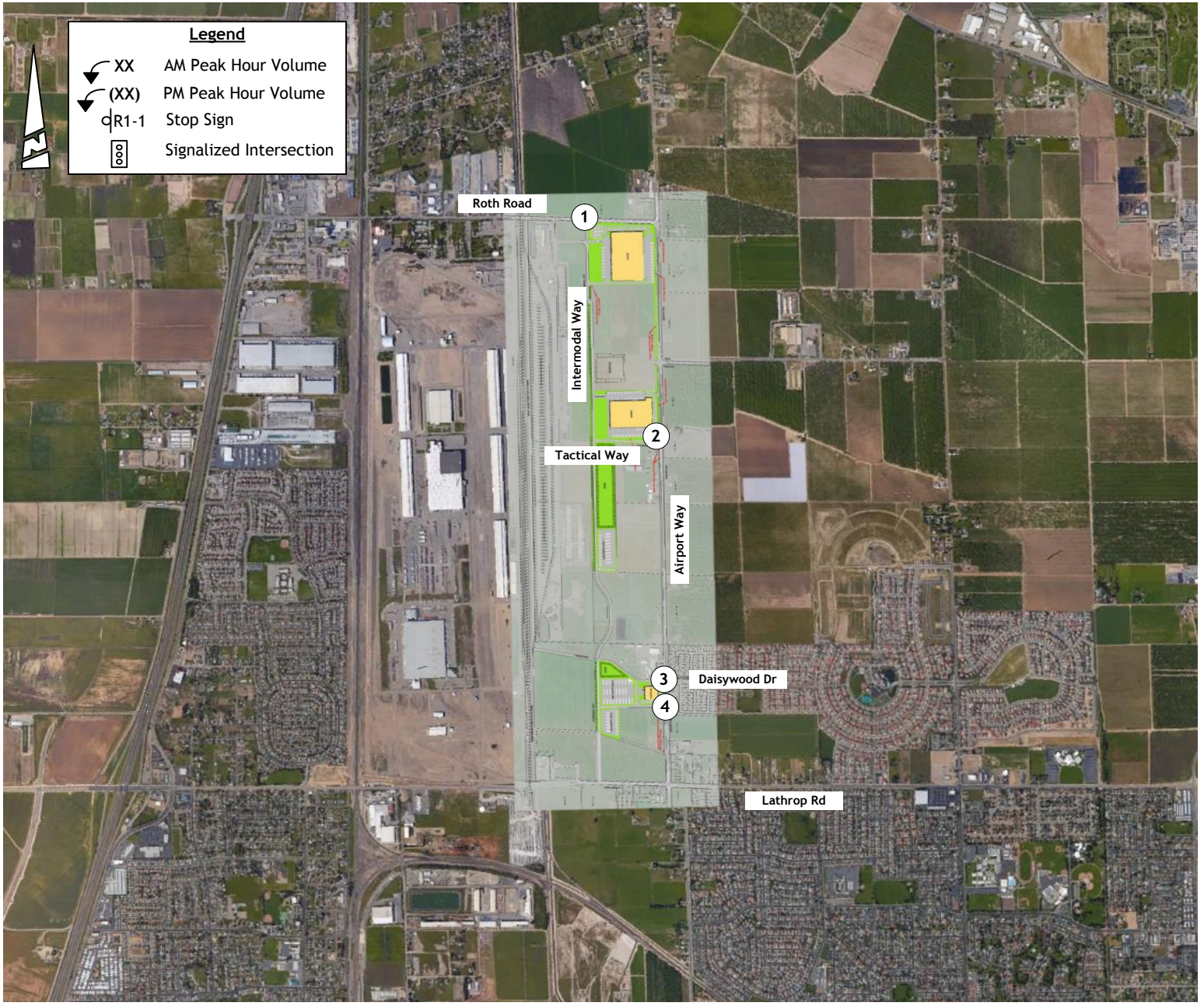
Existing Intersection Operations

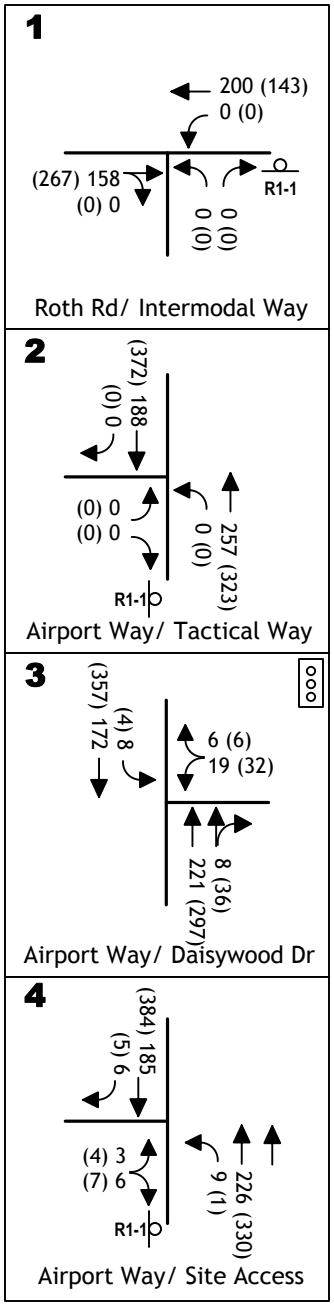
Current operating levels of service at the two existing study intersections are summarized in Table 2. The proposed access road between Airport Way and Intermodal Way will use the existing driveway alignment at Airport Way which currently serves the Crothall building. This driveway is located 540 feet south of Daisywood Drive. The Tactical Way connection to Airport Road and the Intermodal Way connection to Roth Road are pending construction. As shown in Table 2, LOS A is currently provided at the signalized Airport Way / Daisywood Drive intersection. Peak hour traffic volumes on Daisywood Drive into and out of the Del Web residential development are currently relatively minor. Satisfactory LOS A to B operations are also currently experienced at the Access Road (Crothall driveway) intersection with Airport Way. Existing peak hour driveway volumes are very minor.

TABLE 2
EXISTING INTERSECTION LEVELS OF SERVICE

Intersection	Control	Existing Conditions			
		AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Airport Way / Daisywood Drive	Signal	A	4.7	A	4.4
Airport Way / Access Road (Crothall) NB left turn EB approach	EB Stop	 A B	 8.5 11.5	 A B	 9.2 14.5

LOS - Level of Service
Delay - average delay in seconds





EXISTING TRAFFIC VOLUMES AND LANE CONFIGURATIONS

PROPOSED PROJECT CHARACTERISTICS

Development of the trailer container yard facilities would attract new traffic to the study area. The amount of additional traffic on a particular section of the street network and at project access intersections depends on two factors:

- Trip Generation, the number of new trips generated by the projects, and
- Trip Distribution and Assignment, the specific routes that the new traffic uses.

Trip Generation

The number of vehicle trips that are expected to be generated by development of the proposed container yards has been estimated based upon review of trip rates identified in the Northwest Airport Way Master Plan EIR and on traffic counts conducted by the consultant for this analysis at two existing trailer container parking facilities in the City of Lathrop. These existing trailer container parking sites are located immediately east of I-5. Traffic counts were conducted from 7:00 - 9:00 a.m. and 4:00 - 6:00 p.m. at the driveways to these facilities. This information has been used to estimate the number of trips projected to be generated by the Centerpoint container yard sites for purposes of this analysis.

Table 3 summarizes the traffic count information collected at these existing container parking sites as well as the equivalent trip generation rate on a per parking space basis. Information on both truck and automobile traffic was collected at each site. The average trip generation rate per space as shown at the bottom of Table 3 has been used for this analysis. As shown, this data indicates an a.m. peak hour trip rate of 0.10 trips per parking space and a p.m. peak hour trip rate of 0.14 trips per space. Truck traffic comprised 75% and 70% of the total traffic in the a.m. and p.m. peak hour, respectively.

Table 4 summarizes the resulting trip generation quantities for the three proposed container yard sites. As shown, a total of 52 a.m. peak hour and 73 p.m. peak hour trips is projected. A portion of these trips would be expected to remain internal to the intermodal site and this is estimated at 15% as indicated in Table 3. Resulting trips external to the master plan area are estimated at 44 a.m. peak hour and 62 p.m. peak hour trips.

Comparison to Master Plan EIR. Tables 5 and 6 summarize the estimated trip generation comparison for the container yard sites to typical quantities which might be expected using trip rates presented in the Master Plan EIR. An equivalent building coverage for the container yard sites has been used for this comparison. As shown in Table 5, the three container yard sites encompass a total of 18.74 acres. A building floor area ratio of 50% has been used for this comparison and is based upon input from the applicant and review of possible floor area coverage for the Centerpoint Gamma and Laurie projects. This yields development potential of 408,155 sf of building area. Appling trip generation rates identified in the Master Plan EIR for the Centerpoint properties to this square footage yields the estimates shown in Table 5.

Table 6 compares these peak hour trip generation estimates to the estimates developed for the proposed container yard uses. As shown, the container yards are projected to generally generate the same number of peak hour trips when compared to equivalent Master Plan EIR estimates for

industrial / warehouse building coverage. An additional 5 a.m. peak hour and 2 p.m. peak hour trips are projected for the container yard uses. The percentage of truck traffic is estimated to be higher with the container yard land use.

Other Project Trip Generation. This analysis considers development of the proposed container yard sites as well as the pending construction of the Gamma and Laurie development projects. Trip generation quantities for these projects are summarized in Table 7 and are as presented in the traffic study prepared for these projects.

Trip Distribution / Assignment

The distribution of project traffic is based upon estimates presented in the Master Plan EIR Circulation section. These estimates are presented in Table 8 and have been used for this analysis. The assignment of project traffic to the adjacent street system was based upon these regional distribution patterns and the location of each project relative to the on-site circulation system. For existing plus project conditions, container yard 1 will be served by Intermodal Way and Tactical Way. Intermodal Way will extend south from Roth Road and terminate at the south end of container yard 1. Container yards 2 and 3 will be served by the proposed access road to Airport Way on the south side of the Crothall development. Figure 4 displays resulting project generated traffic volumes projected for the container yard sites at each of the study intersections.

TABLE 3
EXISTING CONTAINER YARD SITE TRAFFIC COUNT SUMMARY
(EXISITNG SITES IN LATHROP)

	AM Peak Hour			PM Peak Hour		
	In	**Out**	**Total**	**In**	**Out**	**Total**
Site 1 (300 spaces)						
Cars	2	2	4	1	2	3
Trucks	6	4	10	4	3	7
	8	6	14 (72% trucks)	5	5	10 (70% trucks)
Site 2 (280 spaces)						
Cars	9	2	11	3	19	22
Trucks	15	18	33	33	13	46
	24	20	44 (75% trucks)	36	32	68 (68% trucks)
Site 1 Trip Generation per Space						
(Trucks)	57% (60%)	43% (40%)	0.047	50% (57%)	50% (43%)	0.033
Site 2 Trip Generation per Space						
(Trucks)	55% (45%)	45% (55%)	0.157	53% (72%)	47% (28%)	0.243
Average Trip Generation Both Sites						
	52%	48%	0.10 (75% trucks)	65%	35%	0.14 (70% trucks)

TABLE 4
CENTERPOINT CONTAINER YARD TRIP GENERATION

	AM Peak Hour			PM Peak Hour		
	In	**Out**	**Total**	**In**	**Out**	**Total**
Yard 1 (153 spaces)	8	7	15	14	7	21
Yard 2 (269 spaces)	14	13	27	25	13	38
Yard 3 (101 spaces)	5	5	10	9	5	14
	27	25	52 total (39 trucks)	48	25	73 total (51 trucks)
Estimated trip reduction for internal trips which is not applicable to the observed Lathrop sites = 15%						
Net External Trips	23	21	44 total (33 trucks)	41	21	62 total (43 trucks)

TABLE 5
EQUIVALENT TRIP GENERATION ESTIMATES
FOR PROPOSED CONTAINER YARD SITES USING MASTER PLAN EIR
TRIP GENERATION RATES FOR CENTERPOINT

Proposed Container yards total acreage = 18.74 ac 18.74 ac at 50% building coverage = 408,155 sf	
Master Plan Trip Rates / 1,000 sf	
AM Total	**PM Total**
0.096 (42% trucks)	0.147 (29% trucks)
Resulting Trips for 408,155 sf Building Area	
39 total (16 trucks)	60 total (17 trucks)

TABLE 6
TRIP GENERATION COMPARISON
ESTIMATED CONTAINER YARD TRIPS vs. EQUIVALENT
BUILDING COVERAGE TRIPS PER MASTER PLAN EIR

	AM Peak Hour Total Trips	PM Peak Hour Total Trips
Container Yards (523 spaces)	44 total (33 trucks)	62 total (43 trucks)
Equivalent Building Area (408,155 sf)	39 total (16 trucks)	60 total (17 trucks)
Net Difference for Container Yard Development	5 total (17 trucks)	2 total (26 trucks)

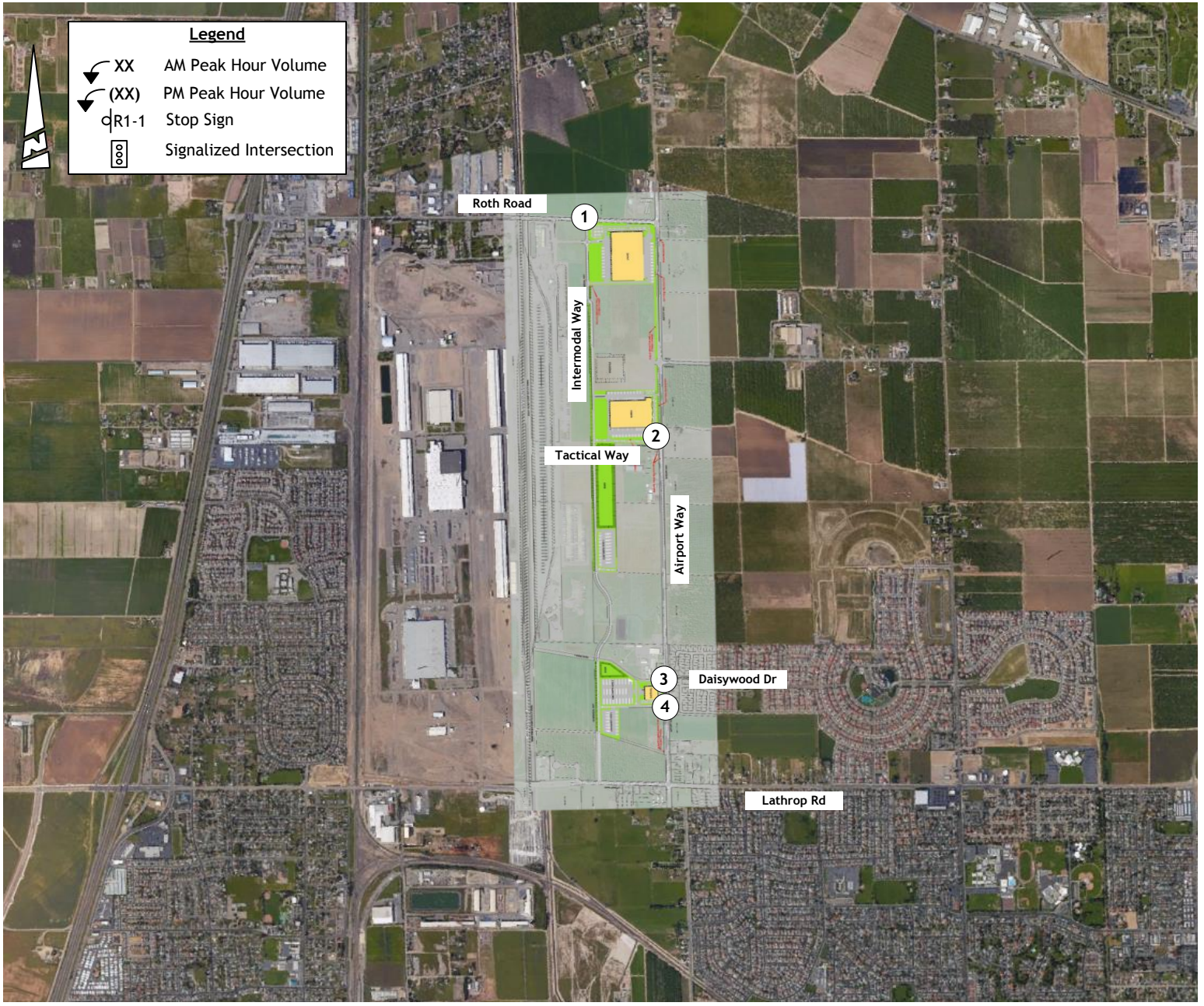
TABLE 7
TRIP GENERATION FOR APPROVED GAMMA AND LAURIE SITES

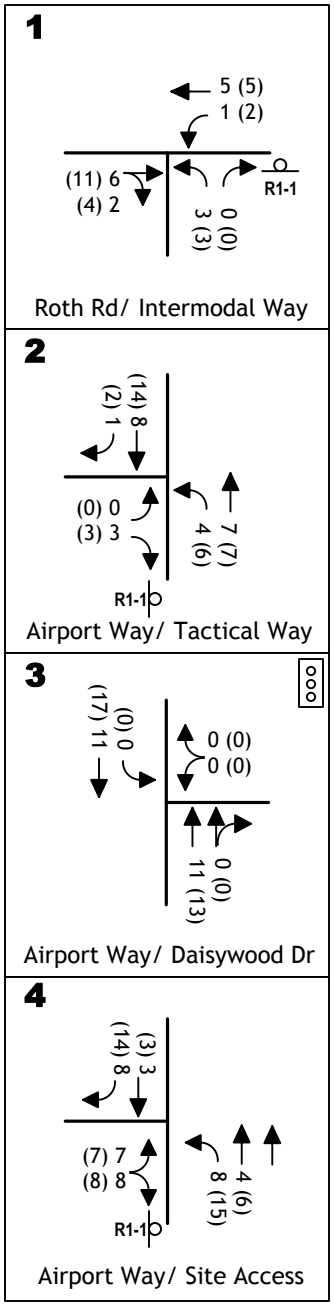
Quantity	Daily	AM Peak Hour	PM Peak Hour
956.1 ksf - Total Trips	1205	92	140
(Trucks Trips only)	(638)	(38)	(40)

TABLE 8
TRIP DISTRIBUTION PERCENTAGES

Direction	Percent Distribution
West on Roth Road	36%
North on Airport Way	8%
East on Lovelace Road	3%
South on Airport Way	53%
Total	100%

Source - Northwest Airport Way Master Plan EIR





CONTAINER YARDS PROJECT TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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figure 4

Existing Plus Project Traffic Conditions

Intersection Levels of Service. Container yard project related traffic as well as traffic generated by the approved Gamma and Laurie projects was added to existing background volumes to calculate Existing plus Project traffic conditions. Figure 5 displays the resulting traffic volumes anticipated for the study intersections in the a.m. and p.m. peak hours. Table 9 summarizes the projected a.m. and p.m. peak hour operating levels of service.

As shown in Table 9, satisfactory operating levels of service are projected at each of the study intersections. Level of Service A to C operations are projected. These calculations include the percentage of truck traffic projected at each of the study intersections. Level of Service calculations are provided in the Appendix.

Vehicle Queues. Projected vehicle queues at select approaches to each of the study intersections are summarized in Table 10. As shown, queues of one to three vehicles are projected at the majority of locations and this reflects the relatively low volume of peak hour automobile and truck traffic projected at each of the project access roads under near term conditions. All forecast queues can be accommodated within existing and planned turn pocket lengths.

The existing northbound left turn lane on Airport Way at the proposed Access Road (Crothall building access) is 200 feet in length plus a 60 foot taper. Proposed improvements to be constructed with the container yards project will increase the left turn pocket length to 315 feet and provide a 12 foot pocket taper. A one vehicle queue is projected in the left turn lane and half of this peak hour left turn volume may consist of trucks. Assuming that one 65 foot truck is waiting in the left turn pocket as a second vehicle approaches, the vehicle would have approximately 250 feet of pocket and the 120 foot taper available for deceleration in the left turn lane area. This deceleration length equates to a design speed of approximately 45 mph per interpolation of Table 405.2B of the *Highway Design Manual (HDM)*. As such, a vehicle traveling at the posted 45 mph speed limit would not need to slow in the northbound through lane prior to entering the pocket.

TABLE 9
EXISTING PLUS PROJECT
INTERSECTION LEVELS OF SERVICE

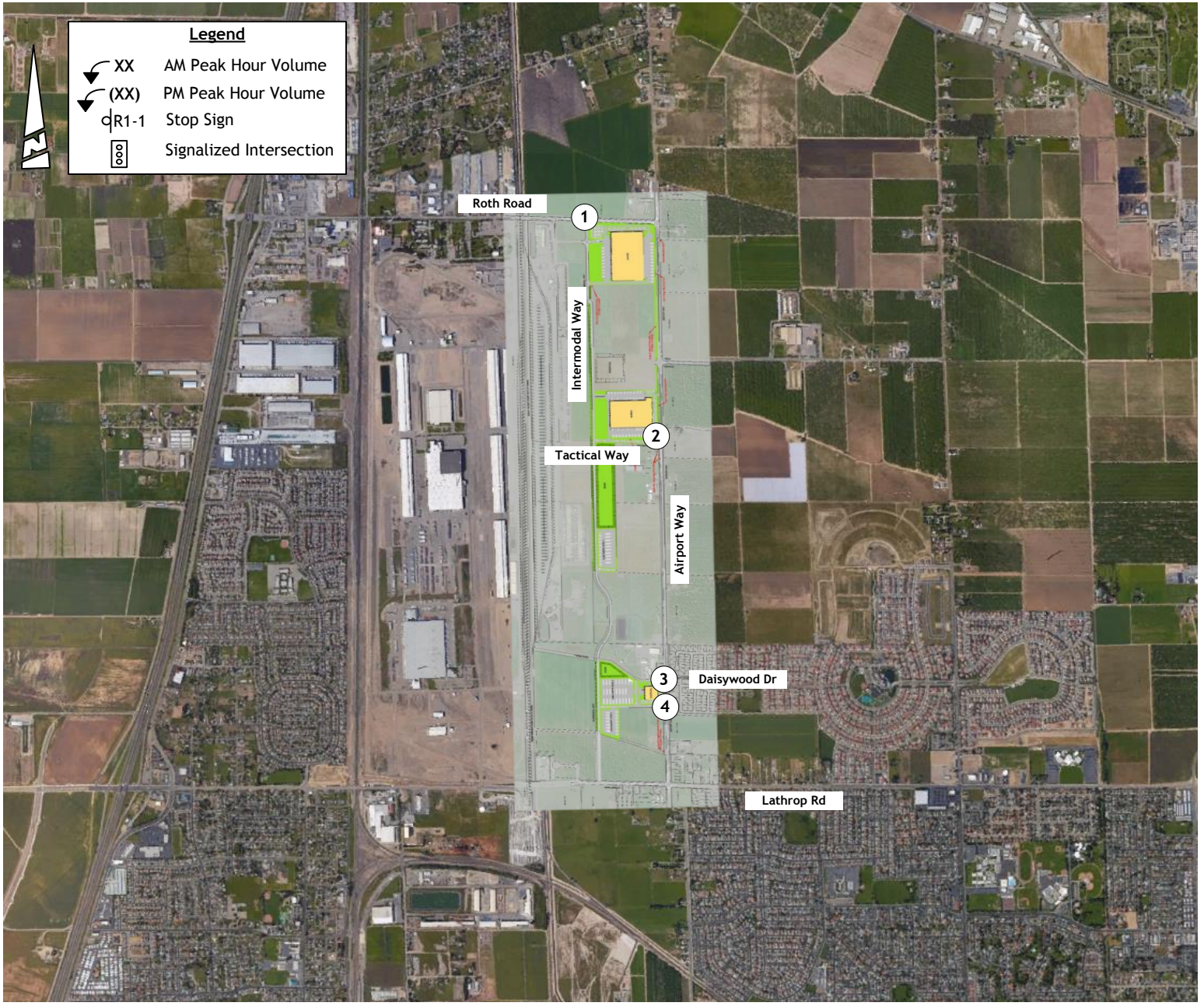
Intersection	Control	Existing plus Project Conditions			
		AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
1. Roth Road / Intermodal Way	NB Stop				
WB left turn		A	8.8	A	9.4
NB left turn		B	12.2	B	13.4
2. Airport Way / Tactical Way	EB Stop				
EB left turn		C	15.8	C	20.2
NB left turn		A	8.6	A	9.4
3. Airport Way / Daisywood Drive	Signal	A	4.5	A	4.3
4. Airport Way / Access Road	EB Stop				
NB left turn		A	8.6	A	9.7
EB approach		B	12.7	C	17.5

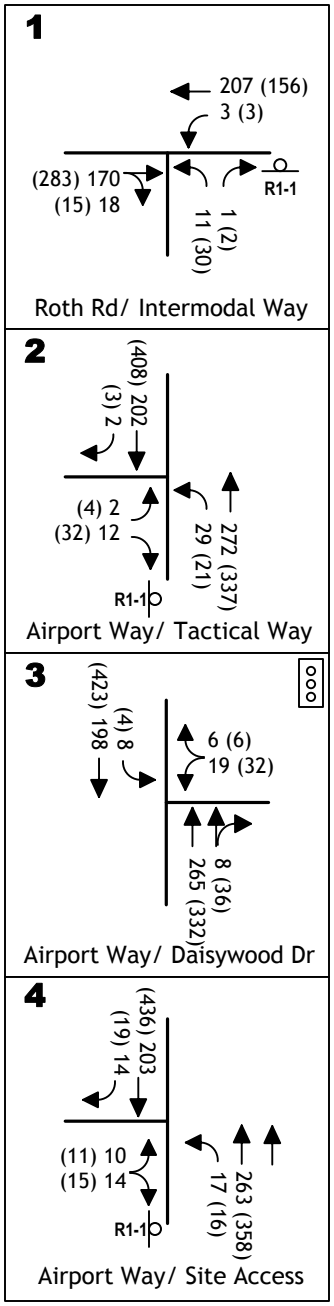
LOS - Level of Service
Delay - average delay in seconds

TABLE 10
EXISTING PLUS PROJECT
PROJECTED VEHICLE QUEUES

Intersection	Control	Queue (Number of Vehicles per Lane)	
		AM Peak Hour	PM Peak Hour
1. Roth Road / Intermodal Way	NB Stop		
WB left turn		0	0
NB left turn		2	3
2. Airport Way / Tactical Way	EB Stop		
EB left turn		1	1
NB left turn		2	2
3. Airport Way / Daisywood Drive	Signal		
NB thru lanes		2	3
4. Airport Road / Access Road	EB Stop		
NB left turn		1	1
EB approach		2	2

Vehicle queues at 95% probability





EXISTING PLUS APPROVED PROJECTS PLUS CONTAINER YARDS TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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CUMULATIVE TRAFFIC CONDITIONS

The cumulative analysis focuses on operations at the Daisywood Drive / Airport Way intersection and the proposed Access Road intersection with Airport Way. Full access is proposed at the connector road to Airport Way, linking Airport Way and Intermodal Way. The Access Road intersection is located 540 feet south of the Daisywood Drive intersection with Airport Way. The master plan also includes an extension of Daisywood Drive to the west to intersect the internal street system. The master plan circulation exhibit also indicates that the Access Road alignment is conceptual and that the location of this connector road is to be determined upon site plan review.

Cumulative traffic volume projections as presented in the Master Plan EIR for master plan buildout conditions have been used to evaluate intersection operations. Figure 6 presents projected peak hour volumes used for this analysis. As shown in Figure 6, traffic volumes on Airport Way are projected to increase substantially over the long term planning horizon. The Master Plan EIR circulation analysis also indicates that Airport Way would be constructed to a 4-lane section to provide satisfactory operating conditions through the study area. A 4-lane street section has been assumed for this analysis as the initial improvements. The transportation section of the Master Plan EIR further indicates the following:

An analysis of post 2025 conditions was also conducted to determine if development beyond the City's current General Plan could require further widening of streets within the City. This exercise revealed the following ultimate roadway right of way needs along the project frontage:

> *Airport Way - Right of way should be dedicated to provide an ultimate 6-lane arterial plus a median or center turn pocket.*

Currently, frontage improvements on the east side of Airport Way at the Daisywood Drive intersection have been constructed to this 6-lane section and extend approximately 650 feet to the north and south of Daisywood Drive. Similarly, west side frontage improvements adjacent to the Crothall site have been constructed to this 6-lane section.

Intersection Levels of Service. Table 11 summarizes projected intersection levels of service for long term cumulative conditions. Satisfactory LOS D or better is projected at the Airport Way / Daisywood Drive intersection. Left turns out of the Access Road to Airport Way are projected to experience unsatisfactory LOS F operations with stop sign control. P.M. peak hour traffic volumes at the Access Road approach are projected to warrant signalization of the intersection. As shown in Table 12, signalization of the intersection is projected to provide LOS A operations.

TABLE 11
CUMULATIVE WITH PROJECT, MASTER PLAN BUILDOUT
INTERSECTION LEVELS OF SERVICE

Intersection	Control	Cumulative plus Project Conditions			
		AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Airport Way / Daisywood Drive	Signal	C	26.0	D	35.0
Airport Way / Access Road (1)	EB Stop				
NB left turn		B	12.5	D	26.3
EB left turn		F	82.3	F	> 500
EB right turn		B	11.4	B	13.2

LOS - Level of Service
Delay - average delay in seconds
(1) - Signal Warranted PM peak hour

TABLE 12
CUMULATIVE WITH PROJECT, MASTER PLAN BUILDOUT
INTERSECTION LEVELS OF SERVICE WITH
NEW TRAFFIC SIGNAL AT ACCESS ROAD

Intersection	Control	Cumulative plus Project Conditions			
		AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Airport Way / Daisywood Drive	Signal	C	25.2	C	33.7
Airport Way / Access Road	Signal	A	4.5	A	5.4

LOS - Level of Service
Delay - average delay in seconds

Vehicle Queues. The *Synchro* traffic signal simulation model has been used to analyze intersection operations and identify projected vehicle queues with signalization of the Access Road intersection. The close proximity of the Access Road intersection to Daisywood Drive will require signal interconnect and coordination of these intersections and coordinated operation has been simulated for this analysis. Table 13 displays projected vehicle queues at key locations with coordinated signal operations and assumes four travel lanes on Airport Way through the study area. As shown in Table 13, the limited spacing between the intersections is projected to result in southbound vehicle queues backing up to the Daisywood Drive intersection from the Access Road intersection in the p.m. peak traffic hour. A distance of approximately 470 feet is

provided between the intersections and vehicle queues in the southbound lanes may extend 505 feet in length. This would result in periods of congestion between the intersections.

Providing six travel lanes on Airport Way through the study area is projected to mitigate this condition. As shown in Table 14, with a 6-lane facility and coordinated signal operations, vehicle queues are not projected to back up to the adjacent intersection in either direction. The 505 foot queue length cited above is projected to be reduced to 343 feet and this could be accommodated between the intersections.

Future development of vacant land on the east side of Airport Way could effect the length of the northbound left turn pocket provided at the Access Road intersection. If a southbound left turn pocket was constructed to access this property, the northbound left turn pocket length may be reduced to 250 feet in length with a 120 foot long bask-to-back left turn taper. A 110' queue length is projected in the northbound left turn pocket under cumulative conditions with signalization of the Access Road intersection. This equates to approximately four cars. Assuming three cars were queued in the left turn lane as a fourth vehicle enters, the vehicle would have approximately 175 feet of pocket and the 120 foot taper available for deceleration in the left turn lane area. This deceleration length equates to a design speed of approximately 35 mph per interpolation of Table 405.2B of the *Highway Design Manual (HDM)*. As such, a vehicle traveling at the posted 45 mph speed limit would need to slow 10 mph in the northbound through lane prior to entering the pocket. This is estimated to be adequate, as Section 405.2(d) of the HDM recognizes that partial deceleration of 10 mph - 20 mph may be permitted in the through lane.

TABLE 13
CUMULATIVE WITH PROJECT, MASTER PLAN BUILDOUT
PROJECTED VEHICLE QUEUES WITH
TRAFFIC SIGNAL AT ACCESS ROAD

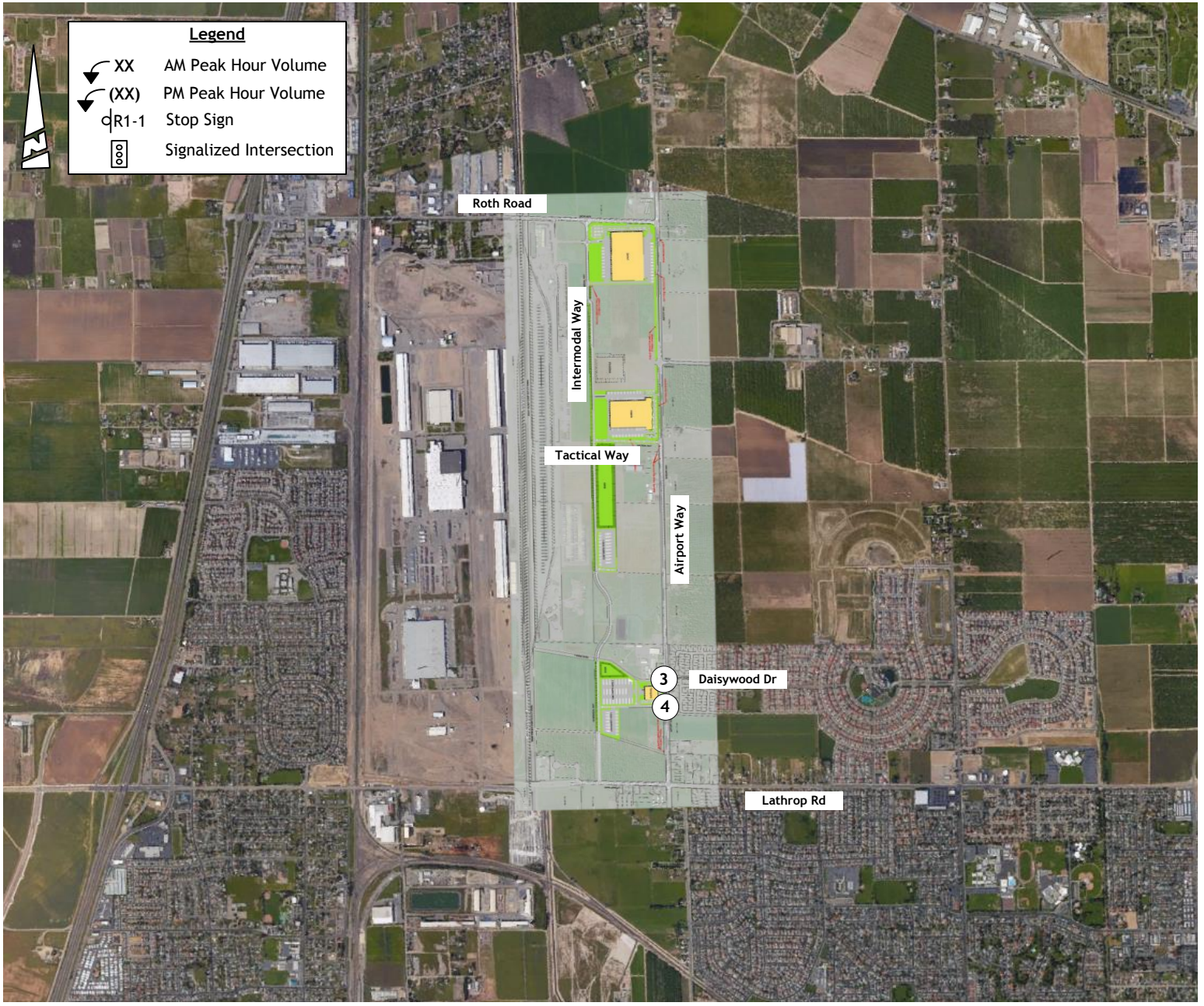
Intersection Approach (storage length)	Control	Queue in feet (Equivalent autos per lane)	
		AM Peak Hour	PM Peak Hour
Airport Way / Daisywood Drive	Signal		
NB left turn lane (300')		167' (6)	266' (11)
NB thru lanes (470')		340' (14)	307' (13)
Airport Road / Access Road	Signal		
NB left turn lane (250')		108' (4)	149' (6)
SB thru lanes (470')		128' (5)	505' (20)

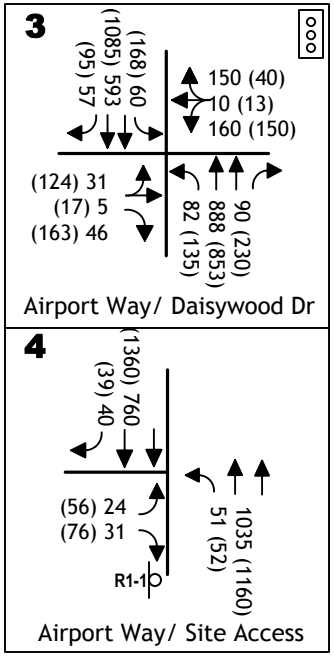
Vehicle queues at 95% probability

TABLE 14
CUMULATIVE WITH PROJECT, MASTER PLAN BUILDOUT
PROJECTED VEHICLE QUEUES WITH
TRAFFIC SIGNAL AT ACCESS ROAD AND 6-LANE AIRPORT WAY

Intersection Approach (storage length)	Control	Queue in feet (Equivalent autos per lane)	
		AM Peak Hour	PM Peak Hour
Airport Way / Daisywood Drive	Signal		
NB left turn lane (300')		125' (5)	212' (9)
NB thru lanes (470')		223' (9)	210' (9)
Airport Road / Access Road	Signal		
NB left turn lane (250')		110' (4)	147' (6)
SB thru lanes (470')		90' (4)	343' (14)

Vehicle queues at 95% probability





CUMULATIVE WITH MASTER PLAN BUILDOUT TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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Transportation Engineers

SUMMARY

This traffic impact study presents a focused analysis of the traffic-related effects of the proposed trailer container yard sites to be located within the Centerpoint portion of the Northwest Airport Way Master Plan area in Manteca. The purpose of the analysis is to demonstrate that the trailer container yard projects are in compliance with the Master Plan EIR and to identify any roadway improvements needed to support development of the container yards. Additionally, the study analyzes projected traffic operations with the proposed street connection between Airport Way and Intermodal Way. The proposed roadway alignment will make use of the existing stub street located immediately south of the Crothall building site. This location is somewhat north of the conceptual location identified in the Northwest Airport Way Master Plan. Development of three container yards is proposed, consisting of 153, 269 and 101 parking spaces for a total of 523 parking spaces.

The scope of this study includes analysis of the following locations which will provide access to the container yard sites.

- Airport Way / East-West connector road at Crothall site
- Airport Way / Daisywood Drive
- Airport Way / Tactical Way
- Roth Road / Intermodal Way

The analysis of intersections and driveways has been conducted relative to existing traffic volumes on Airport Way and Roth Road together with traffic volume projections associated with development of the container yard sites and with the approved Gamma and Laurie development projects. Analysis of the east-west connector road between Airport Way and Intermodal Way has also been conducted using long term cumulative traffic projections contained in the Northwest Airport Way Master Plan EIR.

Existing Intersection Operations

Satisfactory LOS A operation is currently provided at the signalized Airport Way / Daisywood Drive intersection. Peak hour traffic volumes on Daisywood Drive into and out of the Del Web residential development are currently relatively minor. Satisfactory LOS A to B operations are also currently experienced at the Access Road (Crothall driveway) intersection with Airport Way. Existing peak hour driveway volumes are very minor.

Project Trip Generation

A total of 52 a.m. peak hour and 73 p.m. peak hour trips is projected for the three container yard sites. A portion of these trips would be expected to remain internal to the intermodal site and this is estimated at 15% . Resulting trips external to the master plan area are estimated at 44 a.m. peak hour and 62 p.m. peak hour trips.

Existing Plus Project Traffic Conditions

Intersection Levels of Service. Satisfactory operating levels of service are projected at each of the study intersections. Level of Service A to C operations are projected. These calculations include the percentage of truck traffic projected at each of the study intersections.

Vehicle Queues. Queues of one to three vehicles are projected at the majority of locations and this reflects the relatively low volume of peak hour automobile and truck traffic projected at each of the project access roads under near term conditions. All forecast queues can be accommodated within existing and planned turn pocket lengths.

Cumulative Traffic Conditions

Intersection Levels of Service. Satisfactory LOS D or better is projected at the Airport Way / Daisywood Drive intersection. Left turns out of the Access Road to Airport Way are projected to experience unsatisfactory LOS F operations with stop sign control. P.M. peak hour traffic volumes at the Access Road approach are projected to warrant signalization of the intersection. Signalization of the intersection is projected to provide LOS A operations.

Vehicle Queues. The *Synchro* traffic signal simulation model has been used to analyze intersection operations and identify projected vehicle queues with signalization of the Access Road intersection. The close proximity of the Access Road intersection to Daisywood Drive will require signal interconnect and coordination of these intersections and coordinated operation has been simulated for this analysis. The spacing between the intersections is projected to result in southbound vehicle queues backing up to the Daisywood Drive intersection from the Access Road intersection in the p.m. peak traffic hour. This assumes four travel lanes on Airport Way. A distance of approximately 470 feet is provided between the intersections and vehicle queues in the southbound lanes may extend 505 feet in length. This would result in periods of congestion between the intersections.

Providing six travel lanes on Airport Way through the study area is projected to mitigate this condition. With a 6-lane facility and coordinated signal operations, vehicle queues are not projected to back up to the adjacent intersection in either direction. The 505 foot queue length cited above is projected to be reduced to 343 feet and this could be accommodated between the intersections.

Future development of vacant land on the east side of Airport Way could effect the length of the northbound left turn pocket provided at the Access Road intersection. If a southbound left turn pocket was constructed to access this property, the northbound left turn pocket length may be reduced to 250 feet in length with a 120 foot long bask-to-back left turn taper. A 110' queue length is projected in the northbound left turn pocket under cumulative conditions with signalization of the Access Road intersection. This equates to approximately four cars. Assuming three cars were queued in the left turn lane as a fourth vehicle enters, the vehicle would have approximately 175 feet of pocket and the 120 foot taper available for deceleration in the left turn lane area. This deceleration length equates to a design speed of approximately 35 mph. As such, a vehicle traveling at the posted 45 mph speed limit would need to slow 10 mph in the northbound through lane prior to entering the pocket. This is estimated to be adequate, as Section 405.2(d) of the *Highway Design Manual* recognizes that partial deceleration of 10 mph - 20 mph may be permitted in the through lane.

REFERENCES

1. Transportation Research Board, Special Report 209, *Highway Capacity Manual*
2. Traffic Impact Analysis for Projects Gamma and Laurie, February 2017, KD Anderson
3. Northwest Airport Way Master Plan EIR, City of Manteca
4. Highway Design Manual, California Department of Transportation

APPENDIX

Level of Service Calculations

CA MUTCD Signal Warrant 3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	3	6	9	226	185	6
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	4	8	11	282	231	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					545	
pX, platoon unblocked						
vC, conflicting volume	536	231	239			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536	231	239			
tC, single (s)	6.9	6.9	4.7			
tC, 2 stage (s)						
tF (s)	4.0	3.9	2.7			
p0 queue free %	99	99	99			
cM capacity (veh/h)	427	673	1052			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	11	11	282	231	8
Volume Left	4	11	0	0	0
Volume Right	8	0	0	0	8
cSH	564	1052	1700	1700	1700
Volume to Capacity	0.02	0.01	0.17	0.14	0.00
Queue Length 95th (ft)	2	1	0	0	0
Control Delay (s)	11.5	8.5	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	11.5	0.3		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.97		0.99		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	1735		3135		1770	1652
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	1735		3135		1770	1652
Volume (vph)	19	6	221	8	8	172
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	24	8	276	10	10	215
RTOR Reduction (vph)	7	0	1	0	0	0
Lane Group Flow (vph)	25	0	285	0	10	215
Heavy Vehicles (%)	2%	2%	15%	2%	2%	15%
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	3.0		49.1		1.4	56.0
Effective Green, g (s)	4.5		50.6		2.9	57.5
Actuated g/C Ratio	0.06		0.72		0.04	0.82
Clearance Time (s)	5.5		5.5		5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	112		2266		73	1357
v/s Ratio Prot	c0.01		0.09		0.01	c0.13
v/s Ratio Perm						
v/c Ratio	0.22		0.13		0.14	0.16
Uniform Delay, d1	31.1		3.0		32.3	1.3
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.0		0.1		0.9	0.2
Delay (s)	32.1		3.1		33.2	1.5
Level of Service	C		A		C	A
Approach Delay (s)	32.1		3.1			2.9
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	4.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

10: Access Rd & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	7	1	330	384	5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	5	8	1	375	436	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					545	
pX, platoon unblocked	0.97	0.97	0.97			
vC, conflicting volume	814	436	442			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	807	416	422			
tC, single (s)	6.9	6.9	4.7			
tC, 2 stage (s)						
tF (s)	4.0	3.9	2.7			
p0 queue free %	98	98	100			
cM capacity (veh/h)	282	502	855			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	1	375	436	6
Volume Left	5	1	0	0	0
Volume Right	8	0	0	0	6
cSH	391	855	1700	1700	1700
Volume to Capacity	0.03	0.00	0.22	0.26	0.00
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	14.5	9.2	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.5	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		

5: Daisywood & Airport Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.98		0.98		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	1749		3126		1770	1652
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	1749		3126		1770	1652
Volume (vph)	32	6	297	36	4	357
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	36	7	338	41	5	406
RTOR Reduction (vph)	7	0	6	0	0	0
Lane Group Flow (vph)	36	0	373	0	5	406
Heavy Vehicles (%)	2%	2%	15%	2%	2%	15%
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	3.3		48.9		1.3	55.7
Effective Green, g (s)	4.8		50.4		2.8	57.2
Actuated g/C Ratio	0.07		0.72		0.04	0.82
Clearance Time (s)	5.5		5.5		5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	120		2251		71	1350
v/s Ratio Prot	c0.02		0.12		0.00	c0.25
v/s Ratio Perm						
v/c Ratio	0.30		0.17		0.07	0.30
Uniform Delay, d1	31.0		3.1		32.3	1.6
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.4		0.2		0.4	0.6
Delay (s)	32.4		3.3		32.8	2.1
Level of Service	C		A		C	A
Approach Delay (s)	32.4		3.3			2.5
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	4.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

10: Access Rd & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	14	17	263	203	14
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	12	18	21	329	254	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					545	
pX, platoon unblocked						
vC, conflicting volume	625	254	271			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	625	254	271			
tC, single (s)	6.9	6.9	4.7			
tC, 2 stage (s)						
tF (s)	4.0	3.9	2.7			
p0 queue free %	97	97	98			
cM capacity (veh/h)	372	652	1021			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	30	21	329	254	18
Volume Left	12	21	0	0	0
Volume Right	18	0	0	0	18
cSH	496	1021	1700	1700	1700
Volume to Capacity	0.06	0.02	0.19	0.15	0.01
Queue Length 95th (ft)	5	2	0	0	0
Control Delay (s)	12.7	8.6	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.7	0.5		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

5: Daisywood & Airport Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.97		1.00		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	1735		3136		1770	1652
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	1735		3136		1770	1652
Volume (vph)	19	6	265	8	8	198
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	24	8	331	10	10	248
RTOR Reduction (vph)	7	0	1	0	0	0
Lane Group Flow (vph)	25	0	340	0	10	248
Heavy Vehicles (%)	2%	2%	15%	2%	2%	15%
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	3.0		49.1		1.4	56.0
Effective Green, g (s)	4.5		50.6		2.9	57.5
Actuated g/C Ratio	0.06		0.72		0.04	0.82
Clearance Time (s)	5.5		5.5		5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	112		2267		73	1357
v/s Ratio Prot	c0.01		0.11		0.01	c0.15
v/s Ratio Perm						
v/c Ratio	0.22		0.15		0.14	0.18
Uniform Delay, d1	31.1		3.0		32.3	1.3
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.0		0.1		0.9	0.3
Delay (s)	32.1		3.2		33.2	1.6
Level of Service	C		A		C	A
Approach Delay (s)	32.1		3.2			2.8
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

7: Tactical & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	2	12	29	272	202	2
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	2	15	36	340	252	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	665	252	255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	665	252	255			
tC, single (s)	7.0	6.8	4.7			
tC, 2 stage (s)						
tF (s)	4.0	3.8	2.7			
p0 queue free %	99	98	97			
cM capacity (veh/h)	335	664	1036			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	2	15	36	340	252	2
Volume Left	2	0	36	0	0	0
Volume Right	0	15	0	0	0	2
cSH	335	664	1036	1700	1700	1700
Volume to Capacity	0.01	0.02	0.03	0.20	0.15	0.00
Queue Length 95th (ft)	1	2	3	0	0	0
Control Delay (s)	15.8	10.5	8.6	0.0	0.0	0.0
Lane LOS	C	B	A			
Approach Delay (s)	11.3		0.8		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

14: Roth Rd & Intermodal Wy

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	170	18	3	207	11	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	193	20	3	235	12	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			214		445	203
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			214		445	203
tC, single (s)			5.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			3.1		3.9	4.2
p0 queue free %			100		98	100
cM capacity (veh/h)			939		504	641

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	214	3	235	14
Volume Left	0	3	0	12
Volume Right	20	0	0	1
cSH	1700	939	1700	550
Volume to Capacity	0.13	0.00	0.14	0.02
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.0	8.8	0.0	12.2
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		12.2
Approach LOS				B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 5: Daisywood & Airport Way

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (ft)	94	75	90	25	69
Average Queue (ft)	22	8	12	5	7
95th Queue (ft)	66	37	48	21	38
Link Distance (ft)	1650	475	475	1285	1285
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Tactical & Airport Way

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	47	50	45
Average Queue (ft)	2	19	9
95th Queue (ft)	16	54	35
Link Distance (ft)	1147	1147	1285
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Access Rd & Airport Way

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	42	45
Average Queue (ft)	23	6
95th Queue (ft)	53	30
Link Distance (ft)	1888	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 14: Roth Rd & Intermodal Wy

Movement	NB
Directions Served	L
Maximum Queue (ft)	51
Average Queue (ft)	9
95th Queue (ft)	37
Link Distance (ft)	1039
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Nework Summary

Network wide Queuing Penalty: 0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	11	15	16	358	436	19
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	12	17	18	407	495	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					545	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	939	495	517			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	935	467	490			
tC, single (s)	6.9	6.9	4.7			
tC, 2 stage (s)						
tF (s)	4.0	3.9	2.7			
p0 queue free %	94	96	98			
cM capacity (veh/h)	224	458	786			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	30	18	407	495	22
Volume Left	12	18	0	0	0
Volume Right	17	0	0	0	22
cSH	318	786	1700	1700	1700
Volume to Capacity	0.09	0.02	0.24	0.29	0.01
Queue Length 95th (ft)	8	2	0	0	0
Control Delay (s)	17.5	9.7	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	17.5	0.4		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	32.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.98		0.99		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	1749		3128		1770	1652
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	1749		3128		1770	1652
Volume (vph)	32	6	332	36	4	423
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	36	7	377	41	5	481
RTOR Reduction (vph)	7	0	5	0	0	0
Lane Group Flow (vph)	36	0	413	0	5	481
Heavy Vehicles (%)	2%	2%	15%	2%	2%	15%
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	3.3		48.9		1.3	55.7
Effective Green, g (s)	4.8		50.4		2.8	57.2
Actuated g/C Ratio	0.07		0.72		0.04	0.82
Clearance Time (s)	5.5		5.5		5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	120		2252		71	1350
v/s Ratio Prot	c0.02		0.13		0.00	c0.29
v/s Ratio Perm						
v/c Ratio	0.30		0.18		0.07	0.36
Uniform Delay, d1	31.0		3.2		32.3	1.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.4		0.2		0.4	0.7
Delay (s)	32.4		3.3		32.8	2.4
Level of Service	C		A		C	A
Approach Delay (s)	32.4		3.3			2.7
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	4.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

7: Tactical & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	32	21	337	408	3
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	5	36	24	383	464	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	894	464	467			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	894	464	467			
tC, single (s)	7.0	6.8	4.7			
tC, 2 stage (s)						
tF (s)	4.0	3.8	2.7			
p0 queue free %	98	93	97			
cM capacity (veh/h)	241	495	848			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	5	36	24	383	464	3
Volume Left	5	0	24	0	0	0
Volume Right	0	36	0	0	0	3
cSH	241	495	848	1700	1700	1700
Volume to Capacity	0.02	0.07	0.03	0.23	0.27	0.00
Queue Length 95th (ft)	1	6	2	0	0	0
Control Delay (s)	20.2	12.8	9.4	0.0	0.0	0.0
Lane LOS	C	B	A			
Approach Delay (s)	13.7		0.5		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

14: Roth Rd & Intermodal Wy

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	283	15	3	156	30	2
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	322	17	3	177	34	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			339		514	330
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			339		514	330
tC, single (s)			5.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			3.1		3.9	4.2
p0 queue free %			100		93	100
cM capacity (veh/h)			829		457	534

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	339	3	177	36
Volume Left	0	3	0	34
Volume Right	17	0	0	2
cSH	1700	829	1700	488
Volume to Capacity	0.20	0.00	0.10	0.07
Queue Length 95th (ft)	0	0	0	6
Control Delay (s)	0.0	9.4	0.0	13.4
Lane LOS		A		B
Approach Delay (s)	0.0	0.2		13.4
Approach LOS				B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 5: Daisywood & Airport Way

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (ft)	94	53	86	47	74
Average Queue (ft)	36	13	26	6	27
95th Queue (ft)	68	41	67	27	75
Link Distance (ft)	1650	475	475	1285	1285
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Tactical & Airport Way

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	50	94	51
Average Queue (ft)	5	32	11
95th Queue (ft)	31	75	40
Link Distance (ft)	1147	1147	1285
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Access Rd & Airport Way

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	42	50
Average Queue (ft)	22	3
95th Queue (ft)	51	19
Link Distance (ft)	1888	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 14: Roth Rd & Intermodal Wy

Movement	WB	NB
Directions Served	L	L
Maximum Queue (ft)	44	54
Average Queue (ft)	0	28
95th Queue (ft)	0	61
Link Distance (ft)		1039
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	350	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1267	1077		1702		1289	3139	1583	1770	3139	1077
Flt Permitted		0.96	1.00		0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1267	1077		1702		1289	3139	1583	1770	3139	1077
Volume (vph)	31	5	46	160	10	150	82	888	90	60	593	57
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	5	48	168	11	158	86	935	95	63	624	60
RTOR Reduction (vph)	0	0	45	0	37	0	0	0	51	0	0	35
Lane Group Flow (vph)	0	38	3	0	300	0	86	935	44	63	624	25
Heavy Vehicles (%)	50%	2%	50%	2%	2%	2%	40%	15%	2%	2%	15%	50%
Turn Type	Split		Perm	Split			Prot		Perm	Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		5.5	5.5		19.0		9.1	39.9	39.9	5.6	36.4	36.4
Effective Green, g (s)		6.5	6.5		20.0		9.6	41.4	41.4	6.1	37.9	37.9
Actuated g/C Ratio		0.07	0.07		0.22		0.11	0.46	0.46	0.07	0.42	0.42
Clearance Time (s)		5.0	5.0		5.0		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		92	78		378		137	1444	728	120	1322	454
v/s Ratio Prot		c0.03			c0.18		c0.07	c0.30		0.04	0.20	
v/s Ratio Perm			0.00						0.03			0.02
v/c Ratio		0.41	0.04		0.79		0.63	0.65	0.06	0.53	0.47	0.06
Uniform Delay, d1		39.9	38.9		33.1		38.5	18.7	13.5	40.5	18.8	15.4
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.0	0.2		11.0		8.7	2.3	0.2	4.1	1.2	0.2
Delay (s)		42.9	39.1		44.0		47.2	20.9	13.7	44.6	20.0	15.7
Level of Service		D	D		D		D	C	B	D	C	B
Approach Delay (s)		40.8			44.0			22.3			21.8	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

10: Access Rd & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	24	31	51	1035	760	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	25	33	54	1089	800	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					545	
pX, platoon unblocked	0.87	0.87	0.87			
vC, conflicting volume	1452	400	842			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1373	170	676			
tC, single (s)	7.8	8.2	5.3			
tC, 2 stage (s)						
tF (s)	4.0	4.0	2.8			
p0 queue free %	64	94	90			
cM capacity (veh/h)	70	591	534			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	25	33	54	545	545	400	400	42
Volume Left	25	0	54	0	0	0	0	0
Volume Right	0	33	0	0	0	0	0	42
cSH	70	591	534	1700	1700	1700	1700	1700
Volume to Capacity	0.36	0.06	0.10	0.32	0.32	0.24	0.24	0.02
Queue Length 95th (ft)	34	4	8	0	0	0	0	0
Control Delay (s)	82.3	11.4	12.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B	B					
Approach Delay (s)	42.4		0.6			0.0		
Approach LOS	E							

Intersection Summary

Average Delay	1.5		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 5: Daisywood & Airport Way

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	108	40	255	128	386	319	42	176	240	218	90
Average Queue (ft)	44	27	152	69	189	155	14	58	121	119	29
95th Queue (ft)	97	51	226	127	309	274	31	117	205	193	67
Link Distance (ft)	1208	1208	1636		470	470			1547	1547	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)				300			300	225			300
Storage Blk Time (%)					0.00	0.00			0.01		
Queuing Penalty (veh)					0	0			0		

Intersection: 10: Access Rd & Airport Way

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	84	40	71	40
Average Queue (ft)	27	23	24	3
95th Queue (ft)	66	52	61	18
Link Distance (ft)	1877	1877		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			250	300
Storage Blk Time (%)				
Queuing Penalty (veh)				

Nework Summary

Network wide Queuing Penalty: 1

5: Daisywood & Airport Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1262	1077		1749		1289	3139	1583	1770	3139	1077
Flt Permitted		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1262	1077		1749		1289	3139	1583	1770	3139	1077
Volume (vph)	124	17	163	150	13	40	135	853	230	168	1085	95
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	18	172	158	14	42	142	898	242	177	1142	100
RTOR Reduction (vph)	0	0	148	0	10	0	0	0	142	0	0	58
Lane Group Flow (vph)	0	149	24	0	204	0	142	898	100	177	1142	42
Heavy Vehicles (%)	50%	2%	50%	2%	2%	2%	40%	15%	2%	2%	15%	50%
Turn Type	Split		Perm	Split			Prot		Perm	Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		11.7	11.7		11.2		11.2	35.7	35.7	11.4	35.9	35.9
Effective Green, g (s)		12.7	12.7		12.2		11.7	37.2	37.2	11.9	37.4	37.4
Actuated g/C Ratio		0.14	0.14		0.14		0.13	0.41	0.41	0.13	0.42	0.42
Clearance Time (s)		5.0	5.0		5.0		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		178	152		237		168	1297	654	234	1304	448
v/s Ratio Prot		c0.12			c0.12		c0.11	0.29		0.10	c0.36	
v/s Ratio Perm			0.02						0.06			0.04
v/c Ratio		0.84	0.16		0.86		0.85	0.69	0.15	0.76	0.88	0.09
Uniform Delay, d1		37.6	34.0		38.1		38.3	21.7	16.5	37.7	24.2	16.0
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		27.5	0.5		26.1		30.3	3.1	0.5	13.0	8.5	0.4
Delay (s)		65.1	34.5		64.1		68.6	24.8	17.0	50.7	32.6	16.4
Level of Service		E	C		E		E	C	B	D	C	B
Approach Delay (s)		48.7			64.1			28.2			33.7	
Approach LOS		D			E			C			C	

Intersection Summary

HCM Average Control Delay	35.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

10: Access Rd & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	56	76	52	1160	1360	39
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	59	80	55	1221	1432	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					545	
pX, platoon unblocked	0.67	0.67	0.67			
vC, conflicting volume	2152	716	1473			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2225	96	1218			
tC, single (s)	7.8	8.2	5.3			
tC, 2 stage (s)						
tF (s)	4.0	4.0	2.8			
p0 queue free %	0	85	75			
cM capacity (veh/h)	10	519	223			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	59	80	55	611	611	716	716	41
Volume Left	59	0	55	0	0	0	0	0
Volume Right	0	80	0	0	0	0	0	41
cSH	10	519	223	1700	1700	1700	1700	1700
Volume to Capacity	5.91	0.15	0.25	0.36	0.36	0.42	0.42	0.02
Queue Length 95th (ft)	Err	14	23	0	0	0	0	0
Control Delay (s)	Err	13.2	26.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B	D					
Approach Delay (s)	4249.6		1.1			0.0		
Approach LOS	F							

Intersection Summary

Average Delay	205.0		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 5: Daisywood & Airport Way

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	314	272	215	275	294	256	108	250	369	368	90
Average Queue (ft)	171	98	137	120	185	157	36	116	258	246	40
95th Queue (ft)	287	173	212	226	276	244	76	188	367	364	73
Link Distance (ft)	1208	1208	1636		470	470			1547	1547	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)				300			300	225			300
Storage Blk Time (%)					0.00				0.09	0.02	
Queuing Penalty (veh)					0				15	2	

Intersection: 10: Access Rd & Airport Way

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	962	959	152	50	41
Average Queue (ft)	605	582	42	2	1
95th Queue (ft)	959	1053	107	17	14
Link Distance (ft)	1877	1877		470	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250		300
Storage Blk Time (%)					
Queuing Penalty (veh)					

Nework Summary

Network wide Queuing Penalty: 17

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1267	1077		1702		1289	3139	1583	1770	3139	1077
Flt Permitted		0.96	1.00		0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1267	1077		1702		1289	3139	1583	1770	3139	1077
Volume (vph)	31	5	46	160	10	150	82	888	90	60	593	57
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	5	48	168	11	158	86	935	95	63	624	60
RTOR Reduction (vph)	0	0	45	0	37	0	0	0	51	0	0	35
Lane Group Flow (vph)	0	38	3	0	300	0	86	935	44	63	624	25
Heavy Vehicles (%)	50%	2%	50%	2%	2%	2%	40%	15%	2%	2%	15%	50%
Turn Type	Split		Perm	Split			Prot		Perm	Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		5.5	5.5		19.0		9.1	39.9	39.9	5.6	36.4	36.4
Effective Green, g (s)		6.5	6.5		20.0		9.6	41.4	41.4	6.1	37.9	37.9
Actuated g/C Ratio		0.07	0.07		0.22		0.11	0.46	0.46	0.07	0.42	0.42
Clearance Time (s)		5.0	5.0		5.0		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		92	78		378		137	1444	728	120	1322	454
v/s Ratio Prot		c0.03			c0.18		c0.07	c0.30		0.04	0.20	
v/s Ratio Perm			0.00						0.03			0.02
v/c Ratio		0.41	0.04		0.79		0.63	0.65	0.06	0.53	0.47	0.06
Uniform Delay, d1		39.9	38.9		33.1		38.5	18.7	13.5	40.5	18.8	15.4
Progression Factor		1.00	1.00		1.00		0.92	0.93	0.86	1.00	1.00	1.00
Incremental Delay, d2		3.0	0.2		11.0		8.2	2.1	0.1	4.1	1.2	0.2
Delay (s)		42.9	39.1		44.0		43.8	19.5	11.7	44.6	20.0	15.7
Level of Service		D	D		D		D	B	B	D	C	B
Approach Delay (s)		40.8			44.0			20.7			21.8	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

10: Access Rd & Airport Way

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1203	973	1128	3139	3139	1009
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1203	973	1128	3139	3139	1009
Volume (vph)	24	31	51	1035	760	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	33	54	1089	800	42
RTOR Reduction (vph)	0	31	0	0	0	12
Lane Group Flow (vph)	25	2	54	1089	800	30
Heavy Vehicles (%)	50%	66%	60%	15%	15%	60%
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	5.1	5.1	6.9	74.4	63.0	63.0
Effective Green, g (s)	6.1	6.1	7.4	75.9	64.5	64.5
Actuated g/C Ratio	0.07	0.07	0.08	0.84	0.72	0.72
Clearance Time (s)	5.0	5.0	4.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	82	66	93	2647	2250	723
v/s Ratio Prot	c0.02	0.00	c0.05	c0.35	0.25	
v/s Ratio Perm						0.03
v/c Ratio	0.30	0.03	0.58	0.41	0.36	0.04
Uniform Delay, d1	39.9	39.2	39.8	1.7	4.8	3.7
Progression Factor	1.00	1.00	1.00	1.00	0.38	0.29
Incremental Delay, d2	2.1	0.2	8.9	0.5	0.4	0.1
Delay (s)	42.0	39.4	48.7	2.2	2.2	1.2
Level of Service	D	D	D	A	A	A
Approach Delay (s)	40.5			4.4	2.2	
Approach LOS	D			A	A	

Intersection Summary

HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 5: Daisywood & Airport Way

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	107	41	217	324	510	448	319	176	282	184	51
Average Queue (ft)	42	28	154	69	189	165	26	56	121	109	34
95th Queue (ft)	94	52	220	167	341	304	120	112	212	165	61
Link Distance (ft)	1208	1208	1636		470	470			1547	1547	
Upstream Blk Time (%)					0.00						
Queuing Penalty (veh)					2						
Storage Bay Dist (ft)				300			300	225			300
Storage Blk Time (%)					0.01	0.01	0.00		0.01		
Queuing Penalty (veh)					1	1	0		0		

Intersection: 10: Access Rd & Airport Way

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	R
Maximum Queue (ft)	66	62	131	133	133	135	198	72
Average Queue (ft)	24	24	52	36	25	54	42	13
95th Queue (ft)	52	54	108	100	85	117	128	47
Link Distance (ft)	1877	1877		1067	1067	470	470	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			250					300
Storage Blk Time (%)								
Queuing Penalty (veh)								

Nework Summary

Network wide Queuing Penalty: 3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1262	1077		1749		1289	3139	1583	1770	3139	1077
Flt Permitted		0.96	1.00		0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1262	1077		1749		1289	3139	1583	1770	3139	1077
Volume (vph)	124	17	163	150	13	40	135	853	230	168	1085	95
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	18	172	158	14	42	142	898	242	177	1142	100
RTOR Reduction (vph)	0	0	148	0	10	0	0	0	143	0	0	58
Lane Group Flow (vph)	0	149	24	0	204	0	142	898	99	177	1142	42
Heavy Vehicles (%)	50%	2%	50%	2%	2%	2%	40%	15%	2%	2%	15%	50%
Turn Type	Split		Perm	Split			Prot		Perm	Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		11.7	11.7		11.2		11.2	35.5	35.5	11.6	35.9	35.9
Effective Green, g (s)		12.7	12.7		12.2		11.7	37.0	37.0	12.1	37.4	37.4
Actuated g/C Ratio		0.14	0.14		0.14		0.13	0.41	0.41	0.13	0.42	0.42
Clearance Time (s)		5.0	5.0		5.0		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		178	152		237		168	1290	651	238	1304	448
v/s Ratio Prot		c0.12			c0.12		c0.11	0.29		0.10	c0.36	
v/s Ratio Perm			0.02						0.06			0.04
v/c Ratio		0.84	0.16		0.86		0.85	0.70	0.15	0.74	0.88	0.09
Uniform Delay, d1		37.6	34.0		38.1		38.3	21.9	16.7	37.5	24.2	16.0
Progression Factor		1.00	1.00		1.00		0.96	0.89	0.71	1.00	1.00	1.00
Incremental Delay, d2		27.5	0.5		26.1		28.0	2.8	0.4	11.9	8.5	0.4
Delay (s)		65.1	34.5		64.1		64.6	22.2	12.3	49.3	32.6	16.4
Level of Service		E	C		E		E	C	B	D	C	B
Approach Delay (s)		48.7			64.1			25.1			33.6	
Approach LOS		D			E			C			C	

Intersection Summary

HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1203	973	1128	3139	3139	1009
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1203	973	1128	3139	3139	1009
Volume (vph)	56	76	52	1160	1360	39
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	59	80	55	1221	1432	41
RTOR Reduction (vph)	0	72	0	0	0	13
Lane Group Flow (vph)	59	8	55	1221	1432	28
Heavy Vehicles (%)	50%	66%	60%	15%	15%	60%
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	8.0	8.0	6.5	71.5	60.5	60.5
Effective Green, g (s)	9.0	9.0	7.0	73.0	62.0	62.0
Actuated g/C Ratio	0.10	0.10	0.08	0.81	0.69	0.69
Clearance Time (s)	5.0	5.0	4.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	120	97	88	2546	2162	695
v/s Ratio Prot	c0.05	0.01	0.05	c0.39	c0.46	
v/s Ratio Perm						0.03
v/c Ratio	0.49	0.08	0.62	0.48	0.66	0.04
Uniform Delay, d1	38.3	36.8	40.2	2.6	8.0	4.5
Progression Factor	1.00	1.00	1.00	1.00	0.17	0.01
Incremental Delay, d2	3.1	0.4	13.0	0.6	0.8	0.1
Delay (s)	41.5	37.1	53.3	3.3	2.2	0.1
Level of Service	D	D	D	A	A	A
Approach Delay (s)	39.0			5.4	2.1	
Approach LOS	D			A	A	

Intersection Summary

HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 5: Daisywood & Airport Way

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	336	272	234	344	376	322	63	251	450	447	345
Average Queue (ft)	169	93	132	136	202	184	31	139	272	279	61
95th Queue (ft)	294	175	219	266	307	286	51	251	412	412	189
Link Distance (ft)	1208	1208	1636		470	470			1547	1547	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)				300			300	225			300
Storage Blk Time (%)					0.01	0.00		0.00	0.12	0.04	0.00
Queuing Penalty (veh)					1	0		0	20	4	0

Intersection: 10: Access Rd & Airport Way

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	R
Maximum Queue (ft)	170	142	194	176	154	453	479	345
Average Queue (ft)	69	47	69	68	50	309	320	58
95th Queue (ft)	146	97	149	145	121	505	502	220
Link Distance (ft)	1877	1877		1067	1067	470	470	
Upstream Blk Time (%)						0.00	0.00	
Queuing Penalty (veh)						0	3	
Storage Bay Dist (ft)			250					300
Storage Blk Time (%)							0.08	0.00
Queuing Penalty (veh)							3	0

Nework Summary

Network wide Queuing Penalty: 32

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.91	
Frt		1.00	0.85		0.97		1.00	0.97		1.00	0.99	
Flt Protected		0.96	1.00		0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1262	1077		1749		1289	4474		1770	4349	
Flt Permitted		0.96	1.00		0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1262	1077		1749		1289	4474		1770	4349	
Volume (vph)	124	17	163	150	13	40	135	853	230	168	1085	95
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	18	172	158	14	42	142	898	242	177	1142	100
RTOR Reduction (vph)	0	0	145	0	10	0	0	52	0	0	11	0
Lane Group Flow (vph)	0	149	27	0	204	0	142	1088	0	177	1231	0
Heavy Vehicles (%)	50%	2%	50%	2%	2%	2%	40%	15%	2%	2%	15%	50%
Turn Type	Split		Perm	Split			Prot			Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		13.0	13.0		12.5		13.3	33.1		11.4	31.2	
Effective Green, g (s)		14.0	14.0		13.5		13.8	34.6		11.9	32.7	
Actuated g/C Ratio		0.16	0.16		0.15		0.15	0.38		0.13	0.36	
Clearance Time (s)		5.0	5.0		5.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		196	168		262		198	1720		234	1580	
v/s Ratio Prot		c0.12			c0.12		c0.11	0.24		0.10	c0.28	
v/s Ratio Perm			0.02									
v/c Ratio		0.76	0.16		0.78		0.72	0.63		0.76	0.78	
Uniform Delay, d1		36.4	32.9		36.8		36.2	22.5		37.7	25.4	
Progression Factor		1.00	1.00		1.00		0.96	0.90		1.00	1.00	
Incremental Delay, d2		15.8	0.4		13.5		11.3	1.7		13.0	3.9	
Delay (s)		52.2	33.4		50.3		46.2	22.0		50.7	29.3	
Level of Service		D	C		D		D	C		D	C	
Approach Delay (s)		42.1			50.3			24.7			32.0	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1203	973	1128	4510	4443	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1203	973	1128	4510	4443	
Volume (vph)	56	76	52	1160	1360	39
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	59	80	55	1221	1432	41
RTOR Reduction (vph)	0	72	0	0	2	0
Lane Group Flow (vph)	59	8	55	1221	1471	0
Heavy Vehicles (%)	50%	66%	60%	15%	15%	60%
Turn Type		Prot	Prot			
Protected Phases	4	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	8.5	8.5	7.0	71.0	59.5	
Effective Green, g (s)	9.5	9.5	7.5	72.5	61.0	
Actuated g/C Ratio	0.11	0.11	0.08	0.81	0.68	
Clearance Time (s)	5.0	5.0	4.5	5.5	5.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	127	103	94	3633	3011	
v/s Ratio Prot	c0.05	0.01	c0.05	0.27	c0.33	
v/s Ratio Perm						
v/c Ratio	0.46	0.08	0.59	0.34	0.49	
Uniform Delay, d1	37.9	36.3	39.8	2.3	7.0	
Progression Factor	1.00	1.00	1.00	1.00	0.12	
Incremental Delay, d2	2.7	0.3	9.0	0.3	0.4	
Delay (s)	40.5	36.7	48.7	2.6	1.2	
Level of Service	D	D	D	A	A	
Approach Delay (s)	38.3			4.6	1.2	
Approach LOS	D			A	A	

Intersection Summary

HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 5: Daisywood & Airport Way

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (ft)	320	155	217	230	251	218	213	250	261	284	318
Average Queue (ft)	159	76	132	119	161	140	131	122	191	185	185
95th Queue (ft)	274	127	200	212	247	210	200	212	260	263	269
Link Distance (ft)	1210	1210	1638		470	470	470		1547	1547	1547
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)				300				225			
Storage Blk Time (%)								0.00	0.02		
Queuing Penalty (veh)								1	3		

Intersection: 10: Access Rd & Airport Way

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	T	TR
Maximum Queue (ft)	153	92	194	135	114	113	285	286	309
Average Queue (ft)	63	46	69	56	30	23	179	178	191
95th Queue (ft)	128	81	147	112	81	67	317	318	343
Link Distance (ft)	1878	1878		1067	1067	1067	470	470	470
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250						
Storage Blk Time (%)									
Queuing Penalty (veh)									

Nework Summary

Network wide Queuing Penalty: 4

Intersection: 5: Daisywood & Airport Way

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (ft)	112	50	226	149	258	276	214	176	199	138	173
Average Queue (ft)	46	35	159	62	136	119	91	57	99	72	66
95th Queue (ft)	101	64	231	125	223	204	161	114	166	120	126
Link Distance (ft)	1210	1210	1638		470	470	470		1547	1547	1547
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)				300				225			
Storage Blk Time (%)											
Queuing Penalty (veh)											

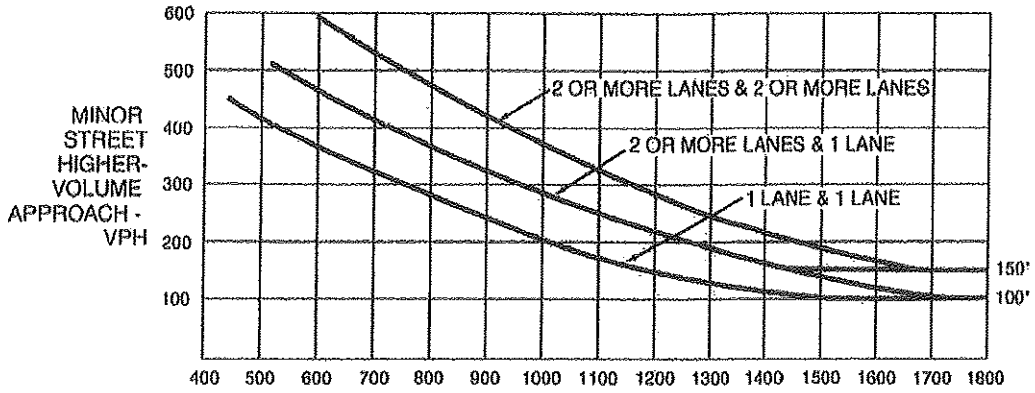
Intersection: 10: Access Rd & Airport Way

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	T	TR
Maximum Queue (ft)	53	50	132	90	72	54	93	135	113
Average Queue (ft)	25	30	56	28	16	9	45	32	27
95th Queue (ft)	58	66	110	74	49	37	88	89	78
Link Distance (ft)	1878	1878		1067	1067	1067	470	470	470
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250						
Storage Blk Time (%)									
Queuing Penalty (veh)									

Nework Summary

Network wide Queuing Penalty: 0

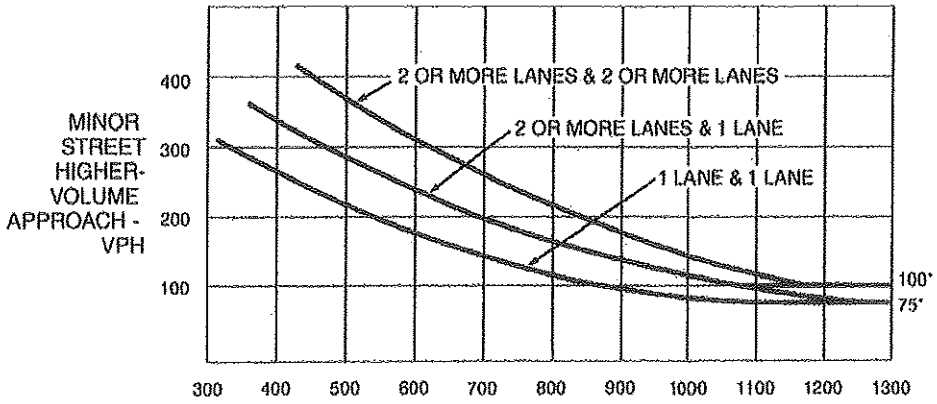
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.