
**APPENDIX D.1: TRAFFIC IMPACT ASSESSEMENT FOR THE
TIVOLI SPECIFIC PLAN PROJECT**

***Traffic Impact Assessment
For the
Tivoli Specific Plan EIR***

Modesto, California

Final



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Oakland, California*

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CHAPTER 1 INTRODUCTION

This report presents the results of the traffic impact assessment conducted for the proposed Tivoli Specific Plan located along the north side of Sylvan Avenue between Oakdale Road and Roselle Avenue in northeastern Modesto, California. The project location is shown on Figure 1.

Project Description

The proposed Specific Plan consists of 454 acres of vacant lands bounded by Sylvan Avenue on the south, Oakdale Road on the west, and Roselle Avenue to the east and the future extension of Claratina Avenue on the north. The planning area consists of proposed commercial and residential uses. As part of the Specific Plan area, HA Development has proposed a regional commercial shopping center, tentatively called "Vintage Square", at the northwestern corner of the Specific Plan area. Table 1 details the land use components and intensities proposed for the entire Specific Plan including Vintage Square (RSC-1).

Table 1 - Proposed Project Land Use Summary

Land Use	Areas	Density/FAR	Units	Gross Square Feet
Residential				
Large Lot Estate	10.00	3 units/acre	30	
Small Lot	165.20	8 units/acre	1,322	
Medium Density	46.30	18 units/acre	833	
High Density	40.00	24 units/acre	960	
Commercial				
Neighborhood Commercial	8.00	0.3 sf./acre		104,544
Commercial	5.70	0.3 sf./acre		74,488
Regional Shopping Center (RSC-1)	46.50	0.30 sf./acre		600,000
Regional shopping Center (RSC-2)	22.3	0.30 sf./acre		300,000
Professional Office	2.40	0.3 sf./acre		31,363
Parks/Public Infrastructure	34.50			
Elementary School (850 students)	13.50			
Existing Uses	28.7			
Streets (Internal)	30.9			
Totals	454.00		3,145	1,110,395

Source: City of Modesto

In this study, two different development levels for the Tivoli Specific Plan area were evaluated. These are: 1) 2012; and 2) project build-out. Project build out was analyzed for 2017 and 2025 (cumulative) scenarios. The basic difference between the 2012 and the project build-out level is that the 2012 project would include 724 fewer residential units and 104,544 less gross feet of commercial use within the northeastern corner of the Tivoli Specific Plan area.

Analysis Locations

The purpose of the analysis is to identify the potential near-term and long-term impacts of the proposed project on the transportation system in the vicinity of the site. The following locations were adopted in consultation with City staff. Impacts further away from the project area than those listed below were considered minimal and therefore have not been included in this study. The transportation system components included in the analysis are intersections and roadway segments. The analysis locations are listed below and illustrated on Figure 2. Roadway and intersection operations were analyzed under weekday morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak-hour traffic conditions. In each case operations were evaluated for the hour with the highest measured traffic volumes. Traffic volumes were obtained from counts conducted during May 2005.

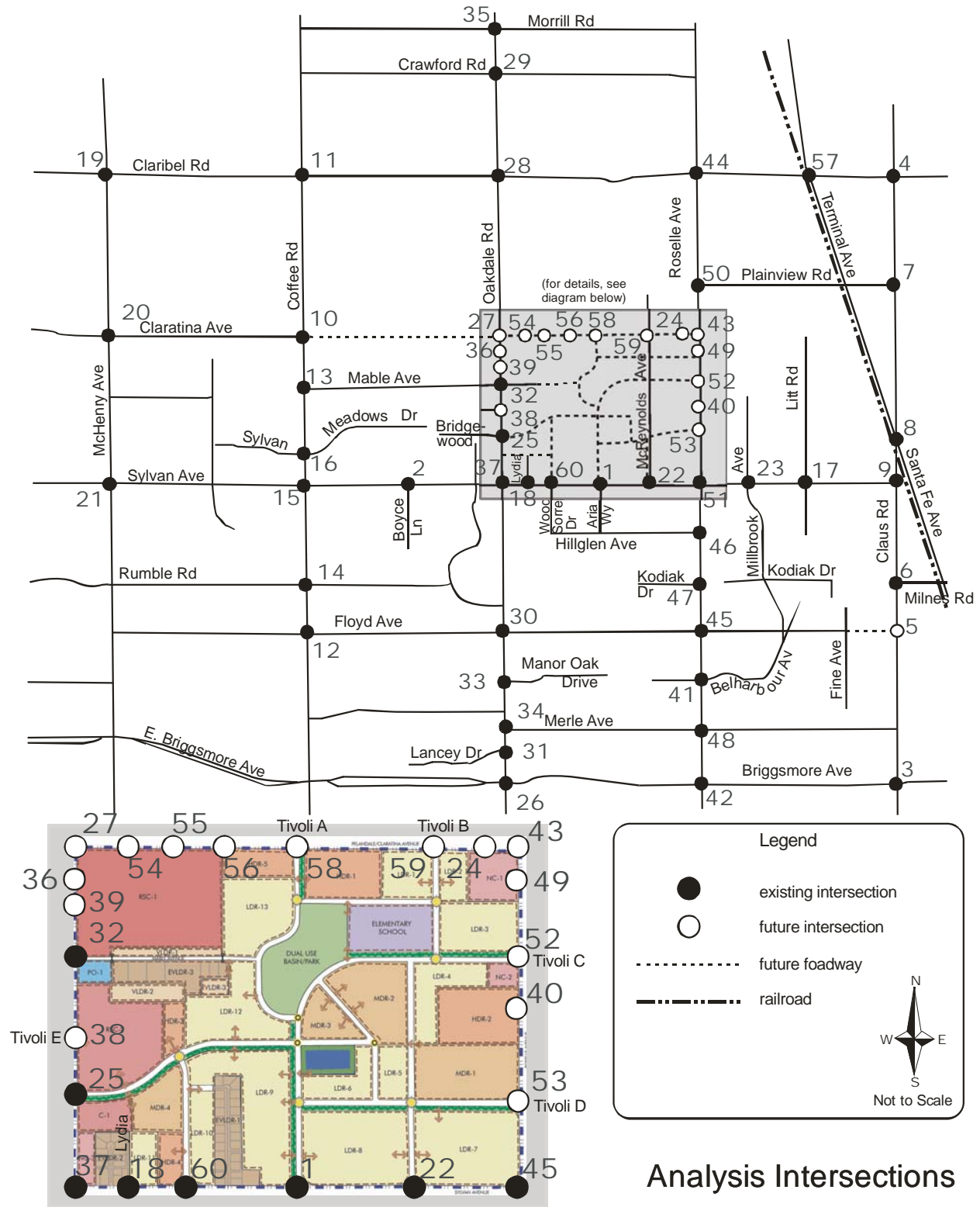
Study Intersections

The following locations were selected in coordination with City staff. Most locations exist today; however, a few do not. These new locations, which are associated with the build out of the Tivoli Specific Plan are noted with an *.

1	Aria Way at Sylvan Avenue	31	Oakdale Road at Lancey Drive
2	Boyce Lane at Sylvan Avenue	32	Oakdale Road at Mable Avenue
3	Claus Road at Briggsmore Avenue	33	Oakdale Road at Manor Oak Drive
4	Claus Road at Claribel Road	34	Oakdale Road at Merle Avenue
5	Claus Road at Floyd Avenue (*)	35	Oakdale Road at Morrill Road
6	Claus Road at Milnes Road	36	Oakdale Road at RSC-1 W. Driveway 2 (*)
7	Claus Road at Plainview Road	37	Oakdale Road at Sylvan Avenue
8	Claus Road at Santa Fe Avenue	38	Oakdale Road at Tivoli E (*)
9	Claus Road at Sylvan Avenue	39	Oakdale Road RSC-1 W. Driveway 1 (*)
10	Coffee Road at Claratina Avenue	40	Roselle Avenue and MHDR-2 Driveway (*)
11	Coffee Road at Claribel Road	41	Roselle Avenue at Belharbour Drive
12	Coffee Road at Floyd Avenue	42	Roselle Avenue at Briggsmore Avenue
13	Coffee Road at Mable Avenue	43	Roselle Avenue at Claratina Avenue
14	Coffee Road at Rumble Road	44	Roselle Avenue at Claribel Road
15	Coffee Road at Sylvan Avenue	45	Roselle Avenue at Floyd Avenue
16	Coffee Road at Sylvan Meadows Drive	46	Roselle Avenue at Hillglen Avenue
17	Litt Road at Sylvan Avenue	47	Roselle Avenue at Kodiak Drive
18	Lydia Lane at Sylvan Avenue	48	Roselle Avenue at Merle Avenue
19	McHenry Avenue at Claribel Road	49	Roselle Avenue at NC-1 E. Driveway (*)
20	McHenry Avenue at Claratina Avenue	50	Roselle Avenue at Plainview Road
21	McHenry Avenue at Sylvan Avenue	51	Roselle Avenue at Sylvan Avenue
22	McReynolds Avenue at Sylvan Avenue	52	Roselle Avenue at Tivoli C (*)
23	Millbrook Avenue at Sylvan Avenue	53	Roselle Avenue at Tivoli D (*)
24	N. NC-1 Driveway at Claratina Avenue (*)	54	RSC-1 Driveway 1 at Claratina Avenue (*)
25	Oakdale Road at Bridgewood Way	55	RSC-1 Driveway 2 at Claratina Avenue (*)
26	Oakdale Road at Briggsmore Avenue	56	RSC-1 Driveway 3 at Claratina (*)
27	Oakdale Road at Claratina Avenue (*)	57	Terminal Avenue at Claribel Road
28	Oakdale Road at Claribel Road	58	Tivoli Road A at Claratina Avenue (*)
29	Oakdale Road at Crawford Road	59	Tivoli Road B at Claratina Avenue (*)
30	Oakdale Road at Floyd Avenue	60	Wood Sorrell Drive at Sylvan Avenue

* = Future intersection location

Figure 2 – Study Intersections



Roadway Segments

The analysis roadways are listed below and shown on Figure 2.

1. Claratina Avenue – McHenry Avenue to Roselle Avenue
2. Oakdale Road - Sylvan Avenue to Claratina Avenue
3. Roselle Avenue - Sylvan Avenue to Claratina Avenue
4. Sylvan Avenue - Oakdale Road to Roselle Avenue

Analysis Scenarios

The above intersections and roadway segments were evaluated for the AM (morning) and PM (afternoon) peak commute periods for the existing and six future growth scenarios. Given that the City of Modesto model only forecasts daily traffic for the year 2025, a set of procedures were developed to create the 2012, 2017 and 2025 future year peak hour turn movements at each of the analysis intersections. Further, because the traffic patterns to and from the Tivoli Specific Plan area are far reaching, the City of Modesto traffic model was used to distribute project traffic onto the surrounding street system. Chapter 2 - Analysis Methodology provides a detailed discussion of the procedures used to forecast the year 2012, 2017 and 2025 with and without project traffic volumes.

- *Scenario 1: Existing Conditions* - Existing AM and PM peak hour traffic volumes, existing geometry, and intersection traffic controls were obtained from data surveys conducted by All Traffic Data, an independent traffic count firm, at each of the existing analysis intersections.
- *Scenario 2: Year 2012 Baseline Conditions* - Existing traffic volumes plus seven years of growth from 2005 to 2012. For this scenario, the existing intersection configurations plus all of the funded CIP projects that would be constructed by 2012 at one or more of the analysis intersections were assumed. Further, the Tivoli Specific Plan suggests various intersection modifications such as roundabouts and traffic signals, these were assumed when the impacts of the with-project scenarios were conducted.
- *Scenario 3: Year 2012 Plus Project Conditions* - Traffic volumes from Scenario 2 plus the traffic estimated for the 7-year build out of the proposed project. By 2012, the majority of the project would be developed. However, within the northeastern corner of the project no residential or commercial development would occur. This results in 724 fewer residential units and 104,544 gross square feet less in commercial development.
- *Scenario 4: Year 2017 Baseline Conditions* - Existing traffic volumes plus twelve years of growth from 2005 to 2017. The section on methodology discusses how the year 2017 baseline traffic volumes were created. For this scenario, the existing intersection configurations plus all of the funded projects that would be constructed by 2017 at one or more of the analysis intersections were assumed. Again, while the Tivoli Specific Plan suggests various intersection modifications

such as roundabouts and traffic signals, these are considered later under potential mitigation measures.

- *Scenario 5: Year 2017 Plus Project Conditions* - Traffic volumes from Scenario 4 plus the traffic estimated for the full build out of the proposed project.
- *Scenario 6: Year 2025 (Cumulative) Baseline Conditions* - Projected 2025 traffic volumes and the future roadway system from the *Final Master EIR for the Urban Area General Plan and related Amendments to the Urban Area General Plan* assuming year 2025 build out for the Salida Community Plan as cited in the City of Modesto General Plan.
- *Scenario 7: Year 2025 (Cumulative) Project Conditions* - Traffic volumes from Scenario 6 plus the traffic estimated for build-out of the proposed Tivoli Specific Plan area. The roadway system from Scenario 6 was maintained.

Site access, on-site circulation, parking, pedestrian, bicycle and transit impacts are evaluated in this analysis.

Report Organization

The remainder of this report is organized into the following chapters:

- *Chapter 1 - Introduction* discusses the purpose and organization of this report.
- *Chapter 2 - Analysis Methodology* discusses the procedures used to: 1) create the project trip generation assumptions; 2) develop the future background baseline intersection and roadway volumes; 3) and the assignment of project traffic to the roadway system.
- *Chapter 3 - Existing Conditions* presents Existing Conditions and includes descriptions of the transportation system serving the site and an evaluation of current intersection and roadway conditions.
- *Chapter 4 - Year 2012 Conditions* discusses intersection and roadway operations under the year 2012 baseline conditions and the impacts of the portions of the project to be completed by 2012. Roadway and intersection improvements cited as part of the CFF or CFD have been included as assumed for the year 2012 baseline condition.
- *Chapter 5 - Year 2017 Conditions* discusses intersection and roadway operations under the year 2017 baseline conditions and the impacts of the portions of the project to be completed by 2017. Roadway and intersection improvements cited as part of the CFF or CFD have been included as assumed for the year 2017 baseline condition. Under this scenario, the Tivoli Specific Plan is assumed fully developed.

- *Chapter 6 - Year 2025 (Cumulative) Conditions* discusses intersection and roadway operations under the year 2025 baseline conditions and the impacts of the portions of the project to be completed by 2025. Roadway and intersection improvements cited as part of the CFF or CFD have been included as assumed for the year 2025 baseline condition.
- *Chapter 7 - Project Impacts and Mitigation Measures* identified significant adverse project impacts and proposed measures to mitigate the impacts to less-than-significant levels.
- *Chapter 8 - Site Access, On-Site Circulation and Parking* provides a discussion of site access, on-site circulation and parking requirements.

CHAPTER 2 - ANALYSIS METHODOLOGY

This chapter describes the procedures used to establish the existing base year and future year conditions. The section also discusses how the project traffic was included in the various future analysis scenarios. It discusses the City of Modesto travel demand model (hereafter “City model”) and its application to the analysis. The use of additional traffic impact analysis software programs to evaluate intersection and roadway levels of service are discussed. Seven steps were employed to develop the future traffic volumes.

1. Validation of Year 2025 Cumulative Growth near the Project

The year 2025 City model land use inputs were reviewed to make sure the projects such as the Crossroads and the proposed High School other development near the Tivoli Specific Plan area was included. The High School was incorporated into the baseline forecasting model.

It was found that the Crossroads development had not been included. Therefore, based upon the trip generation from the Crossroads EIR, this traffic generated by the Crossroads was included in the baseline cumulative traffic volumes.

2. Estimating Year Future Peak Hour Baseline Intersection Volumes

The City of Modesto model forecasts **only** average daily traffic volumes. The model does not include procedures for estimating AM or PM peak hour traffic. Each consultant using the model, to create peak hour estimates, has developed independent processes. Challenges are faced in using the City of Modesto travel demand model to develop peak hour traffic forecasts without redesigning the underlying trip generation and assignment processes that are incorporated within the model. A following method was developed so that future peak hour traffic volumes can be estimated from daily traffic volume projections of the City of Modesto traffic model.

First, each trip purpose of the model's daily trip table was factored to estimate AM and PM peak hour trip tables for the 2025 model year. Then, the trip tables for the individual purposes were combined to create total trip tables for each peak hour. The total peak hour volumes were estimated in this way to be about 7.9% (AM) and 9.8% (PM) of the projected daily traffic volumes. In the factoring process, each trip purpose is factored separately to estimate the number of trips occurring in the peak hour and the appropriate directional split of those trips. The resulting total AM and PM peak hour trip tables were then assigned to the model network and the intersection turning movements were extracted for use in the operational analysis.

3. Refining the Future Forecasts

The 2025 no-project peak hour volumes were subjected to a "Furness" process to obtain the final year 2025 (no-project) turning movements.

The Furness process is a mathematical process of balancing forecast volumes to control for modeling error. This involves two steps. The first is to derive a future year delta that

isolates the growth on each intersection approach between the base-year and future year model output. The second is to assign link volumes to turning movement volumes by balancing approach and departure volumes based on the existing pattern of turning movements. The balance is made between the departing volume on each link and each of the turn volumes made through the intersection that feed that departing volume. The balancing can be set to match the higher value between the departing volume and sum of the turns, the lower of these or the average among other possibilities. In this analysis the process was set to match the higher of the two values to be more conservative. The Furness process was also set to ensure that no turning movement was allowed to fall below existing traffic on that movement. This prevents negative growth.

As discussed, the Furness process was developed with assumptions to prevent negative traffic growth and to bias towards higher volumes in balancing turns. However, neither of these two assumptions ensured that positive growth would occur on each movement. A post process was developed and applied to the 2025 No Project volumes to ensure that a minimal amount of growth occurred on each and every movement. A spreadsheet was developed where each 2025 forecasted (and furnished) turning movement was compared against the corresponding existing turning movement wherever such existed.

The growth for each movement was calculated and any movements experiencing zero growth were flagged. To ensure positive growth all movements that in the first instance experienced zero growth were subjected to the minimum positive growth for any movement at the same intersection. In the one case where no growth was calculated at any movement at that intersection the minimum positive growth for all turns at all intersections was identified and applied intersection-wide. This approach has the benefit of ensuring growth on all movements without being entirely arbitrary. With this approach, all movements show some growth (before rounding) yet none of the movements that were post processed would have more growth than any movement at the same intersection that did not require post processing.

5. Estimating the Year 2012 and 2017 Background Condition

The basic steps to be used to create the background year 2012 and 2017 conditions on roadway segments and at each of the analysis intersections are:

- Furness the existing intersection counts against year 2025 without project volumes extracted from the City of Modesto travel demand model (as discussed above).
- The difference between the year 2025 and year 2005 volumes was calculated.
- The 20 year difference was divided by 20 to create a per year (annual) uniform volume growth increment at each intersection.

The per year traffic increment volumes were multiplied by 7 and 12 respectively. The resultant volumes were added to the year 2005 intersection volumes to establish the year 2012 and 2017 background traffic volumes.

6. Estimating Project Trip Generation

The traffic zone system in the City model was expanded significantly to reflect the components of the proposed Tivoli Specific Plan so that project trip generation and assignment could be estimated through use of the model. For the project scenarios the model was modified to include land use and network assumptions consistent with the proposed project for the interim 2012 scenario and for the 2017 and 2025 scenarios where the project is built out. The City model estimates daily trip attractions (inbound trips) and productions (outbound trips) for traffic analysis zones and these are used to derive peak hour trips as described under step 5 above. The model generated trip attractions and productions were then factored to match the inbound and outbound trip estimates for the proposed project based on ITE trip generation (Institute of Traffic Engineers, 2004). These ITE estimates represent the standard practice in estimating how much traffic would be found at the driveways of each of the project zones. The benefit of this approach is that overall project traffic matches the standard but the model can be used to assign trips to the transportation network directly, including traffic between project zones.

The factoring process was repeated over three iterations with countywide productions and attractions balanced each time. With a few exceptions this results in less than 1 percent error between the model-based trip generation estimate and the expected trip generation from ITE. The residual error is a result of the need for productions and attractions to be balanced after factoring during each iteration, including the last. A comparison of model and ITE trip generation by traffic analysis zone is shown in Appendix B.

7. Estimating the Project Peak Hour Condition

The project peak hour traffic condition does not come directly from the project forecasts. That is because it is not appropriate to apply a Furness adjustment to the project forecasts (this would effectively 'wash away' the effect of the project on baseline conditions). In order to develop the project condition it is necessary to derive a project increment that can be added to the furnished no project future traffic forecasts.

Once the model was run, the trips adjusted to match ITE, and the resultant year 2025 with-project values were developed, the difference between with and without project (un-Furnished) peak hour intersection volumes was calculated for every turning movement. This increment was then added directly to the "Furnished" year 2025 without project intersection volumes to create the year 2025 with project traffic volumes. The same traffic generation was added to the 2017 baseline volumes to create the 2017 with project forecasts.

As mentioned for the year 2012 forecasts, the model was run with the year 2012 trip generation and the same process was used to establish the project increment for 2012. That increment was added to the year 2012 without project volumes to create the 2012 with project condition.

The roadways fronting on the project were retained in the network including portions of Tivoli Road E, Bridgewood Way, Mable Avenue, and Claratina Avenue extending east of Oakdale Road. However, portions of roads extending east of Roselle Avenue and Claus

Road were eliminated where these roads are not expected to be completed by 2012. This includes Claratina Avenue, Hillglen Avenue, and Kodiak Avenue east of Roselle and Floyd Avenue east of Claus Road.

Existing uses within the specific plan area were not included in the with project traffic forecasts. The traffic from these uses was included in the existing turning movement counts and helps to set the floor for baseline traffic forecasts when growth is estimated according to the methodology described above. This traffic was excluded in order to avoid possible double counting of traffic when the project traffic was added as an increment on top of the furnished background traffic forecasts. Therefore traffic associated with the EVLDR-1, 2 and 3 and NC-2 and 3 were not included in the future with project forecasts for the specific plan area as a whole.

Trip Distribution

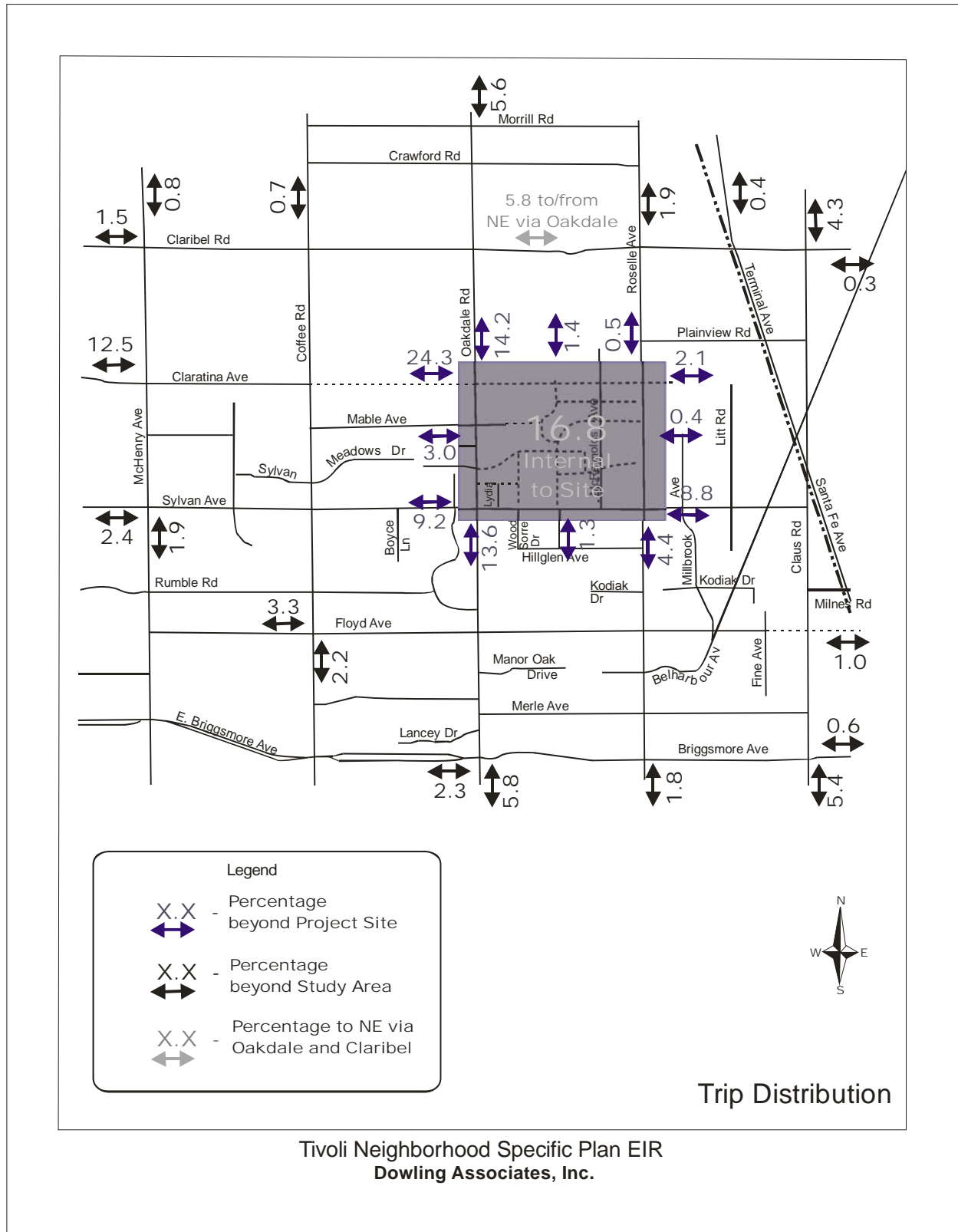
Based on step 6 as described above it is possible to extract a trip distribution from the City model to illustrate the regional pattern of project traffic assignment. Figure 3 depicts the resulting trip distribution graphically. Table 2 shows the basic trip distribution patterns for the entire Tivoli Specific Plan area. These values were extracted directly from the City of Modesto travel demand model. To run the analysis, the full build-out land use and resultant trip generation was input to the model. The table is divided into two parts. The first shows the distribution of traffic beyond the Tivoli Specific Plan site. The second part shows the distribution of traffic beyond the area bounded by the farthest locations of the study intersections. The distribution percent falls off with distance from the project. Note however that to the northeast the percentage of project traffic increases over that found along Roselle Avenue north of Claratina or along Claratina east of Roselle. That is because traffic from RSC-1 tends to travel north along Oakdale Road and then east to Roselle before traveling north. The travel speed along Claratina and the restrictions on left turn turning movements make the route along Oakdale less time consuming that the more direct route along Roselle for traffic to and from this regional commercial shopping area.

Table 2 - Trip Distribution Assumptions

Trip Distribution Beyond Project Boundary	
TOTAL NORTH of SITE	16.1%
North of Claratina on Oakdale	14.2%
North of Claratina on Roselle	0.5%
North of Claratina on Tivoli A	1.4%
TOTAL EAST of SITE	11.3%
East of Roselle on Claratina	2.1%
East of Roselle on Sylvan	8.8%
East of Roselle on other roads	0.4%
TOTAL SOUTH of SITE	19.3%
South of Sylvan on Oakdale	13.6%
South of Sylvan on Roselle	4.4%
South of Sylvan on other roads	1.3%
TOTAL WEST of SITE	36.5%
West of Oakdale on Claratina	24.3%
West of Oakdale on Sylvan	9.2%
West of Oakdale on other roads	3.0%
Total beyond project boundary	83.2%
Internal to Project Site	16.8%

Trip Distribution Beyond Study Area	
TOTAL NORTH of STUDY AREA	13.7%
North of Claribel on Claus	4.3%
North of Claribel on Terminal	0.4%
North of Claribel on Roselle	1.9%
North of Claribel on McHenry	5.6%
North of Claribel on Coffee	0.7%
North of Morrill on Oakdale	0.8%
TOTAL EAST of STUDY AREA	1.9%
East of Claus on Claribel	0.3%
East of Claus on Floyd	1.0%
East of Claus on Briggsmore	0.6%
TOTAL SOUTH of STUDY AREA	17.1%
South of Sylvan on McHenry	1.9%
South of Floyd on Coffee	2.2%
South of Briggsmore on Oakdale	5.8%
South of Briggsmore on Roselle	1.8%
South of Briggsmore on Claus	5.4%
TOTAL WEST of STUDY AREA	22.0%
West of Oakdale on Briggsmore	2.3%
West of McHenry on Sylvan	2.4%
West of McHenry on Pelandale	12.5%
West of Coffee on Floyd	3.3%
West of McHenry on Claribel	1.5%
Total beyond Study Area	54.7%

Figure 3 - Trip Distribution



Level of Service Methodologies

The operations of roadway facilities are described with the term "level of service" (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay and freedom to maneuver. Six levels of service are defined ranging from LOS A (i.e., best operating conditions) to LOS F (worst operating conditions). LOS E corresponds to operations "at-capacity". When volumes exceed capacity, stop-and-go conditions result and operations are designated as LOS F.

Different criteria and methodologies were used to assess operating conditions for the various types of facilities analyzed in this study, including signalized and unsignalized intersections, and roadway segments. The LOS criteria and methodologies for each of these facilities are described in the following sections.

Signalized Intersection Methodology

Traffic conditions at signalized intersections were evaluated using the Transportation Research Board's 2000 Highway Capacity Manual methodology. The operational analysis uses various intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to estimate the average control delay experienced by motorists traveling through an intersection. Control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. Table 3 summarizes the relationship between average delay per vehicle and LOS for signalized intersections. In Modesto, acceptable operations at signalized intersections are defined as LOS D (City of Modesto General Plan) or better. Stanislaus County has established LOS C as the acceptable service level at signalized intersections.

Table 3 - Signalized Intersection LOS Criteria

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	>20.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicle stop and individual cycle failures are noticeable.	>35.0 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, or high V/C ratios. Individual failures are frequent occurrences. This is considered to be the limit of acceptable delay.	>55.0 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0

Source: Highway Capacity Manual, Transportation Research Board, 2000

Unsignalized Intersections and Roundabouts

Traffic conditions at unsignalized (all-way stop-controlled and side street stop-controlled) intersections were also evaluated using the 2000 Highway Capacity Manual methodology. With this methodology, operations are defined by the average control delay per vehicle (measured in seconds) for each stop-controlled movement. At two-way or side street-controlled intersections, the control delay (and LOS) is calculated for each controlled movement and for the entire intersection. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane.

For Roundabouts, the delays and resultant levels of service associated with unsignalized intersections applies. Therefore, the values cited for stop controlled intersections also are used to determine the performance of Roundabouts.

At all-way stop-controlled intersections, the control delay is calculated for the entire intersection and for each approach. The delays for the entire intersection and for the movement or approach with the highest delay are reported. Table 4 summarizes the relationship between delay and LOS for unsignalized intersections.

Table 4 - Unsignalized Intersection and Roundabout LOS Criteria

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delays	≤ 10.0
B	Short traffic delays	> 10.0 to 15.0
C	Average traffic delays	>15.0 to 25.0
D	Long traffic delays	>25.0 to 35.0
E	Very long traffic delays	>35.0 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Source: Highway Capacity Manual, Transportation Research Board, 2000

Vehicle Queuing at Intersections

The City of Modesto significance criteria include consideration of vehicle queues at intersections. For this report, specific consideration of existing and future vehicle queuing impacts was not included. Rather, when project impacts were found to be significant and warranting mitigation, the issue of vehicle queuing was included in the analysis. When needed, additional left turn lanes were added to reduce vehicle queues to acceptable levels.

Roadway Segments

The existing operations of roadway segments were evaluated by comparing the hourly volumes to the hourly capacities to develop a volume-to-capacity (V/C) ratio. The hourly volumes for the roadway segments were obtained from the manual turning movements counts conducted at the intersections. The capacity of each segment was based on the type of facility (expressway, arterial, or collector), number of lanes, type of traffic controls at the downstream intersection, and maximum per lane capacities from the Modesto General Plan. The General Plan defines the classes of arterials and collectors as major and minor according to their number of travel lanes, design speed, and right-of-way width. Roadway segment capacities remain constant for the classes of each roadway facility. The hourly per-lane capacities for each roadway type are presented in Table 5. The roadway segment LOS criteria are shown in Table 6.

Table 5 - Hourly Per Lane Roadway Segment Capacities

Type of Roadway Segment	Capacity (vplph) ¹
Expressway (Class A)	1,500
Expressway (Class B)	1,250
Expressway (Class C)	1,000
Arterial (Signalized)	750
Arterial (Unsignalized)	1,000
Collector (Signalized)	500
Collector (Unsignalized)	750
Rural Road	900

Note: 1. Vehicles per lane per hour. Source: City of Modesto General Plan

Table 6 - Roadway Segment LOS Criteria

Level of Service	Volume / Capacity Ratio ¹
A	≤ 0.60
B	> 0.60 to 0.70
C	> 0.70 to 0.80
D	> 0.80 to 0.90
E	> 0.90 to 1.00
F	> 1.00

Note: 1. Capacities are identified for each facility based on the classification.
Source: City of Modesto General Plan

CHAPTER 3 EXISTING CONDITIONS

This chapter describes the existing transportation conditions in the project study area, including the roadway network, and transit, pedestrian, and bicycle facilities in the vicinity of the project site. This chapter also presents operations conditions at the study intersections and roadway segments as shown on Figure 2. The boundaries of the study area for this report were discussed with City of Modesto staff. Generally, the roadways and intersections were selected for analysis based upon the potential amount of traffic added by the project. The study area is bounded by McHenry Avenue on the west, East Briggsmore Avenue to the south, Claus Road to the east and Claribel Road to the north. In addition, two intersections on Oakdale Road north of Claribel Road are included. These are: Oakdale Road at Crawford Road and Oakdale Road at Morrill Road.

Roadway Network

State Route 99 (SR 99) is a six-lane, north-south freeway located to the west of the project site and provides inter-county and intra-county regional access while local access is provided via Kiernan Avenue (SR 219)-Claribel Road, Pelandale Avenue, Sylvan Avenue, East Briggsmore Avenue, Oakdale Road, and Roselle Avenue. These roadways and others in the vicinity of the project are described below. The two interchanges on SR 99 at Standiford Avenue and Pelandale Avenue provide access to the site. The speed limit on SR 99 is 65 miles per hour (MPH).

Kiernan Avenue (SR 219) is a major east-west state highway that extends from west of SR 99 to McHenry Avenue, where it becomes Claribel Road. Near the site, Claribel Road is a two-lane rural road.

Claribel Road is a two-lane rural road extending from McHenry Avenue to its eastern terminus near the Modesto Reservoir.

Pelandale Avenue is an east-west arterial that extends from west of SR 99 to east of McHenry Avenue, where it becomes Claratina Avenue. The speed limit on Pelandale Avenue is 50 mph east of Dale Road, and 45 mph west of Dale Road. Claratina Avenue continues easterly and terminates at Coffee Road.

McHenry Avenue (SR 108) extends from Needham Street in Downtown Modesto into San Joaquin County. McHenry Avenue is designated as SR 108 from Needham Street to Patterson Road. McHenry Avenue is a four-lane arterial south of Kiernan Avenue/Claribel Road and widens to six lanes near Standiford Avenue/Sylvan Avenue

Coffee Road is a two-lane rural road. Coffee Road extends from Scenic Drive near Dry Creek to Patterson Road. Coffee Road is four-lane minor arterial south of Mable Avenue.

Oakdale Road is rural road in the project vicinity extending from Riverbank to SR 132 near the southern part of Modesto. Oakdale Road is two lanes north of Bridgewood Drive with a second southbound lane from Bridgewood to Sylvan Avenue. South of Sylvan Avenue Oakdale Road is a four lane road.

Claus Road (County Route J7) is a two-lane rural road extending from SR 132 in Modesto to Atchison Road in Riverbank. South of East Briggsmore Avenue Claus Road is constructed as a six-lane arterial street.

Transit Service

Modesto Area Express (MAX) and Stanislaus Regional Transit (StaRT) provide bus services within the City of Modesto.

Modesto Area Express (MAX)

MAX does not currently provide service directly to the project site. However, two MAX bus routes currently provide transit access to the periphery along Oakdale and Sylvan. Route 32, which operates near the site between Modesto's Downtown Transit Center and Coffee Road, has two loop configurations serving Oakdale and Floyd Avenues: one via Mable Avenue, the other via Sylvan Avenue. The Mable Loop has three bus stops that border the project site to the west at the intersections of Oakdale and Mable, Oakdale and Bridgewood, and Oakdale and Sylvan, whereas Sylvan Loop's closest bus stop is at Oakdale and Sylvan. Service hours are Monday through Friday from 6:15 am to 7:15 pm with half-hour frequencies alternating between service to Mable Loop and Sylvan Loop. On Saturday, only the Mable Loop is served hourly between 7:45 am and 6:45 pm and on Sunday, only Sylvan Loop is served hourly between 8:45 am and 5:45 pm. Route 37, which also operates near the site, provides transit between Downtown Modesto and Vintage Faire Mall and serves bus stops at Oakdale and Sylvan. This route operates hourly Monday through Saturday from 6:45 am to 5:45 am, with no Sunday service.

MAX operates the Modesto Altamont Commuter Express (ACE) shuttle to transfer passengers from Modesto (at Vintage Fair Mall) to the Lathrop/Manteca (ACE) train station. ACE provides passenger rail service between San Joaquin Valley and Santa Clara Valley.

MAX also operates the Modesto Bay Area Rapid Transit (BART) Express, connecting Modesto (at Vintage Faire Mall) to the Dublin/Pleasanton BART station. BART provides commuter rail service to San Francisco (including the San Francisco International Airport), Millbrae, Fremont, Richmond and Pittsburg/Bay Point.

Stanislaus Regional Transit (StaRT)

StaRT operates Runabouts, a transit service that combines fixed-route service (with fixed stops) and dial-a-ride service (with curb-to-curb service). Passengers can use this service between the fixed stops without making prior arrangements. Advanced reservations must be made for curbside service. The proposed site is within the service area of three Runabout routes (Waterford/Modesto, Turlock/Modesto and Eastside) and curbside service would be available to passengers with advance reservations.

Pedestrian and Bicycle Facilities

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals. Currently, there are no pedestrian facilities in the immediate vicinity of the proposed project. However, limited segments of sidewalks do exist adjacent to existing development near the Tivoli Specific Plan area.

Bicycle facilities comprise the following:

- Bike paths (Class I) - Paved trails that are separated from roadways.
- Bike lanes (Class II) - Lanes on roadways designated for use by bicycles by striping, pavement legends, and signs.
- Bike routes (Class III) - Designated roadways for bicycle use by signs only; may or may not include additional pavement width for cyclist.

There are no bicycle facilities in the immediate vicinity of the project site.

Existing Intersection Levels of Service

Traffic volumes for all of the study intersections were obtained from counts conducted during May 2005. Figures 4a, 4b and 4c illustrate the existing AM and PM peak hour turn movement counts conducted during May of 2005.

The existing volumes were used with the existing lane configurations and signal phasing as input to the LOS calculations to evaluate current operations at the existing study intersections. The LOS analysis results are presented in Table 7. Locations where the peak hour levels of service exceed the City standard are highlighted.

For unsignalized intersections, the highest controlled movement delay for two-way stop and the overall average delay is reported. The highest approach delay is reported for all-way stop intersections. At those unsignalized intersections when either the delay or peak hour volume criteria are met, Table 7 shows if a signal warrant is met for the AM and/or PM peak hour condition.

The intersection LOS calculation sheets are provided in the technical Appendix to this report, which can be secured upon request from the City of Modesto.

Figure 4a - Existing AM(PM) Peak Hour Intersection Turning Movements

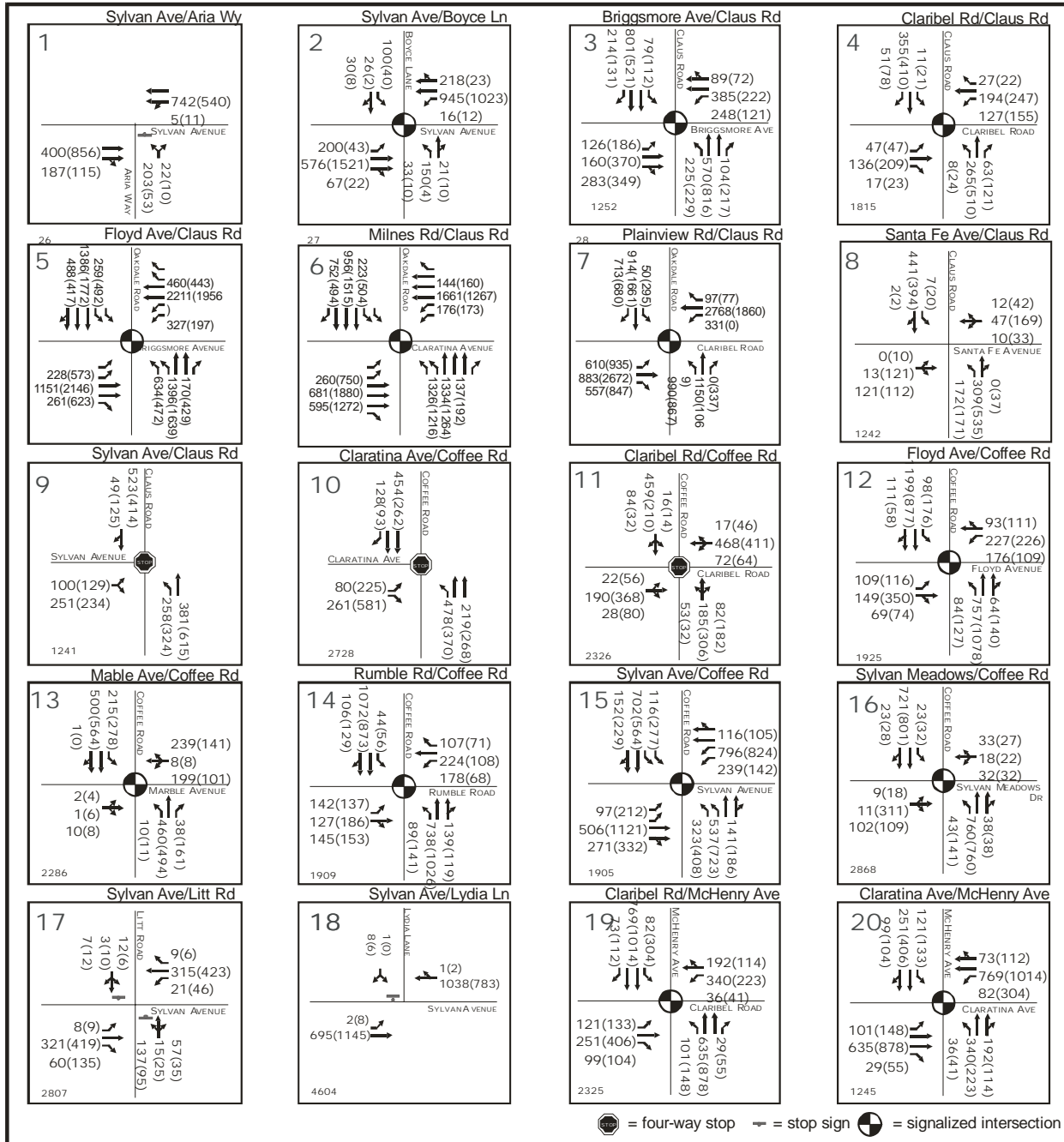


Figure 4b - Existing AM(PM) Peak Hour Intersection Turning Movements

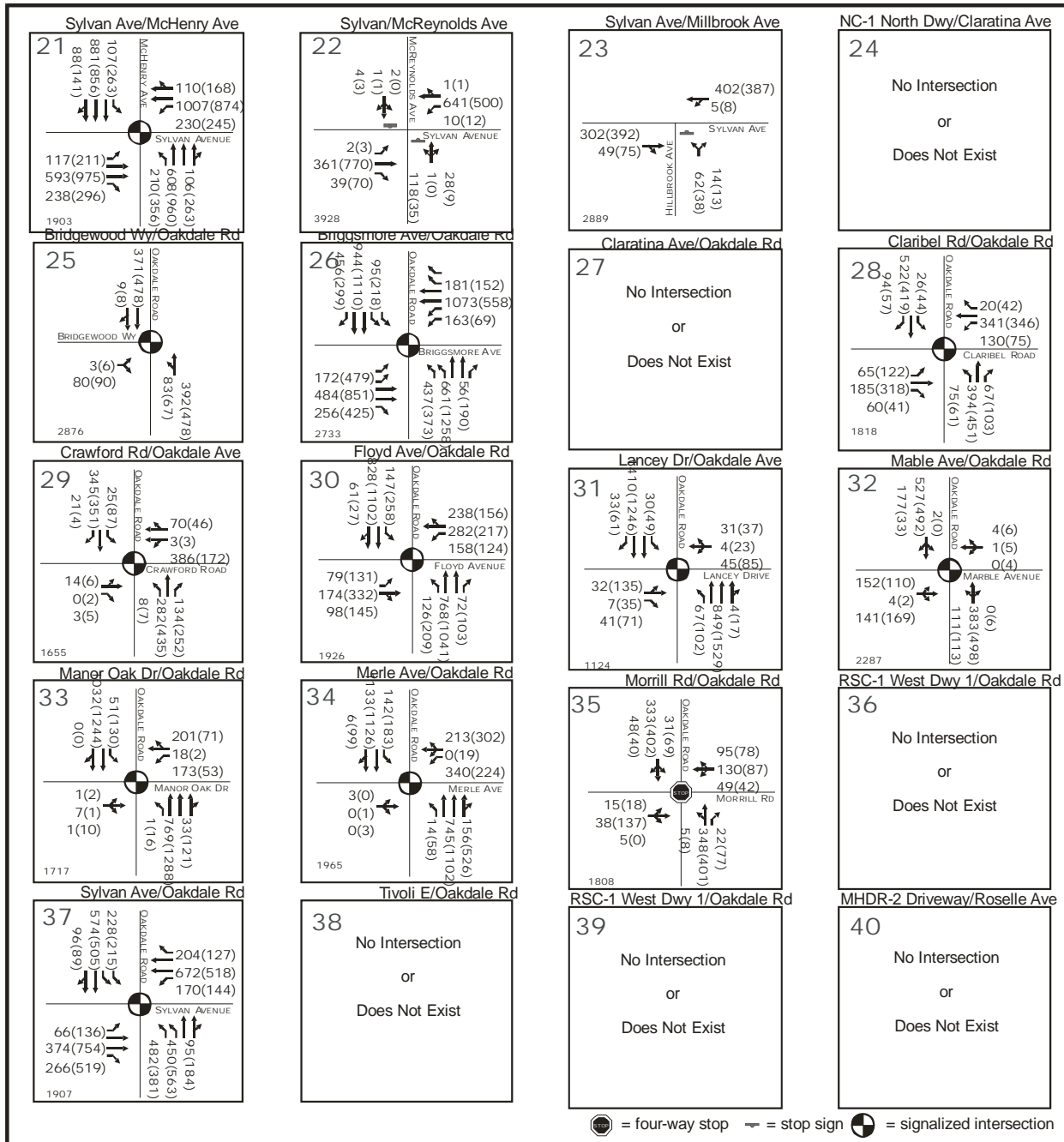


Figure 4c - Existing AM(PM) Peak Hour Intersection Turning Movements

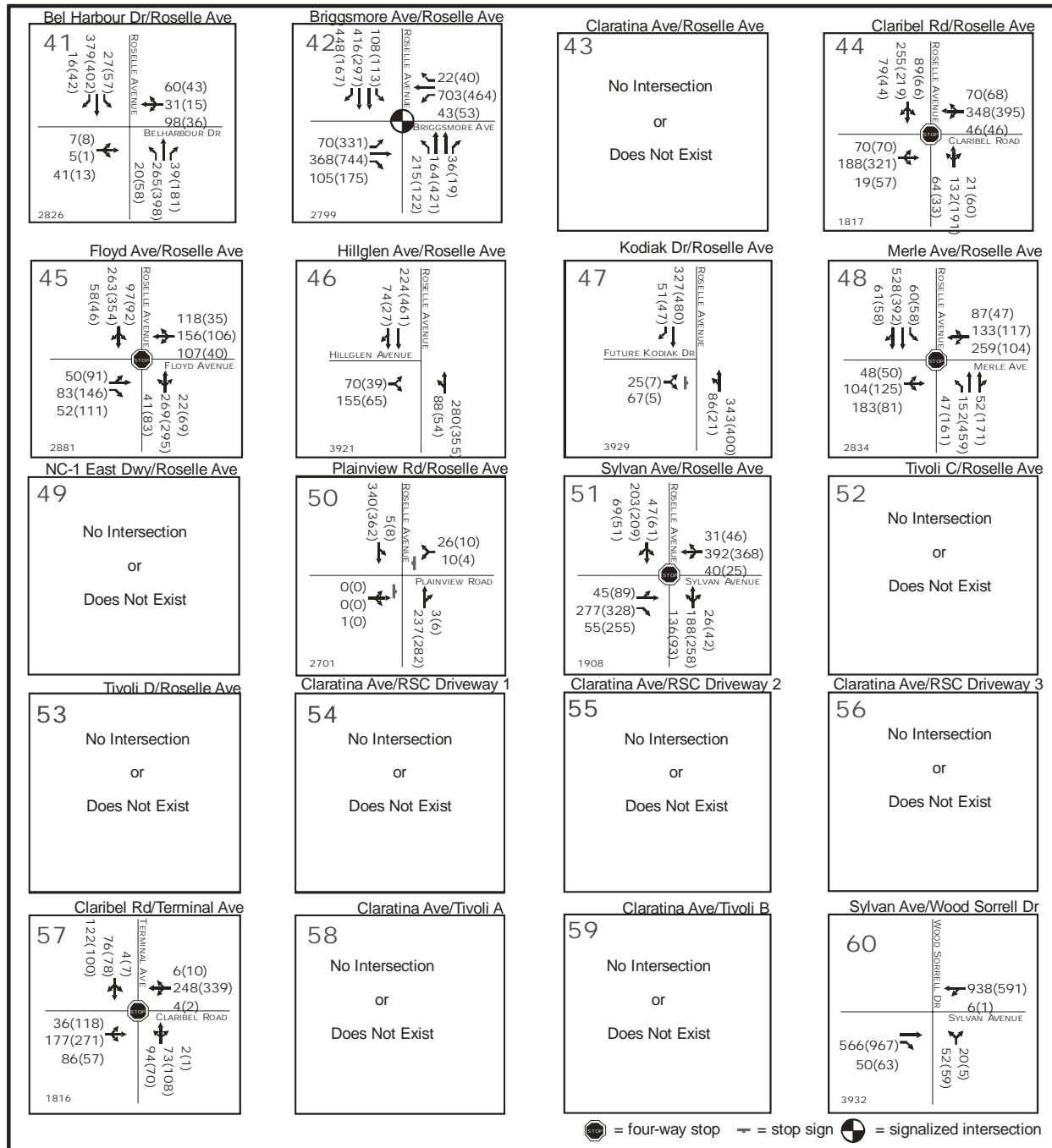


Table 7 - Existing Peak Hour Intersection Levels of Service

Intersection		Control	AM		PM		Meets Signal Warrant AM/PM
ID #	Name		Delay*	LOS	Delay*	LOS	
1	Aria Way at Sylvan Avenue	Unsignalized	107.0 (539.1)	F(F)	5.9 (135.7)	A(F)	Y/N
2	Boyce Lane at Sylvan Avenue	Signal	40.0	D	8.1	A	
3	Claus Road at Briggsmore Avenue	Signal	30.8	C	29.2	C	
4	Claus Road at Claribel Road	Signal	24.4	C	25.6	C	
5	Claus Road at Future Floyd Avenue	n/a	n/a	n/a	n/a	n/a	
6	Claus Road at Milnes Road	Unsignalized	32.7 (241.6)	D(F)	8.3 (106.3)	A(F)	Y/Y
7	Claus Road at Plainview Road	Unsignalized	0.3 (18.1)	A(C)	0.4 (23.6)	A(C)	N/N
8	Claus Road at Santa Fe Avenue	Unsignalized	12.4 (94.9)	B(F)	>9999(>9999)	F(F)	N/Y
9	Claus Road at Sylvan Avenue	All-way STOP	42.4	E	60.6	F	Y/Y
10	Coffee Road at Claratina Avenue	All-way STOP	75.4	F	51.6	F	N/N
11	Coffee Road at Claribel Road	All-way STOP	249.4	F	188.3	F	N/N
12	Coffee Road at Floyd Avenue	Signal	31.8	C	34.1	C	
13	Coffee Road at Mable Avenue	Signal	38.2	D	26.5	C	
14	Coffee Road at Rumble Road	Signal	39.8	D	31.6	C	
15	Coffee Road at Sylvan Avenue	Signal	37.6	D	60.3	E	
16	Coffee Road at Sylvan Meadows Drive	Signal	14.2	B	24.8	C	
17	Litt Road at Sylvan Avenue	Unsignalized	21.9 (95.0)	C(F)	54.7 (320.5)	F(F)	Y/Y
18	Lydia Lane at Sylvan Avenue	Unsignalized	0.1 (21.1)	A(C)	0.1 (14.2)	A(B)	N/N
19	McHenry Avenue at Claribel Road	Signal	30.6	C	32.0	C	
20	McHenry Avenue at Claratina Avenue	Signal	29.5	C	32.8	C	
21	McHenry Avenue at Sylvan Avenue	Signal	39.3	D	59.3	E	
22	McReynolds Avenue at Sylvan Avenue	Unsignalized	46.9 (271.0)	E(F)	3.4 (77.0)	A(F)	Y/Y
23	Millbrook Avenue at Sylvan Avenue	Unsignalized	2.6 (20.3)	A(C)	1.2 (17.7)	A(C)	N/N
24	N. NC-1 Driveway at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
25	Oakdale Road at Bridgewood Way	Unsignalized	1.7(11.4)	A(B)	1.6(13.2)	A(B)	
26	Oakdale Road at Briggsmore Avenue	Signal	36.3	D	30.6	C	
27	Oakdale Road at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
28	Oakdale Road at Claribel Road	Signal	30.4	C	30.5	C	
29	Oakdale Road at Crawford Road	Signal	22.8	C	18.6	B	
30	Oakdale Road at Floyd Avenue	Signal	48.9	D	51.5	D	
31	Oakdale Road at Lancey Drive	Signal	9.5	A	17.4	B	
32	Oakdale Road at Mable Avenue	Signal	20.2	C	16.6	B	
33	Oakdale Road at Manor Oak Drive	Signal	20.0	B	10.4	B	
34	Oakdale Road at Merle Avenue	Signal	18.5	B	21.1	C	
35	Oakdale Road at Morrill Road	All-way STOP	23.2	C	44.7	E	N/N
36	Oakdale Road at Private Driveway	n/a	n/a	n/a	n/a	n/a	
37	Oakdale Road at Sylvan Avenue	Signal	37.8	D	38.0	D	
38	Oakdale Road at Tivoli E	n/a	n/a	n/a	n/a	n/a	
39	Oakdale Road RSC-1 W. Driveway 1	n/a	n/a	n/a	n/a	n/a	
40	Roselle Avenue and MHDR-2 Driveway	n/a	n/a	n/a	n/a	n/a	
41	Roselle Avenue at Belharbour Drive	Unsignalized	23.8 (88.8)	C(F)	3.8 (30.8)	A(D)	Y/N
42	Roselle Avenue at Briggsmore Avenue	Signal	42.8	D	29.0	C	
43	Roselle Avenue at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
44	Roselle Avenue at Claribel Road	All-way STOP	71.1	F	128.5	F	N/N
45	Roselle Avenue at Floyd Avenue	All-way STOP	58.1	F	61.1	F	Y/N
46	Roselle Avenue at Hillglen Avenue	Unsignalized	7.6 (21.6)	A(C)	2.6 (17.3)	A(C)	N/N
47	Roselle Avenue at Kodiak Drive	Unsignalized	3.1 (17.7)	A(C)	0.4 (16.3)	A(C)	N/N
48	Roselle Avenue at Merle Avenue	All-way STOP	77.7	F	21.7	C	Y/N
49	Roselle Avenue at NC-1 E. Driveway	n/a	n/a	n/a	n/a	n/a	
50	Roselle Avenue at Plainview Road	Unsignalized	1.2 (12.2)	A(B)	0.5 (11.7)	A(B)	N/N
51	Roselle Avenue at Sylvan Avenue	All-way STOP	93.0	F	103.2	F	N/N
52	Roselle Avenue at Tivoli C	n/a	n/a	n/a	n/a	n/a	
53	Roselle Avenue at Tivoli D	n/a	n/a	n/a	n/a	n/a	
54	RSC-1 Driveway 1 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
55	RSC-1 Driveway 2 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
56	RSC-1 Driveway 3 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	

Intersection		Control	AM		PM		Meets Signal Warrant AM/PM
ID #	Name		Delay*	LOS	Delay*	LOS	
57	Terminal Avenue at Claribel Road	All-way STOP	15.3	C	25.1	D	N/N
58	Tivoli Road A at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
59	Tivoli Road B at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	
60	Wood Sorrell Drive at Sylvan Avenue	Unsignalized	16.9 (252.5)	C(F)	4.5 (113.4)	A(F)	Y/N

Note: xx (xx) – Overall (Worst Case) delay and levels of service for unsignalized intersection.
n/a = not applicable this location does not currently exist.
* = >9999 indicates overflow delay. The delay calculations for the HCM 2000 methodology are incapable of quantifying delay. Estimated delay would exceed 9999 seconds.

Signalized Intersections

The following locations experience sub-standard, that is, LOS E or F conditions during the AM and/or PM peak hours.

- Coffee Road at Sylvan Avenue
- Mc Henry Avenue at Sylvan Avenue

Existing Stop Control Intersections That Meet Delay or Peak Hour Warrant

The following locations experience sub-standard, that is, LOS E or F conditions during the AM and/or PM peak hours. Further, each intersection meets either the delay, peak hour volume or both signal warrants.

- Aria Way at Sylvan Avenue
- Claus Road at Milnes Road
- Claus Road at Santa Fe Avenue
- Claus Road at Sylvan Avenue
- Litt Road at Sylvan Avenue
- Mc Reynolds Avenue at Sylvan Avenue
- Roselle Avenue at Belharbour Drive
- Roselle Avenue at Floyd Avenue
- Roselle Avenue at Merle Avenue
- Wood Sorrell Drive at Sylvan Avenue

Existing Stop Control Intersections That Do Not Meet Warrants

The following locations experience sub-standard, that is, LOS E or F conditions during the AM and/or PM peak hours. Further, these intersections do not meet either the delay, peak hour volume or both signal warrants.

- Coffee Road at Claratina Avenue
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Roselle Avenue at Claribel Road
- Roselle Avenue at Sylvan Avenue

Existing Roadway Segment Levels of Service

Roadway segment V/C ratios were calculated based on the existing volumes and segment capacities presented in Table 5. Road segment capacities are inherently conservative as they are based on the number of lanes on the mainline segments and do not necessarily consider additional turn lanes (and their added capacity) at the approaches to intersections. The existing V/C ratios and corresponding LOS values are shown in Table 8.

Table 8 - Existing Peak Hour Roadway Levels of Service

Location	Direction	Lane	type	Per lane Capacity	v/c	LOS	v/c	LOS
Claratina Avenue								
McHenry Avenue to Coffee Road	EB	1	rural road	900	1.053	F	1.250	F
McHenry Avenue to Coffee Road	WB	1	rural road	900	1.027	F	1.589	F
Roselle Avenue								
North of Sylvan Avenue	NB	1	rural road	900	0.293	A	0.437	A
North of Sylvan Avenue	SB	1	rural road	900	0.354	A	0.357	A
Sylvan Avenue								
Roselle Avenue to McReynolds Avenue	EB	2	unsignalized arterial	1000	0.189	A	0.336	A
Roselle Avenue to McReynolds Avenue	WB	1	unsignalized arterial	1000	0.597	A	0.569	A
McReynolds Avenue to Aria Way	EB	1	unsignalized arterial	900	0.447	A	0.937	E
McReynolds Avenue to Aria Way	WB	1	unsignalized arterial	900	0.848	D	0.538	A
Aria Way to Wood Sorrell Drive	EB	1	unsignalized arterial	1000	0.587	A	0.971	E
Aria Way to Wood Sorrell Drive	WB	1	unsignalized arterial	1000	0.945	E	0.593	A
Wood Sorrell Drive to Lydia Lane	EB	1	unsignalized arterial	1000	0.619	B	1.030	F
Wood Sorrell Drive to Lydia Lane	WB	1	Collector Arterial	1000	0.993	E	0.650	B
Lydia Lane to Oakdale Road	EB	1	rural road	1000	0.697	B	1.153	F
Lydia Lane to Oakdale Road	WB	1	rural road	750	1.395	F	1.052	F
Oakdale Road								
Sylvan Avenue to Bridgewood Way	NB	1	rural road	900	0.800	D	0.918	E
Sylvan Avenue to Bridgewood Way	SB	2	rural road	900	0.499	A	0.449	A
Bridgewood Way to Mable Avenue	NB	1	rural road	900	0.439	A	0.538	A
Bridgewood Way to Mable Avenue	SB	2	rural road	900	0.211	A	0.270	A
Mable Avenue to Future Claratina Avenue	NB	1	rural road	900	0.599	A	0.682	B
Mable Avenue to Future Claratina Avenue	SB	1	rural road	750	0.941	E	0.700	C

Note: NB = northbound, SB = southbound, WB = westbound and EB = eastbound

Sub-Standard Roadway Segment Operations

The following roadway segments operate at levels of service below the acceptable threshold adopted by the City of Modesto. Refer to Table 8 for details regarding impacts along specific roadway subsegments.

- Claratina Avenue – McHenry Avenue to Oakdale Road
- Oakdale Road – Sylvan Avenue to Future Claratina Avenue
- Sylvan Avenue – Roselle Avenue to Oakdale Road

CHAPTER 4 - YEAR 2012 CONDITIONS

Year 2012 conditions represent near-term conditions with planned and financed transportation system improvements, traffic volume increases due to expected local development plus regional growth, and portions of the project to be conducted by 2012. The Year 2012 portions of the project include:

- The proposed project minus 724 residential units located within the northeastern quadrant of the project site plus 104,544 less gross square footage of commercial uses within the same area.

LOS analysis results for the key intersections and roadway segments were used as the basis for determining near-term (2012) project impacts as discussed in Chapter 2.

Year 2012 Baseline Transportation System Improvements

Modifications to the transportation system include roadway and intersection improvements found with the City of Modesto Capitol Improvement Program. These improvements are described in the following section.

Roadway Segment Improvements

1. Construct 2 lanes on Claratina Avenue between Coffee Road and Oakdale Road (Fall 2006)
2. Widen Floyd Avenue from 2 to 4 lanes between Oakdale Road and Grouse Crossing Way (Fall 2006)
3. Widen Floyd Avenue between Roselle Avenue and Fine Avenue from 2 to 4 lanes (Fall 2007)
4. Construct 4 lanes on Floyd Avenue between Fine Avenue and Claus Road (Fall 2008)
5. Construct a median on Oakdale Road between Mable Avenue and Claratina Avenue (Fall 2012)
6. Construct center turn lane on Oakdale Road between La Force Drive and Floyd Avenue (Fall 2012)
7. Construct third southbound lane on Oakdale Road between Floyd Avenue and E. Briggsmore Avenue (Fall 2012)
8. Widen Roselle Avenue between Sylvan Avenue and Floyd Avenue from 2 to 4 lanes (Fall 2008)
9. To be consistent with the analysis methodology applied in the other recent EIRs, the use of 2 lane roundabouts along portions of Sylvan Avenue and Roselle Avenue mean that these are effectively analyzed as 4-lane unsignalized arterials for roadway LOS.
10. Widen Briggsmore Avenue from 2 to 4 lanes between Oakdale Road and Claus Road

Local Intersection Improvements

1. Construct a traffic signal at Claus Road and Floyd Avenue (Fall 2007)
2. Construct a 2 lane roundabout at Roselle Avenue and Floyd Avenue (Fall 2008)

3. Construct intersection improvements at Oakdale Road and La Force Drive (Fall 2007)
4. Construct a traffic signal at Roselle Avenue and Merle Avenue (Fall 2012)
5. Construct intersection improvements at Sylvan Avenue and Aria Way (Fall 2010)
6. Construct a 2 lane roundabout at Sylvan Avenue and Roselle Avenue (Fall 2006)
7. Construct a 2 x 1 lane roundabout at Sylvan Avenue and Millbrook Avenue (Fall 2006)
8. Construct a 2 x 1 lane roundabout at Sylvan Avenue and Litt Road (Fall 2010)
9. Construct a traffic signal at Sylvan Avenue and Claus Road (Fall 2007)
10. Construct intersection improvements at Sylvan Avenue and Claus Road (Fall 2010)
11. Construct a 2 x 2 lane roundabout at Claratina Avenue and Coffee Road
12. Construct a 2 x 1 lane roundabout at Roselle Avenue and Hillglen Avenue
13. Construct a 2 x 1 lane roundabout at Roselle Avenue and Kodiak Drive

Figures 5a, 5b and 5c show the AM and PM peak hour traffic without the project. The assumed geometry at each intersection is also shown.

Year 2012 Project Related Transportation Improvements

The proposed project will create new intersections at six locations by 2012:

- Tivoli Road A at Claratina Avenue
- RSC-1 Driveway 1 at Claratina Avenue
- RSC-1 Driveway 2 at Claratina Avenue
- RSC-1 Driveway 3 at Claratina Avenue
- Tivoli Road E at Oakdale Avenue
- RSC-1 West Driveway 1 at Oakdale Road

The study has assumed that by 2012, the project will create a new segment of Claratina Avenue from Oakdale Road to Tivoli Road A. The City will ultimately require the project to fund construction of this road to Roselle Avenue. It is assumed that this will be phased and that construction to Tivoli A will be complete by 2012. Conditions on the segment from Tivoli A to Roselle are evaluated under 2017 conditions.

On Roselle Avenue the project will be required to fund improvement to a four lane unsignalized arterial from Sylvan Avenue to the future Claratina Avenue.

The project will fund improvement of Oakdale Road from Claratina Avenue to Sylvan Avenue to 3 northbound lanes to complete a six lane arterial. Improvement of Oakdale Road to a six lane arterial will include a median that will prohibit left turns at minor intersections including Tivoli Road E. These left turns will be shifted to Bridgewood Way. On Oakdale Road at Tivoli Road E and the RSC-1 Driveway the project will have right turn only access with outbound right turns served by an acceleration lane.

Year 2012 Project Traffic

The amount of traffic associated with the project was estimated using the process, which is described in Chapter 2. The major steps include:

1. Estimating the project trip generation and factor to reproduce ITE trip generation estimates.
2. Assign trips to specific roadway segments and intersection turning movements using the City of Modesto Model.
3. Add the increment of project generated traffic to the year 2012 baseline (without project) volumes.

Trip Generation

The amount of traffic generated by Phase 1 of the proposed Tivoli Specific Plan was estimated from the Institute of Transportation Engineers (ITE) Trip Generation (7th Edition) for the variety of uses listed below. The rates are presented below in Table 9.

Table 9 - Project Trip Generation Rates

Land Use Designation (Acronym)	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Large Lot Estate Residential (VLDR)	9.57 ¹	0.19	0.56	0.75	0.64	0.37	1.01
Small Lot Residential (VDR)	9.57 ¹	0.19	0.56	0.75	0.64	0.37	1.01
Medium Density Residential (MDR ⁵)	8.79 ¹	0.16	0.47	0.67	0.45	0.33	0.78
High Density Residential (MHDR)	6.72 ¹	0.75	3.00	0.51	0.40	0.22	0.62
Neighborhood Commercial (NC)	42.94 ²	2.29	1.46	1.03	1.80	1.95	3.75
Commercial (C)	42.94 ²	2.29	1.46	1.03	1.80	1.95	3.75
Regional Serving Commercial (RSC)	60.87 ²	1.45	1.19	2.64	2.60	2.68	5.28
Professional Office (PO)	11.57 ²	3.56	0.44	1.80	0.26	1.47	1.73
Elementary School	1.29 ³	0.00	0.00	0.42	0.13	0.15	0.28
Parks	20 ⁴	2	2	4	2	2	4

¹ All rates are calculated per dwelling unit
² All rates are calculated per thousand square feet
³ All rates are calculated by student enrollment
⁴ All rates are calculated by number of acres
⁵ For the MDR land use, ITE code 231 was used, low-rise residential condo/townhouse rates. As no ADT rate is provided, the ratio of the PM/ADT for ITE code 230 or 0.088737 (0.52/5.86) was applied to the PM rate for ITE 231 or 8.79 (0.78/0.88737).

Figure 5a – 2012 Baseline AM(PM) Peak Hour Intersection Turning Movements

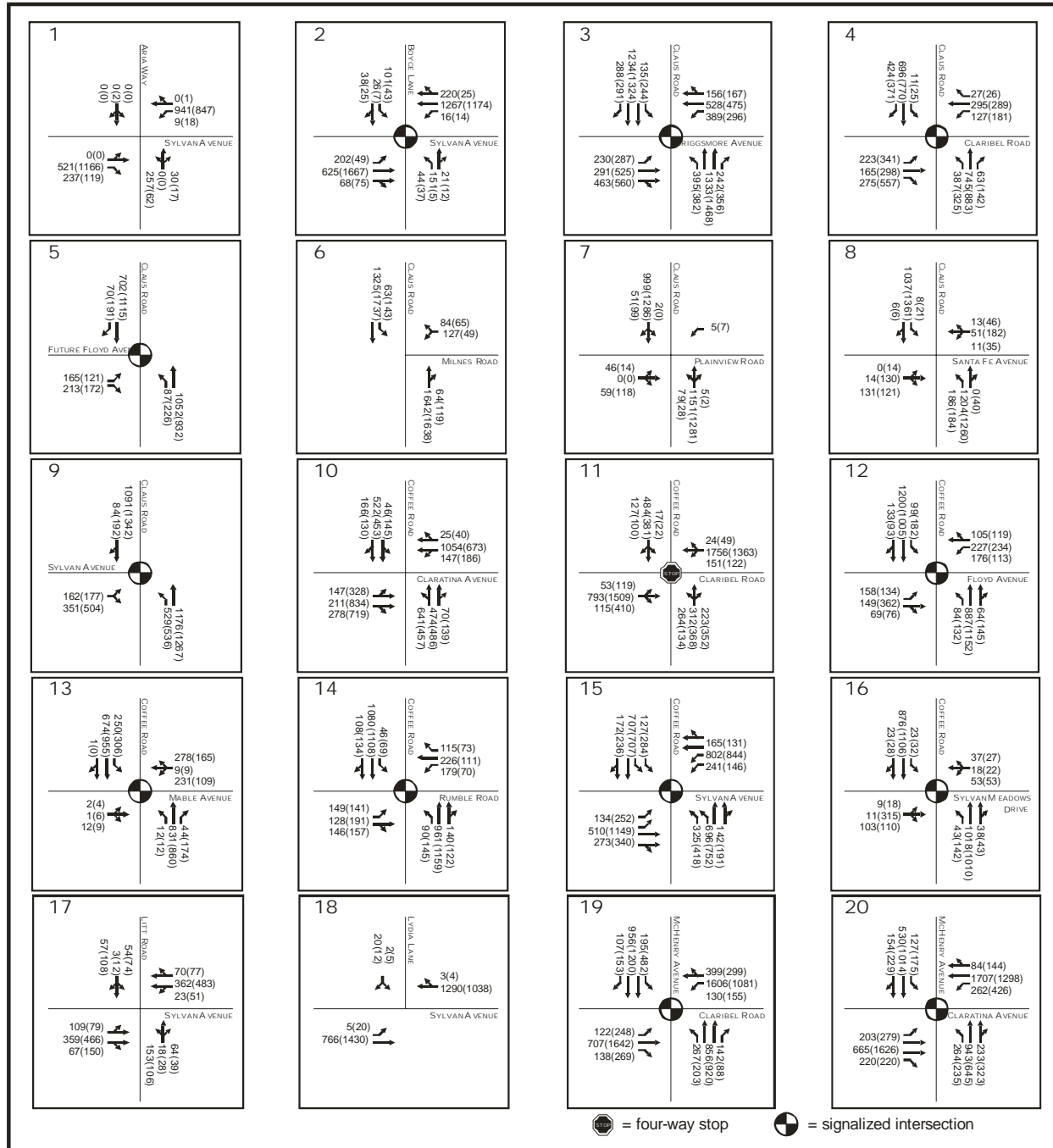


Figure 5b – 2012 Baseline AM(PM) Peak Hour Intersection Turning Movements

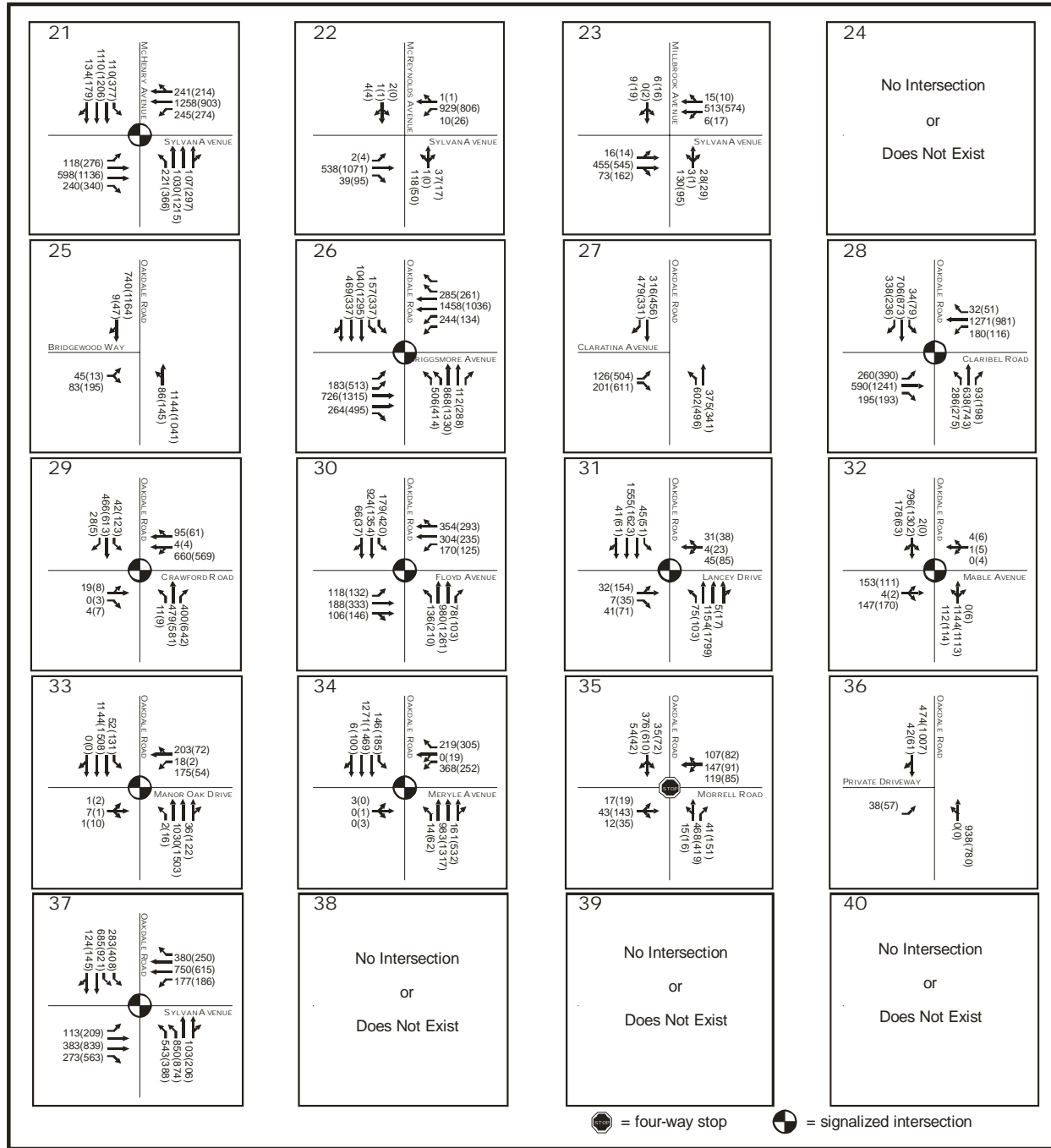
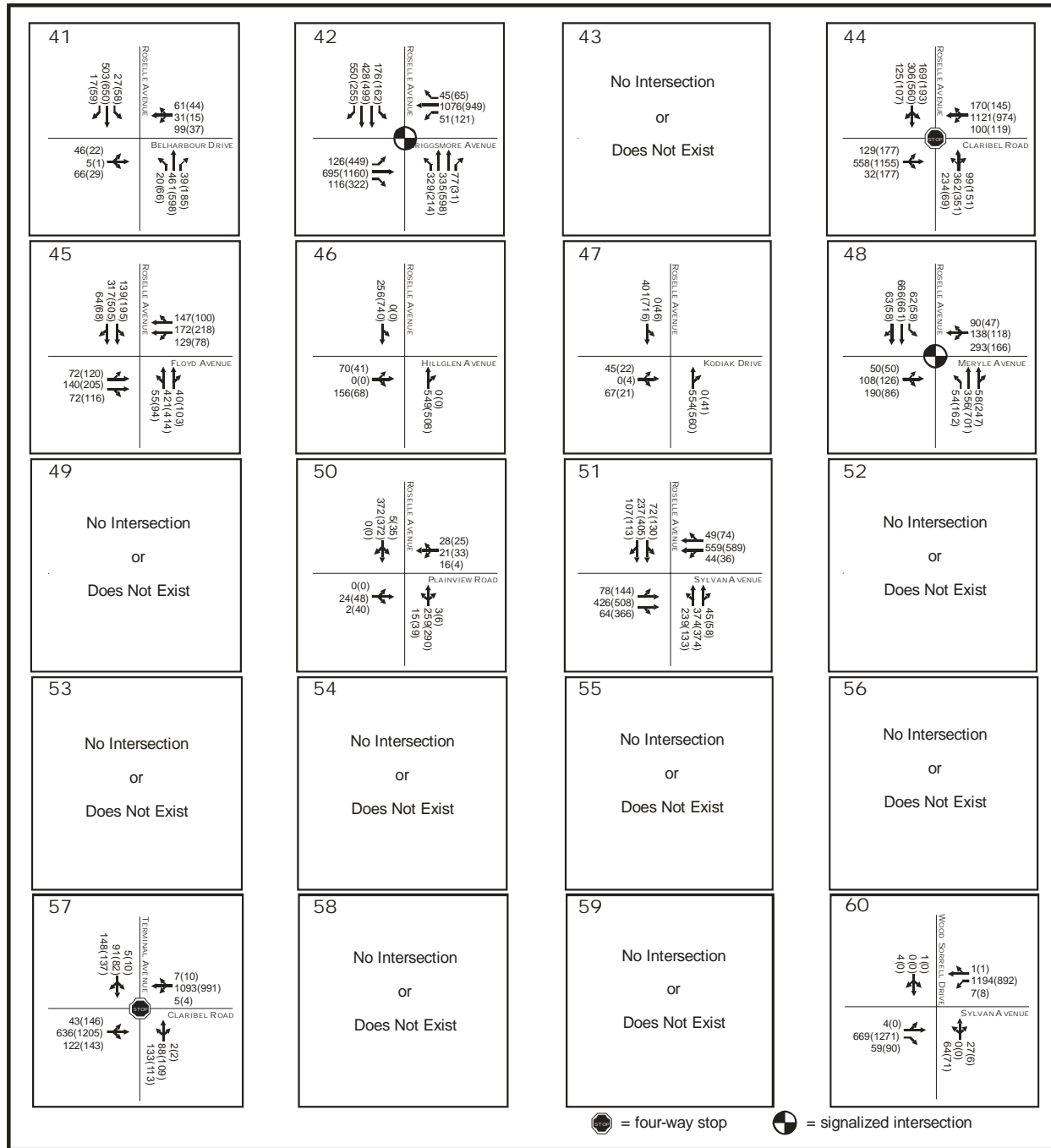


Figure 5c – 2012 Baseline AM(PM) Peak Hour Intersection Turning Movements



The rates were applied to individual uses to estimate project-generated traffic. And the model was adjusted to replicate this traffic. Trip generation estimates are summarized in Table 10. The proposed project is projected to add approximately 80,900 daily trips, 4,600 AM peak-hour trips, and 7,500 PM peak-hour trips to the surrounding roadways by 2012.

Table 10 - Year 2012 Project Trip Generation

Land Use Acronym	Amount	Units	ITE Code	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
VLDR	30	DU ¹	210	287	5	17	22	20	10	30
LDR	1,054	DU ¹	210	10,087	201	589	790	676	390	1,066
MDR	833	DU ¹	231	7,322	142	417	559	376	275	651
MHDR	504	DU ¹	220	3,387	50	207	257	202	111	313
NC	0	SqFt ²	820	0	0	0	0	0	0	0
C	74,488	SqFt ²	820	3,198	47	30	77	134	145	279
RSC-1	600,000	SqFt ²	Ave.	36,520	870	708	1,578	1,558	1,608	3,166
RSC-2	300,000	SqFt ²	Ave.	18,260	435	356	791	780	805	1,585
PO	31,363	SqFt ²	715	363	50	6	56	8	46	54
Elem. Sch.	13.5	Acres	520	1097	196	162	358	111	128	239
Parks	19	Acres	411	380	38	38	76	38	38	76
TOTAL				80,901	2,034	2,530	4,564	3,903	3,556	7,459
¹ DU refers to total number of Dwelling Units ² SqFt refers to Gross Square Footage, and trip generation rates are calculated per 1,000 square feet. ³ Enrl refers to number of students										

Trip Distribution

The City of Modesto model was used to determine the trip distribution values created by the project. Chapter 2 provides a discussion of the trip distribution values identified in the course of the forecasting.

Trip Assignment

Trips generated by the initial phases of the proposed project were assigned to the roadway system based on the directions of approach and departure as described above. Project traffic was then added to the year 2012 baseline (without project) condition. Figures 6a, 6b and 6c show the resultant year 2012 baseline with-project traffic volumes.

Figure 6a – 2012 With Project AM(PM) Peak Hour Intersection Turning Movements

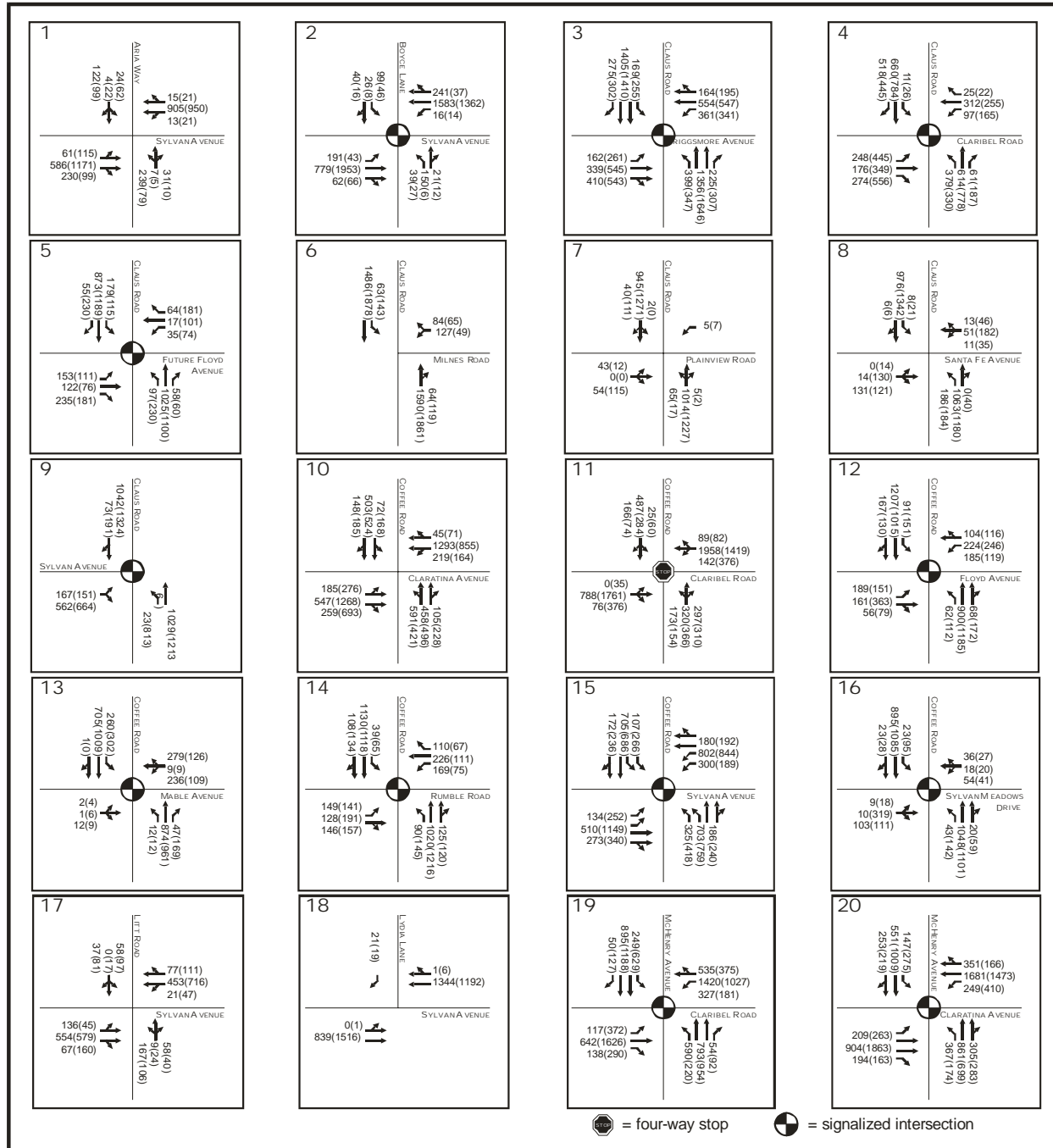


Figure 6b – 2012 With Project AM(PM) Peak Hour Intersection Turning Movements

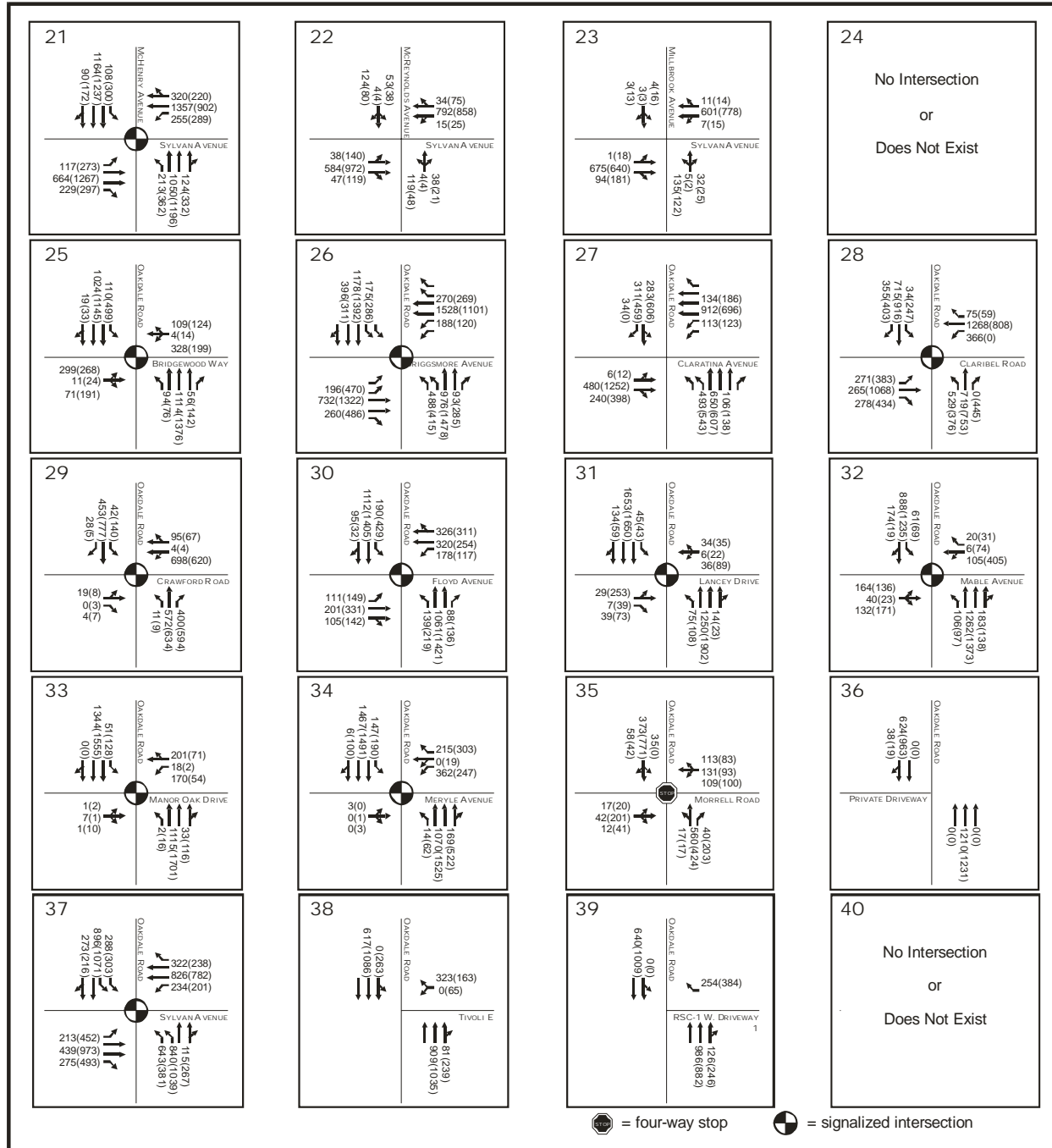
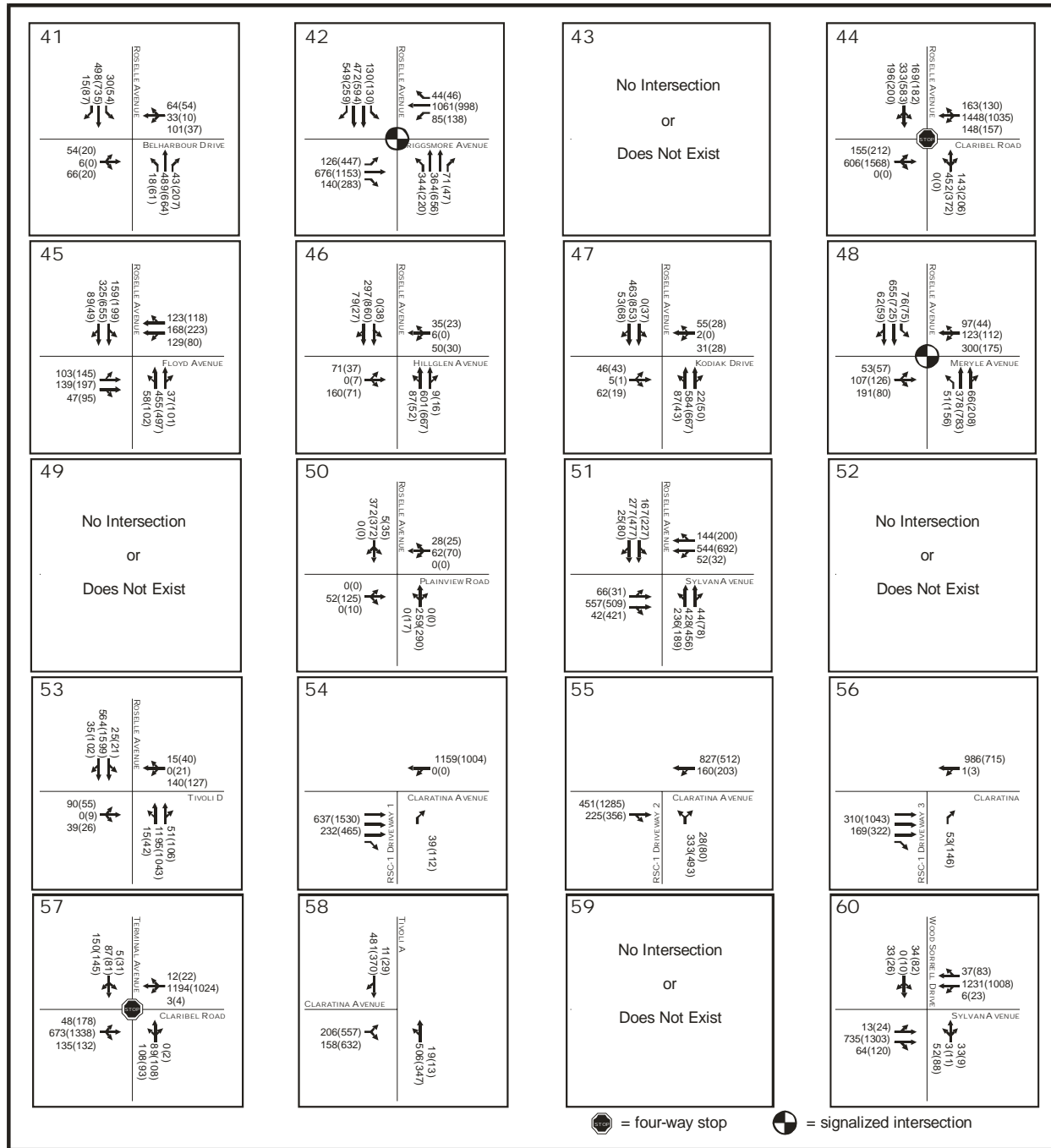


Figure 6c – 2012 With Project AM(PM) Peak Hour Intersection Turning Movements



Year 2012 Intersection Levels of Service

The scenarios developed for the year 2012 include the 2012 baseline without the project as well as year 2012 with the project. Service levels were calculated for the study intersections using the 2012 baseline and project traffic volumes and the planned and project roadway improvements. Table 11 presents the LOS results; the corresponding LOS calculation sheets are included in the technical appendix. Delay increases due to the project and the impacts associated with the project are also presented in Table 11. Table 11 shows the conditions before and after the project traffic is added.

2012 Baseline Conditions

The following intersections are projected to operate at LOS E or LOS F under 2012 baseline conditions during either the AM or PM peak hours.

Signalized Intersections

Claus Road at Briggsmore Avenue
Claus Road at Claribel Road
Claus Road at Sylvan Avenue
Coffee Road at Mable Avenue
Coffee Road at Sylvan Avenue
Mc Henry Avenue at Claribel Road
Mc Henry Avenue at Claratina Avenue
Mc Henry Avenue at Sylvan Avenue
Oakdale Road at Bridgewood Way
Oakdale Road at Claribel Avenue
Oakdale Road at Sylvan Avenue

Stop Controlled Intersections

Aria Way at Sylvan Avenue
Claus Road at Milnes Road
Claus Road at Plainview Road
Claus Road at Santa Fe Avenue
Coffee Road at Claribel Road
Lydia Lane at Sylvan Avenue
Mc Reynolds Avenue at Sylvan Avenue
Oakdale Road at Claratina Avenue
Oakdale Road at Morrill Road
Roselle Avenue at Belharbour Drive
Roselle Avenue at Claribel Road
Roselle Avenue at Kodiak Drive
Terminal Avenue at Claribel Road
Wood Sorrell Drive at Sylvan Avenue

2012 Project Conditions

The following intersections are projected to operate at LOS E or LOS F under 2012 project conditions during either the AM or PM peak hours. It should be noted that the project includes intersection modifications from the base condition, such as signalization or the construction of a roundabout. Therefore, the levels of service under the project condition may be improved. The tables provide details of the types of intersection controls assumed under both the with-project and without-project conditions.

Signalized Intersections

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Sylvan Avenue
- Coffee Road at Mable Avenue
- Coffee Road at Sylvan Avenue
- McHenry Avenue / Claribel Road
- McHenry Avenue at Claratina Avenue
- McHenry Avenue at Sylvan Avenue
- Oakdale Road at Claribel Road
- Oakdale Road at Mable Avenue
- Oakdale Road at Sylvan Avenue
- Roselle Road at Briggsmore Avenue

Stop Controlled Intersections

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Avenue
- Roselle Avenue at Belharbour Drive
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road

Roundabout Intersections

- Coffee Road and Claratina Avenue

Stop Control Intersections That Meet Delay or Peak Hour Warrant

The following locations experience sub-standard, that is, LOS E or F conditions during the AM and/or PM peak hours. Further, each intersection meets either the delay, peak hour volume or both signal warrants under with-project conditions.

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Road
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Roselle at Belharbour Drive
- Roselle Avenue at Claribel Road
- RSC-1 Driveway 1 at Claratina Avenue
- RSC-1 Driveway 3 at Claratina Avenue
- Terminal Avenue at Claribel Road

Year 2012 Roadway Segment Levels of Service

Roadway segment V/C ratios were calculated based on the existing volumes and segment capacities presented in Table 4. These capacities are conservative as they are based on the number of lanes on the mainline segments and do not necessarily consider additional turn lanes (and their added capacity) at the approaches to intersections. The volume to capacity ratios and corresponding LOS values are shown in Table 12.

2012 Baseline Conditions

The following roadway segments are projected to operate at LOS E or LOS F under 2012 baseline conditions. Refer to Table 12 for details regarding impacts along specific roadway segments.

- Claratina Avenue – McHenry Avenue to Oakdale Road
- Sylvan Avenue – Roselle Avenue to Oakdale Road
- Oakdale Road – Sylvan Avenue to Claratina Avenue

2012 Project Conditions

Portions of the following roadway segments are projected to operate at LOS E or LOS F under 2012 project conditions. Refer to Table 12 for details regarding impacts along specific roadway segments.

Claratina Avenue – McHenry Avenue to Oakdale
Sylvan Avenue – Roselle Avenue to Oakdale Road

Table 11 - Comparison of 2012 Baseline and With Project Peak Hour Levels of Service

Intersection		2012 Baseline No Project					2012 With Project					Impact Y/N?
		Control	AM		PM		Control	AM		PM		
ID#	Name		Delay*	LOS	Delay*	LOS		Delay*	LOS	Delay*	LOS	
1	Aria Way at Sylvan Avenue	Unsignalized	69.5 (482.9)	F(F)	18.1 (505.5)	C(F)	Roundabout	3.5	A	3.9	A	N
2	Boyce Lane at Sylvan Avenue	Signal	24.6	C	7.7	A	Signal	26.7	C	7.6	A	N
3	Claus Road at Briggsmore Avenue	Signal	70.5	E	93.4	F	Signal	71.1	E	112.7	F	Y
4	Claus Road at Claribel Road	Signal	51.4	D	85.3	F	Signal	53.0	D	86.1	F	N**
5	Claus Road at Future Floyd Avenue	Signal	17.4	B	24.9	C	Signal	35.6	D	51.6	D	N
6	Claus Road at Milnes Road	Unsignalized	349.0 (5462.4)	F(F)	211.7 (6939.1)	F(F)	Unsignalized	395.1 (6388.2)	F(F)	383.0 (>9999)	F(F)	Y
7	Claus Road at Plainview Road	Unsignalized	32.6 (722.7)	D(F)	23.1 (1548.7)	C(F)	Unsignalized	16.6 (356.6)	C(F)	16.0 (1191.2)	C(F)	N**
8	Claus Road at Santa Fe Avenue	Unsignalized	135.0 (4275.4)	F(F)	>9999(>9999)	F(F)	Unsignalized	71.2 (2027.4)	F(F)	>9999(>9999)	F(F)	N**
9	Claus Road at Sylvan Avenue	Signal	136.7	F	247.1	F	Signal	197.9	F	337.9	F	Y
10	Coffee Road at Claratina Avenue	Roundabout	7.2	A	18.0	C	Roundabout	18.6	C	58.9	F	Y
11	Coffee Road at Claribel Road	All-way STOP	1074.2	F	1293.0	F	All-way STOP	1239.5	F	1524.2	F	Y
12	Coffee Road at Floyd Avenue	Signal	26.5	C	32.0	C	Signal	27.0	C	32.1	C	N
13	Coffee Road at Mable Avenue	Signal	63.3	E	32.7	C	Signal	71.2	E	34.2	C	Y
14	Coffee Road at Rumble Road	Signal	29.3	C	29.0	C	Signal	28.8	C	29.2	C	N
15	Coffee Road at Sylvan Avenue	Signal	37.7	D	72.3	E	Signal	41.1	D	77.9	E	Y
16	Coffee Road at Sylvan Meadows Drive	Signal	12.9	B	24.6	C	Signal	12.7	B	26.3	C	N
17	Litt Road at Sylvan Avenue	Roundabout	2.8	A	2.9	A	Roundabout	3.0	A	3.1	A	N
18	Lydia Lane at Sylvan Avenue	Unsignalized	0.3 (30.0)	A(D)	0.5 (58.9)	A(F)	Unsignalized	0.1 (14.4)	A(B)	0.1 (13.4)	A(B)	N
19	McHenry Avenue at Claribel Road	Signal	257.7	F	251.1	F	Signal	285.7	F	288.4	F	Y
20	McHenry Avenue at Claratina Avenue	Signal	91.3	F	142.7	F	Signal	137.3	F	167.6	F	Y
21	McHenry Avenue at Sylvan Avenue	Signal	47.0	D	94.4	F	Signal	55.5	E	97.2	F	Y
22	McReynolds Avenue at Sylvan Avenue	Unsignalized	21.9 (234.1)	C(F)	9.0 (272.8)	A(F)	Roundabout	3.0	A	3.2	A	N
23	Millbrook Avenue at Sylvan Avenue	Roundabout	2.3	A	2.4	A	Roundabout	2.5	A	2.6	A	N
24	N. NC-1 Driveway at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N
25	Oakdale Road at Bridgewood Way	Unsignalized	9.2(145.2)	A(F)	21.3(257.2)	C(F)	Signal	32.5	C	54.6	D	N
26	Oakdale Road at Briggsmore Avenue	Signal	43.4	D	45.2	D	Signal	48.7	D	50.0	D	N
27	Oakdale Road at Claratina Avenue	Unsignalized	101.1 (613.1)	F(F)	835.6 (2045.8)	F(F)	Signal	28.2	C	40.8	D	N
28	Oakdale Road at Claribel Road	Signal	177.8	F	218.9	F	Signal	228.9	F	181.2	F	Y
29	Oakdale Road at Crawford Road	Signal	28.5	C	31.3	C	Signal	29.6	C	35.6	D	N
30	Oakdale Road at Floyd Avenue	Signal	33.6	C	44.8	D	Signal	33.5	C	54.1	D	N
31	Oakdale Road at Lancey Drive	Signal	8.7	A	15.8	B	Signal	7.8	A	20.7	C	N
32	Oakdale Road at Mable Avenue	Signal	43.9	D	52.9	D	Signal	22.8	C	87.1	F	Y
33	Oakdale Road at Manor Oak Drive	Signal	16.1	B	9.0	A	Signal	15.2	B	8.6	A	N
34	Oakdale Road at Merle Avenue	Signal	17.0	B	19.4	B	Signal	16.2	B	19.5	B	N

Intersection		2012 Baseline No Project					2012 With Project					Impact Y/N?
		Control	AM		PM		Control	AM		PM		
ID#	Name		Delay*	LOS	Delay*	LOS		Delay*	LOS	Delay*	LOS	Delay*
35	Oakdale Road at Morrill Road	All-way STOP	35.2	E	96.3	F	All-way STOP	52.7	F	152.8	F	Y
36	Oakdale Road at Private Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0(0.0)	A(A)	0.0(0.0)	A(A)	N
37	Oakdale Road at Sylvan Avenue	Signal	36.8	D	55.4	E	Signal	53.6	D	75.1	E	Y
38	Oakdale Road at Tivoli E	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0(0.0)	A(A)	0.0(0.0)	A(A)	N
39	Oakdale Road RSC-1 W. Driveway 1	n/a	n/a	n/a	n/a	n/a	Unsignalized	1.9 (15.0)	A(B)	3.3 (21.7)	A(C)	N
40	Roselle Avenue and MHDR-2 Driveway	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N
41	Roselle Avenue at Belharbour Drive	Unsignalized	13.5 (76.3)	B(F)	6.6 (78.6)	A(F)	Unsignalized	16.5 (91.7)	C(F)	7.7 (104.7)	A(F)	Y***
42	Roselle Avenue at Briggsmore Avenue	Signal	93.1	F	77.6	E	Signal	92.3	F	90.1	F	Y
43	Roselle Avenue at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N
44	Roselle Avenue at Claribel Road	All-way STOP	677.9	F	900.6	F	All-way STOP	922.0	F	1090.4	F	Y
45	Roselle Avenue at Floyd Avenue	Roundabout	2.2	A	2.5	A	Roundabout	2.3	A	2.7	A	N
46	Roselle Avenue at Hillglen Avenue	Roundabout	5.6	A	7.4	A	Roundabout	2.7	A	2.7	A	N
47	Roselle Avenue at Kodiak Drive	Roundabout	5.8	A	8.4	A	Roundabout	2.4	A	2.6	A	N
48	Roselle Avenue at Merle Avenue	Signal	34.8	C	29.9	C	Signal	35.1	D	29.9	C	N
49	Roselle Avenue at NC-1 E. Driveway	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N
50	Roselle Avenue at Plainview Road	Unsignalized	2.0 (15.0)	A(C)	3.4 (16.6)	A(C)	Unsignalized	2.8 (15.5)	A(C)	5.5 (22.9)	A(C)	N
51	Roselle Avenue at Sylvan Avenue	Roundabout	2.6	A	3.1	A	Roundabout	2.9	A	3.6	A	N
52	Roselle Avenue at Tivoli C	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N
53	Roselle Avenue at Tivoli D	n/a	n/a	n/a	n/a	n/a	Roundabout	3.6	A	5.6	A	N
54	RSC-1 Driveway 1 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.2 (9.7)	A(A)	0.5 (13.9)	A(B)	N
55	RSC-1 Driveway 2 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	17.7	B	23.8	C	N
56	RSC-1 Driveway 3 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.3 (9.1)	A(A)	0.8 (12.1)	A(B)	N
57	Terminal Avenue at Claribel Road	All-way STOP	339.0	F	576.5	F	All-way STOP	388.6	F	673.0	F	Y
58	Tivoli Road A at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	31.5	C	34.2	C	N
59	Tivoli Road B at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N
60	Wood Sorrell Drive at Sylvan Avenue	Unsignalized	13.4 (296.9)	B(F)	13.1 (395.6)	B(F)	Roundabout	3.1	A	4.0	A	N

Note: n/a = not applicable
 * =>9999 indicates overflow delay. The delay calculations for the HCM 2000 methodology are incapable of quantifying delay. Estimated delay would exceed 9999 seconds.
 ** = Project traffic does not cause critical delay to increase by more than five seconds at signalized intersections or 30 seconds on minor approaches at unsignalized intersections.
 *** = Project traffic contributes more than 10 vehicles per lane at unsignalized intersection operating at LOS F with incremental delay less than 30 seconds.

Table 12 - Comparison of 2012 Baseline and With Project Peak Hour Roadway

Location	Dir	Lane	type	2012 Baseline				Lane	type	2012 WP				v/c change		Impact Y/N?
				AM		PM				AM		PM		AM	PM	
				v/c	LOS	v/c	LOS			v/c	LOS	v/c	LOS			
Claratina Avenue																
McHenry Avenue to Coffee Road	EB	1	rural road	1.139	F	2.360	F	1	rural road	1.507	F	2.690	F	0.368	0.330	Y
McHenry Avenue to Coffee Road	WB	1	rural road	2.281	F	2.076	F	1	rural road	2.534	F	2.277	F	0.253	0.201	Y
Coffee Road to Oakdale Road	EB	1	rural road	0.363	A	1.242	F	1	rural road	0.804	D	1.849	F	0.441	0.607	Y
Coffee Road to Oakdale Road	WB	1	rural road	1.362	F	0.999	E	1	rural road	1.730	F	1.211	F	0.368	0.212	Y
Oakdale Road to RSC-1 Driveway #1	EB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.386	A	0.887	D	n/a	n/a	N
Oakdale Road to RSC-1 Driveway #1	WB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.429	A	0.372	A	n/a	n/a	N
RSC-1 Driveway #1 to RSC-1 Driveway #2	EB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.300	A	0.730	C	n/a	n/a	N
RSC-1 Driveway #2 to RSC-1 Driveway #2	WB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.429	A	0.372	A	n/a	n/a	N
RSC-1 Driveway #2 to RSC-1 Driveway #3	EB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.213	A	0.607	B	n/a	n/a	N
RSC-1 Driveway #3 to RSC-1 Driveway #3	WB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.366	A	0.265	A	n/a	n/a	N
RSC-1 Driveway #3 to Tivoli Road A	EB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.161	A	0.528	A	n/a	n/a	N
RSC-1 driveway #3 to Tivoli Road A	WB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.366	A	0.266	A	n/a	n/a	N
Roselle Avenue																
Future Claratina Avenue to Sylvan Avenue	NB	2	unsignalized arterial	0.158	A	0.169	A	2	unsignalized arterial	0.650	B	0.596	A	0.492	0.427	N
Future Claratina Avenue to Sylvan Avenue	SB	2	unsignalized arterial	0.090	A	0.221	A	2	unsignalized arterial	0.312	A	0.876	D	0.223	0.656	N
Sylvan Avenue																
Roselle Avenue to McReynolds Avenue	EB	2	unsignalized arterial	0.284	A	0.509	A	2	unsignalized arterial	0.333	A	0.481	A	0.049	-0.029	N
Roselle Avenue to McReynolds Avenue	WB	2	unsignalized arterial	0.453	A	0.418	A	2	unsignalized arterial	0.403	A	0.481	A	-0.050	0.063	N
McReynolds Avenue to Aria Way	EB	2	unsignalized arterial	0.290	A	0.585	A	2	unsignalized arterial	0.007	A	0.002	A	-0.283	-0.583	N
McReynolds Avenue to Aria Way	WB	2	unsignalized arterial	0.526	A	0.430	A	2	unsignalized arterial	0.002	A	0.002	A	-0.524	-0.428	N
Aria Way to Wood Sorrell Drive	EB	2	unsignalized arterial	0.379	A	0.643	B	2	unsignalized arterial	0.439	A	0.693	B	0.060	0.050	N
Aria Way to Wood Sorrell Drive	WB	2	unsignalized arterial	0.599	A	0.455	A	2	unsignalized arterial	0.633	B	0.564	A	0.034	0.110	N
Wood Sorrell Drive to Lydia Lane	EB	1	unsignalized arterial	0.732	C	1.361	F	1	unsignalized arterial	0.812	D	1.447	F	0.080	0.086	Y
Wood Sorrell Drive to Lydia Lane	WB	1	unsignalized arterial	1.262	F	0.963	E	1	unsignalized arterial	1.316	F	1.122	F	0.054	0.159	Y
Lydia Lane to Oakdale Road	EB	1	unsignalized arterial	0.769	C	1.453	F	1	unsignalized arterial	0.842	D	1.543	F	0.073	0.090	Y
Lydia Lane to Oakdale Road	WB	2	signalized arterial	0.871	D	0.701	C	2	signalized arterial	0.921	E	0.814	D	0.050	0.113	Y

Location	Dir	Lane	type	2012 Baseline				Lane	type	2012 WP				v/c change		Impact Y/N?
				AM		PM				AM		PM		v/c	LOS	
				v/c	LOS	v/c	LOS			v/c	LOS	v/c	LOS			
Oakdale Road																
<i>Sylvan Avenue to Bridgewood Way</i>	NB	1	signalized arterial	1.791	F	1.333	F	3	signalized arterial	0.386	A	0.887	D	n/a	n/a	N
<i>Sylvan Avenue to Bridgewood Way</i>	SB	2	signalized arterial	0.728	C	0.983	E	3	signalized arterial	0.515	A	0.372	A	n/a	n/a	N
<i>Bridgewood Way to Tivoli Road E</i>	NB	1	rural road	1.321	F	1.171	F	3	signalized arterial	0.300	A	0.730	C	n/a	n/a	N
<i>Bridgewood Way to Tivoli Road E</i>	SB	2	signalized arterial	0.499	A	0.807	D	3	signalized arterial	0.515	A	0.372	A	n/a	n/a	N
<i>Tivoli Road E to Mable Avenue</i>	NB	1	signalized arterial	1.248	F	1.097	F	3	signalized arterial	0.213	A	0.607	B	n/a	n/a	N
<i>Tivoli Road E to Mable Avenue</i>	SB	2	rural road	0.283	A	0.563	A	3	signalized arterial	0.439	A	0.265	A	n/a	n/a	N
<i>Mable Avenue to Future Claratina Avenue</i>	NB	1	rural road	1.446	F	1.367	F	3	signalized arterial	0.161	A	0.528	A	n/a	n/a	N
<i>Mable Avenue to Future Claratina Avenue</i>	SB	1	signalized arterial	1.301	F	1.820	F	3	signalized arterial	0.439	A	0.266	A	n/a	n/a	N

n/a = not applicable does not exist in baseline

CHAPTER 5 - YEAR 2017 CONDITIONS

- Year 2017 conditions represent near-term conditions with planned and financed transportation system improvements, traffic volume increases due to expected local development plus regional growth, and the full build out of the proposed project with a total of 3,145 residential units, 179,032 square feet of neighborhood and standard commercial use, 900,000 square feet of regional commercial use, 31,363 square feet of office, a 850 student elementary school and 19 acres of park.

LOS analysis results for the key intersections and roadway segments were used as the basis for determining near-term (2017) project impacts as discussed in Chapter 7.

Year 2017 Baseline Transportation System Improvements

For the year 2017, the roadway and intersection improvements used for the 2012 analysis were maintained without any additional improvements. In the 2017 scenario southbound Oakdale Road between Claratina Avenue and Sylvan Avenue is assumed to be constructed to 3 lanes as a signalized arterial as would be funded by the land development on the west side of that road. Assuming no project, these improvements are consistent with the assumptions in the City Model for the segment of Oakdale Road from Claratina Avenue to Sylvan Road and with the Transportation Diagram in the General Plan.

Figures 7a, 7b and 7c show the 2017 AM and PM peak hour traffic without the project. The assumed geometry at each intersection is also shown.

Year 2017 Project Related Transportation Improvements

The proposed project will create new intersections at seven locations between 2012 and 2017:

- Tivoli Road B at Claratina Avenue
- NC-1 North Driveway at Claratina Avenue
- NC-1 East Driveway at Claratina Avenue
- Roselle Avenue at Tivoli Road C
- Roselle Avenue at MHDR-2 Driveway
- Roselle Avenue at Tivoli Road D
- Claratina Avenue at Roselle Avenue

Roadway improvements identified for 2012 with project conditions would be included for 2017 with project conditions including widening of Oakdale Road, Roselle Avenue, and Sylvan Avenue. Claratina Avenue will be extended from Oakdale Avenue to Roselle as a six lane signalized arterial.

Figure 7a – 2017 Baseline AM(PM) Peak Hour Intersection Turning Movements

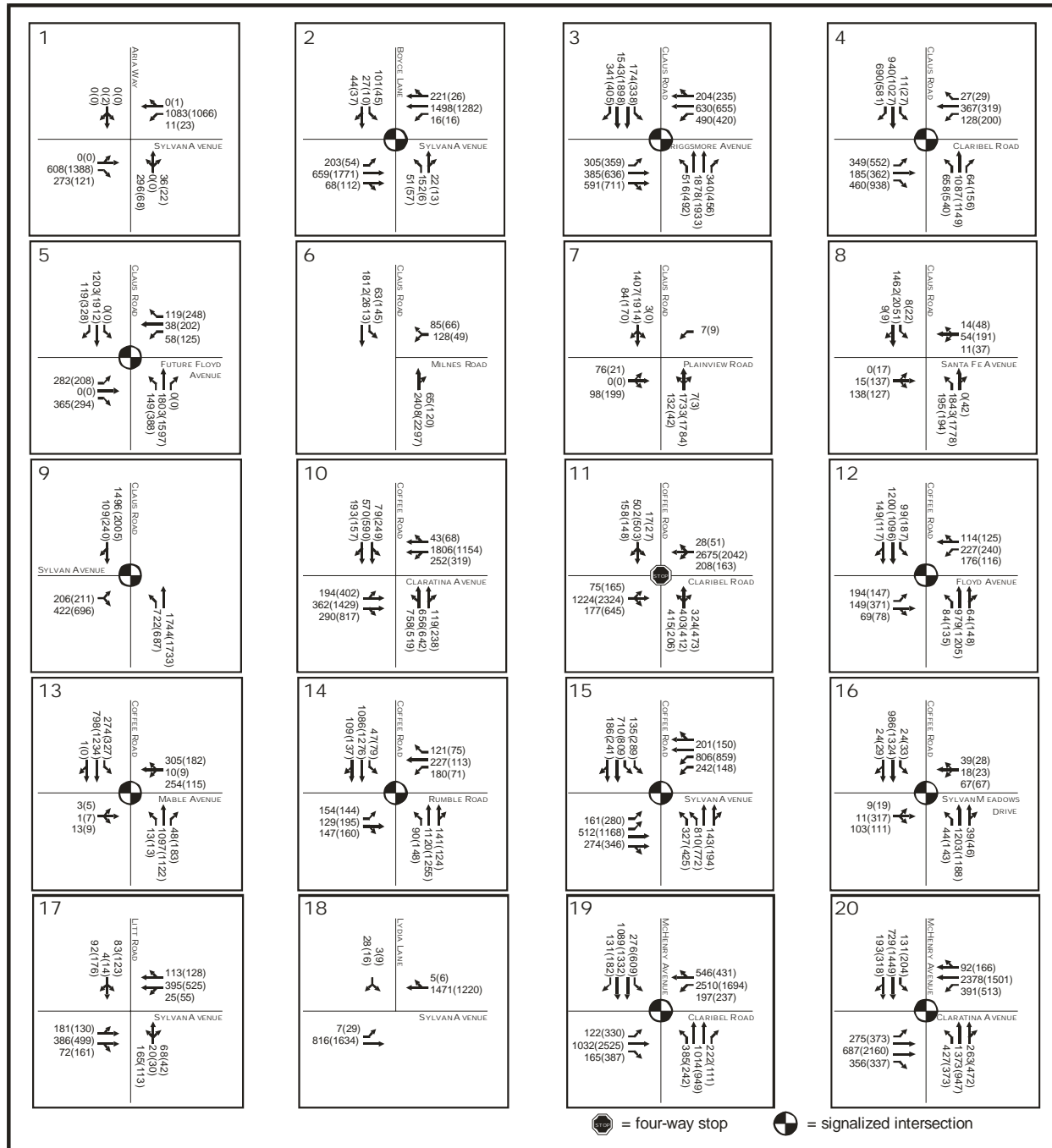


Figure 7b – 2017 Baseline AM(PM) Peak Hour Intersection Turning Movements

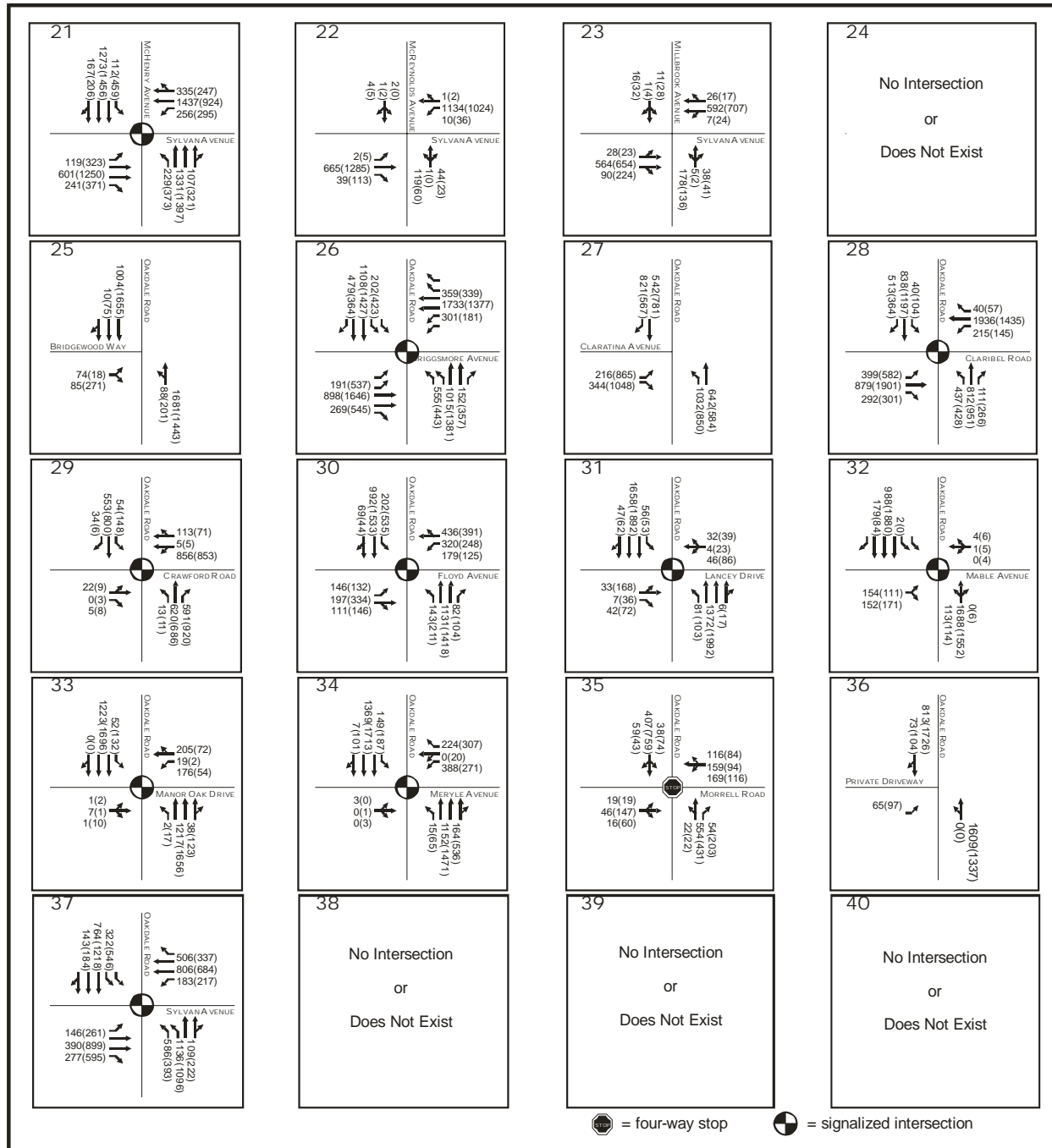
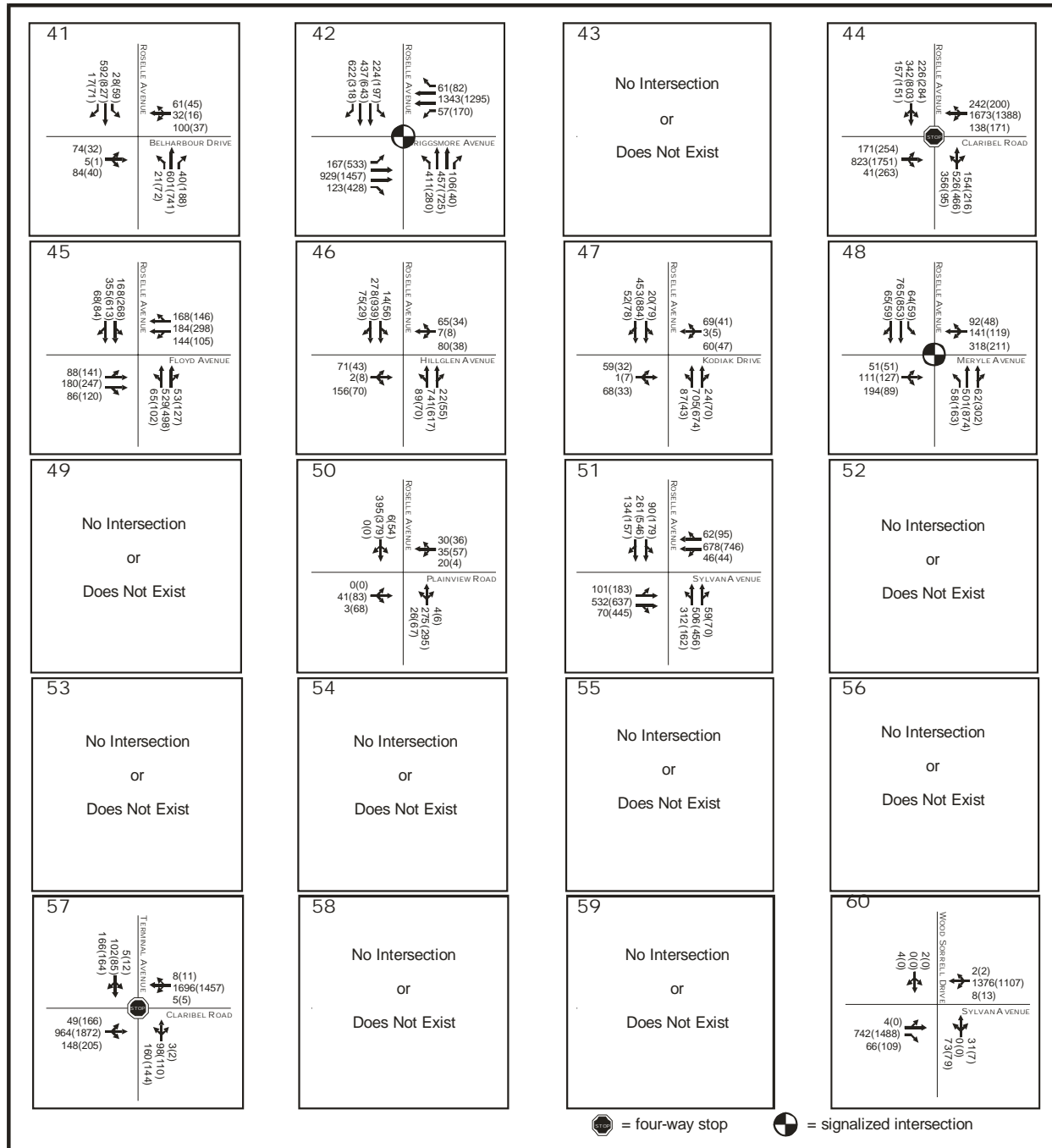


Figure 7c – 2017 Baseline AM(PM) Peak Hour Intersection Turning Movements



Year 2017 Project Traffic

The amount of traffic associated with the project was estimated using the process described in Chapter 2.

Trip Generation

The amount of traffic generated by the proposed Tivoli Specific Plan was estimated from the Institute of Transportation Engineers (ITE) Trip Generation (7th Edition) for the variety of uses listed below. The project will generate about 91,000 daily and 5,100 AM and 8,400 PM peak hour trips. The details of the trip generation are shown in Table 13.

Table 13 - Year 2017 Project Trip Generation

Land Use Acronym	Amount	Units	ITE Code	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
VLDR	30	DU ¹	210	287	5	17	22	20	10	30
LDR	1,322	DU ¹	210	12,652	252	739	991	848	489	1,337
MDR	833	DU ¹	231	7,322	142	417	559	376	275	650
MHDR	960	DU ¹	220	6,451	96	394	490	384	211	595
NC	104,544	SqFt ²	820	4,489	66	42	108	188	204	392
C	74,488	SqFt ²	820	3,198	47	30	77	134	145	279
RSC-1	600,000	SqFt ²	Ave.	36,520	870	708	1,578	1,558	1,608	3,168
RSC-2	300,000	SqFt ²	Ave.	18,260	435	356	791	780	804	1,584
PO	31,363	SqFt ²	715	363	50	6	56	8	46	54
Elem. Sch.	850	Enrl ³	520	1,097	196	162	358	111	128	238
Parks/Public Infrastructure	19	Acres	411	380	38	38	76	38	38	76
TOTAL				91,019	2,197	2,909	5,106	4,445	3,958	8,403

¹ DU refers to total number of Dwelling Units
² SqFt refers to Gross Square Footage, and trip generation rates are calculated per 1,000 square feet.
³ Enrl refers to number of students

Figures 8a, 8b and 8c show the 2017 AM and PM peak hour traffic with the project. The assumed geometry at each intersection is also shown.

Figure 8a – 2017 With Project AM(PM) Peak Hour Intersection Turning Movements

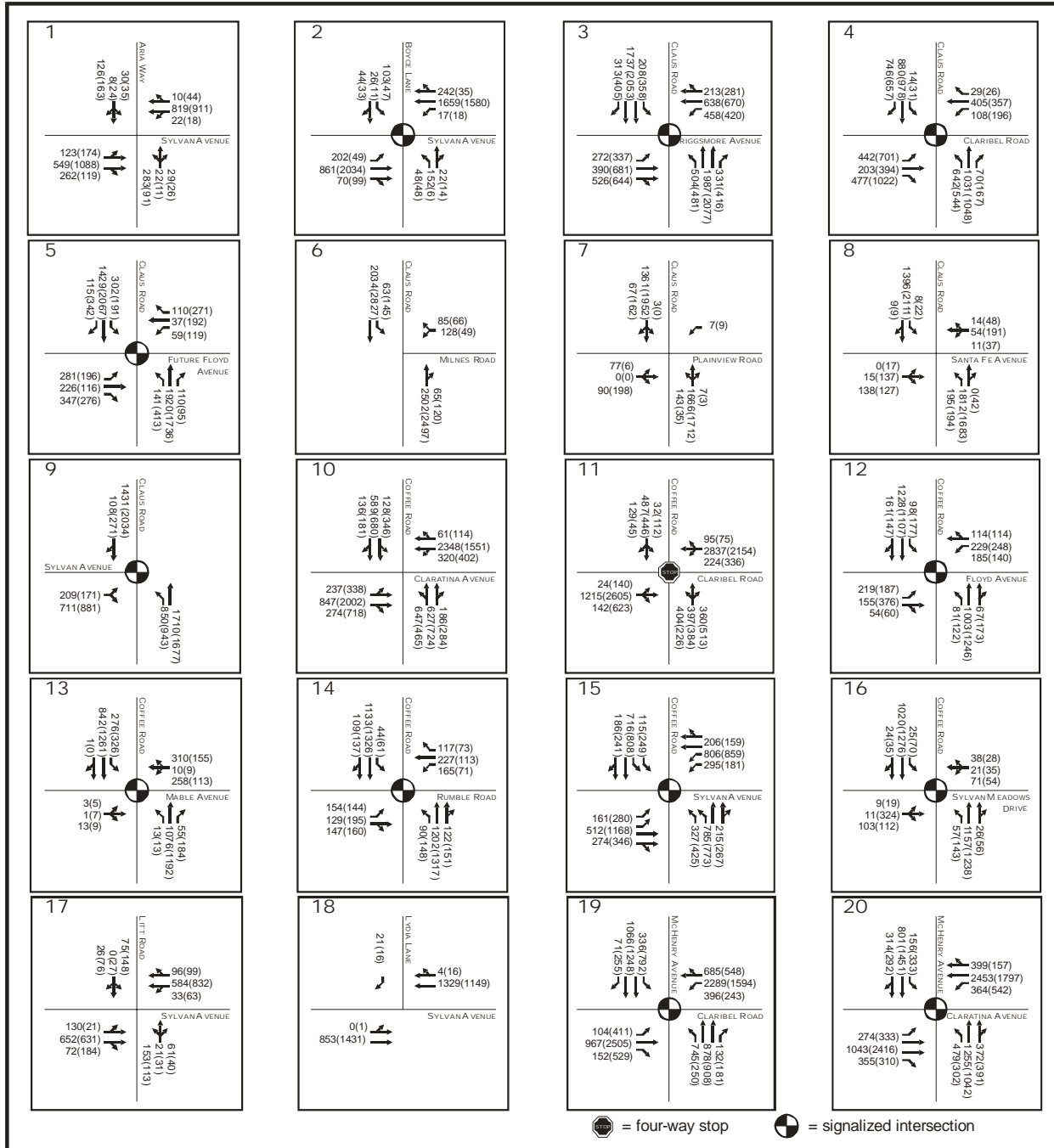


Figure 8b – 2017 With Project AM(PM) Peak Hour Intersection Turning Movements

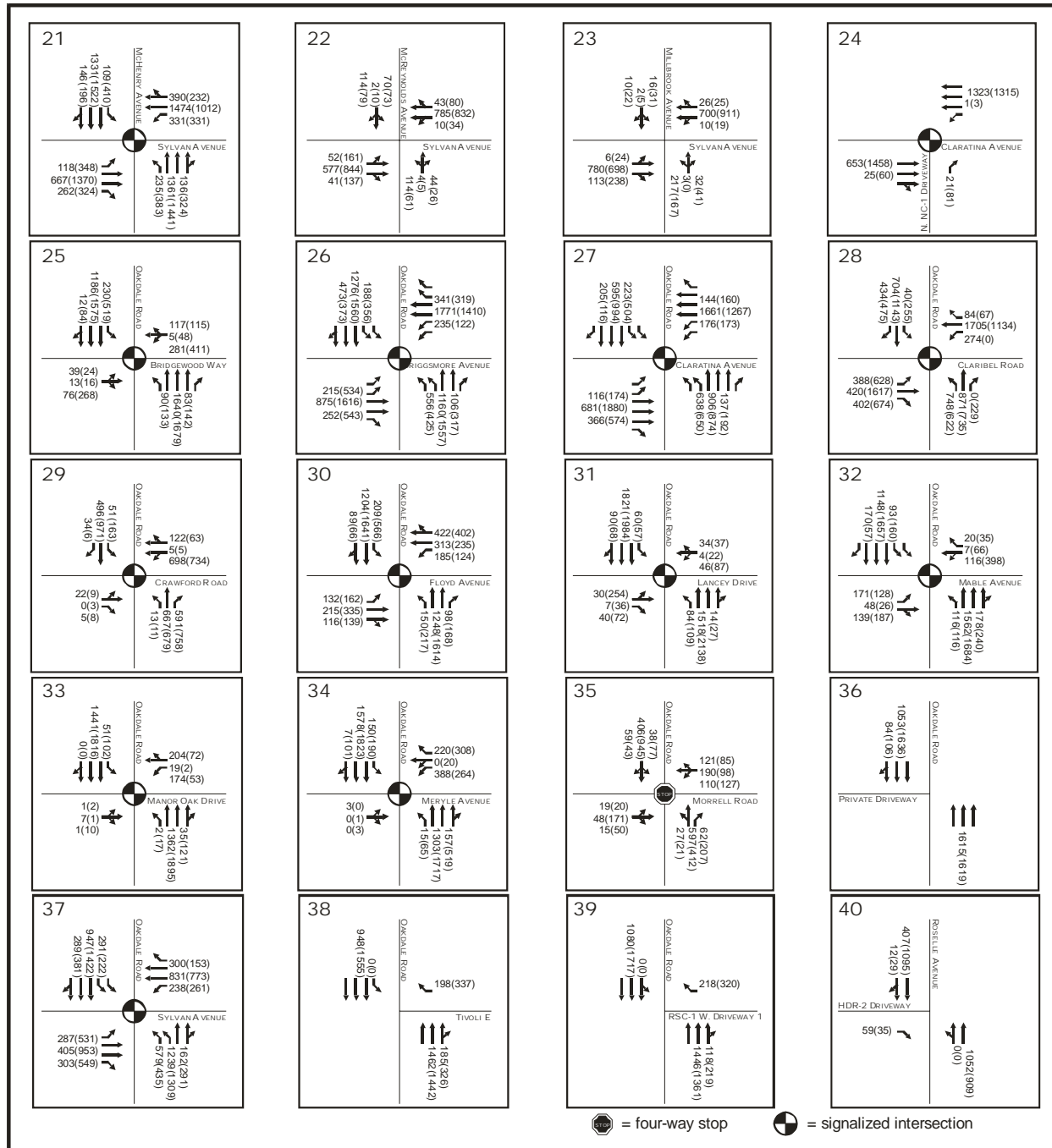
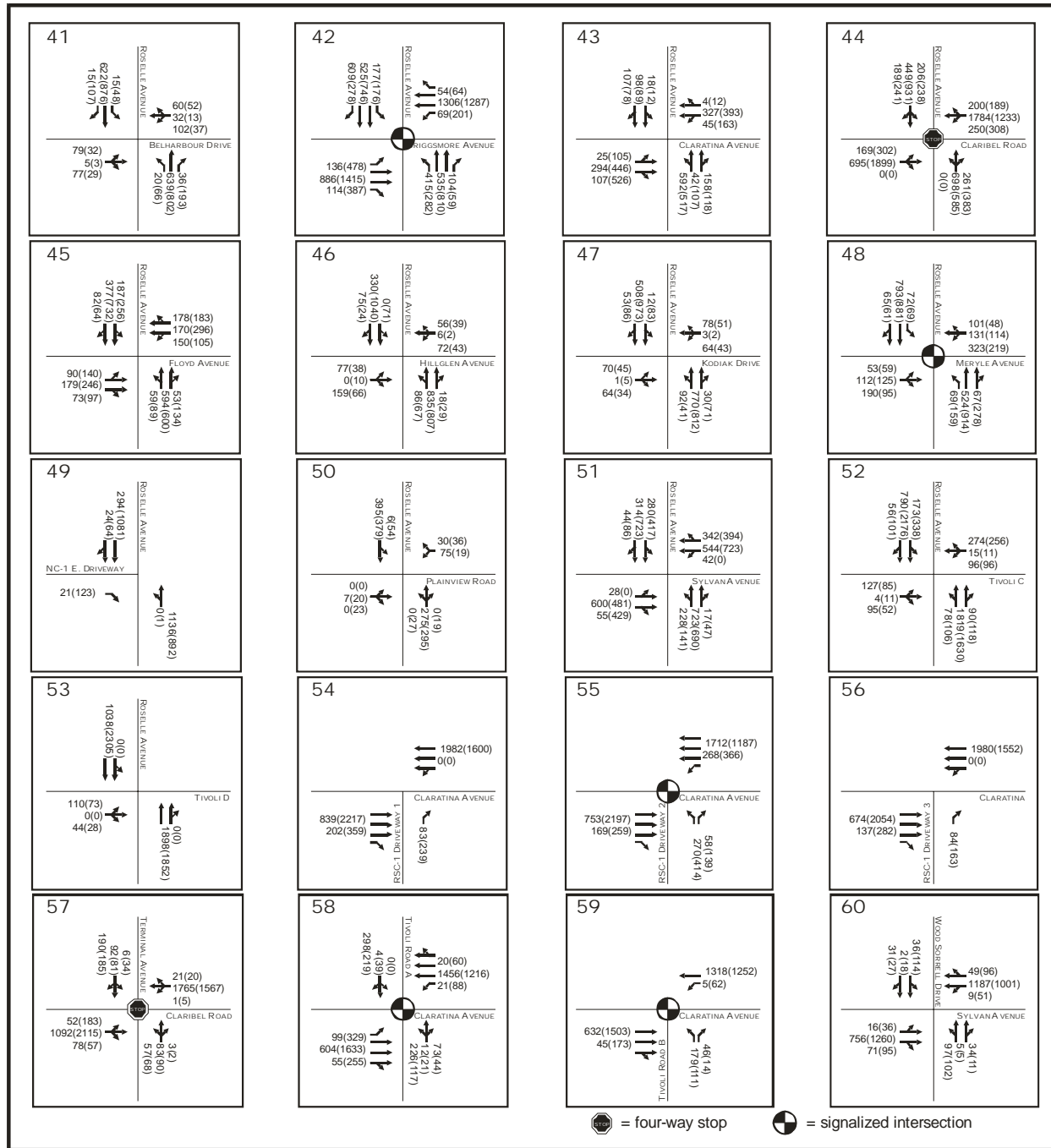


Figure 8c – 2017 With Project AM(PM) Peak Hour Intersection Turning Movements



Year 2017 Intersection Levels of Service

Two scenarios were developed for the year 2017 conditions. These include: year 2017 without the project and year 2017 with the project. Service levels were calculated for the study intersections using the 2017 baseline and project traffic volumes and the planned and project roadway improvements. Table 14 presents the LOS results; the corresponding LOS calculation sheets are included in the technical appendix. Delay increases due to the project and the impacts associated with the project are also presented in Table 14. Table 14 shows the conditions before and after the project traffic is added.

2017 Baseline Conditions

The following intersections are projected to operate at LOS E or LOS F under 2017 baseline conditions during either the AM or PM peak hours.

Signalized Intersections

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Floyd Avenue
- Claus Road at Sylvan Avenue
- Coffee Road at Mable Avenue
- Coffee Road at Sylvan Avenue
- Mc Henry Avenue at Claribel Road
- Mc Henry Avenue at Claratina Avenue
- Mc Henry Avenue at Sylvan Avenue
- Oakdale Road at Bridgewood Way
- Oakdale Road at Briggsmore Avenue
- Oakdale Road at Claribel Avenue
- Oakdale Road at Crawford Road
- Oakdale Road at Floyd Avenue
- Oakdale Road at Mable Avenue
- Oakdale Road at Sylvan Avenue
- Roselle Avenue at Briggsmore Avenue

Stop Controlled Intersections

- Aria Way at Sylvan Avenue
- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Avenue
- Coffee Road at Claribel Road
- Lydia Lane at Sylvan Avenue
- Mc Reynolds Avenue at Sylvan Avenue
- Oakdale Road at Claratina Avenue
- Oakdale Road at Morrill Road
- Roselle Avenue at Belharbour Drive

- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road
- Wood Sorrell Drive at Sylvan Avenue

Roundabout Intersections

- Coffee Road and Claratina Avenue

2017 Project Conditions

The following intersections are projected to operate at LOS E or LOS F under 2017 project conditions during either the AM or PM peak hours.

Signalized Intersections

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Future Floyd Avenue
- Claus Road at Sylvan Avenue
- Coffee Road at Mable Avenue
- Coffee Road at Sylvan Avenue
- McHenry Avenue at Claribel Road
- McHenry Avenue at Claratina Avenue
- McHenry Avenue at Sylvan Avenue
- Oakdale Road at Bridgewood Way
- Oakdale Road at Briggsmore Avenue
- Oakdale Road at Claribel Road
- Oakdale Road at Crawford Road
- Oakdale Road at Floyd Avenue
- Oakdale Road at Sylvan Avenue
- Roselle Avenue at Briggsmore Avenue

Stop Controlled Intersections

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Avenue
- Oakdale Road at Tivoli E
- Roselle Avenue at Belharbour Drive
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road

Roundabout Intersections

- Roselle Avenue at Tivoli C

- Coffee Road at Claratina Avenue

Stop Control Intersections That Meet Delay or Peak Hour Warrant

The following locations experience sub-standard, that is, LOS E or F conditions during the AM and/or PM peak hours. Further, each intersection meets either the delay, peak hour volume or both signal warrants under with-project conditions.

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Road
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Oakdale Road RSC-1 W. Driveway 1
- Roselle Avenue at Belharbour Drive
- Roselle Avenue at Claribel Road
- Roselle Avenue at NC-1 E. Driveway
- RSC-1 Driveway 1 at Claratina Avenue
- RSC-1 Driveway 3 at Claratina Avenue
- Terminal Avenue at Claribel Road

Year 2017 Roadway Segment Levels of Service

Roadway segment V/C ratios were calculated based on the existing volumes and segment capacities presented in Table 4. These capacities are inherently conservative as they are based on the number of lanes on the mainline segments and do not necessarily consider additional turn lanes (and their added capacity) at the approaches to intersections. The volume to capacity ratios and corresponding LOS values are shown in Table 15.

2017 Baseline Conditions

The following roadway segments are projected to operate at LOS E or LOS F under 2017 baseline conditions. Refer to Table 15 for details regarding impacts along specific roadway segments.

- Sylvan Avenue – Roselle Avenue to Oakdale Road
- Oakdale Road – Sylvan Avenue to Claratina Avenue
- Claratina Avenue – McHenry to Oakdale Avenue

2017 Project Conditions

Portions of the following roadway segments are projected to operate at LOS E or LOS F under 2017 project conditions. Refer to Table 15 for details regarding impacts along specific roadway segments.

- Claratina Avenue – McHenry Road to Roselle Avenue
- Oakdale Road – Sylvan Avenue to Bridgewood Way
- Roselle Avenue – Tivoli Road C to Tivoli D
- Sylvan Avenue – Wood Sorrell Road to Oakdale Road

Table 14 - Comparison of 2017 Baseline and With Project Peak Hour Levels of Service

Intersection		2017 Baseline No Project					2017 With Project					Impact Y/N?
		Control	AM		PM		Control	AM		PM		
ID#	Name		Delay*	LOS	Delay*	LOS		Delay*	LOS	Delay*	LOS	
1	Aria Way at Sylvan Avenue	Unsignalized	145.0 (1007.0)	F(F)	56.5 (1681.1)	F(F)	Roundabout	3.8	A	4.0	A	N
2	Boyce Lane at Sylvan Avenue	Signal	26.9	C	9.7	A	Signal	29.0	C	9.8	A	N
3	Claus Road at Briggsmore Avenue	Signal	160.5	F	220.6	F	Signal	164.7	F	237.7	F	Y
4	Claus Road at Claribel Road	Signal	165.6	F	245.1	F	Signal	181.9	F	267.3	F	Y
5	Claus Road at Future Floyd Avenue	Signal	88.6	F	169.9	F	Signal	207.9	F	274.1	F	Y
6	Claus Road at Milnes Road	Unsignalized	2131.0 (>9999)	F(F)	2906.4 (>9999)	F(F)	Unsignalized	3368.2 (>9999)	F(F)	8253.1 (>9999)	F(F)	Y
7	Claus Road at Plainview Road	Unsignalized	627.5 (>9999)	F(F)	>9999(>9999)	F(F)	Unsignalized	535.4 (>9999)	F(F)	>9999(>9999)	F(F)	Y***
8	Claus Road at Santa Fe Avenue	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	N**
9	Claus Road at Sylvan Avenue	Signal	238.2	F	407.7	F	Signal	323.4	F	504.7	F	Y
10	Coffee Road at Claratina Avenue	Roundabout	208.0	F	206.2	F	Roundabout	1552.5	F	436.2	F	Y
11	Coffee Road at Claribel Road	All-way STOP	1850.9	F	2187.3	F	All-way STOP	2018.0	F	2461.6	F	Y***
12	Coffee Road at Floyd Avenue	Signal	28.1	C	34.2	C	Signal	29.4	C	36.1	D	N
13	Coffee Road at Mable Avenue	Signal	118.4	F	59.4	E	Signal	115.4	F	62.6	E	N**
14	Coffee Road at Rumble Road	Signal	29.9	C	30.4	C	Signal	29.4	C	30.4	C	N
15	Coffee Road at Sylvan Avenue	Signal	42.2	D	83.4	F	Signal	43.5	D	88.5	F	Y
16	Coffee Road at Sylvan Meadows Drive	Signal	12.3	B	25.3	C	Signal	13.3	B	26.7	C	N
17	Litt Road at Sylvan Avenue	Roundabout	3.3	A	3.3	A	Roundabout	3.1	A	3.6	A	N
18	Lydia Lane at Sylvan Avenue	Unsignalized	0.6 (43.2)	A(E)	1.7 (183.8)	A(F)	Unsignalized	0.1 (14.3)	A(B)	0.1 (13.0)	A(B)	N
19	McHenry Avenue at Claribel Road	Signal	500.4	F	486.4	F	Signal	528.4	F	500.5	F	Y
20	McHenry Avenue at Claratina Avenue	Signal	237.1	F	310.1	F	Signal	299.4	F	348.1	F	Y
21	McHenry Avenue at Sylvan Avenue	Signal	74.8	E	143.6	F	Signal	85.9	F	163.6	F	Y
22	McReynolds Avenue at Sylvan Avenue	Unsignalized	53.3 (655.0)	F(F)	40.0 (1220.5)	E(F)	Roundabout	3.0	A	3.3	A	N
23	Millbrook Avenue at Sylvan Avenue	Roundabout	2.7	A	2.8	A	Roundabout	3.0	A	3.1	A	N
24	N. NC-1 Driveway at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	1.7	A	4.6	A	N
25	Oakdale Road at Bridgewood Way	Unsignalized	142.8 (2635.9)	F(F)	277.4(3497.5)	F(F)	Signal	34.1	C	118.2	F	Y
26	Oakdale Road at Briggsmore Avenue	Signal	62.1	E	86.2	F	Signal	76.9	E	90.3	F	Y
27	Oakdale Road at Claratina Avenue	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Signal	31.9	C	38.8	D	N
28	Oakdale Road at Claribel Road	Signal	389.9	F	468.1	F	Signal	387.9	F	389.2	F	N**
29	Oakdale Road at Crawford Road	Signal	45.9	D	95.3	F	Signal	34.2	C	63.6	E	N**
30	Oakdale Road at Floyd Avenue	Signal	72.7	E	126.3	F	Signal	41.0	D	100.4	F	N**
31	Oakdale Road at Lancey Drive	Signal	8.8	A	16.0	B	Signal	8.4	A	20.8	C	N
32	Oakdale Road at Mable Avenue	Signal	122.8	F	134.0	F	Signal	11.2	B	33.3	C	N
33	Oakdale Road at Manor Oak Drive	Signal	15.2	B	8.6	A	Signal	14.4	B	7.5	A	N
34	Oakdale Road at Merle Avenue	Signal	16.8	B	19.6	B	Signal	16.2	B	19.9	B	N
35	Oakdale Road at Morrill Road	All-way STOP	80.2	F	179.0	F	All-way STOP	89.1	F	284.1	F	Y
36	Oakdale Road at Private Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0 (0.0)	A(A)	0.0 (0.0)	A(A)	N

Intersection		2017 Baseline No Project					2017 With Project					Impact Y/N?
		Control	AM		PM		Control	AM		PM		
ID#	Name		Delay*	LOS	Delay*	LOS		Delay*	LOS	Delay*	LOS	Delay*
37	Oakdale Road at Sylvan Avenue	Signal	44.7	D	74.6	E	Signal	52.7	D	100.6	F	Y
38	Oakdale Road at Tivoli E	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0(0.0)	A(A)	0.0(0.0)	A(A)	N
39	Oakdale Road RSC-1 W. Driveway 1	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0(0.0)	A(A)	0.0(0.0)	A(A)	N
40	Roselle Avenue and MHDR-2 Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.4 (9.8)	A(A)	0.2 (13.2)	A(B)	N
41	Roselle Avenue at Belharbour Drive	Unsignalized	41.2 (239.0)	E(F)	23.7 (289.3)	C(F)	Unsignalized	47.3 (269.7)	E(F)	27.7 (399.2)	D(F)	Y***
42	Roselle Avenue at Briggsmore Avenue	Signal	75.6	E	65.2	E	Signal	67.9	E	63.5	E	N**
43	Roselle Avenue at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Roundabout	2.3	A	2.9	A	N
44	Roselle Avenue at Claribel Road	All-way STOP	1187.6	F	1521.8	F	All-way STOP	1281.8	F	1513.3	F	Y
45	Roselle Avenue at Floyd Avenue	Roundabout	2.4	A	3.0	A	Roundabout	2.5	A	3.2	A	N
46	Roselle Avenue at Hillglen Avenue	Roundabout	3.0	A	2.9	A	Roundabout	3.0	A	3.1	A	N
47	Roselle Avenue at Kodiak Drive	Roundabout	2.7	A	2.8	A	Roundabout	2.8	A	3.1	A	N
48	Roselle Avenue at Merle Avenue	Signal	46.3	D	38.7	D	Signal	48.2	D	40.1	D	N
49	Roselle Avenue at NC-1 E. Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.1 (9.1)	A(A)	0.8 (14.0)	A(B)	N
50	Roselle Avenue at Plainview Road	Unsignalized	2.9 (16.8)	A(C)	6.3 (23.5)	A(C)	Unsignalized	2.4 (16.3)	A(C)	2.4 (14.9)	A(B)	N
51	Roselle Avenue at Sylvan Avenue	Roundabout	3.2	A	4.5	A	Roundabout	3.8	A	5.2	A	N
52	Roselle Avenue at Tivoli C	n/a	n/a	n/a	n/a	n/a	Roundabout	141.5	F	72.4	F	Y
53	Roselle Avenue at Tivoli D	n/a	n/a	n/a	n/a	n/a	Roundabout	6.1	A	16.9	C	N
54	RSC-1 Driveway 1 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.3 (10.6)	A(B)	1.7 (31.9)	A(D)	N
55	RSC-1 Driveway 2 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	19.0	B	32.1	C	N
56	RSC-1 Driveway 3 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.3 (10.1)	A(B)	0.8 (20.3)	A(C)	N
57	Terminal Avenue at Claribel Road	All-way STOP	785.9	F	1153.5	F	All-way STOP	758.1	F	1182.4	F	Y***
58	Tivoli Road A at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	33.1	C	31.5	C	N
59	Tivoli Road B at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	15.3	B	8.9	A	N
60	Wood Sorrell Drive at Sylvan Avenue	Unsignalized	33.4 (735.3)	D(F)	37.5 (1219.8)	E(F)	Roundabout	2.8	A	3.5	A	N

Note: n/a = not applicable

* =>9999 indicates overflow delay. The delay calculations for the HCM 2000 methodology are incapable of quantifying delay. Estimated delay would exceed 9999 seconds.

** = Project traffic does not cause critical delay to increase by more than five seconds at signalized intersections or 30 seconds on minor approaches at unsignalized intersections.

*** = Project traffic contributes more than 10 vehicles per lane at unsignalized intersection operating at LOS F with incremental delay less than 30 seconds.

Table 15 - Comparison of 2017 Baseline and With Project Peak Hour Roadway

Location	Dir	Lane	type	2017 Baseline				Lane	type	2017 WP				v/c change		Impact Y/N?
				AM		PM				AM		PM		AM	PM	
				v/c	LOS	v/c	LOS			v/c	LOS	v/c	LOS			
Claratina Avenue																
McHenry Avenue to Coffee Road	EB	1	rural road	1.201	F	3.151	F	1	rural road	1.746	F	3.489	F	0.544	0.338	Y
McHenry Avenue to Coffee Road	WB	1	rural road	3.179	F	2.422	F	1	rural road	3.573	F	2.773	F	0.394	0.351	Y
Coffee Road to Oakdale Road	EB	1	rural road	0.622	B	2.129	F	1	rural road	1.290	F	2.924	F	0.668	0.796	Y
Coffee Road to Oakdale Road	WB	1	rural road	2.334	F	1.712	F	1	rural road	3.032	F	2.297	F	0.698	0.584	Y
Oakdale Road to RSC-1 Driveway #1	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.463	A	1.145	F	n/a	n/a	Y
Oakdale Road to RSC-1 Driveway #1	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.880	B	0.711	A	n/a	n/a	N
RSC-1 Driveway #1 to RSC-1 Driveway #2	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.410	A	1.092	F	n/a	n/a	Y
RSC-1 Driveway #1 to RSC-1 Driveway #2	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.881	D	0.711	C	n/a	n/a	N
RSC-1 Driveway #2 to RSC-1 Driveway #3	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.360	A	1.038	F	n/a	n/a	Y
RSC-1 Driveway #2 to RSC-1 Driveway #3	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.880	D	0.690	B	n/a	n/a	N
RSC-1 Driveway #3 to Tivoli Road A	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.337	A	0.985	E	n/a	n/a	Y
RSC-1 driveway #3 to Tivoli Road A	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.880	B	0.771	A	n/a	n/a	N
Tivoli Road A to Tivoli Road B	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.301	A	0.745	C	n/a	n/a	N
Tivoli Road A to Tivoli Road B	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.665	B	0.606	B	n/a	n/a	N
Tivoli Road B to Roselle Avenue	EB	0	rural road	n/a	n/a	n/a	n/a	3	unsignalized arterial	0.213	A	0.539	A	n/a	n/a	N
Tivoli Road B to Roselle Avenue	WB	0	rural road	n/a	n/a	n/a	n/a	2	signalized arterial	0.684	B	0.659	B	n/a	n/a	N
Roselle Avenue																
Claratina Avenue to Tivoli Road C	NB	2	unsignalized arterial	0.271	A	0.289	A	2	unsignalized arterial	0.396	A	0.371	A	0.125	0.083	N
Claratina Avenue to Tivoli Road C	SB	2	unsignalized arterial	0.154	A	0.378	A	2	unsignalized arterial	0.125	A	0.389	A	-0.029	0.012	N
Tivoli Road C to Tivoli Road D	NB	2	unsignalized arterial	0.271	A	0.289	A	2	unsignalized arterial	1.011	F	1.031	F	0.740	0.742	Y
Tivoli Road C to Tivoli Road D	SB	2	unsignalized arterial	0.154	A	0.378	A	2	unsignalized arterial	0.553	A	1.243	F	0.399	0.866	Y
Tivoli Road D to Sylvan Avenue	NB	2	unsignalized arterial	0.335	A	0.367	A	2	unsignalized arterial	0.547	A	0.542	A	0.212	0.175	N
Tivoli Road D to Sylvan Avenue	SB	2	unsignalized arterial	0.243	A	0.441	A	2	unsignalized arterial	0.319	A	0.613	B	0.077	0.172	N
Sylvan Avenue																
Roselle Avenue to McReynolds Avenue	EB	2	unsignalized arterial	0.352	A	0.633	B	2	unsignalized arterial	0.342	A	0.455	A	-0.010	-0.178	N
Roselle Avenue to McReynolds Avenue	WB	2	unsignalized arterial	0.562	A	0.533	A	2	unsignalized arterial	0.408	A	0.475	A	-0.154	-0.058	N
McReynolds Avenue to Aria Way	EB	2	unsignalized arterial	0.353	A	0.702	C	2	unsignalized arterial	0.335	A	0.571	A	-0.018	-0.131	N
McReynolds Avenue to Aria Way	WB	2	unsignalized arterial	0.629	B	0.545	A	2	unsignalized arterial	0.507	A	0.486	A	-0.122	-0.059	N
Aria Way to Wood Sorrell Drive	EB	2	unsignalized arterial	0.441	A	0.755	C	2	unsignalized arterial	0.467	A	0.691	B	0.027	-0.064	N
Aria Way to Wood Sorrell Drive	WB	2	unsignalized arterial	0.690	B	0.567	A	2	unsignalized arterial	0.614	B	0.583	A	-0.076	0.016	N
Wood Sorrell Drive to Lydia Lane	EB	1	unsignalized arterial	0.812	D	1.597	F	1	unsignalized arterial	0.843	D	1.391	F	0.031	-0.206	N
Wood Sorrell Drive to Lydia Lane	WB	1	unsignalized arterial	1.453	F	1.186	F	1	unsignalized arterial	1.315	F	1.130	F	-0.138	-0.056	N
Lydia Lane to Oakdale Road	EB	1	signalized arterial	1.095	F	2.223	F	1	signalized arterial	1.144	F	1.955	F	0.049	-0.268	N
Lydia Lane to Oakdale Road	WB	2	signalized arterial	0.997	E	0.825	D	2	signalized arterial	0.913	E	0.791	C	-0.084	-0.034	N

Location	Dir	Lane	type	2017 Baseline				Lane	type	2017 WP				v/c change		Impact Y/N?
				AM		PM				AM		PM		AM	PM	
				v/c	LOS	v/c	LOS			v/c	LOS	v/c	LOS			
Oakdale Road																
<i>Sylvan Avenue to Bridgewood Way</i>	NB	1	signalized arterial	2.384	F	2.259	F	3	signalized arterial	0.812	D	0.886	D	-1.572	-1.373	N
<i>Sylvan Avenue to Bridgewood Way</i>	SB	3	signalized arterial	0.546	A	0.866	D	3	signalized arterial	0.679	B	0.900	E	0.132	0.034	Y
<i>Bridgewood Way to Tivoli Road E</i>	NB	1	signalized arterial	2.340	F	1.948	F	3	signalized arterial	0.798	C	0.808	D	-1.542	-1.140	N
<i>Bridgewood Way to Tivoli Road E</i>	SB	3	signalized arterial	0.451	A	0.769	C	3	signalized arterial	0.550	A	0.803	D	0.099	0.034	N
<i>Tivoli Road E to Mable Avenue</i>	NB	1	signalized arterial	2.140	F	1.881	F	3	signalized arterial	0.738	C	0.791	C	-1.402	-1.091	N
<i>Tivoli Road E to Mable Avenue</i>	SB	3	signalized arterial	0.389	A	0.773	C	3	signalized arterial	0.506	A	0.856	D	0.117	0.083	N
<i>Mable Avenue to Future Claratina Avenue</i>	NB	1	signalized arterial	2.461	F	2.225	F	3	signalized arterial	0.779	C	0.821	D	-1.682	-1.404	N
<i>Mable Avenue to Future Claratina Avenue</i>	SB	3	signalized arterial	0.520	A	0.873	D	3	signalized arterial	0.627	B	0.833	D	0.108	-0.040	N

n/a = not applicable does not exist in baseline-

CHAPTER 6 - YEAR 2025 (CUMULATIVE) CONDITIONS

Year 2025 conditions represent near-term conditions with planned and financed transportation system improvements, traffic volume increases due to expected local development plus regional growth, and portions of the project to be conducted by 2025. The Year 2025 full build out of the project includes total of 3,145 residential units, 179,032 square feet of neighborhood and standard commercial use, 900,000 square feet of regional commercial use, 31,363 square feet of office, a 850 student elementary school and 19 acres of park.

LOS analysis results for the key intersections and roadway segments were used as the basis for determining near-term (2025) project impacts as discussed in Chapter 7.

Year 2025 Baseline Transportation System Improvements

The City's 2025 (cumulative) traffic model assumes the construction of all of the proposed roadways found in the Circulation Element of the City's General Plan. However, the current CIP includes a list of roadway and intersection improvements, which were used for the 2017 year analyses. As in the 2017 scenario southbound Oakdale Road between Claratina Avenue and Sylvan Avenue is assumed to be constructed to 3 lanes as a signalized arterial as would be funded by the land development on the west side of that road. These same improvements were assumed to be in place for the baseline and baseline plus project year 2025 scenarios.

Figures 9a, 9b and 9c show the 2025 AM and PM peak hour traffic without the project. The assumed geometry at each intersection is also shown.

Year 2025 Project Related Transportation Improvements

Project related transportation improvements should be complete by 2017 impact mitigation measures notwithstanding.

Year 2025 Project Traffic

The amount of traffic associated with the project was estimated using the process, which is described in Chapter 2.

Trip Generation

The amount of traffic generated by the proposed Tivoli Specific Plan was estimated from the Institute of Transportation Engineers (ITE) Trip Generation (7th Edition) for the variety of uses listed below. The project will generate about 91,000 daily and 5,100 AM and 8,400 PM peak hour trips. The details of the trip generation are shown in Table 16.

Table 16 - Year 2025 Project Trip Generation

Land Use Acronym	Amount	Units	ITE Code	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
VLDR	30	DU ¹	210	287	5	17	23	20	10	30
LDR	1,322	DU ¹	210	12,652	252	739	995	848	489	1,335
MDR	833	DU ¹	231	7,322	142	417	558	376	275	650
MHDR	960	DU ¹	220	6,451	96	394	489	384	211	595
NC	104,544	SqFt ²	820	4,489	66	42	108	188	204	392
C	74,488	SqFt ²	820	3,198	47	30	77	134	145	279
RSC-1	600,000	SqFt ²	Ave.	36,520	870	708	1,581	1,558	1,608	3,168
RSC-2	300,000	SqFt ²	Ave.	18,260	435	356	791	780	804	1,584
PO	31,363	SqFt ²	715	363	50	6	56	8	46	54
Elem. Sch.	850	Enrl ³	520	1,097	196	162	357	111	128	238
Parks/Public Infrastructure	19	Acres	411	380	38	38	76	38	38	76
TOTAL				91,019	2,197	2,909	5,111	4,445	3,958	8,401

¹ DU refers to total number of Dwelling Units
² SqFt refers to Gross Square Footage, and trip generation rates are calculated per 1,000 square feet.
³ Enrl refers to number of students

Figures 10a, 10b and 10c show the 2025 AM and PM peak hour traffic with the project. The assumed geometry at each intersection is also shown.

Figure 9a – 2025 Baseline AM(PM) Peak Hour Intersection Turning Movements

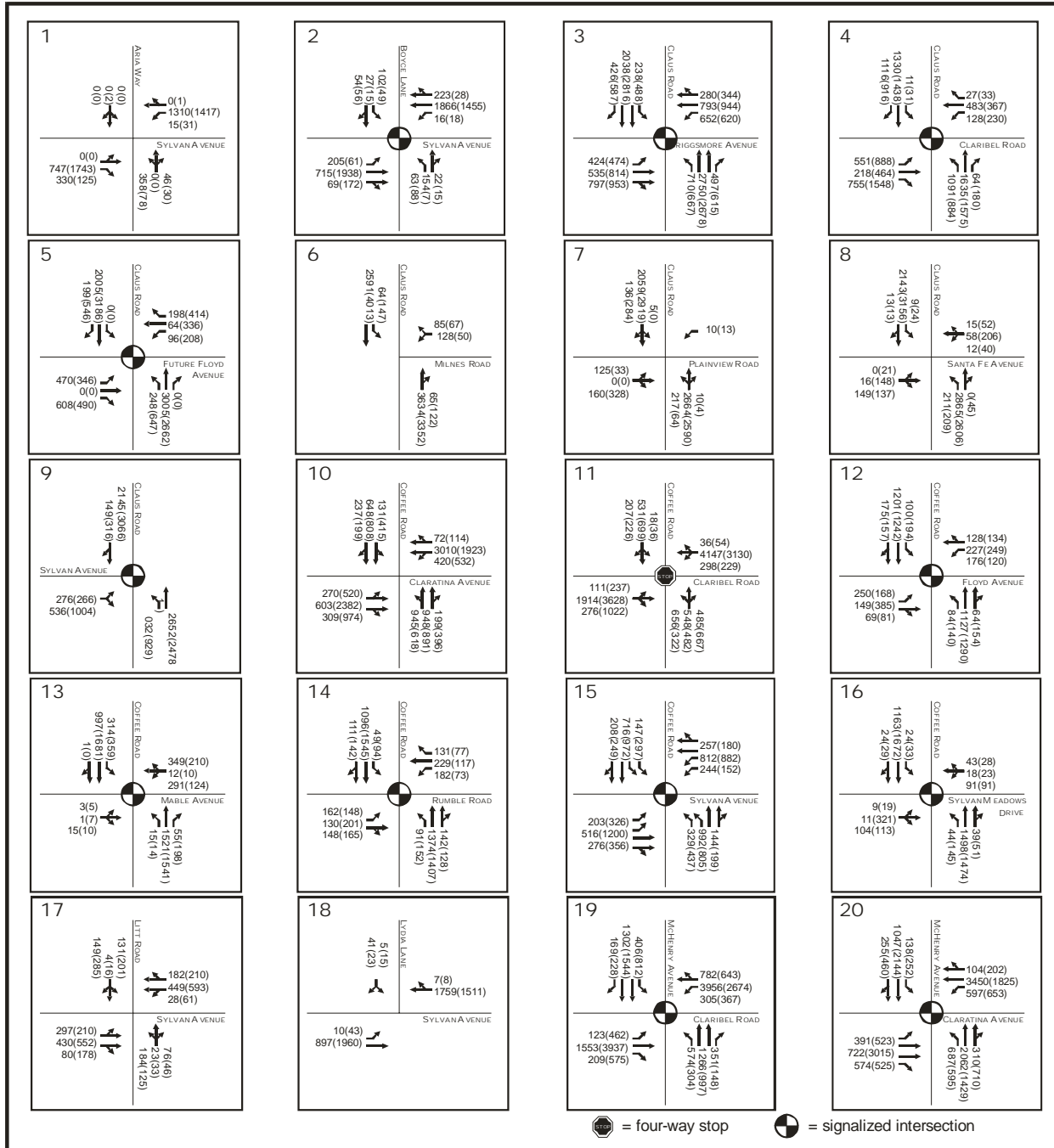


Figure 9b – 2025 Baseline AM(PM) Peak Hour Intersection Turning Movements

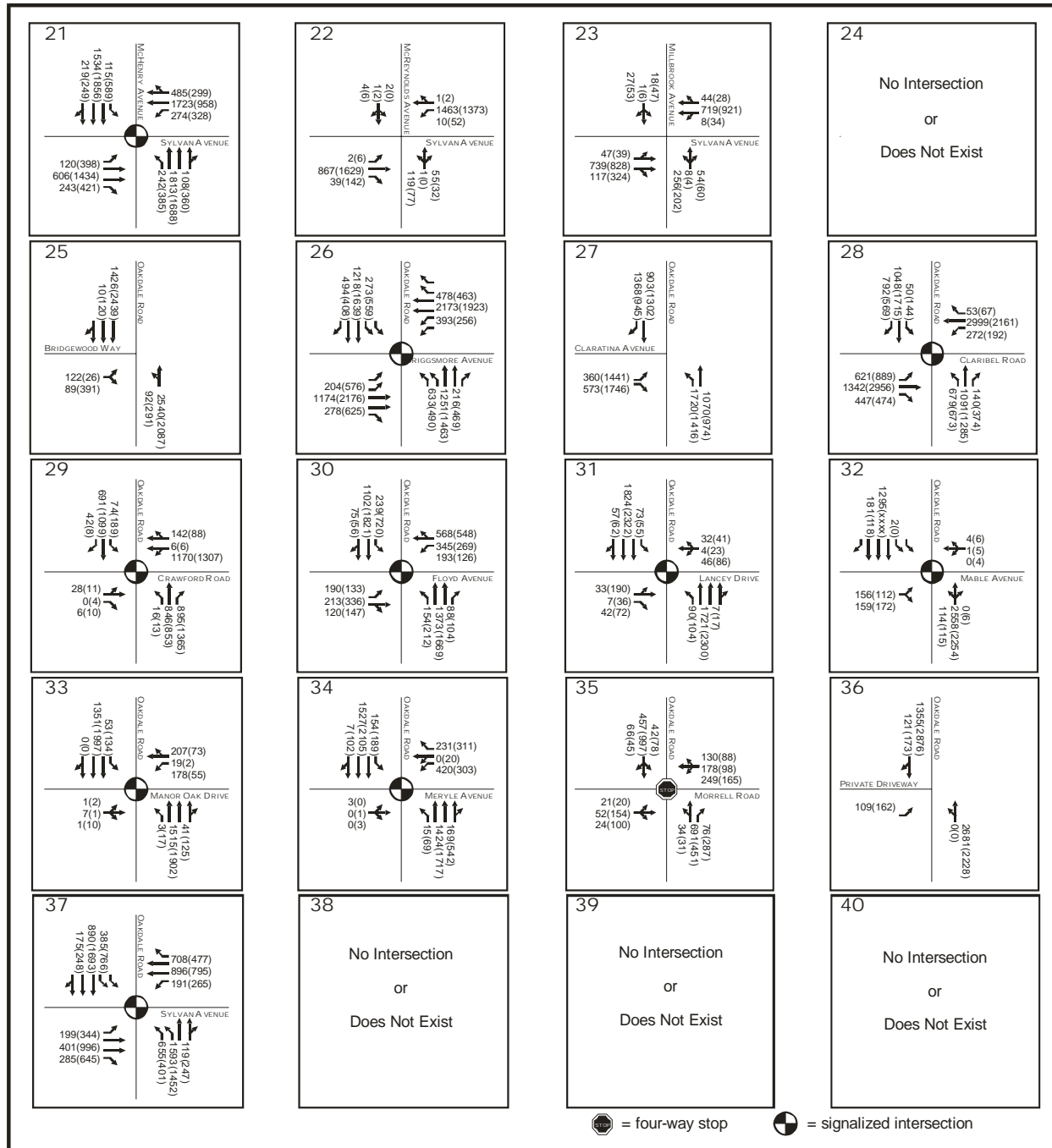


Figure 9c – 2025 Baseline AM(PM) Peak Hour Intersection Turning Movements

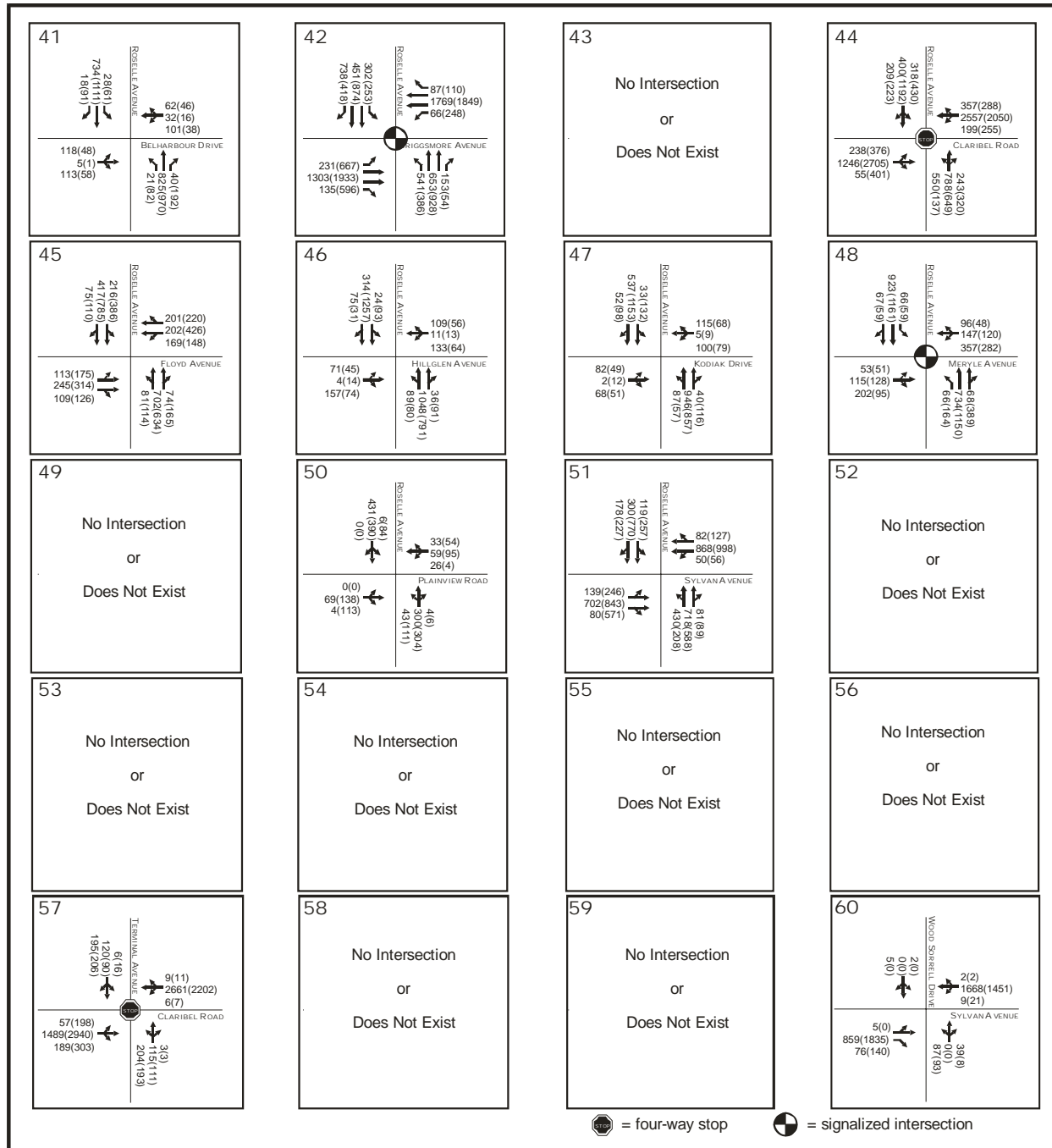


Figure 10a – 2025 With Project AM(PM) Peak Hour Intersection Turning Movements

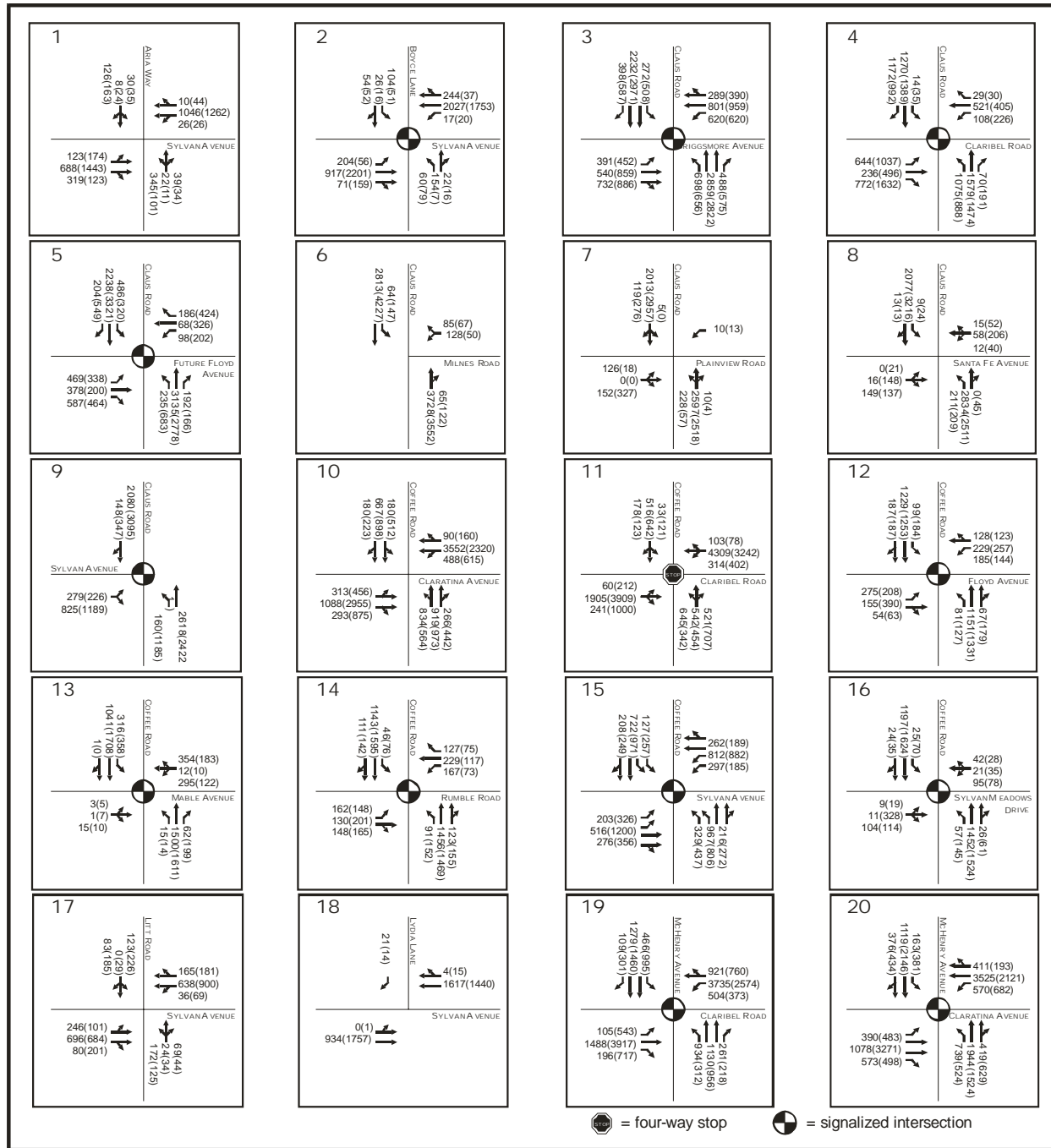


Figure 10b – 2025 With Project AM(PM) Peak Hour Intersection Turning Movements

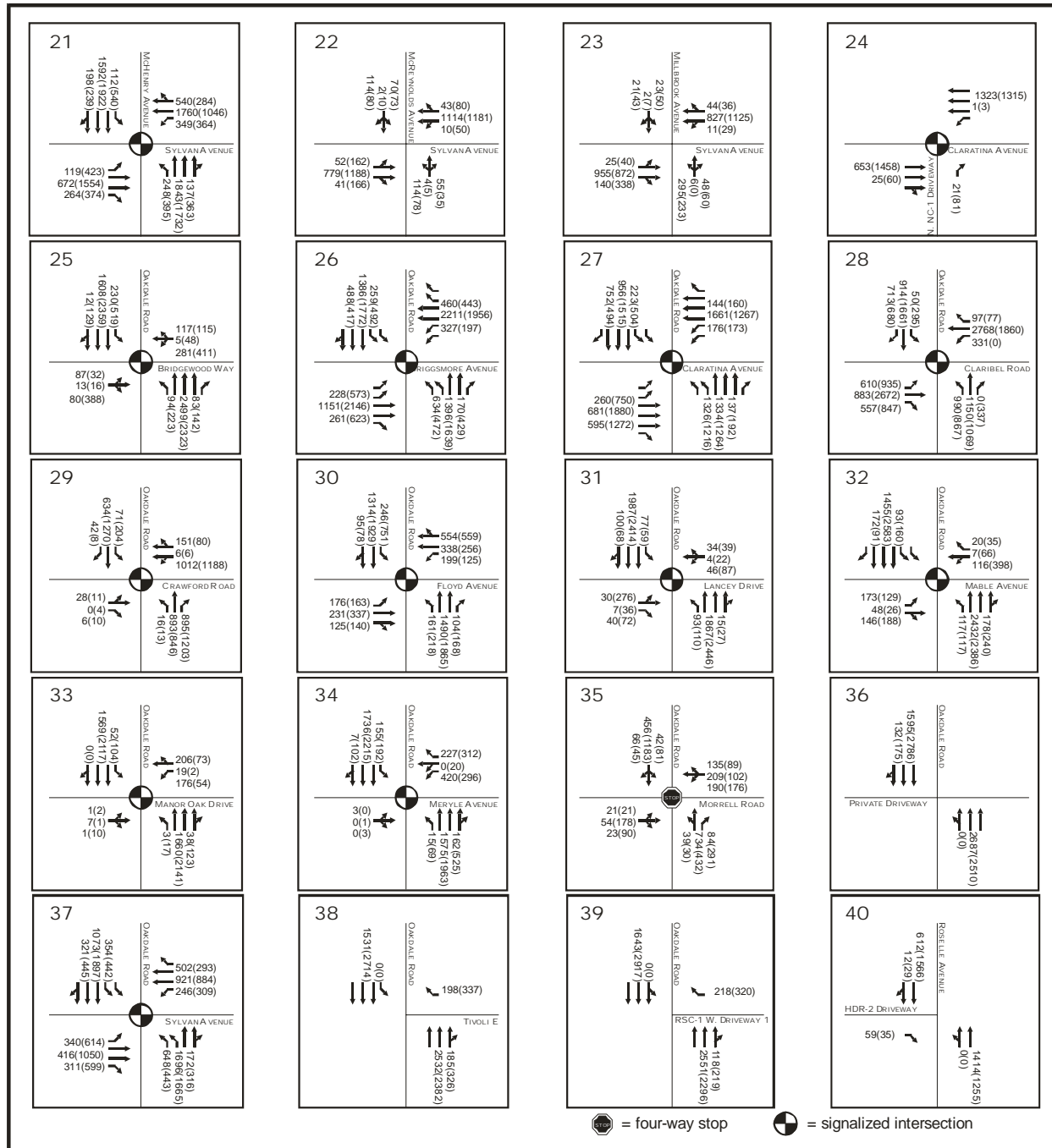
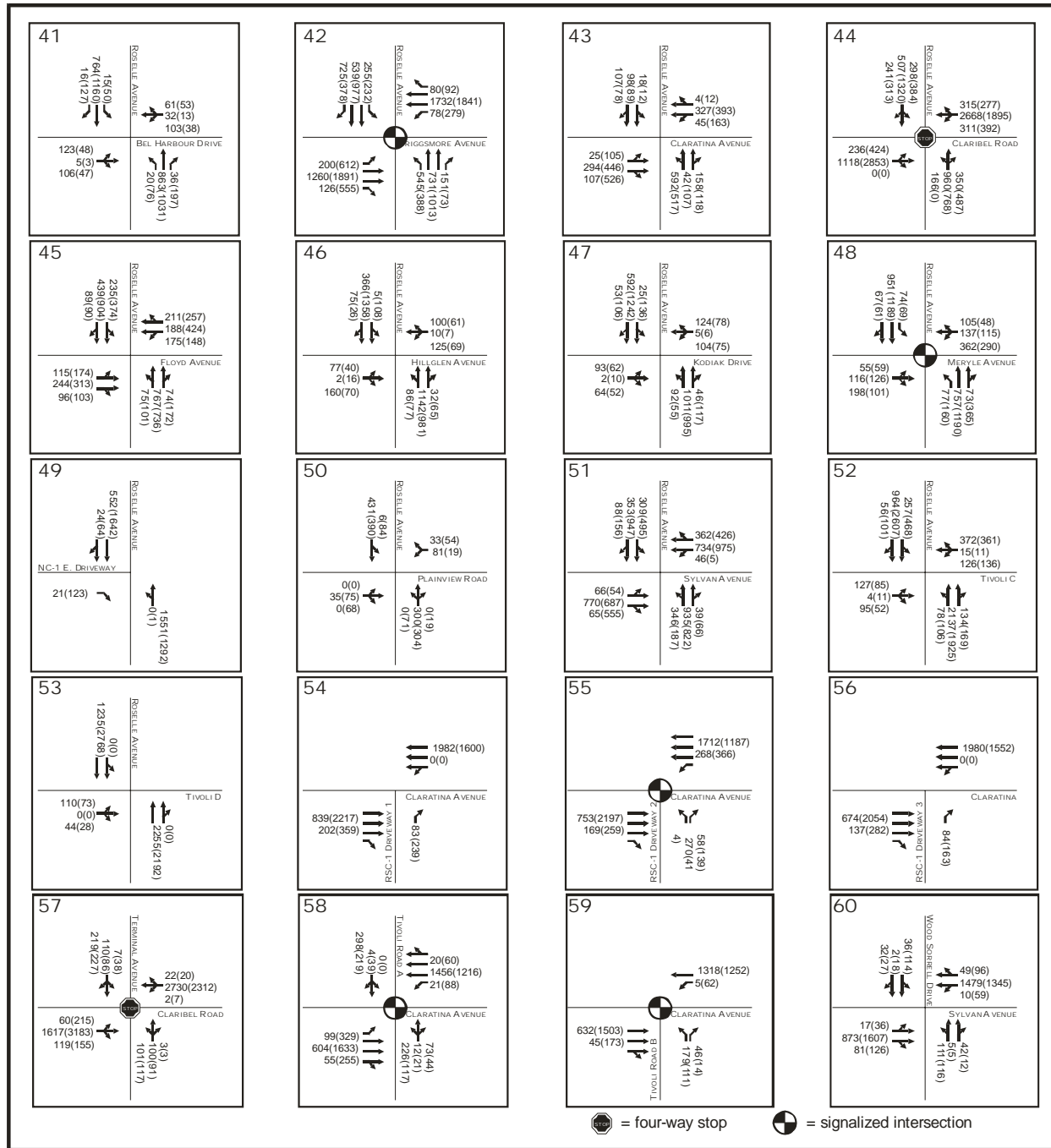


Figure 10c – 2025 With Project AM(PM) Peak Hour Intersection Turning Movements



Year 2025 Intersection Levels of Service

Year 2025 without the project and year 2025 with project scenarios were both evaluated for level of service. Service levels were calculated for the study intersections using the 2025 baseline and project traffic volumes and the planned and project roadway improvements. Table 17 presents the LOS results; the corresponding LOS calculation sheets are included in the technical appendix. Delay increases due to the project and the impacts associated with the project are also presented in Table 17. Table 17 shows the conditions before and after the project traffic is added.

2025 Baseline Conditions

The following intersections are projected to operate at LOS E or LOS F under 2025 baseline conditions during either the AM or PM peak hours.

Signalized Intersections

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Floyd Avenue
- Claus Road at Sylvan Avenue
- Coffee Road at Mable Avenue
- Coffee Road at Sylvan Avenue
- Mc Henry Avenue at Claribel Road
- Mc Henry Avenue at Claratina Avenue
- Mc Henry Avenue at Sylvan Avenue
- Oakdale Road at Bridgewood Way
- Oakdale Road at Briggsmore Avenue
- Oakdale Road at Claribel Avenue
- Oakdale Road at Crawford Road
- Oakdale Road at Floyd Avenue
- Oakdale Road at Mable Avenue
- Oakdale Road at Sylvan Avenue
- Roselle Avenue at Briggsmore Avenue
- Roselle Avenue at Merle Avenue

Stop Controlled Intersections

- Aria Way at Sylvan Avenue
- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Avenue
- Coffee Road at Claribel Road
- Lydia Lane at Sylvan Avenue
- Mc Reynolds Avenue at Sylvan Avenue
- Oakdale Road at Claratina Avenue

- Oakdale Road at Morrill Road
- Roselle Avenue at Belharbour Drive
- Roselle Avenue at Claribel Road
- Roselle Avenue at Hillglen Avenue
- Roselle Avenue at Kodiak Drive
- Roselle Avenue at Plainview Road
- Terminal Avenue at Claribel Road
- Wood Sorrell Drive at Sylvan Avenue

Roundabout Intersections

- Coffee Road at Claratina Avenue

2025 Project Conditions

The following intersections are projected to operate at LOS E or LOS F under 2025 project conditions during either the AM or PM peak hours.

Signalized Intersections

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Future Floyd Avenue
- Claus Road at Sylvan Avenue
- Coffee Road at Mable Avenue
- Coffee Road at Sylvan Avenue
- McHenry Avenue at Claribel Road
- McHenry Avenue at Claratina Avenue
- McHenry Avenue at Sylvan Avenue
- Oakdale Road at Bridgewood Way
- Oakdale Road at Briggsmore Avenue
- Oakdale Road at Claratina Avenue
- Oakdale Road at Claribel Road
- Oakdale Road at Crawford Road
- Oakdale Road at Floyd Avenue
- Oakdale Road at Sylvan Avenue
- Roselle Avenue at Briggsmore Avenue
- Roselle Avenue at Merle Avenue

Stop Controlled Intersections

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Avenue
- Oakdale Road RSC-1 W. Driveway 1
- Roselle Avenue at Belharbour Drive
- Coffee Road at Claribel Road

- Oakdale Road at Morrill Road
- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road

Roundabout Intersections

- Coffee Road at Claratina Avenue
- Roselle Avenue at Tivoli C
- Roselle Avenue at Tivoli D

Stop Control Intersections That Meet Delay or Peak Hour Warrant

The following locations experience sub-standard, that is, LOS E or F conditions during the AM and/or PM peak hours. Further, each intersection meets either the delay, peak hour volume or both signal warrants under with-project conditions.

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Claus Road at Santa Fe Avenue
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Oakdale Road RSC-1 W. Driveway 1
- Roselle Avenue at Belharbour Drive
- Roselle Avenue at Claribel Road
- Roselle Avenue at NC-1 E. Driveway
- RSC-1 Driveway 1 at Claratina Avenue
- RSC-1 Driveway 3 at Claratina Avenue
- Terminal Avenue at Claribel Road

Year 2025 Roadway Segment Levels of Service

Roadway segment V/C ratios were calculated based on the existing volumes and segment capacities presented in Table 4. These capacities are conservative because they are based on the number of lanes on the mainline segments and do not necessarily consider additional turn lanes (and their added capacity) at the approaches to intersections. The volume to capacity ratios and corresponding LOS values are shown in Table 18.

2025 Baseline Conditions

The following roadway segments are projected to operate at LOS E or LOS F under 2025 baseline conditions. Refer to Table 18 for details regarding impacts along specific roadway segments.

- Sylvan Avenue – Roselle Avenue to Oakdale Road
- Oakdale Road – Sylvan Avenue to Claratina Avenue
- Claratina Avenue – McHenry to Oakdale

2025 Project Conditions

Portions of the following roadway segments are projected to operate at LOS E or LOS F under 2025 project conditions. Although parts of Sylvan Avenue would be substandard operations this would be the case in the baseline and the project increment of traffic does not constitute a significant impact. Refer to Table 18 for details regarding impacts along specific roadway segments.

- Claratina Avenue – McHenry Avenue to Roselle Avenue
- Oakdale Road – Sylvan Avenue to Claratina Avenue
- Roselle Avenue – Tivoli Road C to Tivoli Road D
- Sylvan Avenue – Wood Sorrell Road to Oakdale Road

Table 17 - Comparison of 2025 Baseline and With Project Peak Hour Levels of Service

Intersection		2025 Baseline No Project					2025 With Project					Impact Y/N?
		Control	AM		PM		Control	AM		PM		
ID#	Name		Delay*	LOS	Delay*	LOS		Delay*	LOS	Delay*	LOS	
1	Aria Way at Sylvan Avenue	Unsignalized	362.1 (2514.3)	F(F)	286.1 (9062.0)	F(F)	Roundabout	4.9	A	6.3	A	N
2	Boyce Lane at Sylvan Avenue	Signal	36.7	D	13.5	B	Signal	45.4	D	14.6	B	N
3	Claus Road at Briggsmore Avenue	Signal	348.5	F	453.1	F	Signal	353.8	F	469.0	F	Y
4	Claus Road at Claribel Road	Signal	445.9	F	556.8	F	Signal	456.9	F	581.2	F	Y
5	Claus Road at Future Floyd Avenue	Signal	382.4	F	530.3	F	Signal	566.1	F	673.3	F	Y
6	Claus Road at Milnes Road	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Y***
7	Claus Road at Plainview Road	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Y***
8	Claus Road at Santa Fe Avenue	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	N**
9	Claus Road at Sylvan Avenue	Signal	509.1	F	774.5	F	Signal	594.2	F	871.4	F	Y
10	Coffee Road at Claratina Avenue	Roundabout	651.5	F	5625.8	F	Roundabout	796.1	F	879.0	F	Y
11	Coffee Road at Claribel Road	All-way STOP	3125.4	F	3637.5	F	All-way STOP	3295.4	F	3914.0	F	Y
12	Coffee Road at Floyd Avenue	Signal	31.6	C	39.4	D	Signal	33.4	C	42.6	D	N
13	Coffee Road at Mable Avenue	Signal	221.5	F	124.1	F	Signal	217.3	F	128.4	F	N**
14	Coffee Road at Rumble Road	Signal	30.7	C	35.0	C	Signal	30.3	C	35.7	D	N
15	Coffee Road at Sylvan Avenue	Signal	49.2	D	106.9	F	Signal	51.0	D	112.8	F	Y
16	Coffee Road at Sylvan Meadows Drive	Signal	12.1	B	28.8	C	Signal	12.9	B	30.1	C	N
17	Litt Road at Sylvan Avenue	Roundabout	3.9	A	4.2	A	Roundabout	4.0	A	6.1	A	N
18	Lydia Lane at Sylvan Avenue	Unsignalized	1.8 (104.5)	A(F)	13.8 (1275.5)	B(F)	Unsignalized	0.1 (16.7)	A(C)	0.1 (15.0)	A(B)	N
19	McHenry Avenue at Claribel Road	Signal	920.4	F	875.9	F	Signal	942.7	F	889.6	F	Y
20	McHenry Avenue at Claratina Avenue	Signal	502.3	F	589.6	F	Signal	560.1	F	626.3	F	Y
21	McHenry Avenue at Sylvan Avenue	Signal	155.4	F	229.8	F	Signal	169.4	F	250.3	F	Y
22	McReynolds Avenue at Sylvan Avenue	Unsignalized	146.3 (2138.0)	F(F)	263.8 (8014.7)	F(F)	Roundabout	3.7	A	4.8	A	N
23	Millbrook Avenue at Sylvan Avenue	Roundabout	3.4	A	3.7	A	Roundabout	4.1	A	4.2	A	N
24	N. NC-1 Driveway at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	1.7	A	4.6	A	N
25	Oakdale Road at Bridgewood Way	Unsignalized	2069.7 (>9999)	F(F)	>9999(>9999)	F(F)	Signal	59.3	E	214.4	F	Y
26	Oakdale Road at Briggsmore Avenue	Signal	105.7	F	164.3	F	Signal	126.8	F	170.7	F	Y
27	Oakdale Road at Claratina Avenue	Unsignalized	>9999(>9999)	F(F)	>9999(>9999)	F(F)	Signal	143.4	F	177.3	F	Y
28	Oakdale Road at Claribel Road	Signal	768.6	F	879.1	F	Signal	759.6	F	792.9	F	N**
29	Oakdale Road at Crawford Road	Signal	146.5	F	272.2	F	Signal	117.4	F	238.7	F	N**
30	Oakdale Road at Floyd Avenue	Signal	136.0	F	224.3	F	Signal	76.4	E	188.4	F	N**
31	Oakdale Road at Lancey Drive	Signal	8.7	A	17.0	B	Signal	8.5	A	23.0	C	N
32	Oakdale Road at Mable Avenue	Signal	304.3	F	370.3	F	Signal	10.9	B	45.6	D	N
33	Oakdale Road at Manor Oak Drive	Signal	14.1	B	8.3	A	Signal	13.5	B	7.4	A	N
34	Oakdale Road at Merle Avenue	Signal	16.9	B	20.3	C	Signal	16.6	B	21.1	C	N
35	Oakdale Road at Morrill Road	All-way STOP	172.1	F	337.4	F	All-way STOP	188.0	F	467.3	F	Y
36	Oakdale Road at Private Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0 (0.0)	A(A)	0.0 (0.0)	A(A)	N

Intersection		2025 Baseline No Project					2025 With Project					Impact Y/N?
		Control	AM		PM		Control	AM		PM		
ID#	Name		Delay*	LOS	Delay*	LOS		Delay*	LOS	Delay*	LOS	Delay*
37	Oakdale Road at Sylvan Avenue	Signal	103.7	F	141.1	F	Signal	107.5	F	188.5	F	Y
38	Oakdale Road at Tivoli E	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0 (0.0)	A(A)	0.0 (0.0)	A(A)	N
39	Oakdale Road RSC-1 W. Driveway 1	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.0 (0.0)	A(A)	0.0 (0.0)	A(A)	N
40	Roselle Avenue and MHDR-2 Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.3 (10.7)	A(B)	0.2 (17.1)	A(C)	N
41	Roselle Avenue at Belharbour Drive	Unsignalized	205.8 (1108.4)	F(F)	189.6 (3407.4)	F(F)	Unsignalized	224.4 (1269.2)	F(F)	200.0 (3901.1)	F(F)	Y***
42	Roselle Avenue at Briggsmore Avenue	Signal	143.0	F	174.2	F	Signal	135.1	F	174.4	F	N**
43	Roselle Avenue at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Roundabout	2.3	A	2.9	A	N
44	Roselle Avenue at Claribel Road	All-way STOP	2018.4	F	2523.0	F	All-way STOP	2099.4	F	2438.4	F	Y
45	Roselle Avenue at Floyd Avenue	Roundabout	2.9	A	4.5	A	Roundabout	3.0	A	5.0	A	N
46	Roselle Avenue at Hillglen Avenue	Roundabout	4.2	A	3.9	A	Roundabout	4.3	A	4.4	A	N
47	Roselle Avenue at Kodiak Drive	Roundabout	3.5	A	3.9	A	Roundabout	3.8	A	4.4	A	N
48	Roselle Avenue at Merle Avenue	Signal	59.0	E	56.0	E	Signal	62.5	E	60.2	E	N**
49	Roselle Avenue at NC-1 E. Driveway	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.1 (9.9)	A(A)	0.8 (20.0)	A(C)	N
50	Roselle Avenue at Plainview Road	Unsignalized	4.7 (22.4)	A(C)	22.4 (79.1)	C(F)	Unsignalized	3.2 (19.5)	A(C)	6.3 (26.5)	A(D)	N
51	Roselle Avenue at Sylvan Avenue	Roundabout	5.6	A	17.9	C	Roundabout	8.3	A	21.6	C	N
52	Roselle Avenue at Tivoli C	n/a	n/a	n/a	n/a	n/a	Roundabout	32.7	D	432.3	F	Y
53	Roselle Avenue at Tivoli D	n/a	n/a	n/a	n/a	n/a	Roundabout	14.8	B	59.4	F	Y
54	RSC-1 Driveway 1 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.3 (10.6)	A(B)	1.7 (31.9)	A(D)	N
55	RSC-1 Driveway 2 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	19.0	B	32.1	C	N
56	RSC-1 Driveway 3 at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Unsignalized	0.3 (10.1)	A(B)	0.8 (20.3)	A(C)	N
57	Terminal Avenue at Claribel Road	All-way STOP	1640.4	F	2224.6	F	All-way STOP	1551.7	F	2210.1	F	Y***
58	Tivoli Road A at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	33.1	C	31.5	C	N
59	Tivoli Road B at Claratina Avenue	n/a	n/a	n/a	n/a	n/a	Signal	15.3	B	8.9	A	N
60	Wood Sorrell Drive at Sylvan Avenue	Unsignalized	103.1 (2243.4)	F(F)	145.4 (5105.6)	F(F)	Roundabout	3.6	A	5.4	A	N

Note: n/a = not applicable
 * =>9999 indicates overflow delay. The delay calculations for the HCM 2000 methodology are incapable of quantifying delay. Estimated delay would exceed 9999 seconds.
 ** = Project traffic does not cause critical delay to increase by more than five seconds at signalized intersections or 30 seconds on minor approaches at unsignalized intersections.
 *** = Project traffic contributes more than 10 vehicles per lane at unsignalized intersection operating at LOS F with incremental delay less than 30 seconds.

Table 18 - Comparison of 2025 Baseline and With Project Peak Hour Roadway

Location	Dir	Lane	type	2025 Baseline				Lane	type	2025 WP				v/c change		Impact Y/N?
				AM		PM				AM		PM		AM	PM	
				v/c	LOS	v/c	LOS			v/c	LOS	v/c	LOS			
Claratina Avenue																
McHenry Avenue to Coffee Road	EB	1	rural road	1.300	F	4.419	F	1	rural road	1.844	F	4.757	F	0.544	0.338	Y
McHenry Avenue to Coffee Road	WB	1	rural road	4.612	F	2.978	F	1	rural road	5.007	F	3.329	F	0.394	0.351	Y
Coffee Road to Oakdale Road	EB	1	rural road	1.037	F	3.548	F	1	rural road	1.704	F	4.343	F	0.668	0.796	Y
Coffee Road to Oakdale Road	WB	1	rural road	3.891	F	2.854	F	1	rural road	4.589	F	3.439	F	0.698	0.584	Y
Oakdale Road to RSC-1 Driveway #1	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.463	A	1.145	F	n/a	n/a	Y
Oakdale Road to RSC-1 Driveway #1	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.880	B	0.711	A	n/a	n/a	N
RSC-1 Driveway #1 to RSC-1 Driveway #2	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.410	A	1.092	F	n/a	n/a	Y
RSC-1 Driveway #2 to RSC-1 Driveway #2	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.881	D	0.711	C	n/a	n/a	N
RSC-1 Driveway #2 to RSC-1 Driveway #3	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.360	A	1.038	F	n/a	n/a	Y
RSC-1 Driveway #2 to RSC-1 Driveway #3	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.880	D	0.690	B	n/a	n/a	N
RSC-1 Driveway #3 to Tivoli Road A	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.337	A	0.985	E	n/a	n/a	Y
RSC-1 driveway #3 to Tivoli Road A	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.880	B	0.690	A	n/a	n/a	N
Tivoli Road A to Tivoli Road B	EB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.301	A	0.745	C	n/a	n/a	N
Tivoli Road A to Tivoli Road B	WB	1	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.665	B	0.606	B	n/a	n/a	N
Tivoli Road B to Roselle Avenue	EB	0	rural road	n/a	n/a	n/a	n/a	2	unsignalized arterial	0.213	A	0.539	A	n/a	n/a	N
Tivoli Road B to Roselle Avenue	WB	0	rural road	n/a	n/a	n/a	n/a	3	signalized arterial	0.684	B	0.659	B	n/a	n/a	N
Roselle Avenue																
Claratina Avenue to Tivoli Road C	NB	2	unsignalized arterial	0.452	A	0.471	A	2	unsignalized arterial	0.396	A	0.371	A	-0.056	-0.100	N
Claratina Avenue to Tivoli Road C	SB	2	unsignalized arterial	0.256	A	0.300	A	2	unsignalized arterial	0.125	A	0.389	A	-0.131	0.089	N
Tivoli Road C to Tivoli Road D	NB	2	unsignalized arterial	0.452	A	0.471	A	2	unsignalized arterial	1.192	F	1.224	F	0.740	0.753	Y
Tivoli Road C to Tivoli Road D	SB	2	unsignalized arterial	0.256	A	0.300	A	2	unsignalized arterial	0.655	B	1.495	F	0.399	1.195	Y
Tivoli Road D to Sylvan Avenue	NB	2	unsignalized arterial	0.470	A	0.481	A	2	unsignalized arterial	0.682	B	0.651	B	0.212	0.171	N
Tivoli Road D to Sylvan Avenue	SB	2	unsignalized arterial	0.299	A	0.627	B	2	unsignalized arterial	0.375	A	0.799	C	0.077	0.172	N
Sylvan Avenue																
Roselle Avenue to McReynolds Avenue	EB	2	unsignalized arterial	0.461	A	0.830	D	2	unsignalized arterial	0.451	A	0.648	B	-0.010	-0.182	N
Roselle Avenue to McReynolds Avenue	WB	2	unsignalized arterial	0.738	C	0.717	C	2	unsignalized arterial	0.584	A	0.659	B	-0.154	-0.058	N
McReynolds Avenue to Aria Way	EB	2	unsignalized arterial	0.454	A	0.889	D	2	unsignalized arterial	0.436	A	0.758	C	-0.018	-0.131	N
McReynolds Avenue to Aria Way	WB	2	unsignalized arterial	0.793	C	0.728	C	2	unsignalized arterial	0.671	B	0.670	B	-0.122	-0.059	N
Aria Way to Wood Sorrell Drive	EB	2	unsignalized arterial	0.539	A	0.934	E	2	unsignalized arterial	0.565	A	0.870	D	0.027	-0.064	N
Aria Way to Wood Sorrell Drive	WB	2	unsignalized arterial	0.834	D	0.748	C	2	unsignalized arterial	0.759	C	0.763	C	-0.076	0.016	N
Wood Sorrell Drive to Lydia Lane	EB	1	unsignalized arterial	0.940	E	1.975	F	1	unsignalized arterial	0.971	E	1.769	F	0.031	-0.206	N
Wood Sorrell Drive to Lydia Lane	WB	1	unsignalized arterial	1.760	F	1.544	F	1	unsignalized arterial	1.622	F	1.488	F	-0.138	-0.056	N
Lydia Lane to Oakdale Road	EB	1	signalized arterial	1.207	F	2.679	F	1	signalized arterial	1.256	F	2.411	F	0.049	-0.268	N
Lydia Lane to Oakdale Road	WB	2	signalized arterial	1.197	F	1.025	F	2	signalized arterial	1.113	F	0.991	E	-0.084	-0.034	N

Location	Dir	Lane	type	2025 Baseline				Lane	type	2025 WP				v/c change		Impact Y/N?	
				AM		PM				AM		PM		AM	PM		
				v/c	LOS	v/c	LOS			v/c	LOS	v/c	LOS				
Oakdale Road																	
<i>Sylvan Avenue to Bridgewood Way</i>	NB	1	signalized arterial	3.333	F	3.031	F	3	signalized arterial	1.128	F	1.143	F	-2.205	-1.888	N	
<i>Sylvan Avenue to Bridgewood Way</i>	SB	3	signalized arterial	0.644	B	1.203	F	3	signalized arterial	0.777	C	1.237	F	0.132	0.034	N	
<i>Bridgewood Way to Tivoli Road E</i>	NB	1	signalized arterial	3.549	F	2.817	F	3	signalized arterial	1.201	F	1.098	F	-2.348	-1.720	N	
<i>Bridgewood Way to Tivoli Road E</i>	SB	3	signalized arterial	0.638	B	1.137	F	3	signalized arterial	0.737	C	1.172	F	0.099	0.034	N	
<i>Tivoli Road E to Mable Avenue</i>	NB	1	signalized arterial	3.567	F	3.135	F	3	signalized arterial	1.213	F	1.208	F	-2.353	-1.926	N	
<i>Tivoli Road E to Mable Avenue</i>	SB	3	signalized arterial	0.648	B	1.288	F	3	signalized arterial	0.765	C	1.371	F	0.117	0.083	Y	
<i>Mable Avenue to Future Claratina Avenue</i>	NB	1	signalized arterial	3.624	F	3.163	F	3	signalized arterial	1.167	F	1.133	F	-2.457	-2.029	N	
<i>Mable Avenue to Future Claratina Avenue</i>	SB	3	signalized arterial	0.657	B	1.300	F	3	signalized arterial	0.764	C	1.260	F	0.108	-0.040	N	

n/a = not applicable does not exist in baseline.

CHAPTER 7 – PROJECT IMPACTS AND MITIGATION MEASURES

Project impacts and proposed mitigation measures for each of the horizon years (2012, 2017 and 2025) are discussed in this chapter. Mitigation measures are recommended at all of those locations where the development of the project results in significant impacts.

Significant Impact Criteria

Standards of significance were selected based on criteria used by the City of Modesto and accepted professional practice for transportation engineering. Impacts were considered significant if the Project would result in any of the following:

- A. Deterioration of a signalized intersection from LOS D (or better) to LOS E or LOS F, or an increase in the service volume of any approach by 5 percent or more for a signalized intersection operating at LOS E or LOS F under baseline conditions, or an increase in average delay of 5 or more seconds for a signalized intersection operating at LOS E or LOS F under baseline conditions.
- B. Deterioration of a controlled movement at an unsignalized intersection from LOS E or better to LOS F or – at intersections where a controlled movement already operates at LOS F the satisfaction of one of the following conditions.
 - 1. The satisfaction of the peak hour volume signal warrant as a result of **project** traffic.
 - 2. An increase in minor movement delay of 30 seconds or more.
 - 3. If the peak hour volume signal warrant is already met without the project and delay cannot be measured, an increase in traffic of ten or more vehicles per lane on any approach.
- C. Deterioration of a roadway segment from LOS D or better to LOS E or LOS F, or an increase in the Volume to Capacity (V/C) ratio of 0.05 or more for a segment operating at LOS E or LOS F under Baseline Conditions.
- D. Inconsistencies with the City's Bicycle Master Plan.
- E. Inadequate pedestrian facilities along the project frontage or lack of access between those facilities, the parking areas, and the buildings within the project area.
- F. Parking demand exceeds the proposed parking supply.
- G. Installation of a new signal without achieving acceptable levels of service.

All of the above criteria apply either individually or cumulative, for each phase of the scenario (phase) proposed project.

Year 2012 Impacts

Significant year 2012 project impacts were identified using the City of Modesto's significance criteria. Intersection and roadway segments with significant project related impacts are described below.

Transportation Impact 1 – The project will have a significant impact on signalized intersection operations under 2012 conditions.

- Claus Road at Briggsmore Avenue
- Claus Road at Sylvan Avenue
- Coffee Road at Mable Avenue
- Coffee Road at Sylvan Road
- McHenry Avenue at Claribel Road
- McHenry Avenue at Claratina Avenue
- McHenry Avenue at Sylvan Avenue
- Oakdale Road at Claribel Road
- Oakdale Road at Mable Avenue
- Oakdale Road at Sylvan Avenue
- Roselle Avenue at Briggsmore Avenue

Transportation Impact 2 – The project will have a significant impact on stop controlled and roundabout controlled intersection operations under 2012 conditions.

- Claus Road at Milnes Road
- Coffee Road and Claratina Road
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Roselle Avenue at Belharbour Drive
- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road

Transportation Impact 3 – The project will have a significant impact on roadway operations under 2012 conditions.

- Claratina Avenue – McHenry Avenue to Oakdale Road
- Sylvan Avenue – Roselle Avenue to Oakdale Road
- Oakdale Road – Sylvan Avenue to Claratina Avenue

Deficient Intersections that are not 2012 Project Impacts

While several intersections would remain at unacceptable LOS E or F with the project, the project is not considered to have caused the unacceptable conditions because they would not meet the significance criteria identified.

The following intersections would not experience an increase in delay with the project of five seconds or more at signalized intersections or 30 seconds or more for the minor movement at an unsignalized intersection:

- Claus Road at Claribel Road
- Claus Road at Santa Fe Avenue

2012 Mitigation Measures

Mitigation Measures 1, 2 and 3 – Measures to mitigate intersection and roadway segment impacts are presented in Tables 19 and 20.

Table 19 - 2012 Intersection Mitigation Measures (Transportation Impacts 1 & 2)

Intersection	Impacted Peak Hour	Mitigation Measure	LOS/Delay Before	LOS/Delay After
3. Claus Road at Briggsmore Avenue	AM/PM	Add third NB and SB through lane, and second WB left turn lane plus change signalization to allow for overlap on all approaches	E (71.1)/ F (112.7)	C (32.3)/D (45.2)
6. Claus Road at Milnes Road	AM/PM	Signalize intersection and add exclusive NB through lane.	F(F) (395.1(6388.2))/F(F) (383.0(>9999))	C (25.5)/D (45.3)
9. Claus Road at Sylvan Avenue	AM/PM	Add second EB left turn lane, plus a second NB left turn lane and second SB through lane, plus change signalization to allow for overlap on all approaches	F (197.9)/ F (337.9)	C (25.9)/D (39.7)
10. Coffee Road at Claratina	PM	This intersection may fail based on projected approach volumes given future trip generation estimates. At 75% build-out the City will conduct a traffic study to determine the adequacy of the intersection traffic control.		
11. Coffee Road at Claribel Road	AM/PM	Signalize Intersection. Add exclusive left turn and right turn lanes on all approaches. Convert shared lanes on all approaches to exclusive through lanes. Add second eastbound and westbound through lanes.	F (1239.5)/F (1524.2)	C (28.1)/C (34.9)
13. Coffee at Mable Avenue	AM	Add separate WB left and right turn lanes	E (71.2)	C (33.8)
15. Coffee at Sylvan	PM	Add an exclusive eastbound right turn lane	E (72.3)	D (52.7)
19. McHenry Avenue at Claribel Road	AM/PM	Add second left turn lanes on NB and SB approaches plus second and third through lane on the EB and WB approaches	F (285.7)/F (288.4)	D (41.6)/D (50.3)
20. McHenry Avenue at Claratina Avenue	AM/PM	Add third and forth NB and SB through lanes plus third EB and WB through lane	F (137.3)/(F) 167.6	D (47)/D (54.2)
21. McHenry Avenue at Sylvan Avenue	AM/PM	Add second NB and SB left turn lane plus forth NB and SB through lane	F (137.3)/(F) 167.6	C (37.7)/D (48.4)
28. Oakdale Road at Claribel Road	AM/PM	Add second NB left and second SB through lanes plus second and third EB and WB through lanes	E (55.5)/(F) 97.2	D (41.4)/D (47.3)
31. Oakdale Road at Mable Avenue	PM	Add second SB through lanes	F (87.1)	D (36.9)
35. Oakdale Road at Morrill Avenue		Signalize intersection and add exclusive left and right turn lanes on the NB and SB approaches.	F (52.7)/F (152.8)	C (25.2) /C (30.6.)
37. Oakdale Road at Sylvan Avenue	PM	Add second EB left and third SB through lanes	E (75.1)	D (50.5)
41. Roselle Avenue at Belharbour Drive	AM/PM	Signalize intersections and add exclusive left turn and right turn lanes to NB and SB approaches.	C(F) (16.5.(91.7))/A(F) (7.7(104.7))	B (19.3)/A (9.8)
42. Roselle Avenue at Briggsmore Avenue	PM	Add second EB and WB though lanes	F (90.1)	D (38.3)
44. Roselle Avenue at Claribel Road	AM/PM	Add exclusive left turn lanes on all approaches. Add exclusive right turn lane on NB and SB approaches. Add second, exclusive through lanes on EB and WB approaches.	F (922.0)/F (1090.4)	48.6 D/43.7 D
57. Terminal Avenue at Claribel Road	AM/PM	Signalize intersections. Add exclusive left turn lane on all approaches. Add second EB through lane.	F (388.6)/F (673.0)	D (50.2)/D (37.1)

Roadway mitigations are shown in Table 20. Note that the controlling factor in roadway congestion is the downstream intersection at any approach. Therefore where the downstream intersection does or can be mitigated to operate adequately the mitigation measures recommended have been sized to match the through lanes on the downstream intersection approaches.

Table 20 - 2012 Roadway Mitigation Measures (Transportation Impact 3)

Location	Dir	Unmitigated Lanes	Lanes Required for LOS D	Mitigation Measure	Mitigated Lanes
Claratina Avenue					
<i>McHenry Avenue to Oakdale Road</i>	EB	1	2	Add 2 nd EB lane	2
<i>McHenry Avenue to Oakdale Road</i>	WB	1	2	Add 2 nd WB lane	2
Sylvan Avenue					
<i>Roselle Avenue to Oakdale Road</i>	WB	2	3	Add 2 nd WB lane (3 rd WB lane not needed after mitigation of downstream intersection)*	2*
Oakdale Road					
<i>Sylvan Avenue to Bridgewood Way</i>	SB	2	3	Add 3 rd SB lanes	3
<i>Mable Avenue to Claratina Avenue</i>	SB	1	3	Add 2 nd SB lane and 3 rd SB lane	3

* = Downstream intersection Level of Service requirements less extensive than roadway LOS requirements shown here. Mitigation measures based on downstream intersection requirements.

Year 2017 Impacts

Significant year 2017 project impacts were identified using the City of Modesto's significance criteria. Intersection and roadway segments with significant project related impacts are described below.

Transportation Impact 4 – The project will have a significant impact on signalized intersection operations under 2017 conditions.

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Sylvan Avenue
- Claus Road at Floyd Avenue
- Coffee Road at Sylvan Avenue
- McHenry Avenue / Claribel Road
- McHenry Avenue at Claratina Avenue
- McHenry Avenue at Sylvan Avenue
- Oakdale Road at Bridgewood Way
- Oakdale Road at Sylvan Avenue

Transportation Impact 5 – The project will have a significant impact on stop controlled intersection operations under 2017 conditions.

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Coffee Road at Claribel Road
- Oakdale Road at Briggsmore Avenue
- Oakdale Road at Morrill Road
- Roselle Avenue at Belharbour Drive
- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road

Transportation Impact 6 – The project will have a significant impact on roundabout intersection operations under 2017 conditions.

- Roselle Avenue at Tivoli Road C
- Coffee Road at Claratina Avenue

Transportation Impact 7 – The project will have a significant impact on roadway operations under 2017 conditions.

- Claratina Avenue – McHenry Avenue to Roselle Avenue
- Roselle Avenue – Tivoli Road C to Tivoli D
- Oakdale Road – Sylvan Avenue to Bridgewood Way

Deficient Intersections that are not 2017 Project Impacts

While several intersections would remain at unacceptable LOS E or F with the project, the project is not considered to have caused the unacceptable conditions and because they would not meet the significance criteria identified.

The following intersections would not experience an increase in delay with the project of five seconds or more at signalized intersections or 30 seconds or more for the minor movement at an unsignalized intersection:

- Claus Road at Santa Fe Avenue
- Coffee Road at Mable Avenue
- Oakdale Road at Claribel Road
- Oakdale Road at Floyd Avenue
- Roselle Avenue at Briggsmore Avenue
- Oakdale Road at Crawford Road

2017 Mitigation Measures

Mitigation Measures 4, 5 and 6 – Measures to mitigate intersection and roadway segment impacts are presented in Tables 21 and 22.

Table 21 - 2017 Intersection Mitigation Measures (Transportation Impacts 4, 5 & 6)

Intersection	Impacted Peak Hour	Mitigation Measure	LOS/Delay Before	LOS/Delay After
3. Claus Road at Briggsmore Avenue	AM/PM	Add second NB, SB and left turn lane and separate EB and WB right turn lane	F (164.7)/F (237.7)	C (30.4)/D (43.6)
4. Claus Road at Claribel Road	AM/PM	Add second SB through lane second NB left turn lane second EB right turn lane and second WB through lane	F (181.9)/F (267.3)	D (36.5)/D (50.4)
5. Claus Road at Floyd Avenue	AM/PM	Add second NB and SB through lanes and second NB left turn lane	F (207.9)/F (274.1)	D (39.4)/D (40.6)
6. Claus Road at Milnes Road	AM/PM	Signalize intersection. Add second exclusive through lane and second SB through lane.	F(F) (3368(>9999))/F (F) (8253.1(>9999))	C (21.2)/C (20.4)
7. Claus Road at Plainview Road	AM/PM	Signalize intersection. Add exclusive left turn lane on NB and SB approaches. Add second NB and SB through lanes.	F(F) (535.4)/F(F) (>9999(>9999))	B (19.0)/C (23.1)
9. Claus Road at Sylvan Avenue	AM/PM	Add second EB right turn lane	F (323.4)/F (504.7)	B (17)/C (32)
10. Coffee Road at Claratina Road	AM/PM	This intersection may fail based on projected approach volumes given future trip generation estimates. At 75% build-out the City will conduct a traffic study to determine the adequacy of the intersection traffic control.		
11. Coffee Road at Claribel Road	AM	Signalize intersection and convert existing lanes to through lanes. Add exclusive SB left turn lane and two exclusive NB, EB and WB left turn lanes. Add second SB and second and third EB and WB through lanes. Add exclusive right turn lane on all approaches. Implement overlap phasing on NB right turn lane.	F (2018.0)	D (40.4)
15. Coffee Road/Sylvan Road	PM	Add exclusive SB, EB and WB right turn lanes	F (88.5)	D (45.7)
19. McHenry Avenue at Claribel Road	AM/PM	Add second left turn lanes on EB and WB approaches plus third through lane on the NB and SB approaches and fourth lane through lane on WB approach.	F (528.4)/F (500.5)	D (41.7)/D (48.6)
20. McHenry Avenue at Claratina Avenue	AM/PM	Add third and fourth NB and SB through lanes plus third EB and WB through lane Add second LT lane on all approaches and separate right turn lane on NB, SB and WB approaches. Implement overlap phasing on all approaches	F (299.4)/F (348.1)	D (36.4)/D (52.3)
21. McHenry Avenue at Sylvan Avenue	AM/PM	Add third EB and WB through lane	F (85.9)/F (163.6)	C (34.4)/D (48.7)
25. Oakdale at Bridgewood	PM	Add exclusive EB right turn lane with overlap phasing.	F (118.2)	D (30.1)
26. Oakdale Road at Briggsmore Avenue	AM	Add third EB and WB through lanes and implement overlap phasing on the NB, WB and EB approaches	E (76.9)/F (90.3)	D (44.2)/D (53.4)
35. Oakdale Road at Morrill Road	AM/PM	Same as 2012	F (89.1)/F (284.1)	C (28.3)/D (41.2)
37. Oakdale Road at Sylvan Avenue	AM/PM	Add third NB through lane and implement overlap phasing on EB approach.	E (63.9)/F (135.6)	C (34.3)/D (51.5)
41. Roselle Avenue at Belharbour Drive	AM/PM	Same as 2012	E(F) (47.3(269.7)/D(F) (27.7(399.2)))	C (26.8)/B (18.3)

Intersection	Impacted Peak Hour	Mitigation Measure	LOS/Delay Before	LOS/Delay After
44. Roselle Avenue at Claribel Road	AM	Signalize intersection. Add exclusive left turn lanes to NB and SB approaches and two exclusive left turn lanes to EB and WB approaches. Add second exclusive through lane to SB approach and second and third through lanes to EB and WB approaches. Add exclusive right turn lanes to all approaches	F (1281.8)/F (1513.3)	C (31.4)/D (38.5)
52. Roselle at Tivoli C	AM/PM	This intersection may fail based on projected approach volumes given future trip generation estimates. At 75% build-out the City will conduct a traffic study to determine the adequacy of the intersection traffic control.		
57. Terminal Avenue at Claribel Road	AM/PM	Signalize intersection. Add exclusive left turn lane on all approaches. Add second EB and WB through lane.	F (758.1)/F (1182.4)	C (27.2)/D (42.5)

Although the segments of Sylvan Avenue from Roselle Avenue to Oakdale Road and southbound Oakdale Road from Bridgewood Way to Mable Avenue would operate at LOS F under this scenario, these would do so under baseline conditions as well and the increment due to project traffic is not sufficient to result in a significant impact under 2017 conditions.

Roadway mitigation measures are shown on Table 22. Note that in some instances additional lanes are not recommended because intersection operations which create the roadway bottlenecks do not require the additional upstream capacity.

Table 22 - 2017 Roadway Mitigation Measures (Transportation Impact 7)

Location	Dir	Unmitigated Lanes	Lanes Required for LOS D	Mitigation Measure	Mitigated Lanes
Claratina Avenue					
<i>McHenry Avenue to Oakdale Road</i>	EB	1	2	Add 2 nd EB lane	2
<i>McHenry Avenue to Oakdale Road</i>	WB	1	2	Add 2 nd WB lane	2
<i>Oakdale Road to RSC-1 Driveway #1</i>	EB	3	4	None(4 th EB lane not needed after mitigation of downstream intersection)*	3*
<i>RSC-1 Driveway # 1 to RSC-1 Driveway #2</i>	EB	3	4	None(4 th EB lane not needed after mitigation of downstream intersection)*	3*
<i>RSC-1 Driveway #2 to RSC-1 Driveway #3</i>	EB	3	4	None (4 th EB lane not needed after mitigation of downstream intersection)*	3*
<i>RSC-1 Driveway #3 Avenue to Tivoli Road A</i>	EB	3	4	None (4 th EB lanes not needed after mitigation of downstream intersection)*	3*
Roselle Avenue					
<i>Tivoli Road C to Tivoli D</i>	NB	2	3	None (3 rd and 4 th NB lanes not needed after mitigation of downstream intersection)*	2*
<i>Tivoli Road C to Tivoli D</i>	SB	2	3	None (3 rd and 4 th SB lanes not needed after mitigation of downstream intersection)*	2*
Oakdale Road					
<i>Sylvan Avenue to Bridgewood Way</i>	SB	3	4	None (4 th SB lanes not needed after mitigation of downstream intersection)*	3*
<i>Tivoli Road E to Mable</i>	SB	3	4	None(4 th EB lane not needed after mitigation of downstream intersection)*	3*

* = Downstream intersection Level of Service requirements less extensive than roadway LOS requirements shown here. Mitigation measures based on downstream intersection requirements.

Year 2025 Impacts

Significant year 2025 project impacts were identified using the City of Modesto's significance criteria. Intersection and roadway segments with significant project related impacts are described below.

Transportation Impact 8 – The project will have a significant impact on signalized intersection operations under 2025 conditions.

- Claus Road at Briggsmore Avenue
- Claus Road at Claribel Road
- Claus Road at Floyd Avenue
- Claus Road at Sylvan Avenue
- Coffee Road at Sylvan Avenue
- McHenry Avenue / Claribel Road
- McHenry Avenue at Claratina Avenue
- McHenry Avenue at Sylvan Avenue
- Oakdale at Bridgewood Way
- Oakdale Road at Briggsmore Avenue
- Oakdale Road at Claratina Avenue
- Oakdale Road at Sylvan Avenue

Transportation Impact 9 – The project will have a significant impact on stop controlled intersection operations under 2025 conditions.

- Claus Road at Milnes Road
- Claus Road at Plainview Road
- Coffee Road at Claribel Road
- Oakdale Road at Morrill Road
- Roselle Avenue at Claribel Road
- Terminal Avenue at Claribel Road

Transportation Impact 10 – The project will have a significant impact on roundabout operations under 2025 conditions.

- Coffee Road at Claratina Avenue
- Roselle Avenue and Tivoli Road C
- Roselle Avenue and Tivoli Road D

Transportation Impact 11 – The project will have a significant impact on roadway operations under 2025 conditions.

- Claratina Avenue – McHenry Avenue to Oakdale Road
- Roselle Avenue – Tivoli Road C to Tivoli D
- Oakdale Road – Sylvan Avenue to Claratina Avenue

Note that although the segments of Sylvan Avenue from Roselle to Oakdale Road would operate at LOS F under this scenario, these would do so under baseline conditions as well and the increment due to project traffic is not sufficient to result in a significant impact under 2025 conditions.

Deficient Intersections that are not 2025 Project Impacts

While several intersections would remain at unacceptable LOS E or F with the project, the project is not considered to have caused the unacceptable conditions and because they would not meet the significance criteria identified.

The following intersections would not experience an increase in delay with the project of five seconds or more at signalized intersections or 30 seconds or more for the minor movement at an unsignalized intersection:

- Claus Road at Santa Fe Avenue
- Coffee Road at Mable Avenue
- Oakdale Road at Claribel Road
- Oakdale Road at Crawford Road
- Oakdale Road at Floyd Avenue
- Roselle Avenue at Briggsmore Avenue
- Roselle Avenue at Merle Avenue

The following intersections would experience an increase in delay with the project of five seconds or more however these unsignalized intersections would not meet signal warrants as a result of project traffic because warrants are already met under baseline conditions:

2025 Mitigation Measures

Mitigation Measures 7, 8, 9 and 10 – Measures to mitigate intersection and roadway segment impacts are presented in Tables 23 and 24.

Table 23 - 2025 Intersection Mitigation Measures (Transportation Impacts 8, 9 & 10)

Intersection	Impacted Peak Hour	Mitigation Measure	LOS/Delay Before	LOS/Delay After
3. Claus Road at Briggsmore Avenue	AM/PM	Add second EB and third WB through lane and second SB right turn lane	F (353.8)/F (469)	C (31)/D (51.4)
4. Claus Road at Claribel Road	AM/PM	Add second left turn lane on the NB, EB and WB approaches plus a third through lane on the SB and WB approach. Provide free right turn lanes on the EB approach and a second SB right turn lane	F (456.9)/F (581.2)	D (42.1)/D (51.4)
5. Claus Road at Floyd Avenue	AM/PM	Add second exclusive left turn lane on all approaches. Add second EB through lane and second and third NB, SB and WB through lanes. Add second right turn lanes on EB and WB approaches. Operate all right turns with overlap phasing.	F (566.1)/F (879.0)	D (35.8)/D (52.8)
6. Claus Road at Milnes Road	AM/PM	Signalize intersection. Add two exclusive SB through lanes and second and third exclusive SB through lanes and	F(F) (>9999/>9999)/ F(F) (>9999/>9999)	C (22.4)/C (21.1)
7. Claus Road at Plainview Road	AM/PM	Signalize intersections. Add exclusive left turn lanes. Add second and third NB and SB through lanes.	F(F) (>9999/>9999)/ F(F) (>9999/>9999)	C (34.0)/D (38.2)
9. Claus Road at Sylvan Avenue	PM	Add third SB through and separate SB right turn. Add second EB left and provide a free EB right turn lane.	F (594.2)/F (871.4)	C (24.0)/D (52.2)
10. Coffee Road at Claratina Avenue	AM/PM	This intersection may fail based on projected approach volumes given future trip generation estimates. At 75% build-out the City will conduct a traffic study to determine the adequacy of the intersection traffic control.		
11. Coffee Road at Claribel Avenue	AM/PM	Signalize intersection. Add three NB and two SB, EB and WB left turn lanes. Add second NB and SB through lanes and second, third and fourth EB and WB through lanes. Add exclusive right turn lanes on all approaches.	F (3295.4)/F (3914.0)	D (54.5)/D (48.6)
15. Coffee Road at Sylvan Avenue	PM	Same as 2017	F (112.8)	D (54.2)
19. McHenry Avenue at Claribel Road	AM/PM	Requires Grade Separated Interchange or Split Diamond	F (942.7)/F (889.6)	Potentially Significant and Unavoidable (SU)
20. McHenry Avenue at Claratina Avenue	AM/PM	Requires Grade Separated Interchange or Split Diamond	F (560.1)/F (626.3)	Potentially Significant and Unavoidable (SU)
21. McHenry Avenue at Sylvan Avenue	AM/PM	Add fourth through lane on EB and WB approaches plus provide right turn lane on NB and WB approaches	F (169.4)/F (250.3)	C (33.6)/D (53.3)
25. Oakdale at Bridgewood Way	AM/PM	Same as 2017	E (59.3)/F(214.4)	C (21.2)/D(47.6)
26. Oakdale Road at Briggsmore Avenue	AM/PM	Provide third and fourth NB and fourth SB through lanes plus a separate SB right turn lane	F (126.8)/F (170.7)	D (46.6)/D (40.0)
27. Oakdale Road at Claratina Avenue	AM/PM	Add fourth NB and WB and third and fourth SB through lanes. Add	F (143.4)/F (177.3)	C (33.9)/D (44.8)

Intersection	Impacted Peak Hour	Mitigation Measure	LOS/Delay Before	LOS/Delay After
		third NB and second SB and EB left turn lanes plus second SB and EB right turn lane		
35. Oakdale Road at Morrill Road	AM/PM	Signalize intersection and add exclusive left and right turn lanes on the NB and SB approaches. Add second exclusive southbound through lane.	F (188.0)/F (467.3)	D (33.9)/D (44.8)
37. Oakdale Road at Sylvan Avenue	AM/PM	Add fourth NB and SB through lane plus third EB and WB through lane. Add separate right turn lane on NB and SB approaches. Implement Overlap phasing on EB right turn	F (107.5)/F (188.5)	D (40.0)/D (44.4)
41. Roselle Avenue at Belharbour Drive	AM/PM	Same as 2012	F (F) (224.4(1269.2)/F(F) (200.0(3901.1))	C (34.8)/C (28.7)
44. Roselle Avenue at Claribel Road	AM/PM	Signalize intersection. Add exclusive left turn lanes to NB and SB approaches and two exclusive left turn lanes to EB and WB approaches. Add second exclusive through lane to NB and SB approach and second, third and fourth through lanes to EB and WB approaches. Add exclusive right turn lanes to all approaches with overlap phasing.	F (2099.4)/F (2438.4)	D(30.5)/D(46.3)/
52. Roselle Avenue at Tivoli Road C	PM	This intersection may fail based on projected approach volumes given future trip generation estimates. At 75% build-out the City will conduct a traffic study to determine the adequacy of the intersection traffic control.		
53. Roselle Avenue at Tivoli Road D	PM	This intersection may fail based on projected approach volumes given future trip generation estimates. At 75% build-out the City will conduct a traffic study to determine the adequacy of the intersection traffic control.		
57. Terminal Avenue at Claribel Road	AM/PM	Signalize intersection. Add exclusive left turn lane on all approaches. Add second and third EB and WB through lane.	F (1551.7)/F (2210.1)	B (19.4)/C (32.5)

Roadway mitigation measures are shown on Table 24. Note that in some instances additional lanes are not recommended because intersection operations which create the roadway bottlenecks do not require the additional upstream capacity.

Table 24 - 2025 Roadway Mitigation Measures (Transportation Impact 11)

Location	Dir	Unmitigated Lanes	Lanes Required for LOS D	Mitigation Measure	Mitigated Lanes
Claratina Avenue					
<i>McHenry Avenue to Oakdale Road</i>	EB	1	2	Add 2 nd EB lane	2
<i>McHenry Avenue to Oakdale Road</i>	WB	1	2	Add 2 nd WB lane	2
<i>Oakdale Road to RSC-1 Driveway #1</i>	EB	3	4	None(4 th EB lane not needed after mitigation of downstream intersection)*	3*
<i>RSC-1 Driveway # 1 to RSC-1 Driveway #2</i>	EB	3	4	None(4 th EB lane not needed after mitigation of downstream intersection)*	3*
<i>RSC-1 Driveway #2 to RSC-1 Driveway #3</i>	EB	3	4	None (4 th lane not needed after mitigation of downstream intersection)*	3*
<i>RSC-1 Driveway #3 Avenue to Tivoli Road A</i>	EB	3	4	None (4 th EB lanes not needed after mitigation of downstream intersection)*	3*
Roselle Avenue					
<i>Tivoli Road C to Tivoli D</i>	NB	2	4	None (3 rd and 4 th NB lanes not needed after mitigation of downstream intersection)*	2*
<i>Tivoli Road C to Tivoli D</i>	SB	2	4	None (3 rd and 4 th SB lanes not needed after mitigation of downstream intersection)*	2*
Oakdale Road					
<i>Sylvan Avenue to Bridgewood Way</i>	SB	3	4	None (4 th SB lanes not needed after mitigation of downstream intersection)*	3*
<i>Mable Avenue to Claratina Avenue</i>	SB	3	4	None (4 th SB lanes not needed after mitigation of downstream intersection)*	3*

* = Downstream intersection Level of Service requirements less extensive than roadway LOS requirements shown here. Mitigation measures based on downstream intersection requirements.

CHAPTER 8 – SITE ACCESS AND ON-SITE CIRCULATION

This chapter discusses the access to the Tivoli Specific Plan area and on-site circulation. While this traffic assessment was directed at a program level EIR analysis, a portion of the site plan for the Specific Plan area was provided. The two regional shopping center areas, RSC-1 and RSC-2, while not defined on the site plan did have a very preliminary layout concept plan for each component. Based upon the site plan for the Specific Plan area and the two shopping center concept plans, some evaluation of the site access and on-site circulation was able to be accommodated.

Regional Shopping Center Site Access Issues

As part of the development of intersection mitigation measures, vehicle queuing within left turn lanes was considered. At all of the mitigated intersections, the number of recommended left turn lanes, if built to normal standards, will accommodate the peak hour left turn volumes projected for each movement.

Along Claratina Avenue between Oakdale Road and Tivoli Road A, it is recommended that traffic signals be provided. Further, the exiting approaches from the regional shopping center should be designed to provide separate left and through-right turn lanes. Along Claratina Avenue eastbound, it is further recommended that deceleration lanes for right turning vehicles be included in the final site design for the shopping center.

The preliminary concept plan for RSC-1 provided truck loading at the rear of the site with access at Mable Avenue. The concept plan must be more clearly defined to make sure that trucks can maneuver within the regional shopping center.

Access to RSC-1 along Oakdale Road should be restricted to right turns in and right turns out between Oakdale Road and Mable Avenue.

For RSC-2, the exit approaches to Oakdale Road should be designed to provide separate left, through and right turn lanes. Truck access will be very critical for this center. The final site plan must make sure that trucks can maneuver within the regional shopping center.

On-Site Circulation Issues

The Tivoli Specific Plan does not provide good connections between the residential areas and the regional shopping centers. Consideration should be given to modify the site plan to provide both vehicular as well as non-motorized connections between the centers and the surrounding residential areas.

The future school site must be designed to minimize peak hour loading and unloading issues on the surrounding street system. Generally, schools peak between 8:00 and 8:30 AM and 2:30 and 3:00 PM. While these hours do not coincide with normal adjacent street peak hours, the traffic congestion caused by school student pick-up and drop-offs can significantly impact the roadways adjacent to the school. This congestion directly impacts the normal traffic using these facilities.

Transit

As part of the development of the Tivoli Specific Plan area, consideration of providing transit bus stops and expanded peak hour and baseline service should be considered. Transit stops should be provided to serve the regional shopping centers as well as the roadways around the Specific Plan area. If possible, park and ride lots should be developed within the site to capture transit riders. If park and ride lots are developed, local and regional transit services should be modified to access these facilities.

APPENDICES

The appendices for this study are included under separate cover at the City of Modesto and are available for review at the City offices. The appendix is extensive due to the many development scenarios evaluated and the number of signal warrant analyses that were needed. The appendix is 740 pages. Besides the intersection level of service worksheets, the appendix includes the trip distribution tables for the project traffic based upon the City of Modesto Travel Demand Model. The appendix is divided as follows:

- Appendix A – City model node to traffic report intersection number correspondence table.
- Appendix B – Comparison of Model and ITE Trip Generation
- Appendix C – Existing peak hour level of service and signal warrant results
- Appendix D – 2012 Baseline peak hour level of service and signal warrant results
- Appendix E – 2012 With Project peak hour level of service and signal warrant results
- Appendix F – 2017 Baseline peak hour level of service and signal warrant results
- Appendix G – 2017 With Project peak hour level of service and signal warrant results
- Appendix H – 2025 Baseline peak hour level of service and signal warrant results
- Appendix I – 2025 With Project peak hour level of service and signal warrant results
- Appendix J – 2012, 2017 and 2025 With Project Mitigated peak hour level of service results